



**City of Kingston
Report to Council
Report Number 19-143**

To: Mayor and Members of Council
From: Sheila Kidd, Commissioner, Transportation & Public Works
Resource Staff: Ian Semple, Director, Transportation Services
Date of Meeting: May 21, 2019
Subject: North King's Town Strategic Corridor Analysis for the Wellington Street Extension

Executive Summary:

The second phase of the North King's Town (NKT) Secondary Plan that is currently underway includes the development of a transportation plan that reflects the vision that has been developed for the area. A key component of the NKT vision for the transportation plan includes developing alternatives to the Wellington Street Extension (WSE), especially the portion south of Rideau Street through Douglas R. Fluhrer Park and into the downtown.

Initial findings of the transportation study were presented to the public in September 2018. This draft analysis concluded that the WSE did not provide a substantive improvement to the road network service through 2034 based on the land use and growth contemplated in the 2015 KTMP (Kingston Transportation Master Plan).

The land use vision established with the NKT Secondary Plan, and the eventual implementation of that vision, has the potential to support growth in the area's population and employment base over the next 20 to 30 years. The growth envisioned by the Plan is greater than that considered within the 2015 KTMP. Taking this into account, it was important to confirm, through additional review, the suitability of the existing and planned road network to handle increased traffic volumes resulting from planned growth.

In October 2018, Dillon Consulting Limited (Dillon) was tasked to update the City's transportation model and complete a strategic and operational assessment of the NKT study area. The completed strategic assessment entitled "North King's Town Transportation Plan Strategic Corridor Needs Analysis (NKT Strategic Corridor Analysis)" is attached as Exhibit A.

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The results of Dillon's strategic and operational assessment of the NKT study area will be used by the NKT project and consulting teams to complete the NKT transportation plan.

The objective of the NKT Strategic Corridor Analysis is to identify the long-term transportation infrastructure and servicing needs of the NKT study area up to the year 2034, based on the higher population and employment estimates that have been developed as part of the land use vision for the NKT secondary plan. The completed strategic assessment entitled "North King's Town Transportation Plan Strategic Corridor Needs Analysis (NKT Strategic Corridor Analysis)" is attached as Exhibit A.

Separate from the NKT Secondary Plan, the City is developing the background study to support the Development Charge (DC) by-law that will be updated in September 2019. The current DC by-law includes a road project specific to the WSE and the background study underway for the updated DC by-law requires direction on the segments of the WSE roadway that are needed to accommodate future growth within the NKT study area and city as a whole. This report is time sensitive to ensure the recommendations are reflected in the 2019 draft DC background study that is scheduled to be released for public comment on June 13, 2019.

The strategic analysis considered the base population and employment condition reflected in the 2015 KTMP and the growth considered as part of the NKT draft land use plan against the citywide mode share targets of 15% for transit and 20% for active transportation. In all scenarios, it was confirmed that the southern section of the proposed WSE, extending from Rideau Street to Bay Street, was not required as there was adequate capacity within the existing road network to handle growth. The analysis and the conclusions offered therein, which include the abandonment of the need for the southern half of the WSE, rely on the continued shift of trips to transit and active modes.

The analysis indicated that the northern section of the proposed WSE, extending from Rideau Street to John Counter Boulevard, does provide benefit to the existing road network as the greatest congestion issues appear along Division Street and Montreal Street north of Railway Street. The northern segment of the WSE, or an alternate north-south corridor having a comparable design capacity, would be beneficial in addressing a portion of this congestion. In addition, the study notes that increased use of transit and active transportation, beyond the current citywide targets of 15% and 20% respectively, are necessary to manage future growth in the study area while maintaining reasonable levels of roadway capacity.

Although the full NKT transportation plan has not been finalized, the removal of the southern WSE section is consistent with the overall vision that was accepted in Phase 1 of the NKT secondary plan and can be supported by the technical analysis completed to date as part of Phase 2. This conclusion provides guidance to the 2019 DC Background Study and supports the removal of the southern portion of the WSE from Rideau Street to Bay Street as a roads project that would be funded by development charges.

Building on the conclusions of the strategic assessment, an operational analysis is currently underway to provide details related to the geometric design requirements (e.g. turning lanes,

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transit priority lanes, signal timing optimization, etc.) and related performance at all major intersections within the study area.

This operational work also provides an opportunity for a more refined assessment of the northern section of the WSE, from John Counter Boulevard to Rideau Street, along with consideration for the impacts of potential roadway connections, such as the east-to-west extension of River Street to Rideau Street and the west-to-east extension of Russell Street to Rideau Street. The operational analysis will confirm the function of the northern portion of the WSE while considering the potential need to further reduce automobile demands in the study area. The vision of the NKT Secondary Plan suggests that any future roadway connecting John Counter Boulevard to the Rideau/Railway Street area would need to improve the functionality for all users, create local access to businesses, and provide additional options for active transportation (AT) and connectivity to existing AT networks such as the K&P trail. The operational analysis will consider these parameters in reviewing the options for this proposed roadway segment.

As noted, the northern section of the WSE addresses capacity issues related to growth anticipated in the NKT study area. Taking this into account, this section will be retained in the future projects included in the 2019 DC Background Study.

Opportunities to refine the form and function of the northern roadway section will be included as part of the NKT public engagement process and any changes can be incorporated into the future DC by-law update planned for 2024.

Recommendation:

That Council endorse the recommendations of the strategic corridor analysis of the North King's Town Transportation Plan, attached as Exhibit A; and

That Council direct staff to incorporate the findings of Exhibit A, specifically the recommendation that the southern portion of the Wellington Street Extension, from Montreal Street at Rideau Street, southerly to the intersection of Wellington Street at Bay Street, is not required, into the transportation plan under development for the North King's Town Secondary Plan, such that the findings be considered as part of the broader transportation vision that has been completed to date and once complete implemented by way of amendments and future updates to the City's Official Plan, Transportation Master Plan, and other relevant policy and financial plans, including the 15-year capital forecasts; and

That Council, as per the recommendations of Exhibit A, direct staff to remove the southern section of the conceptual arterial roadway known as the Wellington Street Extension, from Montreal Street at Rideau Street, southerly to the intersection of Wellington Street at Bay Street, from the list of planned roadway projects being considered for the 2019 update of the City's Development Charges By-law.

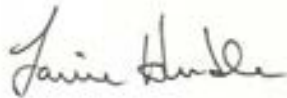
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Authorizing Signatures:



**Sheila Kidd, Commissioner,
Transportation & Public Works**



**Lanie Hurdle, Acting Chief
Administrative Officer**

Consultation with the following Members of the Corporate Management Team:

Gary Dyke, Commissioner, Corporate Enterprise Services	Not required
Peter Huigenbos, Acting Commissioner, Community Services	Not required
Jim Keech, President & CEO, Utilities Kingston	Not required
Desirée Kennedy, Chief Financial Officer & City Treasurer	OK

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Options/Discussion:**Background**

On May 5, 2015, Council passed a motion directing staff to undertake an exceptional, forward-thinking, livable, green, and innovative secondary plan for the Inner Harbour and Old Industrial Areas. The City of Kingston Official Plan identifies both future and completed detailed planning areas, including the Inner Harbour Area and the Old Industrial Area. In the 1980s, both of these areas had secondary plans completed that were never fully implemented. Given the Council motion resulting from public input related to the proposed Wellington Street Extension (WSE), the expressed desire to create a long-term vision for this area of the city, and the age of the past planning studies undertaken for both the Inner Harbour and Old Industrial Areas, the City decided to advance the secondary planning effort for this combined area.

The “North King’s Town Secondary Plan” name was chosen as the project title to provide an identity to the project and new secondary planning area. The area is bounded by John Counter Boulevard and the CN rail line to the north, the Great Cataraqui River to the east, the Central Business District designation in the Official Plan for the downtown to the south, and Division Street to the east.

A Community Visioning Exercise and Preliminary Market Analysis were conducted as the first phase of the overall secondary planning process. The community visioning exercise component involved the creation of a community vision statement, planning principles, and design directions for the secondary plan. It involved extensive consultation throughout a large portion of 2016 and included numerous community engagement events. The preliminary market analysis was intended to support the development of a realistic, balanced, and achievable vision for North King’s Town (NKT) by reviewing local economic factors and broader development market trends. The “Visioning Report & Preliminary Market Analysis for the North King's Town Secondary Plan” was approved by Council on June 6, 2017 ([Report Number 17-043](#)).

One of the key issues addressed in this Community Visioning Exercise was the proposed WSE with the majority of the feedback overwhelmingly opposed to building the WSE, especially the portion south of Railway Street through Douglas R. Fluhner Park and into the downtown. There was some support for the construction of a new north-south street from Railway/Rideau Streets to John Counter Boulevard through the Old Industrial Area, including some businesses and property owners located in the area who thought the additional road access would be beneficial.

Phase 2 of the NKT Secondary Plan began in fall 2018 and involves a number of technical studies including: a land use plan, a transportation plan, a servicing plan, a cultural heritage resources study, and a financial and implementation plan.

NKT Transportation Plan

The intent of the transportation plan for NKT is to realize the vision for a walkable, pedestrian-oriented, and multi-modal network, with minimal emphasis on motor vehicles, and to specify recommendations that reflect this vision. The transportation plan is reviewing the entire

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transportation system in NKT, including its relationship with the wider transportation network in the City. It also reviews the infrastructure, facilities, and service needs of all modes of transportation, including pedestrians, cyclists, transit, and vehicles. The findings of other City studies, such as the 2015 Kingston Transportation Master Plan (KTMP) and the 2018 Active Transportation Master Plan (ATMP), are being considered as part of the NKT transportation plan development.

The objectives of the NKT transportation plan include:

1. Exploring opportunities to support the NKT vision and land use plan;
2. Testing and refining the opportunities related to movement identified in the NKT Visioning Report and Preliminary Market Analysis;
3. Identifying solutions to improve access in the Old Industrial Area, as well as to other vacant and under-utilized properties (including the Davis Tannery);
4. Integrating plans for the Public Works campus on Division Street with any future changes for the Old Industrial Area;
5. Determining design characteristics and the location of pedestrian priority streets, with the understanding that there are limitations to the width of the road allowance on many of the streets in the older neighbourhoods and that this may impact opportunities for all streets to have the full complement of all amenities (e.g. wider sidewalks, benches, street trees, bus shelters, cycling lanes, and on-street parking, etc.);
6. Reviewing the road classifications of both Division Street and Montreal Street with recommendations on how they should operate in the future, with an understanding of the implications on the public realm and future development opportunities along these two important corridors;
7. Supporting active transportation and transit use and growing their allocation of the modal split, with reference to the Active Transportation Master Plan and the Kingston 5-Year Business Plan 2017-2021;
8. Considering the final decision of Council regarding the Third Crossing Action Plan; and
9. Re-evaluating the need for and alternatives to the proposed WSE.

One of the main reasons for undertaking the NKT Secondary Plan was the input from the community requesting that the City review alternatives to the proposed WSE. In re-evaluating the need for all portions of the proposed WSE, different parameters are being used that balance a variety of objectives that are important to the community. These objectives will minimize the emphasis on the vehicle and will consider the following objectives, which include, but are not limited to:

1. Protection of the waterfront, parks and open spaces;
2. Protection of natural heritage resources;

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3. Protection of cultural heritage resources, including the UNESCO World Heritage Site designation for the Rideau Canal and Kingston Fortifications;
4. Promoting environmental sustainability;
5. Promoting active transportation and transit;
6. Improving access and multi-modal connectivity within NKT and to adjacent neighbourhoods; and
7. Prioritizing the vision for NKT to create a pedestrian-oriented environment and a multi-modal transportation network.

Initial findings of the second phase of the NKT Secondary Plan project, including the draft transportation analysis, were presented to the public in September 2018. This draft analysis focused on two key objectives – the need for the WSE and improving the functionality of the network for all users. The draft analysis concluded that the WSE did not provide a substantive improvement to the road network service through 2034 based on the land use and growth contemplated in the 2015 KTMP (Kingston Transportation Master Plan).

The land use vision established with the NKT Secondary Plan, and the eventual implementation of that vision, has the potential to support growth in the area's population and employment base over the next 20 to 30 years. The growth envisioned by the Plan is greater than that considered within the 2015 KTMP. Taking this into account, it was important to confirm, through additional review, the suitability of the existing and planned road network to handle increased traffic volumes resulting from planned growth.

Dillon Consulting Limited (Dillon), a consulting firm on retainer to manage the City's transportation model, was tasked in October 2018 to update the City's transportation model and to complete a strategic and operational assessment of the NKT study area. The completed strategic assessment entitled "North King's Town Transportation Plan Strategic Corridor Needs Analysis (NKT Strategic Corridor Analysis)" is attached as Exhibit A. The results of Dillon's strategic and operational assessment of the NKT study area will be used by the NKT project and consulting teams to complete the NKT transportation plan.

The objective of the NKT Strategic Corridor Analysis is to identify the long-term transportation infrastructure and servicing needs of the NKT study area up to the year 2034 based on the population and employment estimates that have been developed as part of the land use vision for the NKT secondary plan.

2019 Development Charges By-law Update

The City's Development Charge (DC) by-law provides funding for new infrastructure required to support growth within the Municipality. The by-law is renewed every five years. The current DC by-law expires on September 29, 2019 and the City is currently developing a background study to support the new development charge that would be effective from 2019 to 2024.

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The current DC by-law includes a road project specific to the WSE and the background study underway for the updated DC by-law requires direction of the segments of the WSE roadway that should be retained based on current information.

The NKT Strategic Corridor Analysis was scoped to provide clear information regarding the need and function of the WSE that is required as input for the 2019 Development Charges By-law Update. The conclusions of the analysis will be used as a basis for the draft DC background study that is scheduled to be released for public comment on June 13, 2019. This report is time sensitive to ensure the recommendations are accurately reflected in the draft DC background study.

NKT Strategic Corridor Model and Scenarios

The City's current citywide transportation model has a base year of 2014 and reflects the 2015 Kingston Transportation Master Plan (KTMP) land use for the 2034 horizon. This model was updated to evaluate various scenarios for the NKT Secondary Plan and used population and employment data to forecast travel demand for each mode of travel (active transportation, transit and motor vehicle) for the 2034 horizon. This updated model, which includes the Third Crossing project, formed the base for the NKT Strategic Corridor Analysis.

The modelling work included a 5% reduction in all trips through transportation demand management (TDM) programs (i.e. carpooling, telecommuting) revised the 2015 KTMP mode share targets (as per Council's December 1, 2015 direction) to 15% transit and 20% active transportation. The model assigned motor vehicle trips and transit trips to the planned transportation network based on the origin and destination of the trip, the capacity of the transportation network and the estimated travel time between origin and destination.

The scenarios shown in Table 1 were tested within the model to evaluate the overall function of the transportation system within the NKT study area based on different iterations of land use (i.e. that captured within the KTMP and that contemplated by the NKT Secondary Plan). The scenarios also recognize the impacts of implementing varying proportions or sections of the WSE extension (i.e. all, some or none). All of the scenarios evaluate growth to 2034.

Table 1 – Description of Scenarios Evaluated

Scenario	Year	Land Use	Road Network	Wellington Street Extension (WSE)
1	2034	KTMP	2015 KTMP	No WSE
2	2034	NKT Secondary Plan	2015 KTMP	No WSE
3	2034	NKT Secondary Plan	2015 KTMP	WSE – north section Rideau to JCB only
4	2034	NKT Secondary Plan	2015 KTMP	WSE Bay to JCB (full length)

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Table 2 provides a summary of total vehicle trips travelling through and within the NKT study area in relation to different land use scenarios by population and employment. By 2034, the KTMP land use, population, and employment growth in the NKT study area, the Third Crossing and other changes in the city, increase vehicle trips in the model study area by 4,750 (compared to the 2014 land use). The NKT Secondary Plan contemplates greater residential intensification and support for employment uses, which lead to an additional 3,825 vehicle trips beyond that anticipated in the 2034 KTMP land use scenario.

Table 2 – Study Area Population, Employment and Vehicle Trips

Land Use	NKT Population	NKT Employment	Number of vehicles (travelling within and through NKT)
2014 - Model Base	8,119	5,135	10,700
2034 - KTMP Land Use	8,119	5,485	15,450 (4,750 more than base)
2034 - NKT Secondary Plan	16,447	7,413	19,275 (3,825 more than KTMP)

Screenline Approach and Vehicle Volume Summary

The strategic assessment for the various scenarios used a “screenline” approach to determine if additional north-south and east-west vehicle capacity would be required and identified travel patterns on key study area roadways. A screenline sets a delineation line used to measure traffic volumes flowing across the lines. The screenlines are used to identify traffic patterns throughout the study area. The screenlines chosen for this study bisect the main arterial and collector roadways in the study area and allow the WSE to be subdivided into segments for additional analysis.

