Appendix A

CITY OF PETERBOROUGH TRANSPORTATION MASTER PLAN
CHAPTER 2 – CURRENT AND FUTURE MOBILITY

MOVE PTBO

DRAFT REPORT - November 2021

peterborough

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1 CURRENT AND FUTURE MOBILITY

Having developed the vision, objectives, and performance criteria for the TMP, the next step in the process focused on determining the current (2018) and expected (2051) mobility challenges for travellers. With an in-depth understanding of future mobility in the system, opportunities in the form of transportation strategies were identified to address these challenges. The strategies comprised of a mix of land use, infrastructure, and policy initiatives to achieve the City's vision. Importantly, the challenges and opportunities were designed to fulfill the Phase 1 requirements of the EA process.

Data driven decision (D3) making was one of the key foundations of this TMP. A significant emphasis on D3 was placed throughout the process, whether it was in the extensive public engagement program or the transportation analysis. D3 efforts for the latter were accomplished via investments made by the City in analytical tools that predicted future mobility patterns. The strategic model was one such tool, which reported modal split for auto, transit, walking and cycling and several more performance criteria that can be found in Chapter 1. Forecasts made by the model were a function of network capacity and topology, including the effects of land use and travel behavior. Importantly, the travel model allowed for defining, testing, and evaluating a myriad of "What if?" strategies. Exogenous inputs in the form of assumptions on land use and infrastructure were essential for producing forecasts from the travel model. The former was made available by the City's planning department and reflected the on-going Official Plan amendment, while the latter was gleaned from the City's Cycling Master Plan and Transit Route Review study. Plans and recommendations from these studies were integrated into the TMP to reflect improvements to these modes.

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1.1 CHALLENGES

A "business as usual (BAU)" approach to transportation planning and policy that focuses on the single occupant automobile is not a practical solution for the future of the City. In fact, it is contrary to the vision and objectives of the TMP, which clearly articulates that a more sustainable way of travel is the only path forward, as corroborated by the overwhelming response from City residents for a future that hinges on "greener" mobility. To appreciate the future state of mobility in the City and opportunities for making it more sustainable; an in-depth understanding of current and future challenges was essential and is presented in the subsequent sub-sections.

1.1.1 DEMOGRAPHIC TRENDS

The City of Peterborough is forecasting 125,000 people and 63,000 jobs by 2051. This growth, translated onto the existing transportation network has the potential to impact future travel times, worsen levels of congestion, increase green house gas emissions, and the lower quality of life in general. Given that demographic and land use patterns are the biggest "push and pull" factor in influencing mobility, it is important to get a deep understanding of how they are expected to evolve from 2018 to 2051. A district map has been created with six distinct areas (Figure 1) with the intent of setting the framework for where population and employment growth will generally take place in the City of Peterborough.

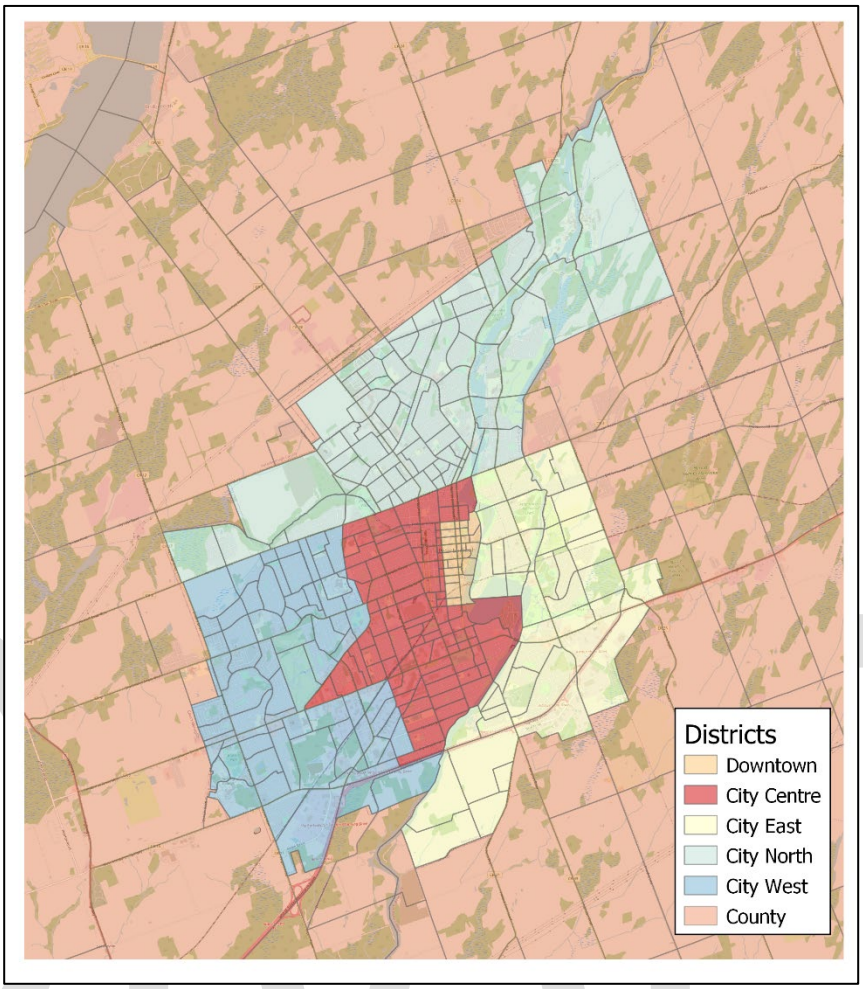

Figure 1 - District Map of County and City of Peterborough

Complimentary to the district map is Table 1, which summarizes the population and employment by each individual district with the purpose of illustrating the movement of population and employment growth.

Table 1 - Population and Employment Growth by District

District	Population 2018	Population 2051	Employment 2018	Employment 2051
County*	43, 529	64, 294	12, 395	20, 018
City Centre	23, 671	29, 249	11, 085	14, 974
Downtown	1, 668	3, 989	9, 973	9, 939
City East	12, 326	19, 816	4, 972	8, 639
City North	23, 119	42, 854	5, 123	13, 695
City West	21, 166	28, 989	13, 393	15, 520
TOTAL* (excludes County)	**81,950**	**124,897**	**44,545**	**62,768**

** County figures includes only a portion of County residents within the model coverage area (the Southern Townships of Cavan-Monaghan, Otonabee – South Monaghan, Douro-Dummer, Selwyn, Asphodel-Norwood)*

The growth trends combined with the base land use forecast assumptions anticipate that more residents will opt for working from home, with a 50 per cent increase in the rate of Office and Professional jobs that will work from home in the future. Working from home is based on classifications of “Office” and “Professional” jobs. Similarly, the forecast assumes a 55 per cent increase in the residents who identify with no fixed place of work, by 2051.

Looking at a population comparison from 2018 to 2051, the City is expected to grow by 50 per cent with concentration in the downtown and developed areas across districts. Pulling from the numbers noted in the table above, Figure 2 and Figure 3, are maps of population growth per acre comparing again 2018 to the 2051 planning horizon. Employment is expected grow by 30% during this 30-year period and unlike population that is concentrated in a few broad areas, employment is expected to be distributed throughout the City (Figure 4 and Figure 5).

The density trends are indictive of the growth in greenfield areas, particularly in the north portions of the City around Lily Lake Road, Parkhill Road West and Chemong Road, along Landsdowne Street West, and Brealy Drive to the west, making up majority of the new population and employment growth to 2051 (Figure 6 and Figure 7)Figure 6 - Population and Employment Density (per acre), 2018. City’s efforts to focus growth in built-up areas via infill development to support sustainable modes of travel. The intensification targets for the City of Peterborough are based on the Provincial Growth Plan for the Greater Golden Horseshoe (2020), where some of these areas are expected to be planned at densities that exceed the threshold in built up areas of the City.

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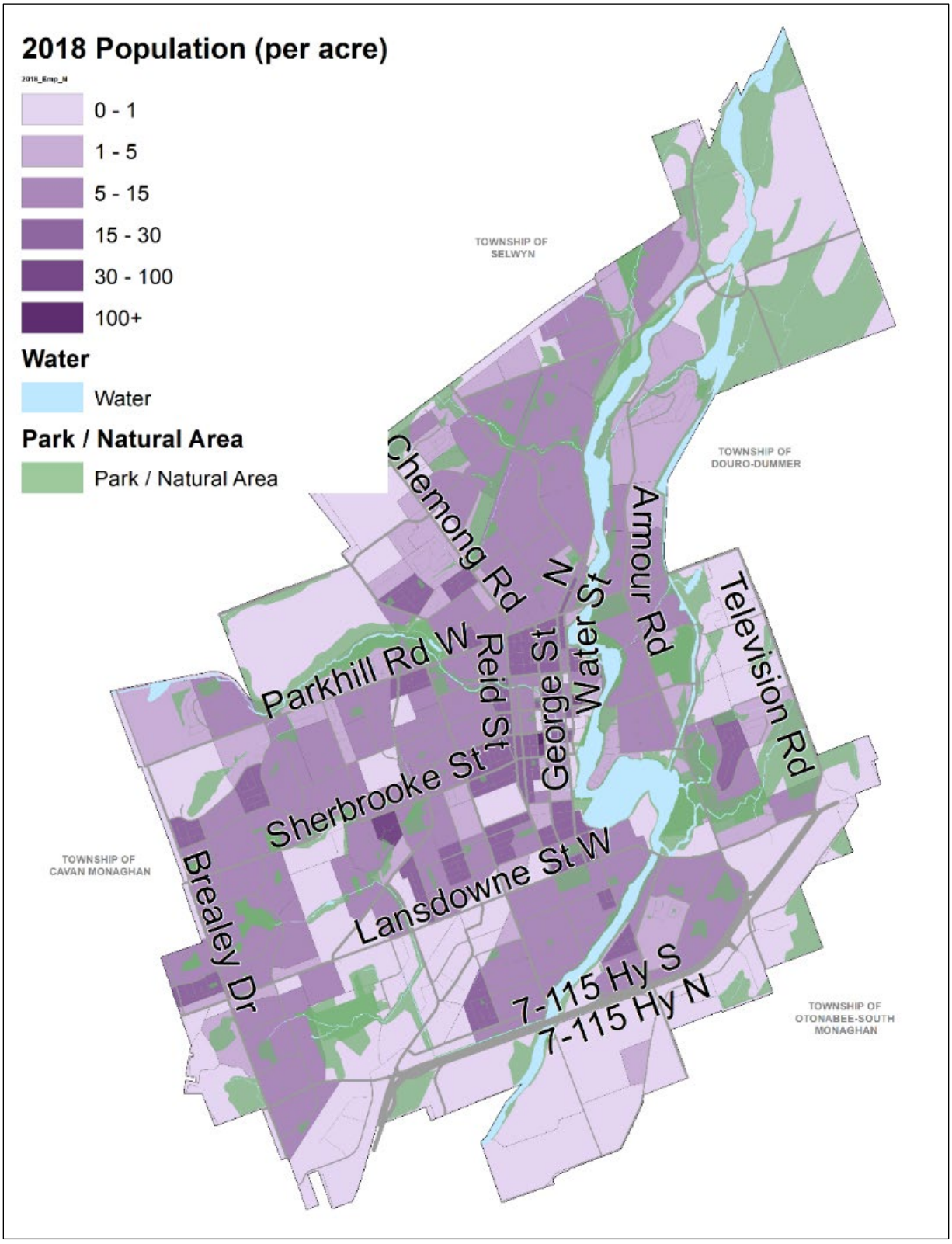