The five screenlines in the NKT study area are listed below and are shown in Exhibit A (see Figure 14).

1. South of John Counter Boulevard (for north/south traffic volumes)
2. North of Stephen Street (for north/south traffic volumes)
3. Between Stephen Street and Queen Street (for north/south traffic volumes)
4. North of Queen Street (for north/south traffic volumes)
5. East of Division Street (for east/west traffic volumes)

The screenline assessment also considered how improvements to transit service and pedestrian and cyclist infrastructure could reduce vehicle demands and alleviate capacity issues. A summary of the total number of screenline traffic volumes for each scenario is shown in Table 3.

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Table 3 – Summary of total screenline volumes - 2034 afternoon peak period

Scenario	Total Vehicle Volumes (All Screenlines)	Difference in Total Vehicle Volume
1) KTMP Land Use without WSE	21,109	Base Scenario
2) NKT Land Use without WSE	24,089	2,980 greater than Scenario 1
3) NKT Land Use with WSE North Section	26,290	2,201 greater than Scenario 2
4) NKT Land Use with WSE Full Length	26,924	2,835 greater than Scenario 2

As shown in Table 3, Scenario 1, which represents the KTMP land use without the WSE models, 21,109 vehicles across the screenlines. Scenario 2, which represents the NKT Land Use without the WSE, increases total volumes across the screenlines by 2,980 to 24,089 vehicles.

The addition of the northern section of the WSE to the NKT Land Use in Scenario 3 results in a total vehicle volume of 26,290 for an increase of 2,201 vehicles above Scenario 2. Scenario 4, which includes the NKT land use and the full length of the WSE, increases this by 634 vehicles for the highest vehicles volume in the NKT study area of 26,924.

Overall, the implementation of the NKT land use and the full WSE (Scenario 4) results in 5,815 more screenline crossings when compared to Scenario 1. Approximately 50% of this growth is a result of the increased density of population and employment in the area. The remaining 50% is a result of the increased capacity through the study area, which draws motorists from Division Street, Harvey Street and Montreal Street.

Screenline Performance Assessment

Level of Service (LOS) is a ratio of volume of vehicles predicted to use the roadway to the design capacity of the roadway lanes. LOS is represented as a letter from “A” through “F” to indicate the expected performance of the screenline. LOS A – C generally describe a roadway that experiences little to no delay, LOS D represents slight delay, and LOS E represents moderate delay and the need for some mitigation. LOS F represents significant delay and the need for intervention. The City has adopted LOS E as the point that would trigger mitigation measures and is characterized as a volume to capacity ratio of 1.0 or less. A summary of the screenline assessment is contained in Table 7 of Exhibit A.

The screenline analysis showed that south of Rideau Street (screenline 2), the north-south capacity was sufficient and the segment of the WSE from Bay Street to Rideau Street was not required.

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Capacity issues were shown south of John Counter Boulevard (screenline 1) where the capacity of the road network is exceeded by 24% in the NKT scenario where the capacity of the full WSE is removed. The analysis shows that the addition of the northern section of the WSE, roadway from Rideau Street to John Counter Boulevard, creates capacity to address this concern, but that screenline 1 is still over capacity by 6%.

A more detailed assessment of the roadway segments within the screenlines, outlined in Table 8 of Exhibit A, shows that even under Scenario 1 with the base KTMP land use scenario for 2034, there are north-south capacity issues within the study area, particularly along Division Street and Montreal Street. These congestion issues are present in all four scenarios that were tested, even with the more aggressive non-auto mode share targets of 15% transit and 20% active transportation.

The greatest congestion issues along Division Street and Montreal Street are in the north section of the study area, north of the end point of Rideau Street. The northern portion of the WSE alleviates a portion of this congestion, but increased use of transit and active transportation, beyond the current citywide targets of 15% and 20% respectively, will be critical to manage future growth in the study area.

The analysis confirms that the northern section of WSE (John Counter Boulevard to Rideau Street) provides benefit to the existing road network but the south portion (Rideau Street to Bay Street) is not required since there is adequate capacity with the existing roadways in all future growth scenarios.

Accordingly, the southern portion of the WSE is not necessary to handle the additional vehicular traffic anticipated because of the implementation of the NKT plan and the realization of broader citywide growth as contemplated within the KTMP. The recommendations of the NKT Secondary Plan ought to include reference to the removal of the southern portion of the WSE from the NKT Transportation Plan and other City documents (e.g. the Official Plan, KTMP, Development Charges Background Study, etc.), which may refer to this road improvement.

Conversely, the analysis by Dillon demonstrates that the northern half of the WSE will provide benefits to the capacity of the transportation system as growth occurs within the study area and will be addressed as part of the broader NKT Secondary Plan.

Next Steps for the NKT Transportation Study

The screenline performance assessment showed that the northern segment of the WSE provides a key north-south corridor capacity however additional options need to be considered to fully address transportation needs, especially in the northern part of the study area.

Building on the conclusions of the assessment, an operational analysis is currently underway to provide details related to the geometric requirements and performance at all major intersections within the study area. This operational work will also provide an opportunity for a more refined assessment of the northern section of the WSE (John Counter Boulevard to Rideau Street)

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along with consideration for roadway connections of River Street to Rideau Street and Russell Street to Rideau Street.

The vision of the NKT Secondary Plan suggests that any future roadway connecting John Counter Boulevard to the Rideau/Railway Street area would need to improve the functionality for all users, create local access to businesses, and provide additional options for active transportation and connectivity to existing AT networks such as the K&P trail. The operational analysis will consider these parameters in developing options for this future roadway segment.

Since the strategic analysis shows that the northern portion of the WSE will not fully address future capacity issues, additional strategies related to increased transit use and AT are required to reduce the motor vehicle mode share as part of the operational assessment. These revised transportation demands will be carried forward into the operational assessment.

To accommodate intensified growth in the study area, transit is expected to play a critical role in moving people to/from and through the NKT community. Increased transit use will improve the performance of the roadways through diversion of trips to sustainable modes of travel, especially for longer-distance trips to and from the northern part of the study area. The modelling work demonstrated that the travel pattern in the study area is generally for longer distance trips that are challenging to accommodate with active transportation. For this reason, transit will be most important in the northern portion of the study area where population is less dense.

To address capacity deficiencies in the northern part of the study area with the NKT land use and the northern segment of the WSE (John Counter Boulevard to Rideau Street), an additional 225 trips during the afternoon peak hour must be accommodated through sustainable modes. This represents approximately 8% of the new automobile trips related to the NKT land use. If this were to be accommodated by transit alone, the overall mode share for transit would need to increase from 15% to 23% for the study area to perform adequately during the afternoon peak hour in 2034. This increased demand for transit service represents an additional five to six full buses (40 passengers) during the afternoon peak hour over the northern screenline of the study area.

In addition to transit, AT initiatives in the NKT study area will be key to shift motor vehicle trips to sustainable modes, such that the transportation system can accommodate future growth. AT will be most important in the south end of the study area, where trips are shorter and it is more practical for residents to walk and cycle to and from the downtown area. The AT target in the study area will need to extend beyond 20% to at least 25 to 30% although further increases in transit service could be expected to lessen the required increase in the AT target.

The Active Transportation Master Plan (ATMP) identifies many citywide and neighbourhood level routes that will be developed to provide connectivity to and throughout the NKT study area.

Both improved transit service and new AT infrastructure along key corridors will work together to significantly enhance the overall performance of the transportation network. The ongoing operational assessment will serve as technical information that will be incorporated into the broader transportation study for the NKT Secondary Plan. The draft transportation study will be available for review and public comment in Fall 2019.

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Next Steps for the 2019 DC By-law Background Study

The conclusions of the NKT Strategic Corridor Analysis indicate that the southern portion of the WSE from Rideau Street to Bay Street is not required in any of the growth scenarios contemplated for the NKT area. Although the full NKT transportation plan has not been completed, the removal of the southern WSE section is consistent with the overall vision that has been adopted in Phase 1 of the NKT secondary plan and can be supported by the technical analysis completed to date as part of Phase 2.

This conclusion will inform the 2019 DC Background Study and supports the removal of the southern portion of the WSE from Rideau Street to Bay Street as a roads project that would be funded by development charges.

The operational analysis currently underway will confirm the function of the northern portion of the WSE while considering the potential need to further reduce automobile demands in the study area. As the northern section of the WSE addresses capacity issues related to growth anticipated in the NKT study area, this section will be retained in the future projects included in the 2019 DC Background Study. Opportunities to refine the form and function of the northern roadway section will be included as part of the NKT public engagement process and any changes can be incorporated into the future DC by-law update planned for 2024.

Existing Policy/By-law:

N/A

Notice Provisions:

N/A

Accessibility Considerations:

N/A

Financial Considerations:

There are no immediate financial implications related to the recommendations in this report however the technical analysis updates the road infrastructure projects that are to be considered as part of the updated Development Charge By-law. The WSE project, approved as part of previous Development Charge By-law reviews, will be modified to remove the southern section of the project that was proposed from Rideau Street to Bay Street.

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Exhibits Attached:

Exhibit A – North King’s Town Transportation Plan Strategic Corridor Needs Analysis



City of Kingston

North King's Town Transportation Plan

Strategic Corridor Needs Analysis

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1.0

Introduction

The purpose of this memo is to document the results of the strategic transportation network analysis undertaken for the North King's Town Secondary Plan area.

Dillon Consulting Limited (Dillon) was retained by the City of Kingston to undertake strategic and operational assessment of the North King's Town (N.K.T.) area for the 2034 horizon. The recent N.K.T. Secondary Plan (N.K.T.S.P.) identifies significant population and employment growth for the N.K.T. area for the next 20 years, which reflects a significant increase in density and number of units compared to that assumed for the 2034 time horizon assessed on the City's 2015 Transportation Master Plan Update.

As City staff is preparing a report for council related to the Development Charges update, there is an urgent need to understand the strategic corridor needs in the study area, specifically related to the extent, role, and function of the proposed Wellington Street Extension. Therefore, Dillon has completed a strategic assessment that includes an update of the City's T.M.P. Travel Demand Forecasting Model (T.M.P. Model), a review of the future performance of the transportation corridors in the study area, and tests of the alternative infrastructure and service required to address the long terms needs of the community.

The following sections describe the study area, analysis parameters, results, and next steps.

2.0

Study Area

Figure 1 illustrates the N.K.T.SP study area. The study area is bound by John Counter Boulevard (J.C.B.) to the north, the Cataraqui River to the east, Queen Street to the south (not inclusive), and Division Street to the west.

The N.K.T.S.P. study area contains a mix of residential, commercial and office land uses. The future Third Crossing (of the Cataraqui River) is immediately north of the study area and the downtown employment centre of Kingston is immediately south of the study area.

The southern portion of the study area is mostly developed, with the primary land use being a mix of older, single family detached housing. The north-east portion of the study area has large areas of undeveloped land, what development there is can be characterized as general industrial use.

Figure 1: Study Area



3.0

Methodology

The strategic assessment focuses primarily on the auto vehicle and transit connectivity in the study area. The T.M.P. Model was used to determine the future volume and travel behaviour in the study area.

The model uses population and employment data to forecast travel demand for each mode of travel (auto vehicle, transit persons, and active transportation persons). The model assigns auto vehicle trips and transit trips to the transportation network based on the origin and destination of the trip, the capacity of the transportation network, and the calculated travel time between origin and destination in consideration of the prevailing congestion.

The model currently reflects the City of Kingston's Transportation Master Plan (December 2015) land use for the 2034 horizon. As part of the scenario analysis, the model was updated to reflect the N.K.T.S.P. land use and the planned road network. Volume assignments were updated to reflect the new trips and their travel behaviour.

The following scenarios were tested within the model to examine the impacts of changes to the land use and transportation network on the overall system performance:

1. 2034 T.M.P. Land use / T.M.P. recommended network (without Wellington Street Extension);
2. 2034 N.K.T.S.P. Land use / T.M.P. recommended network (without Wellington Street Extension);
3. Scenario 2 with Wellington Street Extension (north of Montreal Street only); and
4. Scenario 2 with Wellington Street Extension and improvement (J.C.B. to Bay Street)

Figure 2 illustrates the road network modifications for the scenarios. Scenarios 1 and 2 apply the base road network (i.e., the T.M.P. Road Network). Note that the Third Crossing is included in this network.

Figure 3 illustrates the preferred alignment and design for the Wellington Street Extension; the impact of the Wellington Street extension is the subject of Scenarios 3 and 4.

Figure 2: N.K.T. Scenarios – Road Network Modifications

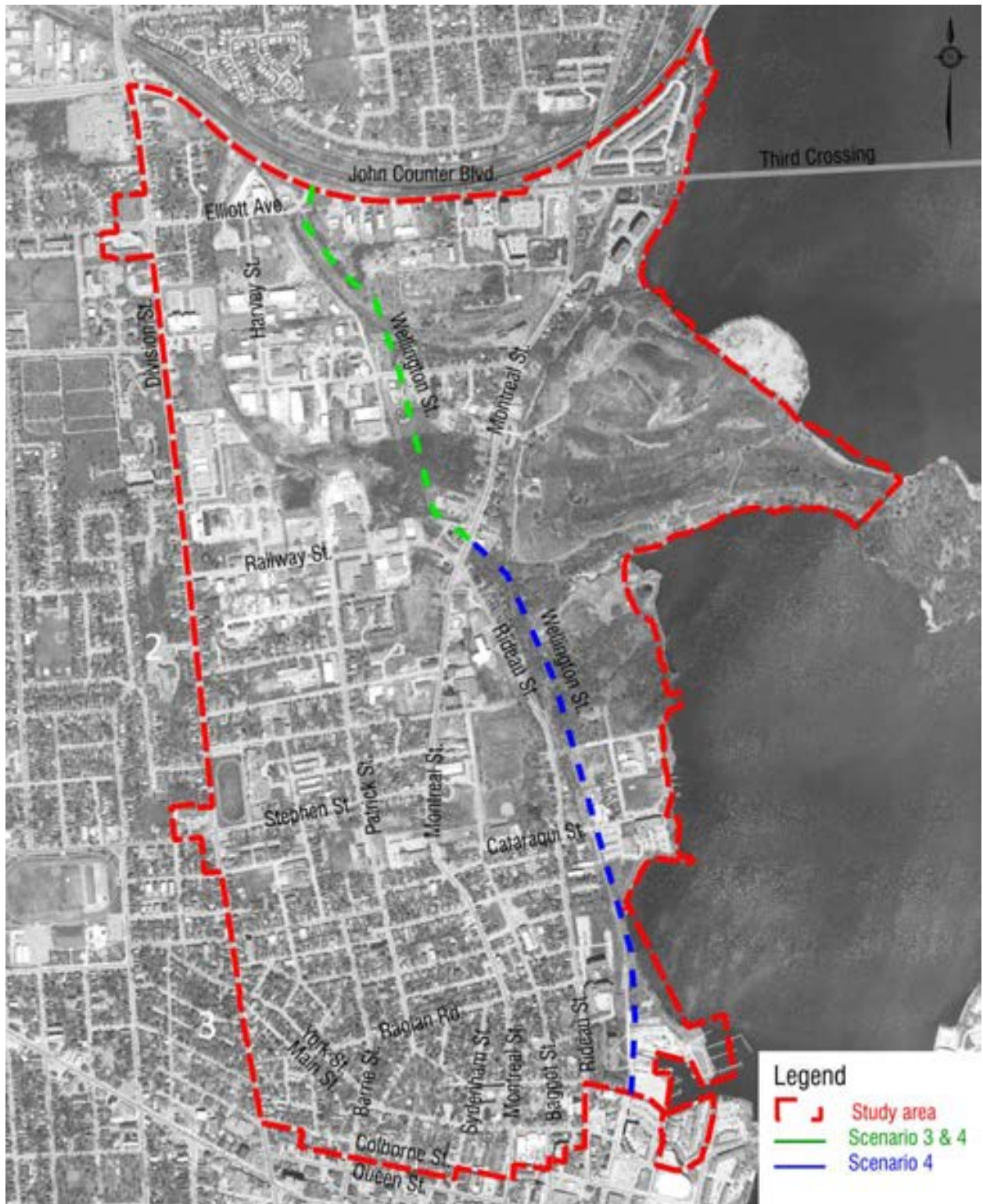
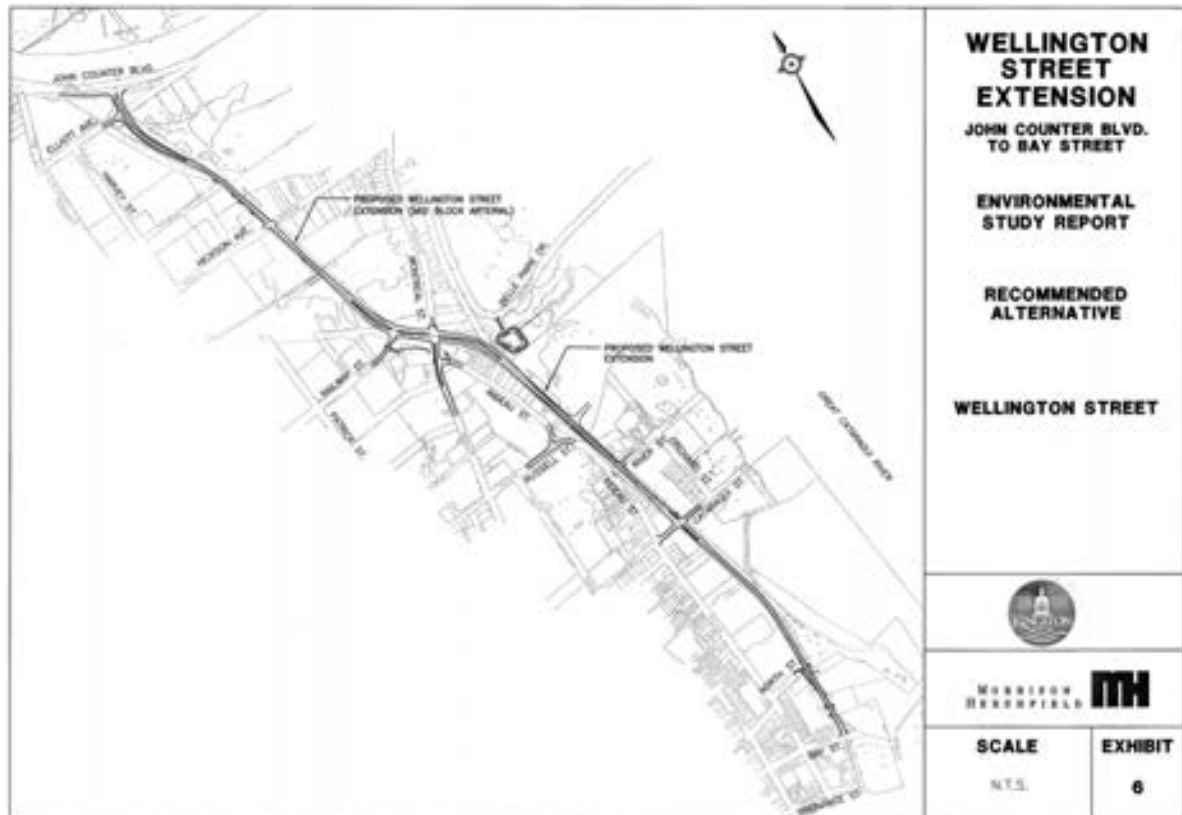


Figure 3: Wellington Street Extension Preferred Alignment and Design



Source: *Wellington Street Extension (John Counter Boulevard to Bay Street) Environmental Study Report, May 2006*

The strategic assessment included:

- a screenline performance assessment, to determine if additional north-south and east-west vehicle capacity is required;
- a select link analysis, to identify vehicle travel patterns on key study area roadways and determine where additional north-south and/or east-west vehicle capacity is required; and,
- a discussion on the sensitivity of the results, specifically how improving pedestrian and cyclist infrastructure and increasing transit service could reduce vehicle demands and alleviate capacity issues.

4.0

Study Foundations

Dillon was retained by the City of Kingston in 2015 to migrate the City of Kingston's Transportation Demand Model from the TransCAD software package to the Visum software package, and to further enhance the model content to make it microsimulation-ready (i.e., the ability to extract network and demand conditions from the strategic city-wide model to a local study area model to assess more detailed operational level issues) and to reflect actual assignments of the transit demand. During this migration, no adjustments to the T.M.P. foundations were made. Some of the model features that have been modified include:

- The model's zone structure was refined (more zones, smaller zones)
- The model was recalibrated using new traffic counts from 2014.
- Transit stops and transit routes were added to the model which allowed the model to assign trips to transit routes.
- The model was updated for the 2034 horizon which corresponds with the Kingston T.M.P. horizon.

The T.M.P. model is based on data from the 2008 household survey that defines travel behaviour for the city's residents (origin-destination patterns, trip purposes, trip mode).

In assessing the N.K.T. study area, it was important to understand what T.M.P. foundations are being held static versus what changes were being proposed. The following sections document the key mode foundations that were applied in the analysis.

4.1

Trip Generation

The City of Kingston provided the N.K.T.S.P. land use, population, and employment growth forecasts for various 'blocks' in the study area. These forecasts were used to update the trip generation forecasts in the model for the 2034 horizon. **Figure 4** illustrates the location of the blocks in the study area.

Figure 4: N.K.T.S.P. Blocks



Table 1 summarizes the N.K.T.S.P. land use population and employment growth assumptions for the blocks identified above.

The table source was the N.K.T. Growth Estimates Methodology, version 5, dated August 14, 2018, provided by Dialog Design.

Table 1: NTKSP Land Use – Growth Forecast – Blended Growth Scenario

Block	Level of Change	Area (m ²)	Future residential units	Future commercial area (m ²)	Future employment area (m ²)	Future population	Future retail/ office jobs	Future industrial/ manufacturing jobs
A	Low	64,172	171	0	0	298	0	0
B	Significant	135,611	1,266	74,756	0	2,202	2,136	0
C	Significant	87,104	406	0	0	707	0	0
D	Significant	177,177	1,984	32,556	0	3,453	930	0
E	Significant	131,125	2,164	24,094	0	3,765	688	0
F	Modest	116,377	186	36,659	0	324	1,047	0
G	Modest	355,818	968	33,625	0	1,684	961	0
H	Low	96,998	323	0	0	563	0	0
I	Low	1,800	0	0	315	0	0	9
J	Modest	43,300	139	6,820	0	241	195	0
K	Low	53,100	113	0	0	197	0	0
L	Low	82,830	0	10,437	0	0	298	0
M	Low	692,292	0	0	67,845	0	0	905
N	Low	789,435	1,684	0	0	2,930	0	0
O	Low	18,000	48	8,505	0	84	243	0
2014 Base	n/a	2,845,139	4,666	169,174	48,775	8,120	4,834	650
2034 Future	n/a	2,845,139	9,453	227,451	68,160	16,447	6,499	914
Change	n/a	0	+4,786	+58,277	+19,384	+8,328	+1,665	+263

The table above shows significant change in blocks B, C, D, and E which correspond to Montreal Street, from J.C.B. to Russell Street. There is also modest change in blocks F, G, and J. Blocks F and G correspond to Montreal Street, from Russell Street to Queen Street, and block J corresponds to Division Street, from J.C.B. to Elliott Avenue.

The model uses a 'zone' system that is different from the block system used for the N.K.T.S.P.; sometimes a block spanned two or more zones, and sometimes a zone spanned two or more blocks. In some cases zones were subdivided for the purpose of translating growth from the N.K.T.S.P. block system to the zone system used in the model.

Figure 5 and **Figure 6** illustrate the N.K.T.S.P. land use population and employment change in the study area.

Figure 5: N.K.T.S.P. Land Use - Population Change

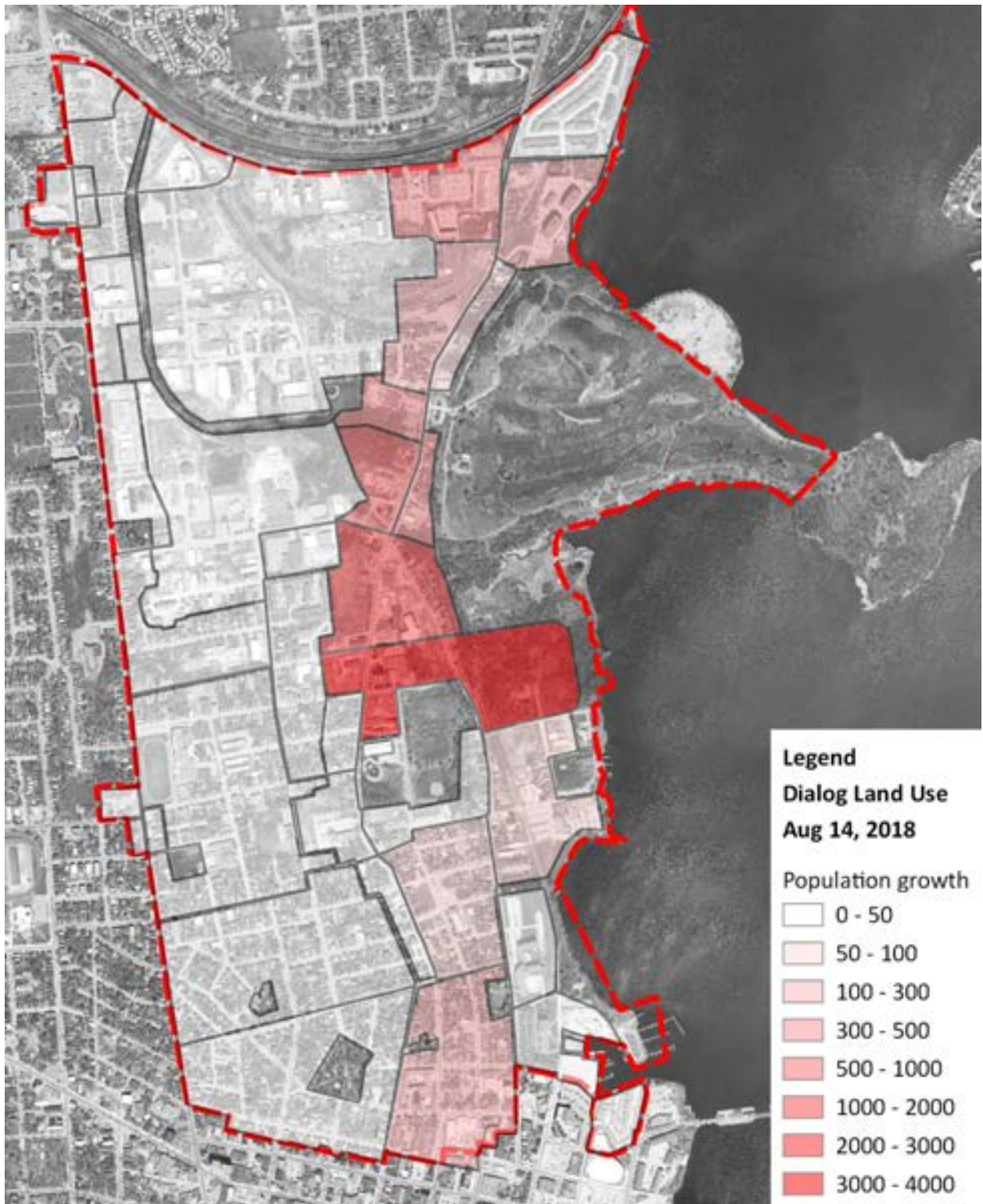
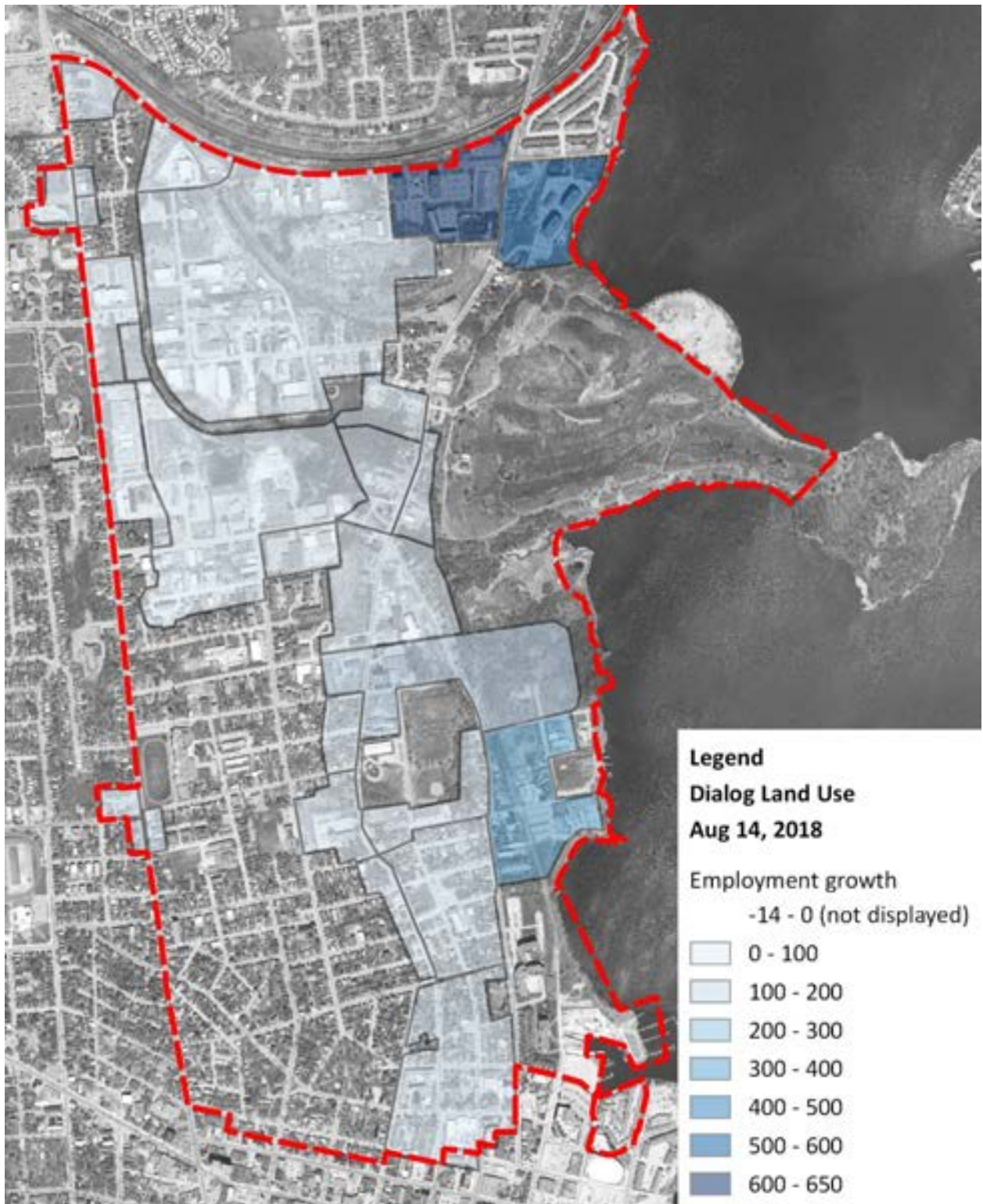


Figure 6: N.K.T.S.P. Land Use - Employment Change



Since the transportation demand model represents the weekday P.M. peak hour when the majority of people are leaving work and going home, increased employment levels for a zone will more likely result in additional vehicle trips leaving that zone (“productions”) and increased population levels for a zone will result in additional vehicle trips travelling to that zone (“attractions”). Increased population levels also result in additional vehicle trips leaving that zone (“productions”) for shopping, recreation, school, shift work, or other purposes.

Table 2 summarizes the study area population, employment, and vehicle trips. The number of vehicle trips includes vehicle trips to and from the study area as well as those passing through the study area. The opening of the Third Crossing results in increased vehicle traffic through the study area.