Figure 2 - City of Peterborough Population (per acre), 2018. Total Population: 82,000

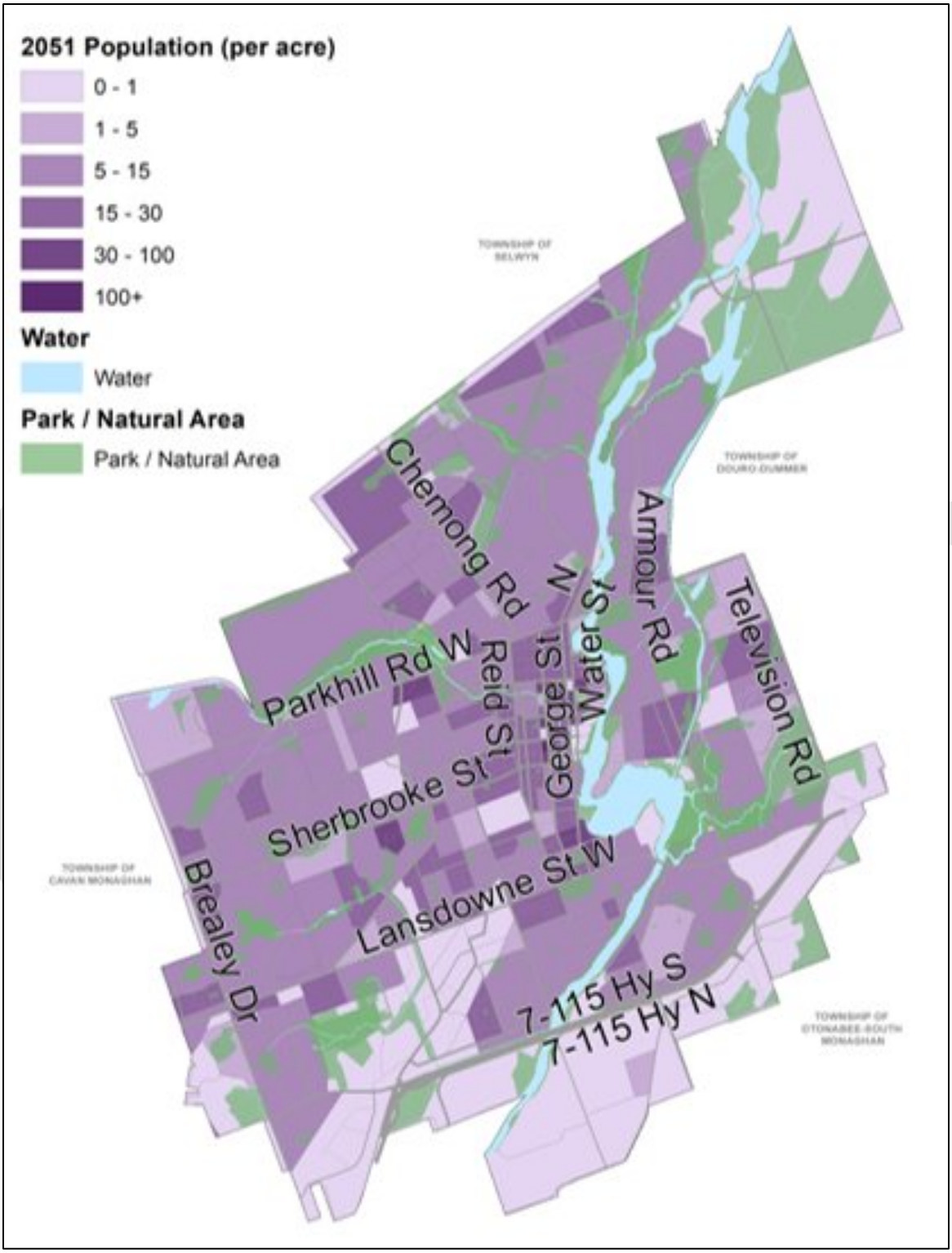

Figure 3 - City of Peterborough Population (per acre), 2051. Total Population: 125,000

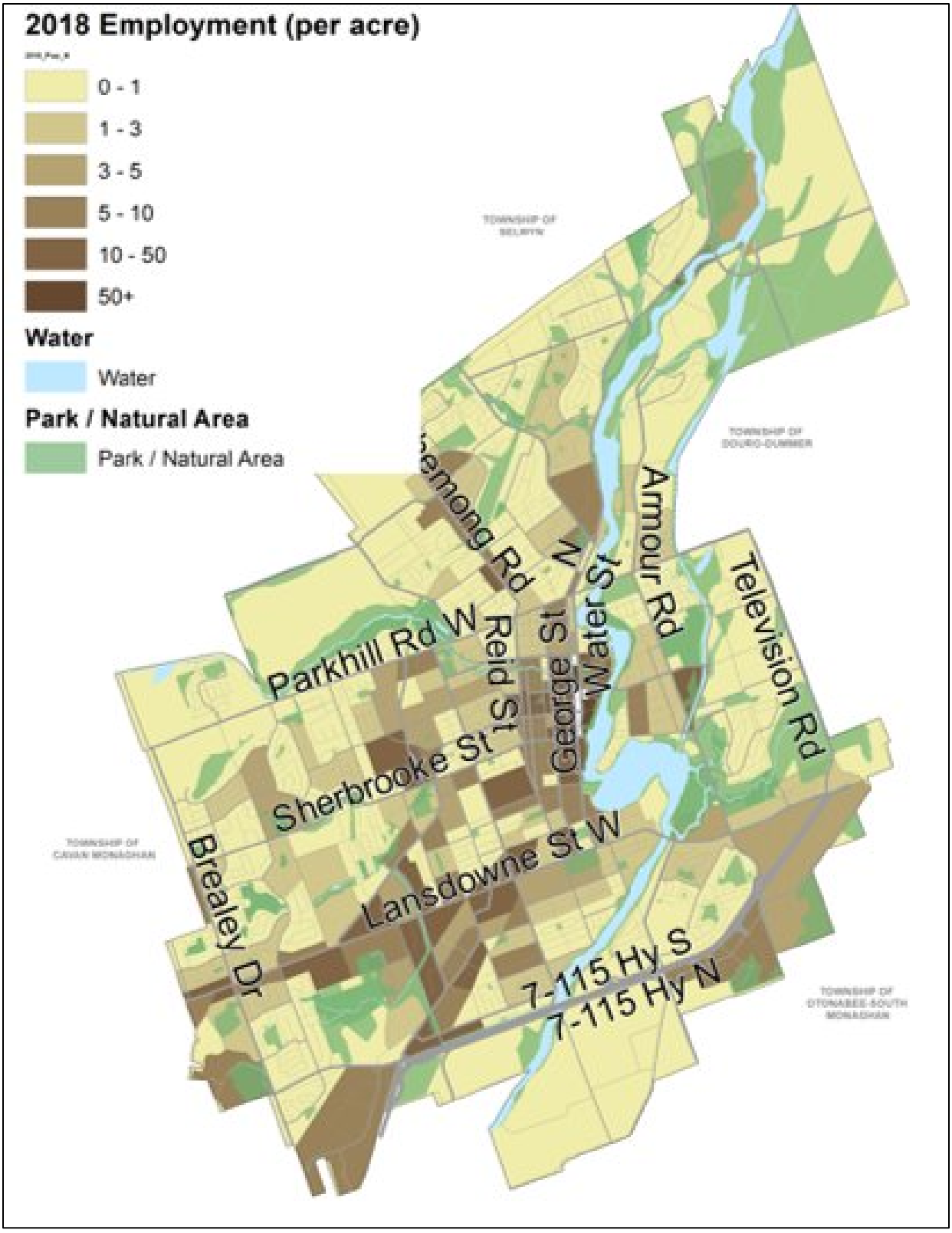

Figure 4 - City of Peterborough Employment (per acre), 2018. Total Employment: 44, 500