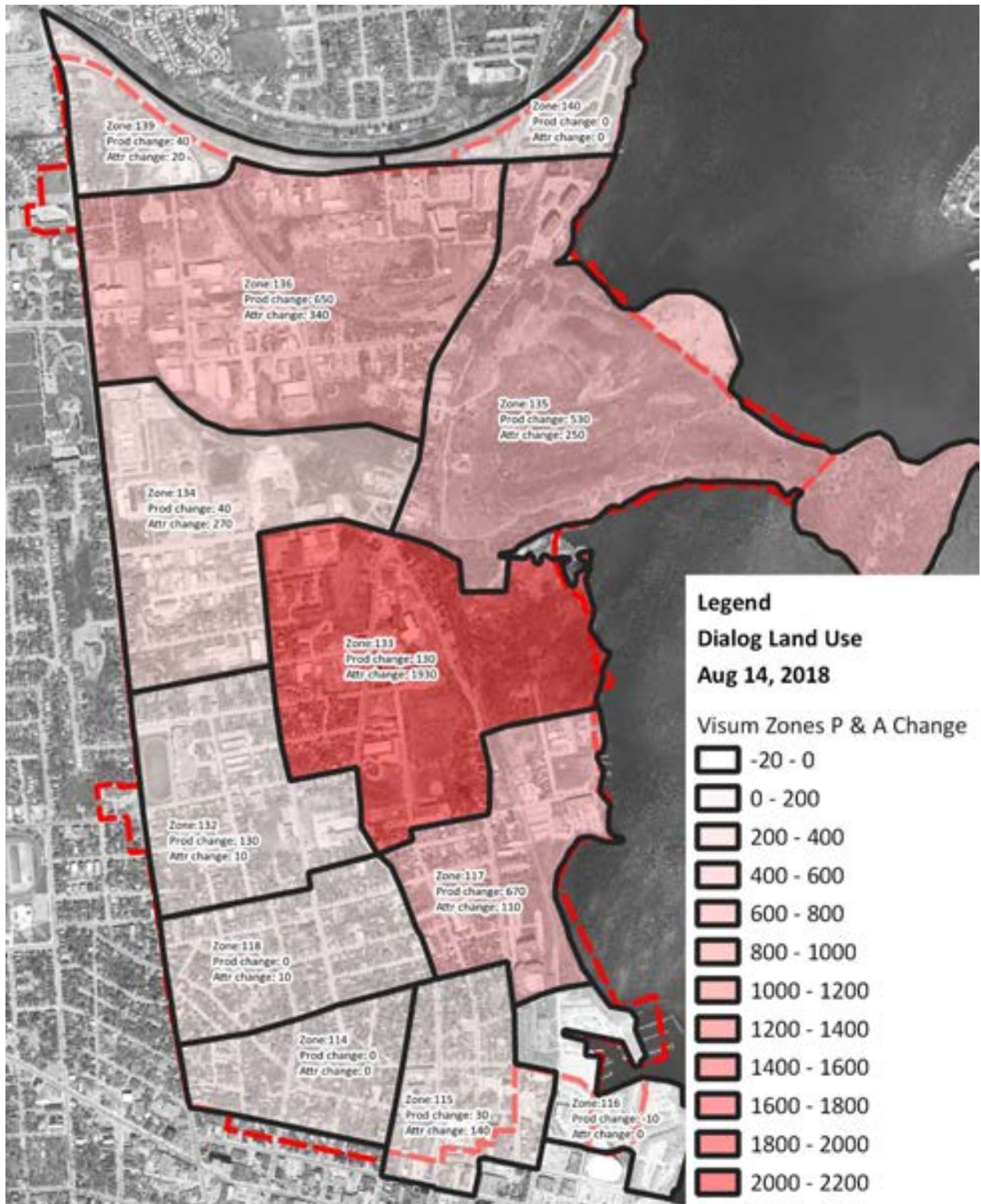
Table 2: Study Area Population, Employment, and Vehicle Trips

Land Use	N.K.T. Population	N.K.T. Employment	N.K.T. Vehicle Trips
2014 Model Base	8,119	5,135	10,700
2034 T.M.P. Land Use	8,119	5,485	15,450
2034 N.K.T.S.P. Land Use	16,447	7,413	19,275

The table shows that the T.M.P. land use, population and employment growth in the study area, the Third Crossing of the Cataraqui river, and other changes in the City of Kingston will increase vehicle trips in the study area by 4,750 (compared to the 2014 land use). The N.K.T.S.P. land use will increase study area vehicle trips by 3,825 (compared to the 2034 T.M.P. land use).

Figure 7 illustrates the change in auto vehicle trips (productions and attractions) for each zone in the model based on the population and employment changes documented above. As expected, the largest change in vehicle trips is in the middle of the study area where there is significant population and employment growth.

Figure 7: N.K.T.S.P. Land Use – Change in Auto Vehicle Trips



4.2

Travel Mode

The City of Kingston’s Transportation Master Plan (2015) recommended a target of 9% transit trips, 17% active transportation, and 5% reduction from Transportation Demand Management (T.D.M.) for the 2034 horizon. These targets were referred to as the “Base” mode share.

For the analysis summarized in this memo, more aggressive targets were applied, as directed by City of Kingston council on December 1, 2015. These are referred to as the “Reduced” demand scenario and targeted 15% transit usage, 20% active transportation, and 5% T.D.M. “Reduced” refers to the reduction of auto trips on the network through increased use of sustainable travel modes.

It is important to note that this analysis was based on meeting the modal splits sought by Council. There is, however, an opportunity to realize an ever greater modal split that would have the effect of further reducing traffic (vehicle) volumes as summarized in the findings. Within the North King's Town Study Area in particular, it is understood that the community has expressed a desire to support increased non-auto travel through transit use, cycling, walking and other forms of active travel.

Table 3 lists the mode share targets. These represent the share of the various modes of the trips that actually make it onto the network. Trips related to the 5% T.D.M. are removed from the travel stream. The reduced mode share results in 12% fewer auto trips, 67% more transit trips, and 18% more active transportation trips when compared to the base demand mode share.

Table 3: Mode Share Targets

Mode	2008 Household Travel Survey	2034 Base Mode Share	2034 Reduced Mode Share	Difference (Base to Reduced)
Auto	81%	74%	65%	-12%
Transit	5%	9%	15%	+67%
Active Transportation	14%	17%	20%	+18%
Total	100%	100%	100%	

4.3

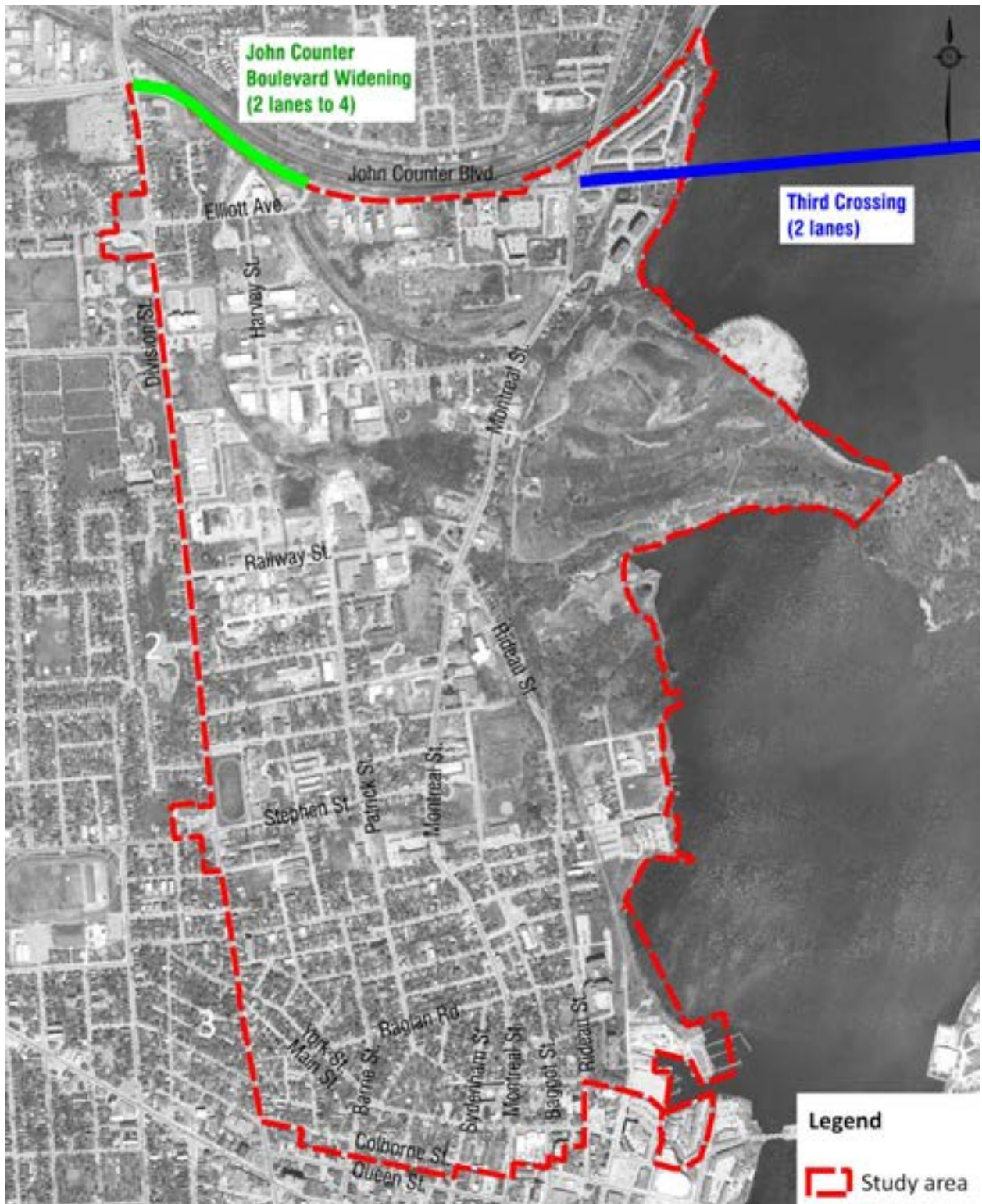
Road Network

The 2034 road network assumed the following infrastructure improvements would be in place within the study area:

- Third Crossing of the Cataraqui River; and,
- Widening John Counter Boulevard (from two lanes to four) between Division Street and Elliott Avenue (or the north terminus of the Wellington Street Extension, if built).

Figure 8 illustrates the Kingston Transportation Master Plan (K.T.M.P.) N.K.T. Roadway Improvements. Note that, for the purposes of this analysis, it was assumed that the base roadway network in 2034 would not include the Wellington Street Extension, despite its recommendation in the K.T.M.P. This allowed the analysis to focus on the impacts of the facility in the tested alternatives.

Figure 8: K.T.M.P. N.K.T. Roadway Improvements - 2034



4.4

Transit Network

Table 4 lists the 2034 transit service assumptions for the study area. There are seven (7) transit routes operating in the study area with headways ranging from 15 minutes to 60 minutes.

Within the study area, Route 1 operates on the entire length of Montreal Street and routes 2, 18, 701, and 702 operate the entire length of Division Street. Routes 701 and 702 are express routes with 15-minute headways.

Table 4: Study Area 2034 Peak Hour Transit Service Assumptions

Route	Study Area Roads	Headways
1: Montreal Street – St. Lawrence College	Montreal Street, Raglan Road, Bagot Street	30 minutes
2: Division Street – Kingston Centre	Division Street, Elliott Avenue	30 minutes
7: Rideau Heights – INVISTA Centre	J.C.B., Division Street, Elliott Avenue	30 minutes
16: Division Street / Dalton Avenue – Train Station	J.C.B., Division Street, Elliott Avenue, Kirkpatrick Street	30 minutes
18: Train Station Circuit	Division Street, Elliott Avenue	60 minutes
701: King’s Crossing Centre	Division Street	15 minutes
702: Cataraqui / King’s Crossing Centre	Division Street	15 minutes

Figure 9 illustrates the future transit network. Transit stops are located every few hundred metres throughout the study area. **Figure 10** illustrates the catchment area of the transit routes in the study area (typically defined as 400 metres from stops with local service and 800 metres from stops with express service).

Note that the City of Kingston recently implemented two additional express transit routes along Montreal Street (Route 801 and 802) following the completion of the technical analysis for this report. Therefore, these do not form part of the analysis, but these routes will assist with increasing transit mode share in the future beyond that achieved in the analysis contained in this memorandum. Table 4 and Figure 9, therefore, do not show Routes 801 and 802, and Figure 10 does not include the 800 metre catchment area of these routes.

Figure 9: Future Assumed Base Transit Network

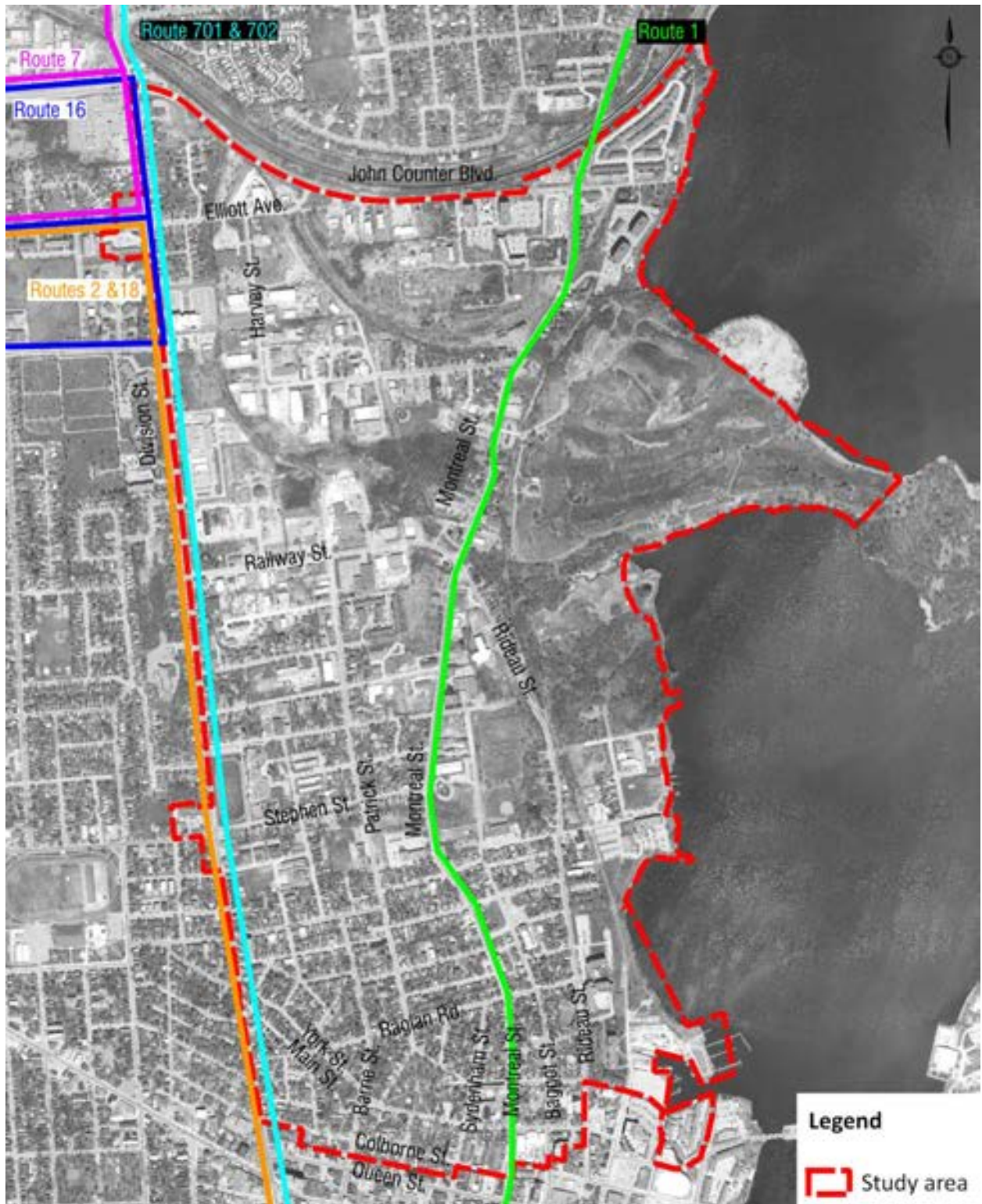
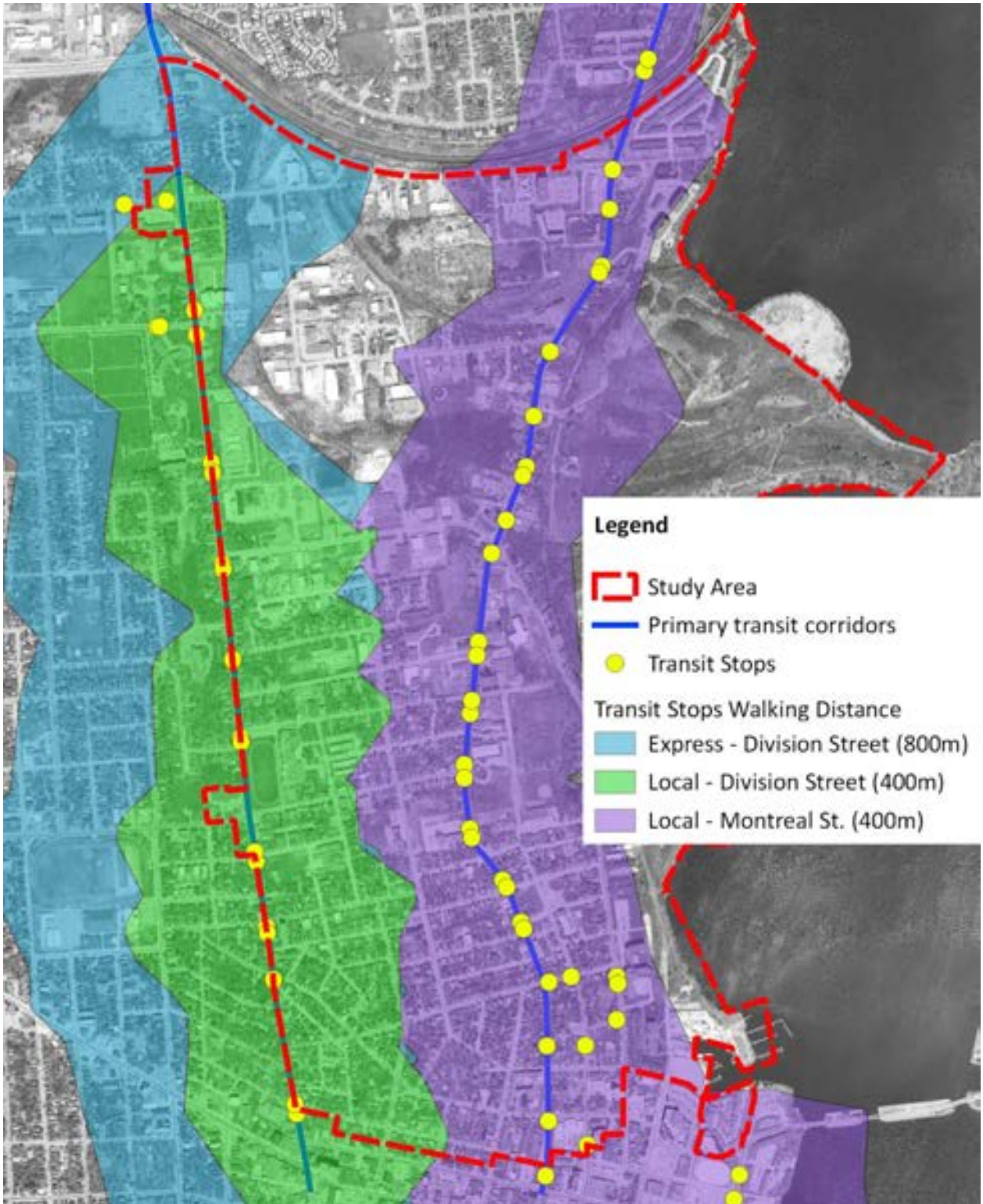


Figure 10: Transit Catchment Area



The figure shows that the majority of the study area is within 400 metres of Division Street and/or Montreal Street. The middle of the industrial park in the north is the only developed part of the study area that is not within 800 metres of transit stops on Division Street or within 400 metres of transit stops on Montreal Street.

4.5 Active Transportation

John Counter Boulevard, the Third Crossing, Montreal Street (south of Rideau Street), Division Street, Stephen Street are all proposed cycling “spine” routes which are defined as “direct north-south and east-west routes that link to major destinations such as transit hubs and commercial centres”¹.

Patrick Street and York Street are proposed cycling neighbourhood routes which are “typically along local roads with low motor vehicle volumes and low speeds, and may link through open spaces and parks... they provide access to local destinations, link to the spine network, or provide access to the transit network”¹.

Several pedestrian and cyclist intersection crossings are proposed along Montreal Street and Division Street.

Figure 11 illustrates the existing and planned active transportation network within the study area. There are existing or planned facilities for the majority of roadways within the study area, aside from local residential streets which usually have low speeds and low traffic volumes and usually do not require dedicated facilities.

Figure 12 and **Figure 13**, respectively, illustrate the walking and cycling time from the downtown core to other areas of the study area. The majority of the study area is within 30 minutes walking time (5 km/h) and 10 minutes cycling time (15 km/h) of the downtown core.

¹ City of Kingston Active Transportation Master Plan, “Walk ‘n’ Roll Kingston” (June 2018)

Figure 11: Planned Active Transportation Network



Source: City of Kingston Active Transportation Master Plan, “Walk ‘n’ Roll Kingston” – Technical Appendix G – Neighbourhood Focus - Area G (June 2018)

Figure 12: Walking Time from Downtown Core

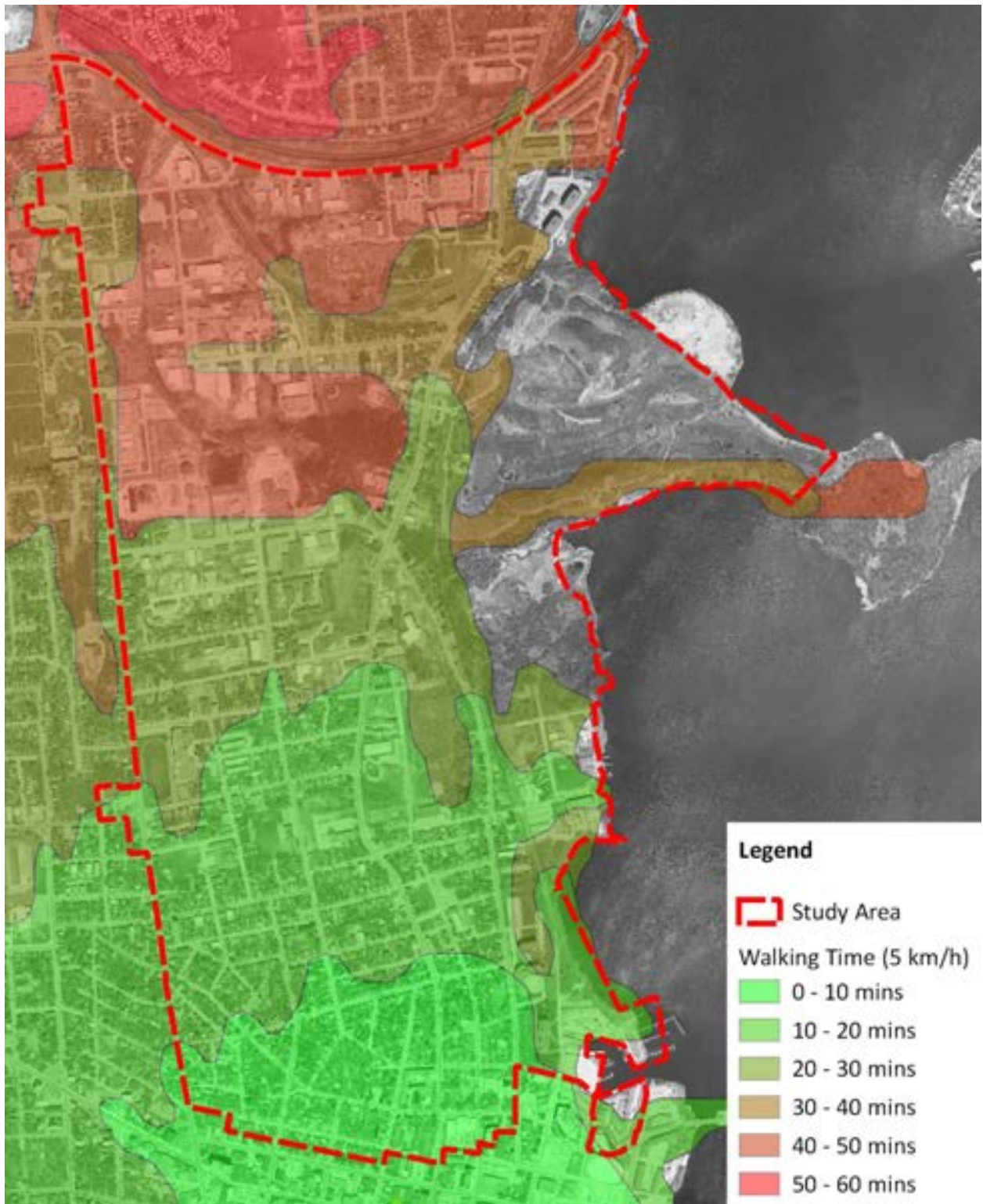
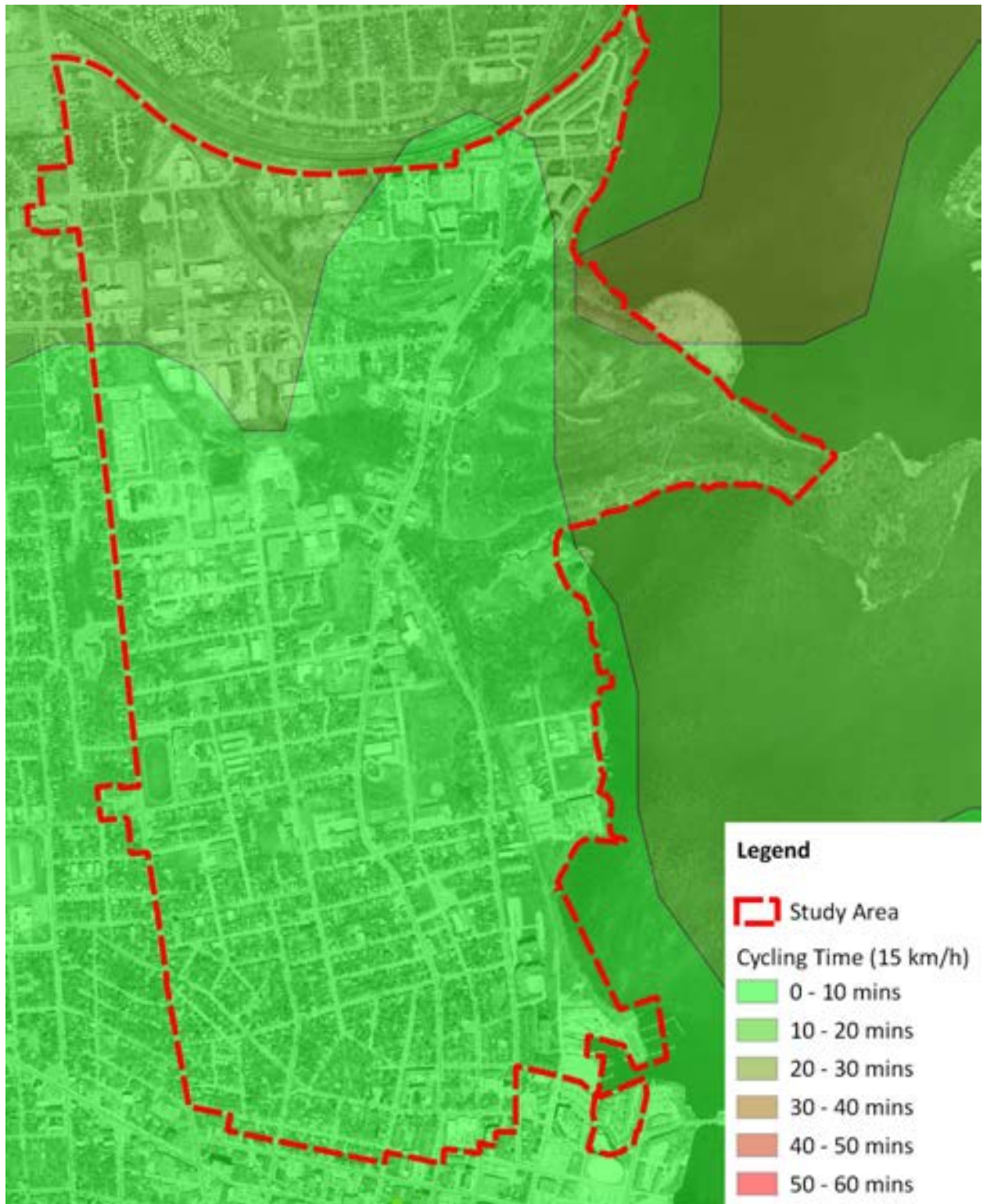


Figure 13: Cycling Time from Downtown Core



5.0 Strategic Assessment

The purpose of the strategic assessment was to determine, at a high level, the transportation network elements required to align with the transportation network needs and the desired role and function for study area roadways.

The strategic assessment was broken into two parts: i) a screenline analysis to determine where capacity will be required; and ii) a select link analysis to determine the role and function of study area roadways. Understanding the role and function of study area roadways is necessary to properly align potential mitigation with identified needs.

The findings of the strategic assessment will inform the next steps for the project, the operational analysis.

5.1 Screenline Analysis

The screenline analysis evaluated the total north-south and total east-west transportation network capacity at several locations to determine if there will be a systematic lack of capacity or if the demand will be concentrated in specific areas.

Figure 14 illustrates the screenlines used for this analysis.

Figure 14: Screenlines

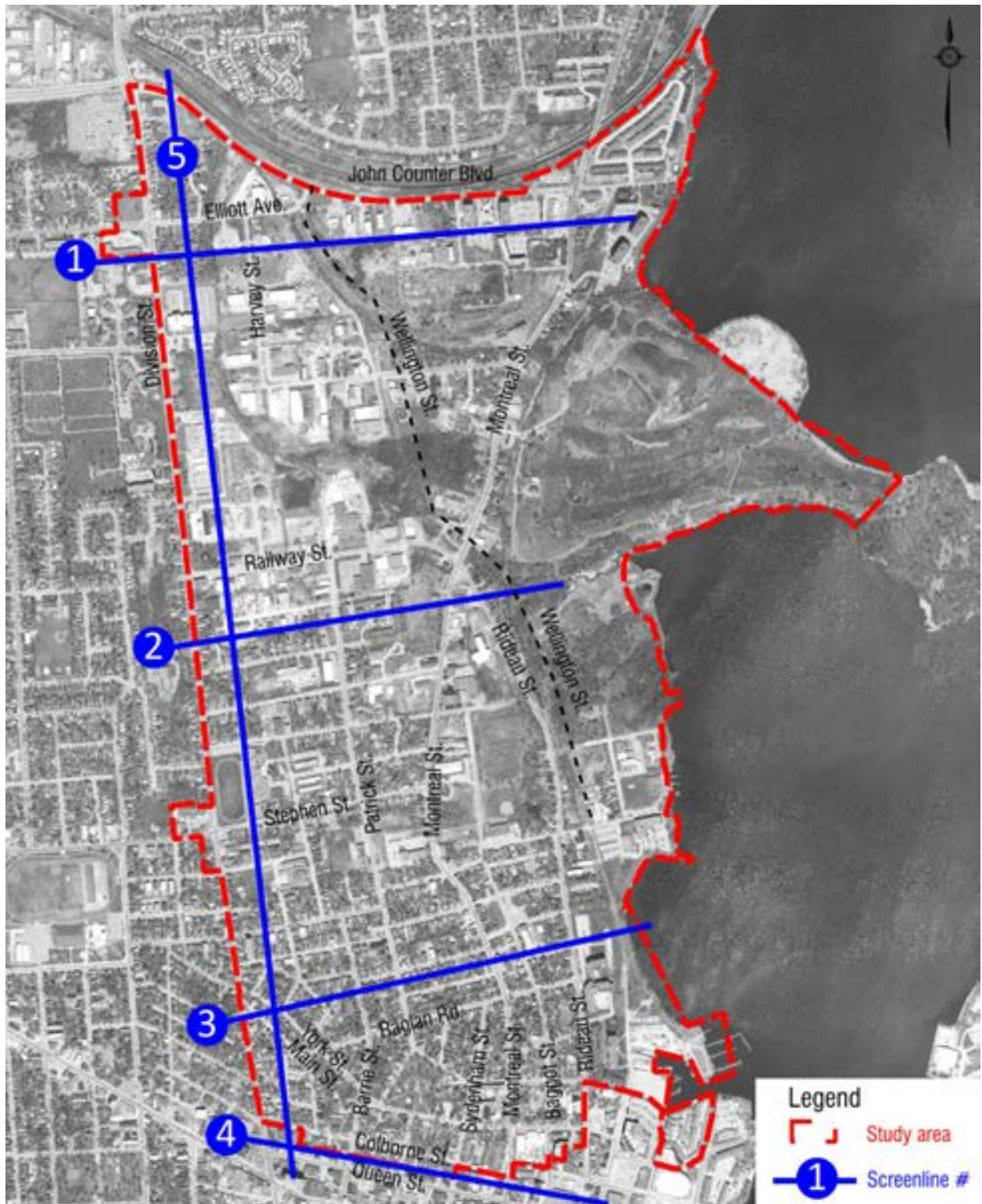


Table 5 summarizes the change in screenline volumes between scenarios. Note that W.S.E. indicates Wellington Street Extension, W.S.E. North indicates north of Rideau Street, and Full W.S.E. indicates W.S.E. between J.C.B. and Cataraqui Street.