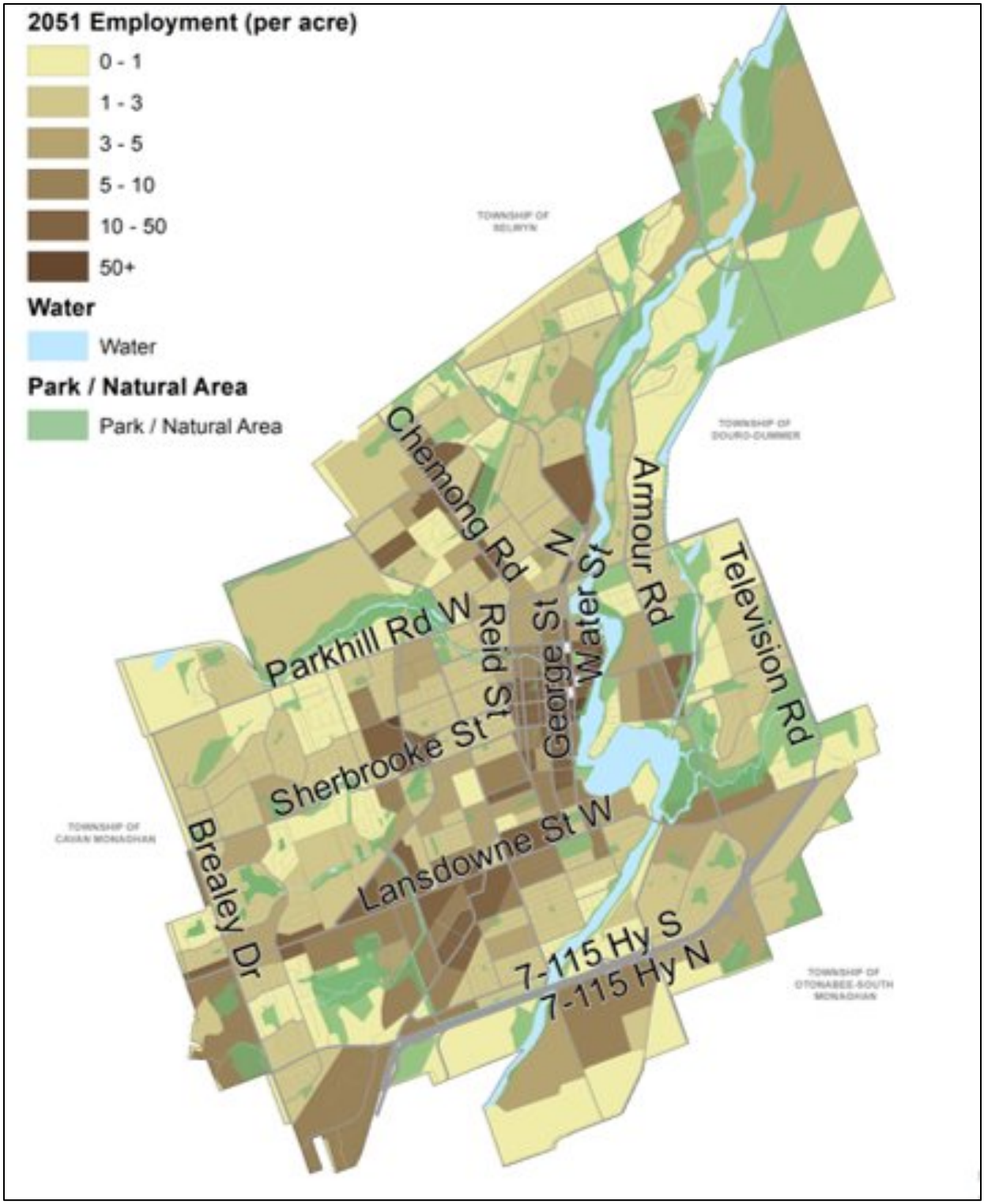

Figure 5 - City of Peterborough Employment (per acre), 2051. Total Employment: 59,000

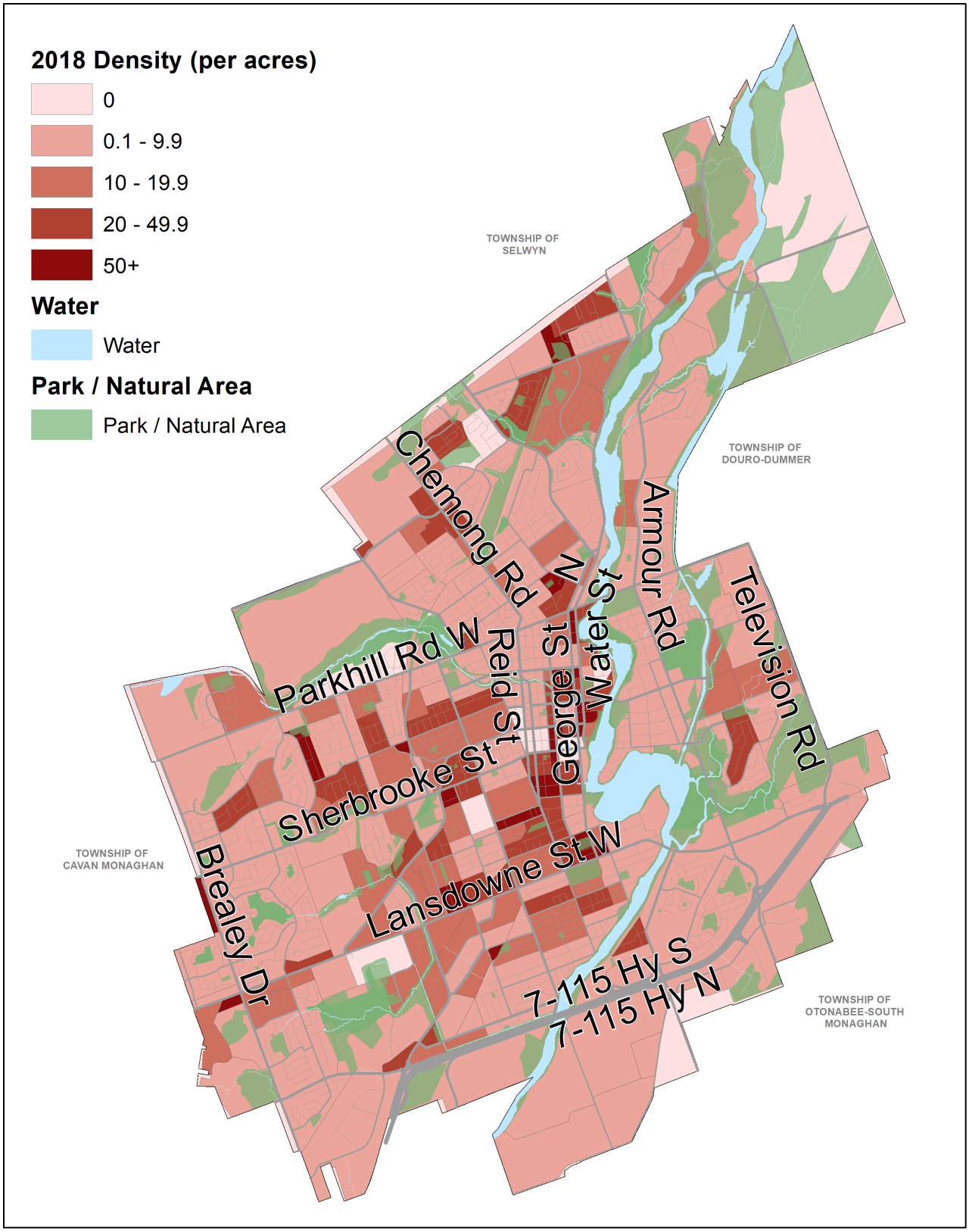

Figure 6 - Population and Employment Density (per acre), 2018

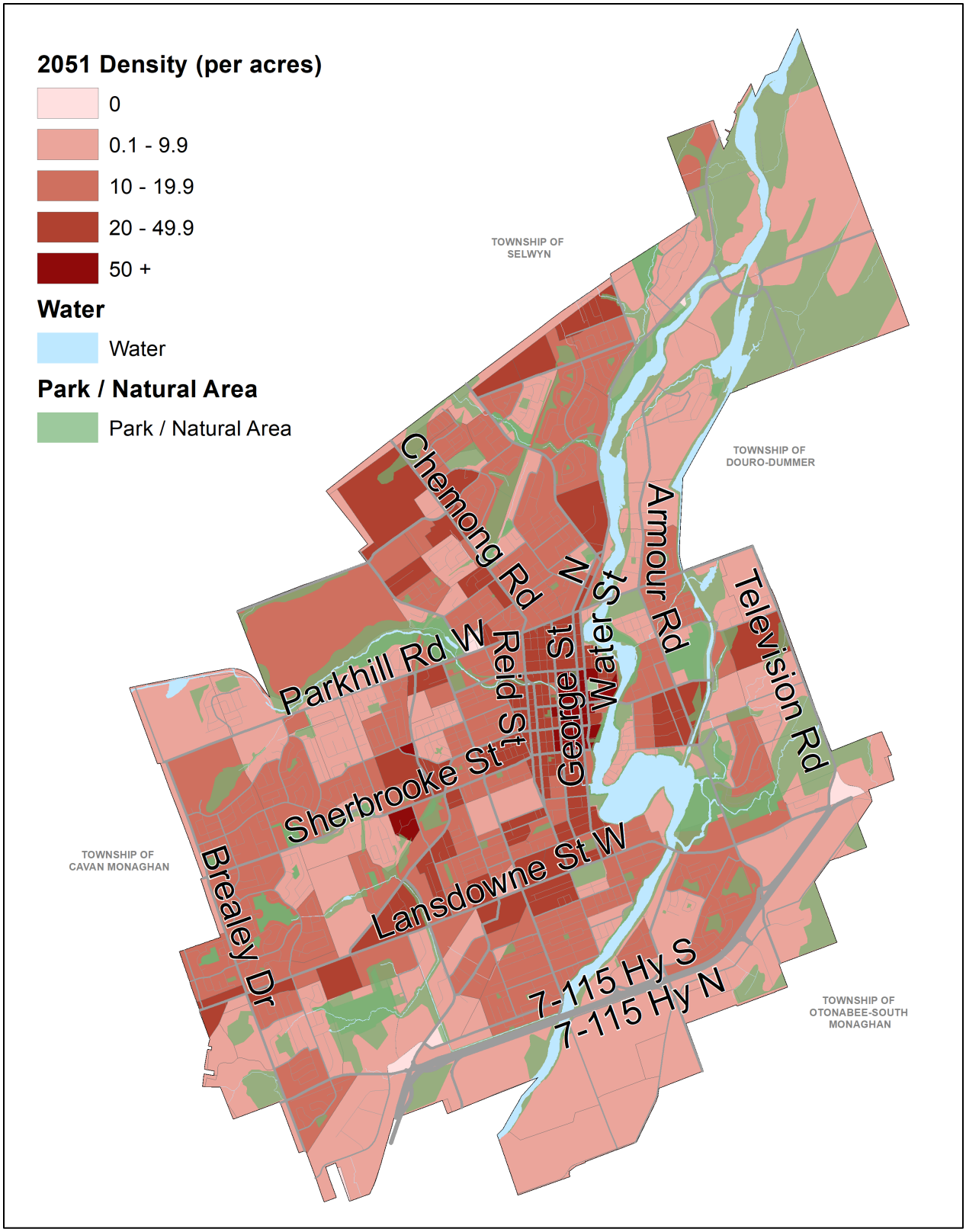

Figure 7 - Population and Employment Density (per acre), 2051

1.2 CITY-WIDE TRAVEL CONSTRAINTS

Following the assessment of forecasted growth in population and employment, the next step determined existing and future travel constraints and patterns in the City. The travel demand model developed as part of the Transit Route Review and Long Term Growth Study was used to document the 2018 existing conditions and the 2051 BAU. The BAU is defined as the 2018 road and transit network with 2051 land use. The 2018 and 2051 BAU strategy in tandem provides a baseline for evaluating opportunities or strategies that are designed to address the challenges or constraints in the network. Select performance criteria are reported to highlight the existing and future challenges in the transportation network. These include:

- Modal split;
- Congestion hot spots;
- Vehicle kilometres traveled;
- Greenhouse gas emissions;
- Total time on the road;
- Percentage of driving time in congestion;
- Per capita transit ridership; and
- Percentage of transit routes operating in congestion.