The table above shows that the N.K.S.P. land use results in increased volume across the screenlines by nearly 3,000 vehicles overall. Note that this can be larger than the overall increase in vehicle trips as some vehicles will cross multiple screenlines.

The Wellington Street extension further increases screenline traffic volumes by another 2,200 or 2,835 vehicles for the Scenario 3 and the Scenario 4, respectively. The full Wellington Street Extension increases the total study area screenline volumes by approximately 600 vehicles compared to when only the north portion of the Wellington Street Extension is implemented.

Overall, the implementation of the N.K.T. land use and the full Wellington Street Extension (Scenario 4) will result in approximately 6,000 more screenline crossings by vehicles in the study area than forecasted in Scenario 1, which is a 27% increase versus the base network and T.M.P. land use. Approximately 50% of this growth is a result of the increased density of population and employment in the area. The remaining 50% is a result of the increased capacity through the study area, which was shown to draw drivers from Division Street, Harvey Street, and Montreal Street as it is a more convenient route to/from downtown and avoids the congested parts of those roads.

Table 5: Screenline Volumes Summary

Screenline	Scenario 1 T.M.P. Land Use, No W.S.E.	Scenario 2 (vs. Sc. 1) N.K.T. Land Use, No W.S.E.	Scenario 3 (vs. Sc. 2) N.K.T. Land Use, W.S.E. North	Scenario 4 (vs. Sc. 2) N.K.T. Land Use, Full W.S.E.
1: South of J.C.B., Northbound	2,261	+218	+490	+546
1: South of J.C.B., Southbound	1,672	+315	+435	+521
2: North of Stephen Street, Northbound	2,058	+58	+389	+504
2: North of Stephen Street, Southbound	1,539	+541	+149	+402
3: Between Stephen Street and Queen Street, N.B.	2,732	+312	+130	+199
3: Between Stephen Street and Queen Street, S.B.	1,977	+84	+15	+128
4: North of Queen Street, Northbound	1,413	+459	-4	-158
4: North of Queen Street, Southbound	1,660	+138	+5	-108
5: East of Division Street, Westbound	2,229	+349	+189	+386
5: East of Division Street, Eastbound	3,568	+506	+403	+415
Total	21,109	+2,980	+2,201	+2,835

Table 6 summarizes the screenline performance thresholds. The City of Kingston's threshold for mitigation is level-of-service E (L.O.S. E), or a volume-to-capacity ratio (v/c ratio) of 1.00 or less. Note that L.O.S. means Level of Service and V/C means the volume-to-capacity ratio.

Table 6: Screenline Performance Thresholds

L.O.S.	V/C	Qualitative description
A, B, C	< 0.75	Good, no issues anticipated, little to no delay.
D	0.75 – 0.85	Fair, early potential indicator of future problem, some delay.
E	0.85 – 1.00	Poor, some mitigation required, moderate delay.
F	> 1.00	Failure, significant mitigation required, significant delay.

Table 7 summarizes the screenline assessment. Note that northbound, southbound, eastbound, and westbound have all been abbreviated.

Table 7: Screenline Assessment – Summary

Screenline	Direction	Scenario 1 Capacity	Scenario 1 Volume	Scenario 1 V/C	Scenario 2 Capacity	Scenario 2 Volume	Scenario 2 V/C	Scenario 3 Capacity	Scenario 3 Volume	Scenario 3 V/C	Scenario 4 Capacity	Scenario 4 Volume	Scenario 4 V/C
1: South of J.C.B.	N.B.	2,000	2,261	1.13	2,000	2,479	1.24	2,800	2,969	1.06	2,800	3,025	1.08
1: South of J.C.B.	S.B.	2,000	1,672	0.84	2,000	1,987	0.99	2,800	2,422	0.87	2,800	2,508	0.90
2: North of Stephen Street	N.B.	2,800	2,058	0.74	2,800	2,103	0.75	2,800	2,492	0.89	3,600	2,607	0.72
2: North of Stephen Street	S.B.	2,800	1,539	0.55	2,800	2,070	0.74	2,800	2,219	0.79	3,600	2,472	0.69
3: Between Stephen Street and Queen Street	N.B.	4,200	2,732	0.65	4,200	3,044	0.72	4,200	3,174	0.76	5,000	3,243	0.65
3: Between Stephen Street and Queen Street	S.B.	4,200	1,977	0.47	4,200	2,061	0.49	4,200	2,076	0.49	5,000	2,189	0.44
4: North of Queen Street	N.B.	3,300	1,413	0.43	3,300	1,772	0.54	3,300	1,768	0.54	3,300	1,614	0.49
4: North of Queen Street	S.B.	3,300	1,660	0.50	3,300	1,798	0.54	3,300	1,803	0.55	3,300	1,690	0.51
5: East of Division Street	W.B.	6,200	3,568	0.58	6,200	4,074	0.66	6,200	4,477	0.72	6,200	4,489	0.72
5: East of Division Street	E.B.	5,600	2,229	0.40	5,600	2,578	0.46	5,600	2,767	0.49	5,600	2,964	0.53

The screenline assessment summary shows issues at screenline #1. The northbound demand exceeds the capacity of the 2034 base road network by 13% for the T.M.P. land use and 24% for the N.K.T.S.P. land use. The north W.S.E. will add much-needed additional capacity to this screenline but the demand will still exceed capacity by up to 8%. South of Rideau Street, the north-south capacity was shown to be sufficient and therefore the full W.S.E. is not justified from the perspective of the screenline assessment.

Table 8 contains the detailed screenline assessment. The detailed assessment lists the capacity and volume of traffic on individual roadways that form the screenline, which may identify specific roadways that lack adequate capacity.

Note that for screenline #2, scenario #3, and scenario #4, the Rideau Street southbound volume is zero (0) because the intersection of Montreal Street and Rideau Street has been converted to right-in/right-out only. Vehicles travelling north on Montreal Street are unlikely to turn right onto Rideau Street and travel south, directly where they originated from.

Note that “Scenario” is abbreviated as “Sc.” for formatting purposes in the table below.

Table 8: Screenline Assessment - Detailed

Screenline	Direction	Road / Screenline Total	Sc. 1 Lanes	Sc. 1 Capacity	Sc. 1 Volume	Sc. 1 V/C	Sc. 2 Lanes	Sc. 2 Capacity	Sc. 2 Volume	Sc. 2 V/C	Sc. 3 Lanes	Sc. 3 Capacity	Sc. 3 Volume	Sc. 3 V/C	Sc. 4 Lanes	Sc. 4 Capacity	Sc. 4 Volume	Sc. 4 V/C
1	N.B.	Division Street	1	800	1,189	1.49	1	800	1,214	1.52	1	800	1,092	1.37	1	800	1,092	1.37
1	N.B.	Harvey Street	1	400	3	0.01	1	400	300	0.75	1	400	125	0.31	1	400	145	0.36
1	N.B.	Wellington Street	0	0	0	0.00	0	0	0	0.00	1	800	845	1.06	1	800	862	1.08
1	N.B.	Montreal Street	1	800	1,069	1.34	1	800	965	1.21	1	800	907	1.13	1	800	926	1.16
1	N.B.	Total	3	2,000	2,261	1.13	3	2,000	2,479	1.24	4	2,800	2,969	1.06	4	2,800	3,025	1.08
1	S.B.	Division Street	1	800	944	1.18	1	800	1,098	1.37	1	800	1,023	1.28	1	800	1,006	1.26
1	S.B.	Harvey Street	1	400	2	0.01	1	400	21	0.05	1	400	0	0.00	1	400	3	0.01
1	S.B.	Wellington Street	0	0	0	0.00	0	0	0	0.00	1	800	629	0.79	1	800	680	0.85
1	S.B.	Montreal Street	1	800	726	0.91	1	800	868	1.09	1	800	770	0.96	1	800	819	1.02
1	S.B.	Total	3	2,000	1,672	0.84	3	2,000	1,987	0.99	4	2,800	2,422	0.87	4	2,800	2,508	0.90
2	N.B.	Division Street	1	800	776	0.97	1	800	780	0.98	1	800	788	0.99	1	800	786	0.98
2	N.B.	Patrick Street	1	400	29	0.07	1	400	17	0.04	1	400	76	0.19	1	400	33	0.08
2	N.B.	Montreal Street	1	800	616	0.77	1	800	540	0.68	1	800	790	0.99	1	800	540	0.68
2	N.B.	Rideau Street	1	800	637	0.80	1	800	766	0.96	1	800	838	1.05	1	800	579	0.72
2	N.B.	Wellington Street	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00	1	800	669	0.84
2	N.B.	Total	4	2,800	2,058	0.74	4	2,800	2,103	0.75	4	2,800	2,492	0.89	5	3,600	2,607	0.72
2	S.B.	Division Street	1	800	611	0.76	1	800	603	0.75	1	800	828	1.04	1	800	631	0.79
2	S.B.	Patrick Street	1	400	1	0.00	1	400	292	0.73	1	400	329	0.82	1	400	304	0.76
2	S.B.	Montreal Street	1	800	499	0.62	1	800	779	0.97	1	800	1,062	1.33	1	800	916	1.15
2	S.B.	Rideau Street	1	800	428	0.54	1	800	396	0.50	1	800	0	0.00	1	800	0	0.00
2	S.B.	Wellington Street	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00	1	800	621	0.78
2	S.B.	Total	4	2,800	1,539	0.55	4	2,800	2,070	0.74	4	2,800	2,219	0.79	5	3,600	2,472	0.69

Table 8: Screenline Assessment - Detailed (continued)

Screenline	Direction	Road /Screenline Total	Sc. 1 Lanes	Sc. 1 Capacity	Sc. 1 Volume	Sc. 1 V/C	Sc. 2 Lanes	Sc. 2 Capacity	Sc. 2 Volume	Sc. 2 V/C	Sc. 3 Lanes	Sc. 3 Capacity	Sc. 3 Volume	Sc. 3 V/C	Sc. 4 Lanes	Sc. 4 Capacity	Sc. 4 Volume	Sc. 4 V/C
3	N.B.	Division Street	1	800	907	1.13	1	800	870	1.09	1	800	877	1.10	1	800	851	1.06
3	N.B.	Barrie Street	1	400	3	0.01	1	400	64	0.16	1	400	42	0.11	1	400	4	0.01
3	N.B.	York Street	1	400	322	0.81	1	400	348	0.87	1	400	315	0.79	1	400	303	0.76
3	N.B.	Main Street	1	400	141	0.35	1	400	70	0.18	1	400	114	0.29	1	400	69	0.17
3	N.B.	Patrick Street	1	400	20	0.05	1	400	162	0.41	1	400	224	0.56	1	400	195	0.49
3	N.B.	Montreal Street	1	600	551	0.92	1	600	531	0.89	1	600	581	0.97	1	600	548	0.91
3	N.B.	Bagot Street	1	400	25	0.06	1	400	234	0.59	1	400	218	0.55	1	400	143	0.36
3	N.B.	Rideau Street	1	800	763	0.95	1	800	765	0.96	1	800	803	1.00	1	800	782	0.98
3	N.B.	Wellington Street	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00	1	800	348	0.44
3	N.B.	Total	8	4,200	2,732	0.65	8	4,200	3,044	0.72	8	4,200	3,174	0.76	9	5,000	3,243	0.65
3	S.B.	Division Street	1	800	703	0.88	1	800	549	0.69	1	800	719	0.90	1	800	589	0.74
3	S.B.	Main Street	1	400	4	0.01	1	400	4	0.01	1	400	4	0.01	1	400	4	0.01
3	S.B.	York Street	1	400	257	0.64	1	400	81	0.20	1	400	65	0.16	1	400	74	0.19
3	S.B.	Barrie Street	1	400	0	0.00	1	400	0	0.00	1	400	0	0.00	1	400	0	0.00
3	S.B.	Patrick Street	1	400	0	0.00	1	400	0	0.00	1	400	6	0.02	1	400	0	0.00
3	S.B.	Montreal Street	1	600	290	0.48	1	600	329	0.55	1	600	397	0.66	1	600	263	0.44
3	S.B.	Bagot Street	1	400	205	0.51	1	400	346	0.87	1	400	321	0.80	1	400	338	0.85
3	S.B.	Rideau Street	1	800	518	0.65	1	800	752	0.94	1	800	564	0.71	1	800	558	0.70
3	S.B.	Wellington Street	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00	1	800	363	0.45
3	S.B.	Total	8	4,200	1,977	0.47	8	4,200	2,061	0.49	8	4,200	2,076	0.49	9	5,000	2,189	0.44
4	N.B.	Division Street	1	800	704	0.88	1	800	703	0.88	1	800	717	0.90	1	800	637	0.80
4	N.B.	Barrie Street	1	500	78	0.16	1	500	401	0.80	1	500	352	0.70	1	500	321	0.64
4	N.B.	Sydenham Street	1	400	4	0.01	1	400	73	0.18	1	400	82	0.21	1	400	57	0.14
4	N.B.	Montreal Street	1	600	90	0.15	1	600	136	0.23	1	600	142	0.24	1	600	112	0.19
4	N.B.	Bagot Street	1	400	317	0.79	1	400	313	0.78	1	400	314	0.79	1	400	338	0.85
4	N.B.	Wellington Street	1	600	220	0.37	1	600	146	0.24	1	600	161	0.27	1	600	149	0.25
4	N.B.	Total	6	3,300	1,413	0.43	6	3,300	1,772	0.54	6	3,300	1,768	0.54	6	3,300	1,614	0.49
4	S.B.	Division Street	1	800	401	0.50	1	800	413	0.52	1	800	577	0.72	1	800	391	0.49
4	S.B.	Barrie Street	1	500	162	0.32	1	500	215	0.43	1	500	205	0.41	1	500	190	0.38
4	S.B.	Sydenham Street	1	400	66	0.17	1	400	58	0.15	1	400	55	0.14	1	400	66	0.17
4	S.B.	Montreal Street	1	600	239	0.40	1	600	335	0.56	1	600	414	0.69	1	600	243	0.41
4	S.B.	Bagot Street	1	400	433	1.08	1	400	423	1.06	1	400	405	1.01	1	400	417	1.04
4	S.B.	Wellington Street	1	600	359	0.60	1	600	354	0.59	1	600	147	0.25	1	600	383	0.64
4	S.B.	Total	6	3,300	1,660	0.50	6	3,300	1,798	0.54	6	3,300	1,803	0.55	6	3,300	1,690	0.51

Table 8: Screenline Assessment - Detailed (continued)

Screenline	Direction	Road / Screenline Total	Sc. 1 Lanes	Sc. 1 Capacity	Sc. 1 Volume	Sc. 1 V/C	Sc. 2 Lanes	Sc. 2 Capacity	Sc. 2 Volume	Sc. 2 V/C	Sc. 3 Lanes	Sc. 3 Capacity	Sc. 3 Volume	Sc. 3 V/C	Sc. 4 Lanes	Sc. 4 Capacity	Sc. 4 Volume	Sc. 4 V/C
5	W.B.	J.C.B.	2	1,800	954	0.53	2	1,800	1,244	0.69	2	1,800	1,799	1.00	2	1,800	1,840	1.02
5	W.B.	Elliott Street	1	500	256	0.51	1	500	355	0.71	1	500	453	0.91	1	500	459	0.92
5	W.B.	Railway Street	1	500	209	0.42	1	500	292	0.58	1	500	177	0.35	1	500	156	0.31
5	W.B.	Stephen Street	1	600	588	0.98	1	600	624	1.04	1	600	564	0.94	1	600	589	0.98
5	W.B.	York Street	1	400	322	0.81	1	400	348	0.87	1	400	315	0.79	1	400	303	0.76
5	W.B.	Main Street	1	400	141	0.35	1	400	70	0.18	1	400	114	0.29	1	400	69	0.17
5	W.B.	Raglan Road	1	400	11	0.03	1	400	11	0.03	1	400	7	0.02	1	400	8	0.02
5	W.B.	Colborne Street	1	400	42	0.11	1	400	84	0.21	1	400	52	0.13	1	400	98	0.25
5	W.B.	Queen Street	2	1,200	1,045	0.87	2	1,200	1,046	0.87	2	1,200	996	0.83	2	1,200	967	0.81
5	W.B.	Total	11	6,200	3,568	0.58	11	6,200	4,074	0.66	11	6,200	4,477	0.72	11	6,200	4,489	0.72
5	E.B.	J.C.B.	2	1,800	1,051	0.58	2	1,800	1,208	0.67	2	1,800	1,778	0.99	2	1,800	1,803	1.00
5	E.B.	Elliott Street	1	500	181	0.36	1	500	175	0.35	1	500	111	0.22	1	500	144	0.29
5	E.B.	Railway Street	1	500	44	0.09	1	500	346	0.69	1	500	59	0.12	1	500	197	0.39
5	E.B.	Stephen Street	1	600	448	0.75	1	600	620	1.03	1	600	611	1.02	1	600	607	1.01
5	E.B.	York Street	1	400	257	0.64	1	400	81	0.20	1	400	65	0.16	1	400	74	0.19
5	E.B.	Main Street	1	400	0	0.00	1	400	0	0.00	1	400	0	0.00	1	400	0	0.00
5	E.B.	Raglan Road	1	400	38	0.10	1	400	46	0.12	1	400	45	0.11	1	400	45	0.11
5	E.B.	Colborne Street	1	400	0	0.00	1	400	0	0.00	1	400	0	0.00	1	400	0	0.00
5	E.B.	Queen Street	1	600	210	0.35	1	600	102	0.17	1	600	98	0.16	1	600	94	0.16
5	E.B.	Total	10	5,600	2,229	0.40	10	5,600	2,578	0.46	10	5,600	2,767	0.49	10	5,600	2,964	0.53

There are significant issues on Division Street for screenlines #1, 2, and 3. The most significant issues are at screenline #1 where northbound demand exceeds capacity by up to 52% on the 2034 T.M.P. base road network with the N.K.T.S.P. land use. The W.S.E. shifts traffic volumes in the model and reduces traffic volumes on Division Street somewhat, but the demand still exceeds capacity by 37%.

There are also issues on Montreal Street for screenlines #1 and #2. At screenline #1, the northbound demand exceeds capacity by 21% for the 2034 T.M.P. road network with the N.K.T.S.P. land use. At screenline #2, the southbound demand exceeds capacity by up to 33% for the N.K.T.S.P. land use with W.S.E. north and 15% with the full W.S.E.

W.S.E. north is anticipated to approach or exceed capacity in both directions at screenline #1 for both the W.S.E. north and the full W.S.E. scenarios. The detailed screenline analysis confirms that the W.S.E. north is required but the full W.S.E. is not required since there is adequate north-south capacity at screenlines #2, #3, and #4.

Screenline #5 shows the W.S.E. will increase traffic volumes on J.C.B., Elliott Street, and Stephen Street. The additional north-south capacity provided by the W.S.E. shifts traffic from Division Street and Harvey Street to the W.S.E. The individual roadways are only slightly over capacity (3% at most) and in general the east-west screenline is well under capacity (72% at most) and therefore there appears to be sufficient east-west capacity and additional capacity is not required.

5.2

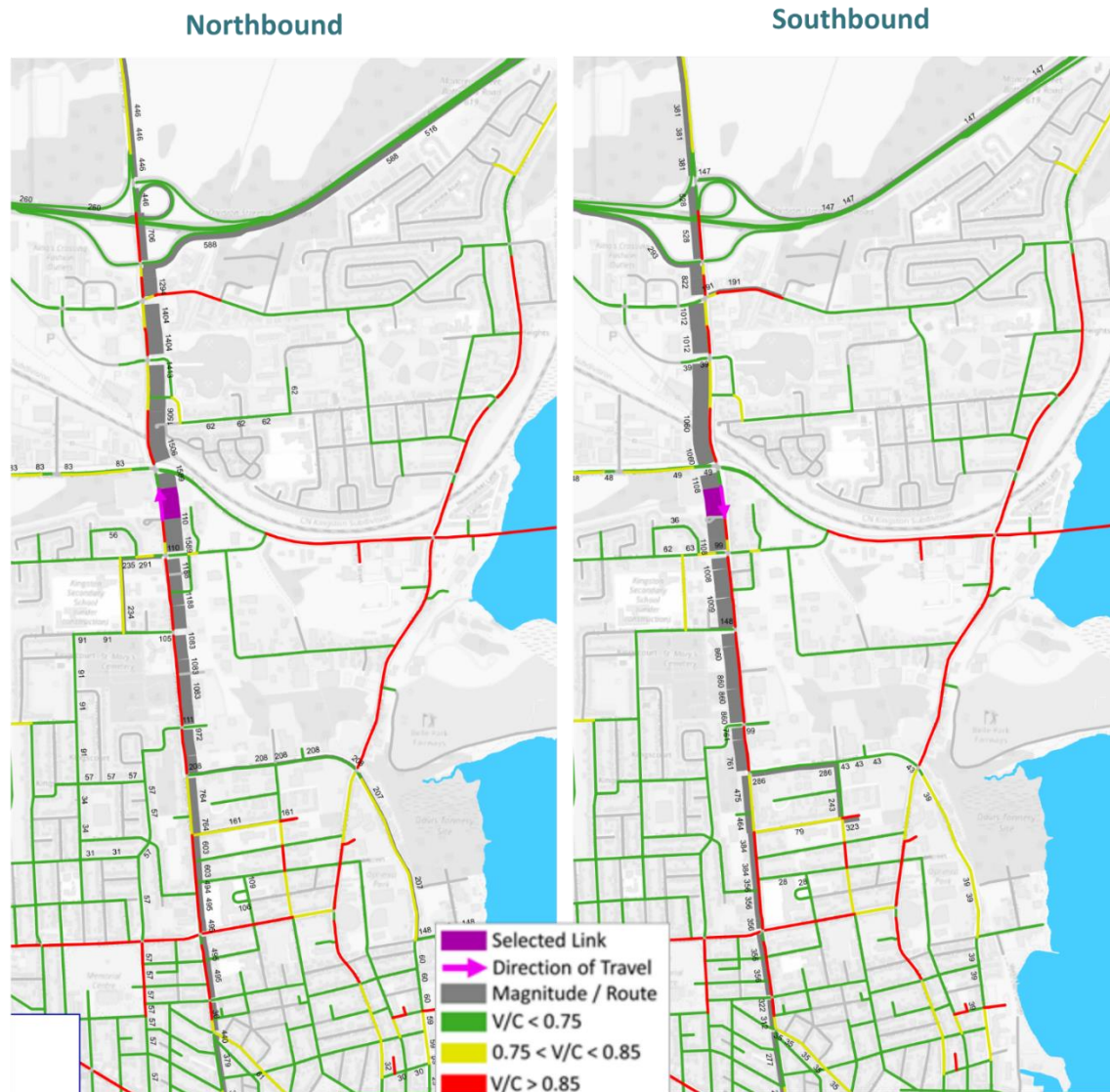
North King's Town Secondary Plan Land Use

The purpose of Scenario 2 was to evaluate the impact of the N.K.T.S.P. land use on study area roadways. As documented in **Section 4.1**, the N.K.T.S.P. land use results in an additional 8,350 people, 1,900 jobs, and 3,825 vehicle trips in the study area (resulting from a combination of changed land use and changed travel patterns) compared to the 2034 T.M.P. land use.

The screenline analysis completed above shows that traffic demands resulting from the N.K.T.S.P. land use will exceed capacity by approximately 400 vehicles in the northbound direction at screenline #1. Select link analyses were completed for Division Street and Montreal Street at screenline #1 to determine the role and function of these roadways and to determine how the issue could be resolved.

Figure 15 illustrates the select link analysis for Division Street south of J.C.B.

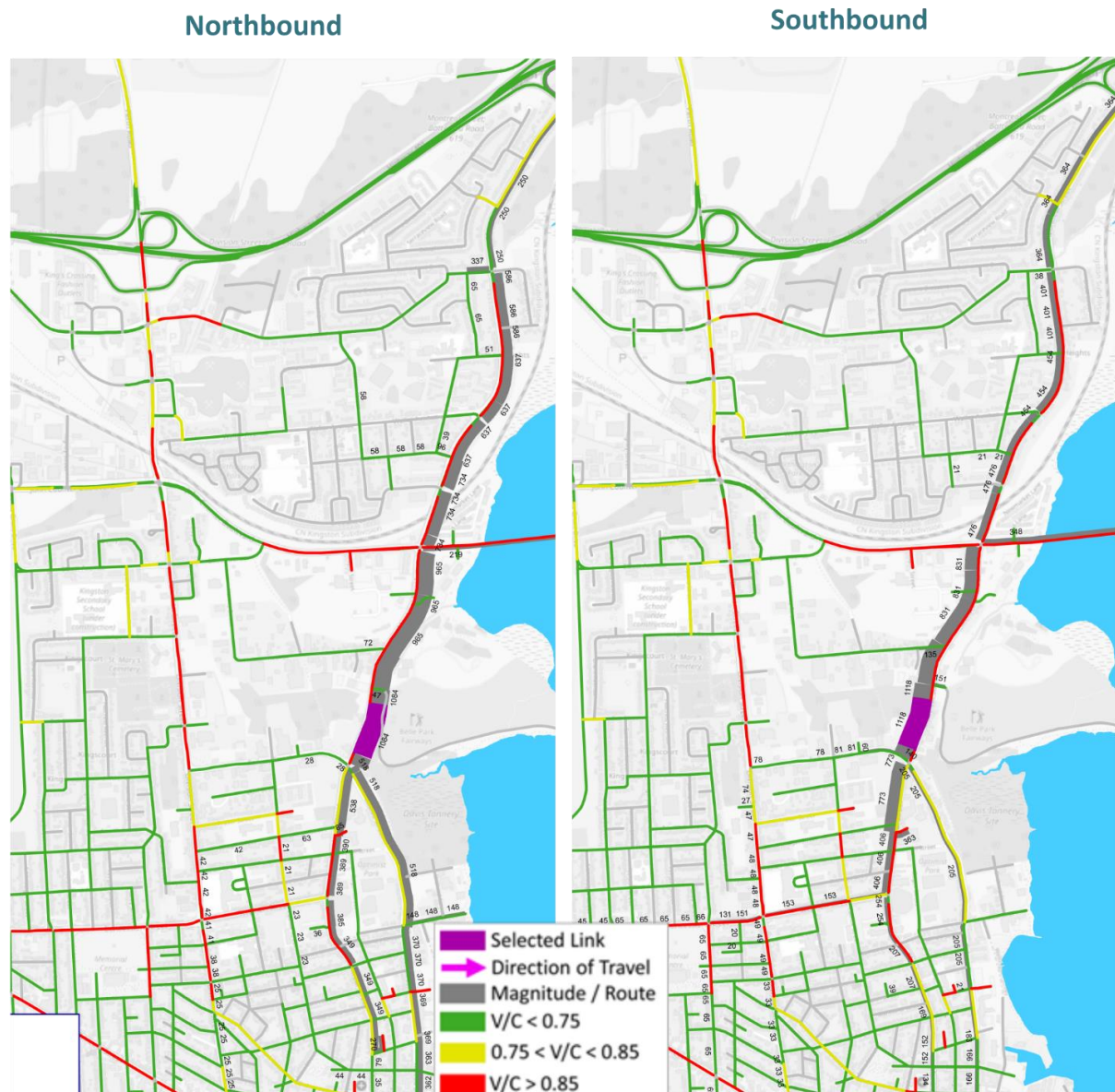
Figure 15: Select Link Analysis - Scenario 2 - Division Street



The analysis shows that the majority of traffic using Division Street originates downtown and is destined to Highway 401 or north of Highway 401, or vice-versa for the opposite direction. Improvements to Montreal Street and the Wellington Street Extension may provide some relief to Division Street. Improvements to rural commuter transit service, or carpool/park and ride lots, may also help reduce this demand on study area roadways.

Figure 16 illustrates the select link analysis for Montreal Street south of J.C.B. Montreal Street.

Figure 16: Select Link Analysis - Scenario 2 - Montreal Street



Southbound capacity could be added in the form of improved transit service to the downtown core. There are approximately 240 trips originating in study area destined towards downtown; this is approximately 10% of trips generated by the N.K.T.S.P. land use and therefore the transit mode share of new trips would need to increase by 10% in the corridor. This would require approximately six more buses at 10-minute headways for the southbound direction during the PM peak hour.

It would be challenging to add northbound capacity by improving PM peak hour transit service northbound since the area north of the study area is quite sparse and serving

such a sparse area would be costly. The Wellington Street Extension (north of Rideau Street) is recommended to relieve Division Street and Montreal Street between the downtown core and J.C.B. for the northbound direction.

5.3**Wellington Street Extension – Role and Function**

Select link analyses were completed for the partial W.S.E. and the full W.S.E. The analyses focused on the role and function of the north portion of the W.S.E. and the south portion of the W.S.E., and the impact of the full W.S.E. compared to only the north portion.

Figure 17 illustrates the select link analysis for the partial Wellington Street Extension north of Montreal Street. The analysis shows different traffic patterns for the northbound and southbound directions.

The majority of northbound traffic originates from the downtown area and is destined to Highway 401 eastbound. The majority of southbound traffic originates from J.C.B. and is destined to the new residential developments near the intersection of Montreal Street and Rideau Street / Wellington Street Extension.

Figure 17: Select Link Analysis - Scenario 3 – Partial Wellington Street Extension