Like many urban areas, the City witnesses peak congestion in the PM peak period and therefore it is used for reporting the above metrics. Of note, similar metrics have been prepared for the AM and Mid-day periods as well but are not shown for reasons of brevity.

MODAL SPLIT

Like 2018, the 2051 BAU illustrates that automobile trips, either as a driver or passenger, will certainly remain the primary mode of travel in the City. Table 2 highlights this trait along with shares for transit, walking, and cycling as well. In fact, mode shares for auto (SOV + shared ride) and transit are expected to increase marginally at the expense of walking and cycling. These shifts are primarily attributable to growth in population and employment in the fringes of the City where walking, cycling, and transit are not as frequently used compared to downtown.

Table 2 - City of Peterborough Travel Characteristic, 2018 and 2051 BAU (PM Peak Period)

Mode of Transport	2018 PM Peak Period	2051 PM Peak Period
Single-Use Automobile (Driving Alone)	48.4%	51.3%
Shared Ride	25.5%	27.3%
Transit	6.1%	5.6%
Walking	17.4%	13.5%
Cycling	2.6%	2.2%

Table 3 breaks down mode shares in Table 2 by trip purpose for the PM peak period. As noted previously, there is a high uptake of transit primarily amongst post-secondary students, with little increase in transit amongst other purposes. The BAU trends continue to show a high dependency on the single-use automobile for travel to and from “work” and “other”.

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Table 3 - Purpose of Trip, 2051 BAU (PM Peak Period)

Trip Purpose	Single-Use Automobile (Driving Alone)	Shared Ride	Transit	Walking	Cycling
Home-Base Work (HBW)	76.5%	9.4%	3.2%	7.4%	3.5%
Home-Base Other (HBO)	52.1%	38.2%	2.9%	5.1%	1.7%
Home-Base Post Secondary	42.4%	11.0%	45.2%	0.9%	0.4%
Home-Base Elementary Secondary	0.5%	22.4%	2.1%	71.5%	3.4%

CONGESTION HOT SPOTS

Congestion hot spots are designed to help visually clue in on locations in the network that are expected to operate under elevated stress. Stress levels are identified for every individual link and then rationalized to include logical start and end points on the network to avoid creating one-off hot spots that are an artifact of the construct of the model. Figure 8 and Figure 9 highlights congestion hot spots by highlighting links or corridors that are operating at volumes greater than 85 per cent of the roadway capacity.

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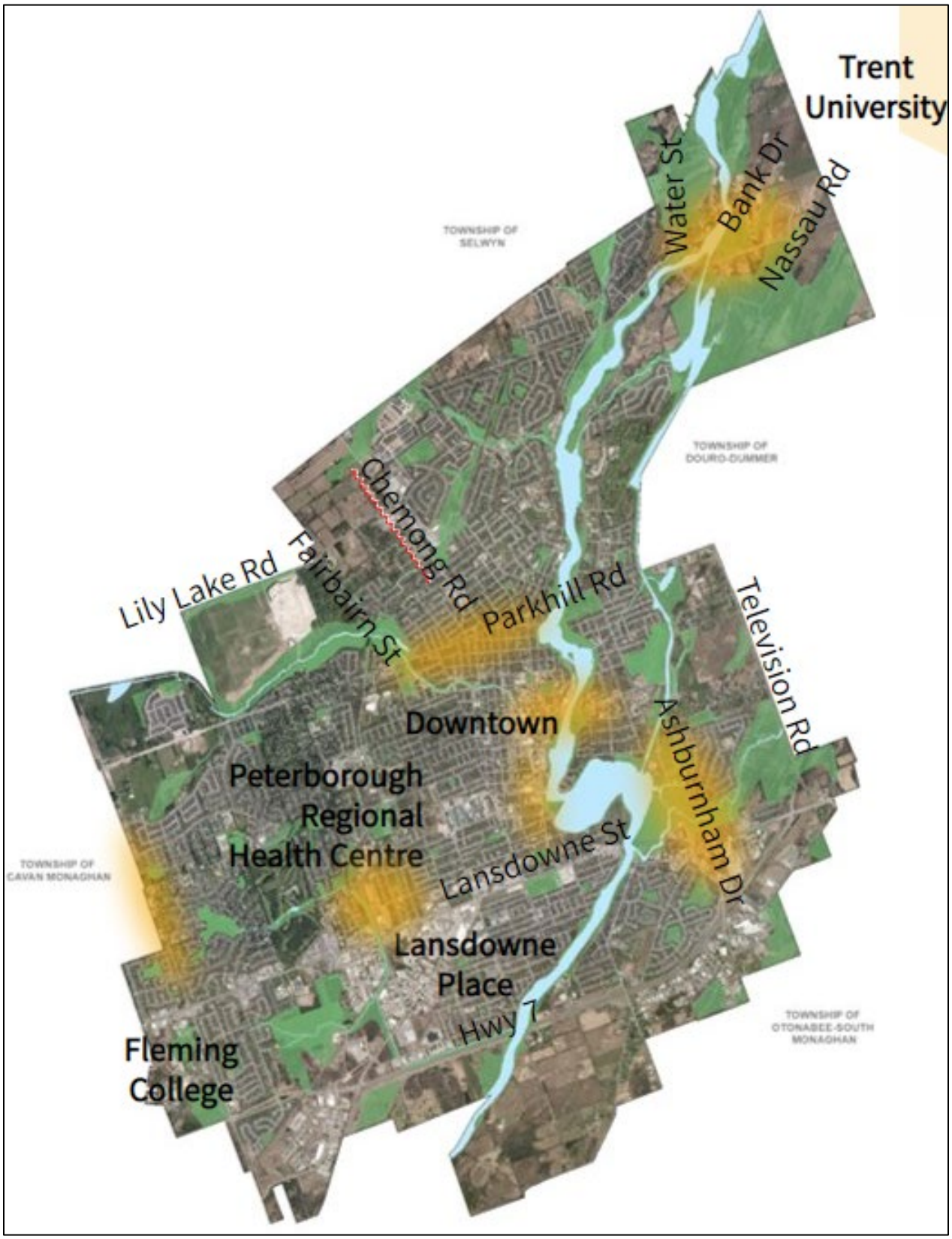

Figure 8 - Areas of Congestion, 2018 (Peak Period)

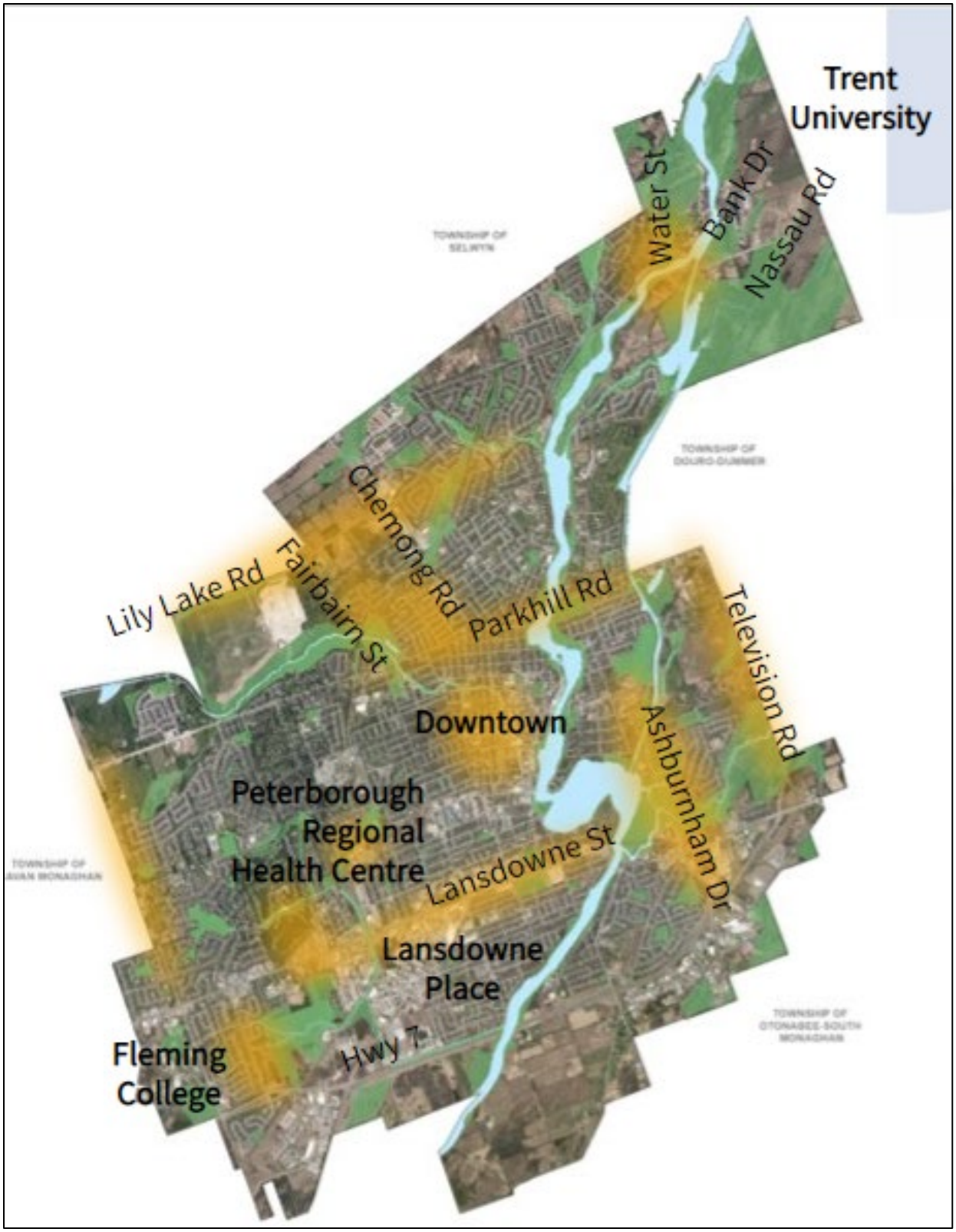

Figure 9 - "Business as Usual" Areas of Congestion, 2051 (PM Peak Period)

VEHICLE KILOMETRES TRAVELLED (VKT)

Table 4 presents vehicle kilometers travelled for the 2018 and 2051 BAU conditions, showing the length of lane-kilometers in the system, segmented by road class, that are currently operating under stress (Volume to capacity is greater than 0.85, exceeding the acceptable level of service) and expected to do so in the future as well. The 2051 BAU is predicting a 44% increase in VKT, which is marginally below the forecasted population growth, but highlights the expectations for a BAU scenario.