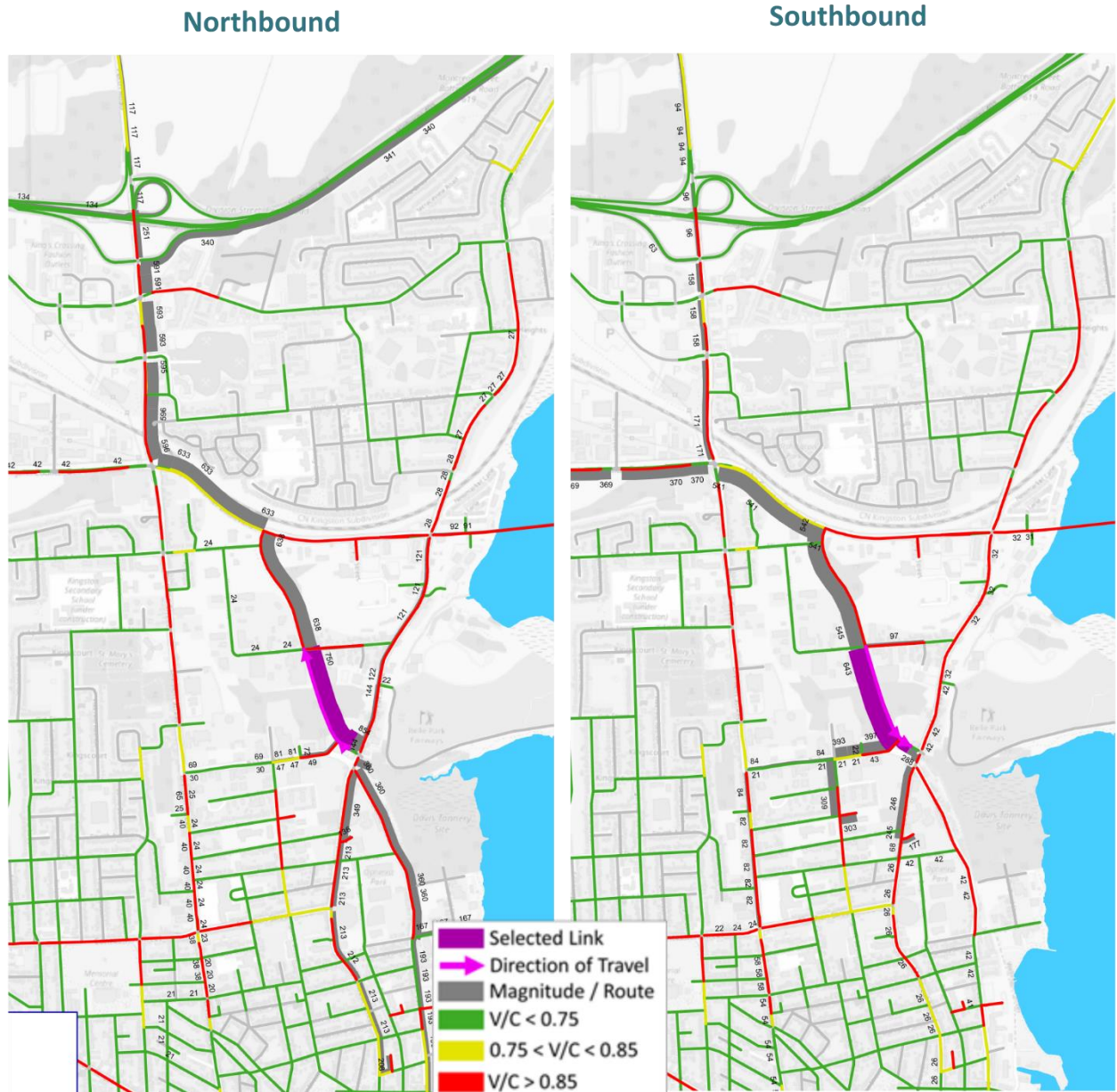
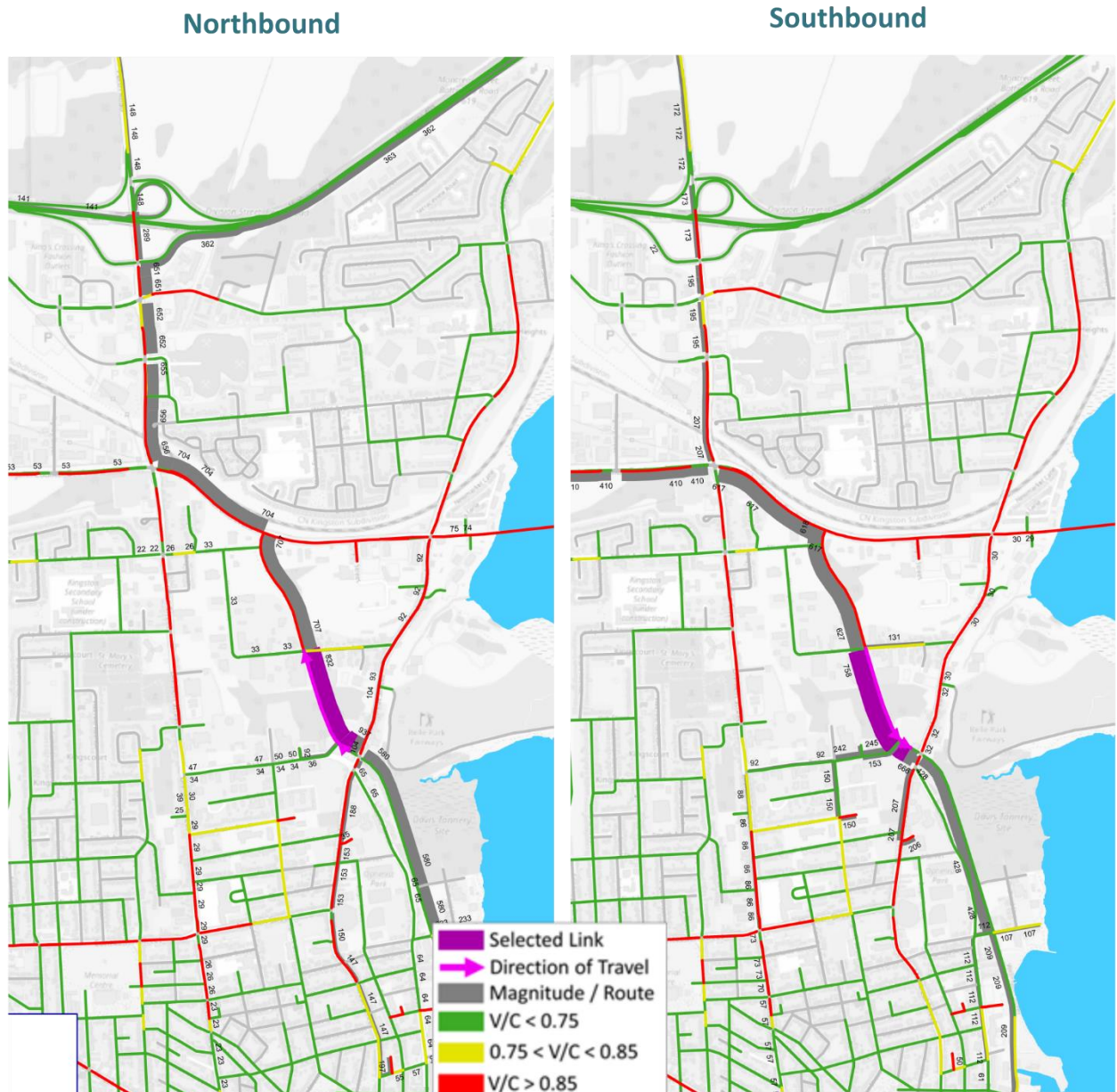


Figure 18 illustrates the select link analysis for the Full Wellington Street Extension north of Montreal Street. The analysis shows that the majority of vehicle trips originate from downtown and travel north on W.S.E. to J.C.B. and then northbound on Division Street or west on J.C.B.

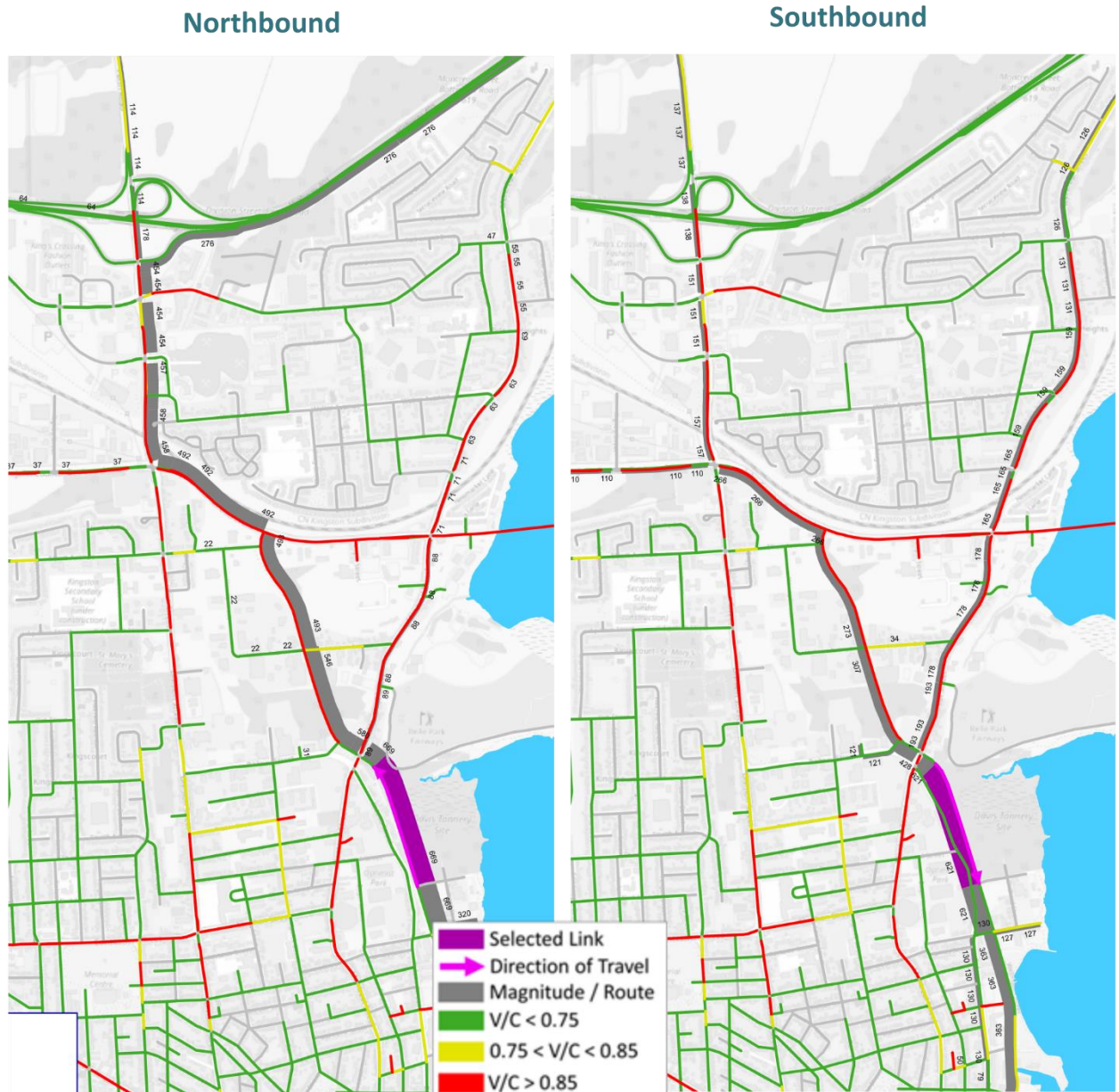
Figure 18: Select Link Analysis - Scenario 4 – Full Wellington Street Extension (north)



Comparing **Figure 17** to **Figure 18**, it can be seen that traffic has shifted from Rideau Street to the Wellington Street Extension. Rideau Street and the Wellington Street Extension appear to serve the same role and function, which is logical since they are nearly parallel. Taking this into account, the full Wellington Street Extension is not justified from the perspective of its role in the network.

Figure 19 illustrates the select link analysis for the Full W.S.E. south of Montreal Street.

Figure 19: Select Link Analysis - Scenario 4 – Full Wellington Street Extension (south)



The analysis shows that the majority of vehicle trips originate from downtown and travel north on W.S.E. to J.C.B. and then northbound on Division Street or west on J.C.B. As discussed above, the role and function of W.S.E. south appears to be the same as Rideau Street and therefore there is no distinct role for the southern portion of the W.S.E.

The results of the flow bundle analysis suggest that the function of the W.S.E. should be, from an automobile perspective, to provide longer-distance mobility for auto trips destined between downtown and Highway 401. This would suggest that the design of the facility should favour that of an arterial, where there direct access to the facility is limited and it is designed for mobility.

However, if there is a desire to enable a more locally-focused pattern of land use and access on W.S.E., tipping the function of the facility away from providing strictly mobility to perform a collector function, the role of W.S.E. would be to provide more access and a more community-friendly focus. With the collector role, the auto carrying capacity will be commensurately reduced, and the parallel arterial corridors (Division Street and Montreal Street) will face increased pressure, requiring increased focus on providing through capacity between downtown and Highway 401.

A design for W.S.E. that is more reflective of a collector function will provide more options for active transportation and allow for the connection to planned active transportation infrastructure (e.g., K&P Trail). The subsequent operational analysis will confirm the function of the facility in light of the potential need to reduce automobile demands in the study area beyond those directed by city council.

5.4 Transit Opportunities

Transit service will play a critical role in improving the function of the roadways in the study area. As shown in the screenline and flow bundle analyses above, the pattern of travel is generally for longer distance trips that are impractical to accommodate via active transportation. This is particularly true in the northern portion of the study area where the block sizes are larger and land uses are less dense.

To address the capacity deficiency in the northern portion of the corridor, in the worst case (with N.K.T. intensification and the inclusion of the W.S.E.), an additional 225 trips must be accommodated via sustainable modes. This represents approximately 8% of the new automobile trips produced by the N.K.T. land use. If this were to be accommodated by transit alone, the overall mode share for transit would need to move from 15% to reach 23% for the network to perform adequately during the peak hour in 2034.

This increased demand for transit service represents an additional five to six full buses during the peak (assuming a capacity of 40 passengers) carrying passengers over the northern screenline. The City of Kingston is committed to increasing express bus service

in the study area; the recent implementation of Routes 801 and 802, for example, will provide four additional buses along Montreal Street during the peak hour, which will provide most of the increased service required by 2034.

5.5

Active Transportation Opportunities

Similar to the discussion of transit opportunities, active transportation will play an important role in the southern portion of the study area, where walking and cycling are more practical for residents of the study area who work or go to school closer to the downtown area. The density of streets and population and the mix of land uses produce far greater opportunities to encourage and enable active transportation.

The council-directed 20% active transportation target will need to be pushed further within the study area to reduce the dominance of the automobile and solve specific corridor issues along Division Street and Montreal Street. Examining the individual corridor performance, Division Street generally requires the most assistance along screenlines 3, 4, and 5 with demand exceeding capacity in the range of 50 to 80 trips. This represents 6 to 10% of the demand in the corridor. To reduce demand below the capacity threshold, therefore, the active transportation mode share along these corridors would need to be in the range of 25% to 30% in the worst case. However, in combination with increases in transit service in the corridor, this need will be significantly lessened. In reality, the two approaches (provision of improved transit and active transportation infrastructure along key corridors) will work together to significantly enhance overall performance of the corridor for all modes.

City of Kingston could improve the mode share for active transportation in the study area and reduce automobile demand through implementation of a connected network of All Ages and Abilities (A.A.A.) cycling infrastructure (e.g., separated bike lanes, local street bikeways), reducing automobile travel speeds on local and collector streets through regulation or design treatments, and other approaches to create a safer and more attractive environment for walking and cycling. Active transportation is particularly sensitive to the mix and distribution of land uses, as users require a mix of useful employment, shopping, education, and other land uses to make active transportation a reasonable option for daily use.

6.0

Conclusion

The strategic assessment has demonstrated a lack of north-south capacity in the study area, particularly for Division Street and Montreal Street. This is an issue that was identified in the Kingston T.M.P. and is further exacerbated by the intensification identified by the N.K.T.S.P. land use. The capacity issue is most pronounced to the north of Rideau Street, in particular along Montreal Street and Division Street. Notably, this condition is present for the baseline K.T.M.P. land use and network scenario with an assumption for significant increases in the use of sustainable modes (walking, cycling, and transit).

The capacity issue is most pronounced to the north of Rideau Street along Montreal Street and Division Street. The implementation of the northern portion of the W.S.E. was shown to provide some relief to automobile capacity in the area. However, further reduction in automobile use will be required and should be targeted.

The analysis showed that the W.S.E. provides a key role in the provision of north-south corridor capacity, from J.C.B. to Rideau Street. It provides direct relief to Division Street and Montreal Street and will improve the network connectivity for not only auto vehicles but also for alternative modes (transit, and active modes).

The W.S.E. south of Rideau Street does not play a significant role in terms of capacity or access in the future. As it does not improve the connectivity of the transportation network significantly, its inclusion in the future network is not considered necessary.

Beyond infrastructure, transit service is expected to play a significant role in moving people to/from, as well as through, the N.K.T. community. To achieve the desired increase in mode share will require further targeted improvement in the study area (increased routes, increased frequency) beyond that assumed in the T.M.P. and more recent analysis. Transit priority measures should be considered on Montreal Street and Division Street that could include bus rapid transit, queue jumps, exclusive lanes, or other transit priority measures. (As previously noted, City of Kingston has recently implemented additional express buses along Montreal Street beyond what was assumed for this analysis.)

Montreal Street should be designed with quality pedestrian and cycling facilities that provide safe and attractive connections to the adjacent neighbourhoods; this will allow for a wide range of users from novice to experienced, and will encourage the use of active transportation modes. The transit service increase and the design of the operating environment to support it should be considered within the context of the significant mode shift already assumed within the K.T.M.P. and with consideration of the ultimate build-out of the N.K.T. (i.e., beyond 50 years).

7.0

Next Steps

The strategic network needs have been identified and it is recommended that the W.S.E., from J.C.B. to Rideau Street, be carried forward as part of the future transportation network in the more detailed analysis of future infrastructure and service needs to support the proposed N.K.T.S.P. land use.

However, the strategic analysis also suggests that the W.S.E. will not wholly address the forecast capacity issues and, therefore, additional strategies beyond infrastructure are required to reduce the auto mode share prior to the operational assessment.

Moving to the next steps of analysis for the N.K.T., the transportation demands identified in this memo will be further assessed and adjusted to reflect the potential for increased transit use and active transportation in the study area. These enhanced transportation demands will be carried forward into the operational level assessment. The operational assessment model (microsimulation) will be developed and used to evaluate network and intersection performance at a detailed/operational level. The preliminary results will be used to identify mitigation measures which will influence the intersection level geometry.

The final street design concepts for study area roadways will in part be determined through the strategic analysis findings with respect to the role and function of the infrastructure and the geometric requirements identified the operational analysis.