Table 4 - 2018 and 2051 Congested Lane Kilometres (PM Peak Period)

Road class	Lane Km	2018 Congested Lane Kms	2051 Congested Lane Kms
Peterborough Bypass (Highway 7 / 115) and Major County Roads	1, 202	46	140
Collector	250	5	13
Arterial	801	15	88
Total	**2, 253**	**66**	**241**

Focusing on roads under the City's jurisdiction suggests that collector roads operating under congested conditions will reduce to 5.3% (5/66) of all congested links in 2051 from 7.5% (13/241) in 2018. Arterials on the other hand will witness close to 36.5% (88/241) of all links operating under congestion in 2051 compared to only 22.7% (15/66) in 2018. Across arterials and collectors combined, congested links will increase from 2% (20/1051) in 2018 to 9.6% (101/1051) in 2051.

TOTAL TIME ON THE ROAD

A 50% increase in vehicle hours travelled is expected during the PM period, where 20,083 hours in 2018 increases to 30,221 hours in 2051.

PERCENTAGE OF AVERAGE DRIVING TIME IN CONGESTION

Looking at automobile use across the transportation network, time spent on congested links (VC<=0.85) is expected to increase from 8% to 24% in the PM peak period.

TRANSPORTATION GREENHOUSE GAS EMISSIONS

Without a shift towards alternative modes, such as cycling, walking, transit, and shared rides, GHG emissions show a nearly 44% increase between 2018 (238 tonnes in the peak hour) and 2051 (342 tonnes in the peak hour). Although the increase in GHG emissions spans over a 30-year period, by pursuing a BAU approach to mobility planning, it would be challenging for the City to meet its Climate Change GHG Reduction Targets and Action Plans through a transportation lens. In 2019 the City of Peterborough declared a Climate Emergency that recognizes the need to achieve a 45% reduction in GHG emissions by the year 2030 and net-zero by 2050.

PER CAPITA ANNUAL TRANSIT RIDERSHIP

Taking the BAU approach modestly increases transit ridership per capita. In 2018, transit ridership was 3.8 trips per capita with an increase to 4.3 by the year 2051.

PERCENTAGE OF TRANSIT ROUTES OPERATING IN CONGESTION

Factoring in the increased travel times over the next 30 years, transit trips travelling in congestion show an increase with the BAU approach, particularly in the PM peak period. Trends show that in 2018, 5% of

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total transit routes operated in congestion during this peak period. By 2051 horizon, we expect 20% of total transit routes in the PM peak operating in congestion. From a transit reliability point of view, this would indicate that buses are unable to maintain their schedules, resulting in increased waiting times or missed transfer, which can be a deterrent from taking transit.

1.3 OPPORTUNITIES

The preceding analysis has shown that the 2051 BAU does not create any meaningful shift towards sustainable modes of travel during the PM peak, which is the most congested time period in the City. In fact, it is forecasting an increase in auto mode share at the expense of cycling and walking. Thus, the TMP's vision for a sustainable, safe, and efficient system of travel for people of all ages and abilities is unlikely to be achieved by the BAU approach. The TMP instead needs to consider strategies that would encourage and even force a shift in travel behaviour through policies and infrastructure investments that prioritize alternative modes of travel over single-use automobiles, critical to achieving its vision.

1.3.1 TRANSPORTATION THEMES AND ELEMENTS

Evaluating an entire spectrum of strategies or opportunities that can arise due to various changes , combined with infrastructure projects and policies, was not deemed practical. Therefore, it was necessary to eliminate "edge cases" that were thought to be impractical solutions or states of either an infrastructure project or policy, such as congestion pricing, tolling, free transit etc. This structured elimination was achieved by developing four themes and defining elements that would support council priorities and public input, as shown in Table 5. The themes and elements introduced in this table capture a series of policies, infrastructure improvements, and overall investments a municipality can implement to encourage shift in travel behaviour.

Table 5 - Transportation Themes and Elements for Developing 2051 Strategies

Walking & Cycling	Transit	Roads	Policies
Moderate/Aggressive investment in expanding the sidewalk network	Implement new transit network	Enhance intersection improvement and safety	Re-evaluate parking rates and regulations
Increase the length of new cycling facilities (on-road, trail, separated, etc)	Increase in service hours and frequency	Widen the select roads with congestion conditions	Implement congestion charging
Implement cycling - specific programs and policies	Increase transit speed	Optimize signals	Adjust land use approach
	Subsidized transit fee	Implement programs for connected and automated vehicles	
	Switch to emission free fleets	Implement transit specific improvements such as queue jump	

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Walking & Cycling	Transit	Roads	Policies
		lanes and transit signal optimization	
	Design and implement exclusive/dedicated transit lanes		

A series of initial model runs were undertaken to "book end" the elements. For example, several transit strategies were developed and tested, such as the impact of: doubling frequency, increasing transit speed to match that of auto, making transit free, and doubling transit frequency and making it free. These initial set of runs served a dual purpose. First, they helped appreciate that elements within each theme would need to be aggressive to create meaningful shift in the non-auto mode; and second, only strategies or opportunities that borrowed elements from each theme had a reasonable chance of success i.e., hybrid strategies. The source of the model runs and strategies for transit and cycling include the Transit Route Review and Long-Term Growth Study and the Cycling Master Plan, respectively.

1.3.1.1 *CYCLING AND TRANSIT ELEMENTS*

The cycling and transit elements were looked at in isolation to understand what types of modal splits might be expected. For the cycling elements, a jurisdictional scan of similar municipalities in Ontario was undertaken. Commonalities include similar population, include a University, and in some cases such as St. Catharines, Niagara Region, similar geographic features that can present as a challenge to travel.

City	2016 Population (Census)	Existing Cycling Mode Split	Future Aspiration
Peterborough	81,000	2.6%	10-12% (2041)
Guelph	132,000	3%	15% (2051)
Kingston	124,000	3.7%	3% (2034)
St. Catharines	133,000	5% (including walking)	NA

Although these municipalities are not experiencing the modal split the City of Peterborough desires for cycling, they do have a vision for improving their split, similar to Peterborough.

With the transit element, implementing approaches such increasing service hours by doubling the frequency, increase transit speeds, and/or subsidizing transit fares are big initiatives. However, on their own, they may not be enough to achieve an appreciable difference in the modal split for transit.

Recognizing cycling and transit elements alone are not sufficient to meet the vision of this TMP, a multi-faceted approach with multiple elements and complimentary measures are needed to encourage meaningful shifts in travel mode.

1.3.2 ASSEMBLING IMPROVEMENT ELEMENTS INTO HYBRID STRATEGIES

The initial testing of strategies revealed the need for aggressive targets for each element within a theme and their chance of success with each individual hybrid strategy. However, it did not yet negate the theoretical possibility of several hybrid strategies. Hence, five hybrid strategies were defined *a priority* that

could be differentiated from each other based on increasing degrees of intensity across multiple elements and themes. As a starting point, the mode share targets originally assigned to each hybrid strategy were aspirational in nature and were based on the previous studies that focused on opportunities within one single mode of travel. For example, the Cycling Master Plan assessed the cycling potential related to increased infrastructure or the Transit Route Review and Long-Term Growth Study looked at potential increased in transit use based on increased levels of service. These starting points go on to serve as inputs to the analysis and preliminary recommendation discussed in Chapter 3.

1.3.2.1 *HYBRID STRATEGY #1 | STATUS QUO*

Continuation of current mode share trends:

- Transit Ridership has the potential to increase due to implementation of the new transit network and general growth in population and students. The resulting mode share will improve from 7% to 8%, based on a 14% increase in service hours.

- Cycling mode share has the potential to improve modestly from 2.5% to 5% of trips, in line with the Continue Scenario from the Cycling Master Plan, which will require about 20km of new cycling infrastructure expanded gradually - with a higher focus on recreational trail connections (cycling and walking), and to a lesser extent improving on road cycling infrastructure and filling in missing sidewalks on key arterial road corridors to build a modest network of connected routes.

- Walking mode share has the potential to increase from 7.8% to 10%, primarily focussed on the downtown and adjacent neighbourhoods with moderate investment in expanding the sidewalk network and filling in missing segments along transit routes.

- Road improvements would include intersection and safety improvements, plus widening of existing roads or building new arterial / collector roads. Measures to optimize the performance of signalized intersections and major corridors would continue with the intent to improve traffic flow and defer or delay the need for widening.

1.3.2.2 *HYBRID STRATEGY #2 | NUDGE*

- Transit Ridership has the potential to increase due to implementation of the new transit network and general growth in population and students. The resulting mode share will improve from 7% to 8%, based on a 14% increase in service hours.

- Cycling mode share has the potential to improve from 2.5% to 7-10% of trips, in line with the Accelerate Scenario from the Cycling Master Plan, including emphasis on completing new on-road routes to create a basic network of All-Ages-All- Abilities facilities that combines on-road and new / existing trails to provide coverage in most areas of the City.

- Walking mode share has the potential to increase from 7.8% to 10%, primarily focussed on the downtown and adjacent neighbourhoods, with moderate investment in expanding the sidewalk network and filling in missing segments along transit routes.

- Road network improvements would include intersection and safety improvements, plus widening of existing roads or building new arterial / collector roads, however projects that include safety improvements and new cycling infrastructure would be prioritized. Measures to optimize the performance of signalized intersections and major corridors would continue with the intent to improve traffic flow and defer or delay the need for widening.

1.3.2.3 *HYBRID STRATEGY #3 | SHIFT*

- Major investment in transit (43% increase in service hours) has the potential to improve the Mode Share from 7% to 10% of total trips with improved frequency of service and measures to improve the speed of transit service on a number of key corridors (i.e., 15 minute) with 30-minute frequency on other routes. Policies to support transit, such as increased parking costs in the downtown would be implemented.

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- Cycling mode share has the potential to improve from 2.5% to 7-10% of trips, in line with the Accelerate Scenario from the Cycling Master Plan, including emphasis on completing new on-road routes to create a basic network of All-Ages-All- Abilities facilities that combines on-road and new / existing trails to provide coverage in most areas of the City.

- Walking mode share has the potential to increase from 7.8% to 12%, focussed on the downtown, adjacent neighbourhoods, and an aggressive program of investment in expanding the sidewalk network in existing built-up neighbourhoods and filling in missing segments along transit routes.

- Strategic road network improvements that address capacity deficiencies and also achieve other TMP goals such as improved safety or support for enhanced transit travel times would be prioritized. A limited expansion of the road network will be included, primarily to address safety issues (ie add TWLTL on 2 or 4 lane roads). Intersection improvements and other measures to optimize roadway performance (including a Smart Signal program) will be implemented on key corridors in the City to defer the need for widening in order to reduce delays and emissions while improving transit priority at signalized intersections. Widening or new roads would only be considered after implementing optimization measures first, or to support improved transit access / transit travel times, or in areas where regular fixed route transit cannot service.

1.3.2.4 *HYBRID STRATEGY #4 | TRANSFORM*

- An adjusted approach to land use may be required, limiting future planned (not approved) growth in greenfield areas of the City and redirecting this growth into built up areas along arterial and collector road corridors where intensification and higher densities would be required.

- Adopt aggressive Transit mode share targets has the potential to increase from 7% to 12% requiring a 71% increase in service hours, including measures to significantly improve the speed of transit service and providing enhanced frequency on numerous routes (i.e., 10-minute frequency on key corridors during peaks, 15-minute service on other corridors during peaks, and 30 minute frequency at other periods of the day). Policies to support transit, such as significantly increasing parking costs in the downtown and in other key intensification corridors, limiting new supply of parking, and expanding number of residents eligible for subsidized (free) transit passes would be implemented.

- Adopt the Spark Mode Share Targets from the Cycling Master Plan (10-12% cycling MS) – large investment in cycling routes with 160 km of new facilities including emphasis on completing new on-road routes to create an extensive connected All-Ages-All-Abilities network of on road facilities throughout the City, combined with an expansion of the off-road trail system as well.

- Extensive investment in new sidewalks within existing built-up areas will be implemented to encourage an increase in the walking mode share from 7.8% to 15%, with improvements all across the City, particularly in the downtown, new growth areas, and along major intensification corridors and transit routes.

- Road improvements will add separated cycling facilities on all Major Collector and Arterial Roads (even if this means that there are no additions to through lane capacity and a few road diets). Other strategic road improvements will be implemented, but primarily in order to improve transit performance (queue jump lanes, TSP, etc). Intersection improvements and other measures to optimize roadway performance will be implemented on most major corridors in the City. A Smart Signal / Connected-Autonomous Vehicle program will be implemented across the City to reduce delays and emissions while improving transit and connected vehicle priority at signalized intersections.

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1.3.2.5 *HYBRID STRATEGY #5 | CLIMATE FOCUS*

- Investments in Transportation will be made with a view to achieving the City's Greenhouse Gas Emissions targets, both corporately and in the broader community.

- A new approach to land use may be required, significantly limiting approved and planned growth in greenfield areas of the City and redirecting this growth into built up areas along arterial and collector road corridors where intensification beyond provincial targets would be required.

- Aggressive Transit investment in excess of 120% increase in service hours has the potential to achieve high frequency of service (i.e. 10-15 minute frequency on all routes all day long, with more frequent service in key corridors during peak periods). Service enhancements will be combined with strong policy measures (such as significantly increased parking costs or congestion charges and limiting supply of parking in the downtown), limiting the supply of parking and charging for parking in areas outside the downtown across the City (including malls, Hospital, major employers). Transit fares would be eliminated in favour of a broad-based transit charge on property tax bills that will provide all residents with unlimited access to use the transit service. These measures will be designed to achieve transit modes shares in excess of 15%. Exclusive transit lanes will be considered on key corridors to improve and prioritize transit travel times. A complete replacement of the transit fleet to zero emission buses will be achieved over a 10-year horizon.

- An aggressive investment in Cycling infrastructure (the same as the Spark Scenario), combined with strict policy measures has the potential to increase the cost of traveling by auto (parking costs, congestion charges, etc.) to support cycling mode shares in the 15-20% range.

- Extensive investment in new sidewalks within existing built-up areas will be implemented to encourage an increase in the walking mode share to 20%, with improvements all across the City, particularly in the downtown, new growth areas, and along major intensification and transit corridors.

- Road improvements will only be considered for rehabilitation of existing infrastructure, to incorporate safety improvements, to add separated cycling facilities on all Major Collector and Arterial Roads, or to support enhanced transit services. Road diets may be implemented on certain corridors to implement dedicated road space for cycling or transit lanes. An aggressive program of strategic intersection improvements to improve transit operating speeds will be implemented (queue jump lanes, TSP, etc). A Smart Signal / Connected-Autonomous Vehicle program will be implemented across the City to reduce delays and emissions while improving transit and connected vehicle priority at signalized intersections.

1.4 PHASE 2 CONSULTATION HIGHLIGHTS

The challenges and city-wide travel constraints associated with growth in population and employment, along with the preliminary opportunities to address the challenges and constraints, were shared with stakeholders and the public through a series of events as part of the Phase 2 work. The events are summarized in **Table 6**.

Table 6: Phase 2 Consultation Events

Technical Advisory	Engagement Date: July 16, 2021 Engagement Format: Virtual Presentation & Facilitation

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Committee Meeting	Focus: Transportation challenges related to growth; Opportunities through hybrid strategies to address the challenges
Community Working Group Meeting	Engagement Date: July 21, 2021 Engagement Format: Virtual Presentation & Facilitation Focus: Transportation challenges related to growth; Opportunities through hybrid strategies to address the challenges
Online Public Survey	Engagement Date: August 6 to 27, 2021 Engagement Format: Taped Presentation and Survey Focus: Transportation challenges related to growth; Opportunities through hybrid strategies to address the challenges Participation: 3,084 visits to ConnectPTBO website 1,050 survey responses
Public Information Centre #1	Engagement Date: August 11, 2021 (two identical presentations, at noon and 7pm) Engagement Format: Virtual Presentation & Facilitation Focus: Transportation challenges related to growth; Opportunities through hybrid strategies to address the challenges Participation: 50 to 60 people

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The feedback received during the Phase 2 was substantial and provided the Project Team with several considerations for the hybrid strategies. The key themes included:

- Link the strategies to the Council priorities and the TMP vision;
- Consider the impact on small businesses in the downtown when determining parking rates;
- Provide financial costs for the hybrid strategies;
- Respondents are willing to pay more taxes and change travel behaviour if it helps meet climate change objectives; and
- Electric vehicles can help address climate change – consider ways to support this type of technology.

1.5 NEXT STEPS

The findings from the 2051 BAU strategy and input gathered from the Public Information Centre as part of Phase 2 has uncovered that the City of Peterborough's transportation network will experience an increase in congestion, increase in travel times, and little to no shift in travel behavior. Thus, an evaluation of each hybrid strategy is warranted using the travel model to discover what the City needs to do to fulfill the TMP's objectives.

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APPENDIX

CITY OF PETERBOROUGH TRANSPORTATION MASTER PLAN
CHAPTER 3 – STRATEGY ANALYSIS AND RECOMMENDATION

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DRAFT REPORT - November 2021

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TABLES

FIGURES

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1 FORECASTING FUTURE TRAVEL DEMAND

An understanding of the existing travel conditions and characteristics sets the basis for forecasting future travel demand to the 2051 planning horizon. As documented in Chapters 1 and 2 of this report, the City's forecasted population and employment data shows that considerable growth is anticipated. These forecasts have been used in the travel demand model to develop and analyze the five hybrid strategies as transportation opportunities to the year 2051.

To evaluate future travel demand, the 2051 BAU strategy, as detailed in Chapter 2, is used for comparison purposes as a way to illustrate where the existing road network would experience congestion and increased travel times based on forecasted volumes. This particular strategy assumes forecasted population and employment growth will occur with no additional investments or programming in transportation infrastructure. Using this comparison helps suggest network improvements for the preferred strategy.

The analysis undertaken to arrive at the preliminary recommendation focuses on how the Hybrid Strategies would meet the four Council priorities, including: Travel Mode Shift, Safe Transportation Systems, Reduced Capital and Maintenance Costs, and Meeting Climate Change Mitigation Targets, in addition to the TMP vision.

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2 TRAVEL DEMAND FORECASTING PROCESS

Forecasting travel in future years is a field called travel demand modelling, which creates estimates of the number of trips to and from different parts of a region, travel patterns, mode shares, and auto and transit volumes based on a wide variety of inputs including land use (such as present and future population and employment), present and forecast networks, and estimated statistical models that represent travel behaviour. These models are usually estimated from household travel surveys. The last such survey, called the Transportation Tomorrow Survey, was run in 2016 by the University of Toronto. Travel demand models are the best tools available to estimate future travel patterns, including the impacts of various land-use and network scenarios.

The City of Peterborough has developed a travel demand model prior to the commencement of this transportation master plan, which was used by WSP for the analyses undertaken as part of this TMP. WSP has made selective changes to this model, however, to better understand the effects of different strategies. These changes are summarized below.

Lane increases: In order to accommodate the forecasted growth in population by 2051, it is anticipated that some road widenings will be required. These widenings were made by analyzing roads that were overly congested in AM period in the 2051 business as usual scenarios (existing 2018 network with forecast population and employment land use). The AM peak period was selected as road capacity expansion should be required in more than just the more heavily congested PM peak before warranting the widenings as part of these strategies. The lane widenings were calculated based on the 2051 "Business-as-usual" scenario, which uses the forecast land-use on the existing network. Links were selected for widening based on their "volume-to-capacity ratio" (vcr) which is the traffic volume divided by the representative carrying capacity of the road. Different thresholds were used for the lane widenings, as are explained in each hybrid scenario. This stage of the analysis is primarily focused on identifying the hybrid scenarios and therefore the lane widenings were not checked for feasibility. This will be done in later components of this TMP.

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Lane capacity increases: The lane carrying capacity (number of vehicles per hour that can reasonably by accommodated in a road lane) is primarily driven by road signalization in urban areas. Hybrid scenarios S4 and S5 allow for a blanket increase in the lane capacity throughout the network as a means of representing improved efficiencies due to increased investment in smart signal technologies.

Cycling network improvements: The existing Peterborough City travel demand model uses auto distance to calculate bike utilities as part of the mode choice model. Given this construction, it seems reasonable to assume that the model was estimated primarily assume that most, if not all, of a cycling trip is on city streets with no cycling specific infrastructure. To better model likely response to active transportation, trails and roads with existing and proposed cycling facilities were identified. The auto distance was multiplied by the following ratios to reflect cycling improvements: 0.9 for bike lanes, 0.8 for trails and 0.75 if a road has both a bike lane and a trail.

Auto costs: Auto costs is used in the drive alone and shared ride mode choices. Auto costs are calculated in the Peterborough City model as the $auto\ distance \times price\ per\ km + parking\ costs$. When analyzing all hybrid scenarios, the $price\ per\ km$ was increased 25% from the base model values to reflect higher fuel prices, such as due to federal carbon taxes. The existing model applies parking costs in the downtown region, Trent University and Fleming College. As parking costs are understood to be one of the most effectiveness means of encouraging use of non-auto modes, these prices are adjusted in some of the hybrid scenarios, details of those adjustments are described in the scenarios themselves.

Transit fares: Transit fares are reduced in hybrid scenarios S4 and S5 to reflect further subsidies of transit fares to encourage transit use.

3 STRATEGY ANALYSIS

The analysis of the five Hybrid Strategies presented in Section 2.1.1 of this report uses performance criteria generated from the travel demand model to analyze travel demand and road network conditions. The purpose of the analysis was to identify a strategy that would alleviate the transportation network from increased congestion, increased travel times, and increased greenhouse gas emissions while meeting the aspirational mode share targets presented in Table 1. The questions that the analysis focused on is whether or not these alternatives would be sufficient to meet the Council priorities and travel demand over a 30-year period; and, whether the aspiration mode share targets could actually be achieved when the various measures were tested in combination. The predicted performance of each hybrid strategy is analyzed in the following section using the following measures:

- Mode share
- Greenhouse Gas Emissions
- Preliminary Cost Analysis
- Safety

After analyzing the hybrid strategies using the above criteria, Section 2.4 presents the recommended hybrid strategy.

3.1 MODE SHARE ANALYSIS

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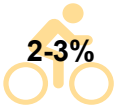
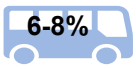
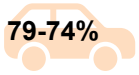
In total, the five Hybrid Strategies detailed in Chapter 2 were assessed against the 2051 BAU for the City of Peterborough. To arrive at the preferred strategy that would meet the Council Priorities as well as the TMP Vision, the following mode share goals were established. Their purpose was to set aspiration goals for each of the strategies, with the understanding that these targets would need to be verified via the travel demand modelling exercise and other analysis conducted as part of this TMP. Table 1 is a summary of the mode share goals originally aspired for each of the Hybrid Strategies.

Table 1: Hybrid Strategies and their Mode Share Goals

Hybrid Strategy	Mode Share Goal
S1: Status Quo	10% 5% 8% 77%
S2: Nudge	10% 7-10% 8% 72-75%
S3: Shift	12% 7-10% 10% 68-71%
S4: Transform	15% 10-12% 12% 61-63%
S5: Climate Change	20% 15-20% 15% 45-50%

Each individual Hybrid Strategy underwent a technical analysis to understand how mode share goals would shift with the implementation of infrastructure improvements and transportation policies. The technical analysis was approached from strategic level where, for example, road improvements were assessed from a needs perspective versus individual projects; all road links with volume to capacity equal to or exceeding the 0.85 threshold is assumed to be widened, as per the City's Official Plan; and, the cycling and transit elements being drawn from the Cycling Master Plan and the grid transit network from the Transit Route Review Study, respectively.

HYBRID STRATEGY 1: STATUS QUO

	Walking	Cycling	Transit	Driving Alone
Mode Share Technical Analysis	 13-15%	 2-3%	 6-8%	 79-74%

Status Quo exhibits the lowest levels of alignment with the TMP Vision, the four Council priorities, and public feedback about the change they would like to see for the City of Peterborough. The Status Quo strategy would require a significant expansion of the road network to accommodate the forecasted growth, over 76 kilometres of new lanes, and extensive arterial road network expansion. Lane widenings were added when the business-as-usual scenario showed a volume-to-capacity (vcr) ratio of 0.85 or higher. This strategy exhibits the highest potential for impacts to natural areas as well as private properties due to extensive road network expansions. The analysis also shows the potential for eroding the recent walking and cycling gains made throughout the City's network and the possibility of limiting opportunities to expand active transportation facilities. The Status Quo strategy dedicates moderate investments in sidewalk expansions, focused primarily in the downtown and neighbourhood areas and 20 kilometres of new cycling infrastructure. Cycling infrastructure emphasizes trail connections, connecting sidewalks on key arterial roads to build a mode network of connected routes with no additional programming costs allocated. From a transit point of view, four new buses would need to be added to the existing fleet to support a 14% increase in service hours.

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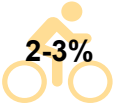
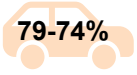
HYBRID STRATEGY 2: NUDGE

	Walking	Cycling	Transit	Driving Alone
Mode Share Technical Analysis	 13-15%	 2-3%	 6-8%	 79-74%

Similar to the Status Quo, Hybrid Strategy 2 "Nudge" also exhibits a low level of alignment with the TMP Vision, the four Council Priorities, as well as the public feedback. It will require the second highest expansion of the road network as per the volume-to-capacity threshold, estimated at over 48 kilometres,

to accommodate the forecasted growth with a high likelihood of an extensive arterial road network expansion. Lane widenings were added when the business-as-usual scenario showed a vcr ratio of 0.95 or higher. Implementing “Nudge” as a preferred scenario results in potential impacts to natural areas as well as private property. The analysis also shows that this approach would potentially erode the recent walking and cycling gains achieved. It will also include moderate investment in sidewalk expansions, however, unlike the Status Quo option, the Nudge strategy will focus on expanding the cycling infrastructure by 4km per year for a total for 80km. The Nudge Strategy implements the “Accelerate” scenario from the Cycling Master Plan where the focus is on building cycling facilities in the denser areas such as the downtown with strategic upgrades beyond, with funding beyond current levels for programming and support. From a transit point of view, four new buses would be added to the overall fleet with a 14% increase in service hours.

HYBRID STRATEGY 3: SHIFT

	Walking	Cycling	Transit	Driving Alone
Mode Share Technical Analysis	14-16%	3-6%	6.5-9%	76.5-69%

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The “Shift” strategy exhibits moderate levels of alignment with the TMP Vision, the four Council priorities, and feedback received from the public engagement sessions. To be able to achieve the mode share goals in this strategy, the network will still require significant road network expansions, which were added when the business-as-usual scenario showed a vcr ratio of 1.0 or higher. There is still a moderate focus on sidewalk expansion and 80 kilometres of new cycling infrastructure added, which is still the “Accelerate” scenario from the Cycling Master Plan. Cycling infrastructure will focus on denser areas and strategic area updates, with increased funding beyond the current levels for additional programming and support. To increase transit use, 17 new buses would be added to the fleet with a 43% increase in service hours. As an added travel characteristic, Shift introduces parking policies whereby the cost of parking in the downtown region were increased from $5.00 to $7.50, specifically increased costs in the downtown, as a means to further incentivize active transportation and transit. However, despite the added investment in transit and active transportation and introduction of new policies, these sustainable modes do not generate enough modal split to offset driving alone and the need for road improvements to accommodate future growth.

HYBRID STRATEGY 4: TRANSFORM

	Walking	Cycling	Transit	Driving Alone
Mode Share Technical Analysis	14-17%	3-7%	7-10%	76 – 66%

The Transform Strategy demonstrates the most alignment with the TMP Vision, the Council priorities, and the public feedback. It is demonstrative of best practice in transportation planning with an emphasis towards shifting to more sustainable modes of travel. With a greater emphasis on active transportation and transit, this Strategy sees a reduced need in new lane-kilometres across the network with less than 30 kilometres of new lane kilometres anticipated. The reason for this reduced need is the added assumption of 10 per cent increase in capacity based on implementation of Smart Signal technology on key corridors as part of intersection improvement requirements to increase road capacity. The vcr threshold for lane widenings in the business-as-usual scenario was increased to 1.1. The Transform approach pursues the "Spark" scenario from the Cycling Master Plan, adding 160 kilometres of cycling infrastructure in denser areas and expansion of off-road trail systems. There is a moderate likelihood of arterial network investments that support the movement of people and goods, such as a north-south capacity on the west side of the Otonabee River and bridge capacity across the river. Transit would expand with 30 new buses and a 71% increase in service hours where there is 10-minute service frequency on key corridors, 15 minutes outside of these corridors, and 30 minutes during off-peak hours. Transit fares were reduced for non-students to encourage increased transit ridership. Transform, similar to Hybrid Strategy 3, would implement a parking policy with increased parking costs from $5.00 to $7.50 in the downtown area with expansion of paid parking into strategic areas. Achieving the mode share goals tied to this Strategy requires a significant shift in the culture of travel behaviour as a means of demonstrating the convenience of using active transportation and transit as primary modes of travel. From a policy standpoint, the implementation of this strategy relies on changes to the land use in the City's Official Plan. Greenfield lands designated for development but with no planning approvals in place would be made off limits to growth. The growth would be reallocated as infill development along existing transit corridors. Such changes in the land use would be intended to reduce urban growth on the fringe of the city and focus growth on existing corridors, to locate more people and jobs near existing sustainable infrastructure such as transit routes and active transportation facilities.

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HYBRID STRATEGY 5: CLIMATE CHANGE

	Walking	Cycling	Transit	Driving Alone
Mode Share Technical Analysis	16-18%	4-8%	11-15%	69-59%

The Climate Change strategy is well aligned with the TMP Vision, the Council priorities, and the public feedback focused on climate change mitigation and sustainability. Given the primary focus being on more sustainable modes of travel, there is considerable investment in transit with 58 new buses and 120% increase in service hours with 10-to-15-minute frequency on all routes, all day; combined with an aggressive investment in sidewalk expansion with emphasis on the downtown, new growth areas, and major intensification corridors. Transit fares were also reduced to encourage increased transit ridership. To help address climate change, the City's entire fleet of buses, both existing and future purchases, would be zero emission buses that is less polluting than the conventional buses in use today. The "Spark" scenario from the Cycling Master Plan is included in this strategy, adding 160 kilometres of facilities throughout the network where 90% of the residents will be within 400 metres of a cycling facility. These is still road expansion is this scenario, but the threshold for lane widenings was to a volume to capacity ratio

of 1.25, which is much higher than even the hybrid scenario 4 scenario. This scenario also assumes a 15 per cent increase in road capacity based on implementation of Smart Signal technology on key corridors as part of intersection improvement requirements to increase road capacity. Policy development through this strategy is focused on increased parking costs city-wide, $10.00 in the downtown and $5.00 elsewhere in the City of Peterborough, and limiting the supply of parking. To achieve the goals of Climate Change, an overhaul of the land use would be required in the Official Plan. This would entail, in some cases, rescinding approvals for development where construction has not begun to eliminate development in greenfield sites. Future growth in jobs and population would be channeled to infill sites along existing transit corridors. Expansion of the urban area and greenfield development typically would not be permitted.

Table 2 is a summary of assumptions and characteristics that were analyzed for the “Do Nothing” scenario as well as the Hybrid Strategies.

Table 2: Elements of the Strategies Analyzed

Element	2018 Existing Conditions	2051 – Do Nothing	Hybrid Strategies				
			S1: Status Quo	S2: Nudge	S3: Shift	S4: Transform	S5: Climate Change
Roads							
New Lane KM (volume to capacity threshold for additional road construction)	Existing	Existing	76 (V/C > 0.85)	48 (V/C > 0.95)	41 (V/C > 1.00)	30 (V/C > 1.10)	16 (V/C > 1.25)
Active Transportation							
Walking	Existing	Existing	Moderate	Moderate	Moderate	Aggressive	Aggressive
New Cycling (KM)	Existing	Existing	20	80	80	160	160
Transit							
Number of New Buses	Existing	Existing	4	4	17	30	58
Increase in Service (hours)	Existing	Existing	14%	14%	43%	71%	120%
Policies							
Parking Rates	Existing	Existing	Existing	Existing	Increase Downtown	Increase Downtown	City-Wide
Lane Use	Existing	2051 Land Use	2051 Land Use	2051 Land Use	2051 Land Use	2051 Land Use Intensification and Reduced	2051 Land Use Intensification and Reduced

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Element	2018 Existing Conditions	2051 – Do Nothing	Hybrid Strategies				
			S1: Status Quo	S2: Nudge	S3: Shift	S4: Transform	S5: Climate Change
						development in greenfield sites	development in greenfield sites

3.2 CHANGE IN TRAVEL MODE AND GREENHOUSE GAS (GHG) EMISSIONS

Part of the mode share analysis looked at the relative change from both a context of travel mode as well as greenhouse gas emissions. This analysis was carried out to understand change in use of mode to the 2051 planning horizon and the associated reduction in greenhouse gas emissions as a result of the shifts. Figure 1 includes the absolute values of mode usage in 2018, with the percentage change across the 2051 BAU and the five Hybrid Strategies. On a similar note, the relative percentage change in greenhouse gas (GHG) emissions was analyzed to understand the decrease across each Hybrid Strategy, shown in Figure 2.

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The analysis shows sustainable travel modes increasing moving from strategy 1 to strategy 5 and greenhouse gas emissions decreasing moving from strategy 1 to strategy 5. The greenhouse gas emissions consider a vehicle fleet similar to today. With the increasing electrification of fleets and movement to less reliance on gasoline and diesel to power vehicles, the greenhouse gas emissions may reduce more than is being estimated for each strategy.

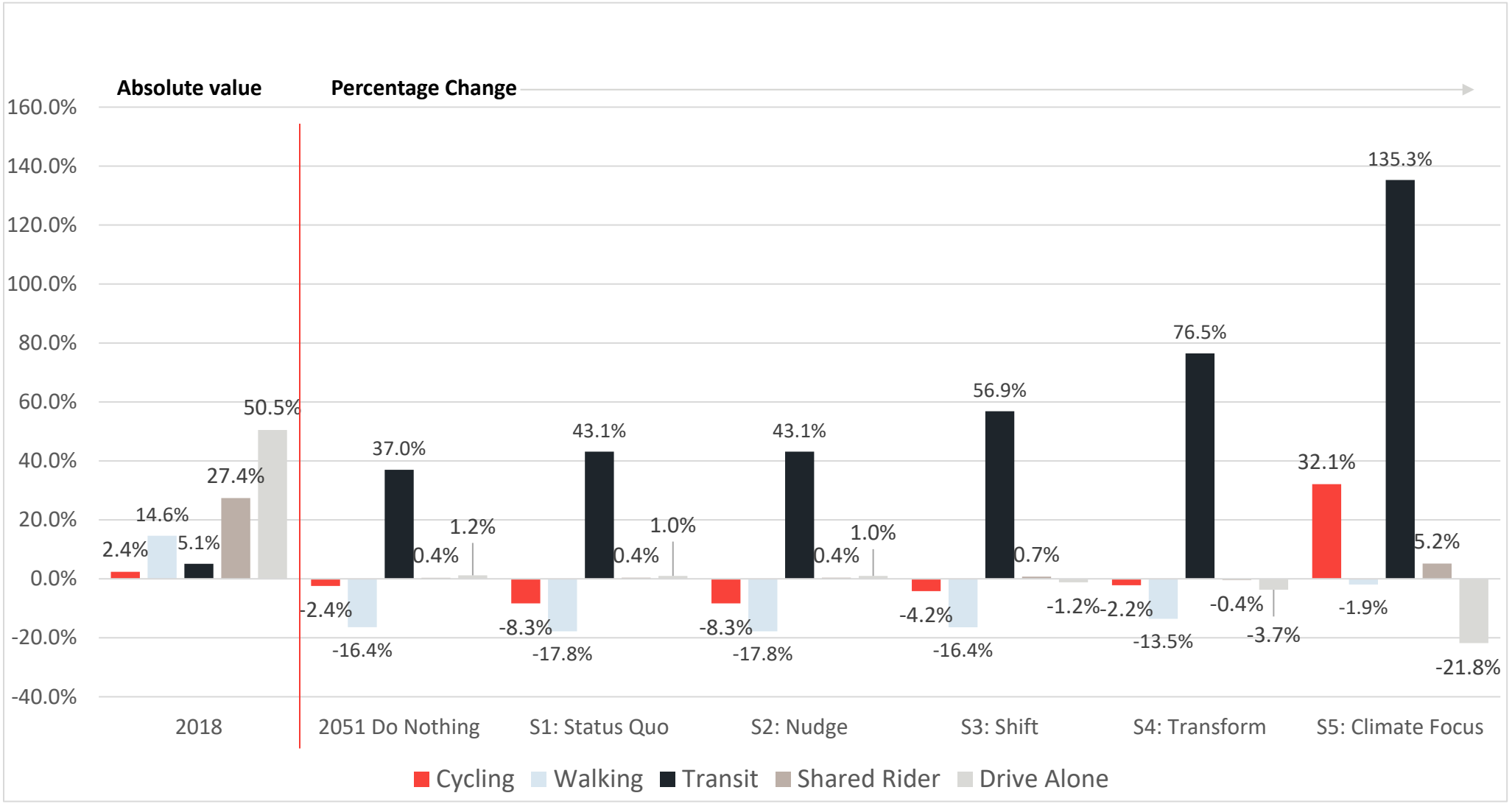

Figure 1 - Relative Change of Mode Share by Hybrid Strategy (PM Peak)

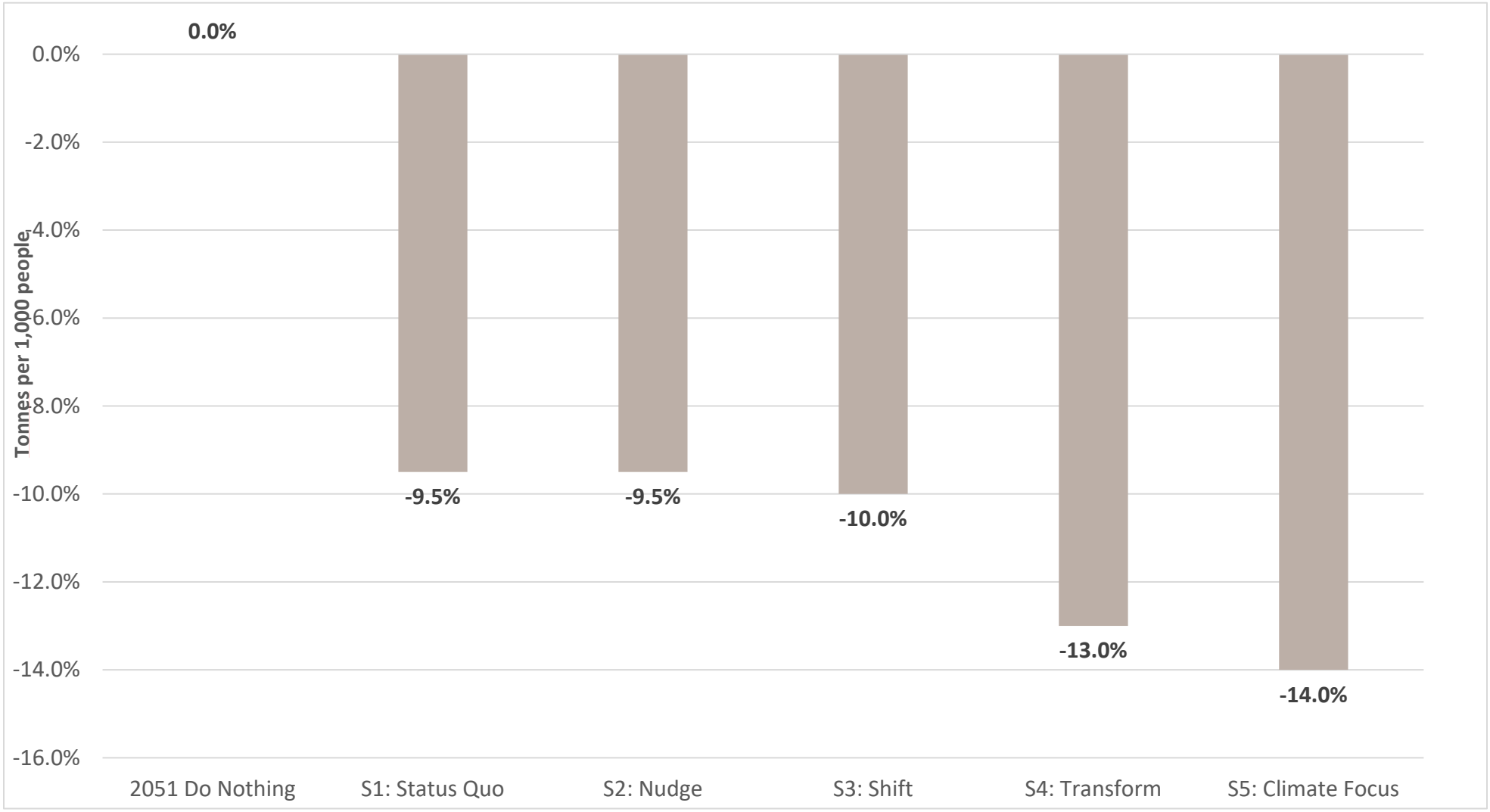

Figure 2 - Relative Percentage Change of Hybrid Strategies in Greenhouse Gas Emission

As a note, the 2018 GHG Emissions are 3.4 tonnes per 1,000 people.

3.3 PRELIMINARY COST ANALYSIS

Potential costing of implementing the hybrid strategies compared to the 2051 BAU scenario was also analyzed. The costing analysis for each of the individual strategies includes the capital and operating cost over a 30-year period to for the purposes of understanding which approach would best meet Council's priority focused on reduced capital and maintenance costs. Part of the analysis is to ensure that the City is able to invest strategically in new capital projects that will provide long-term benefit, while ensuring that existing assets are maintained and supported. **Table 3** has been prepared to summarize the potential additional costs of each Hybrid Strategy, broken down by mode of improvement. It is acknowledged that external funding from federal or provincial levels, or other sources, may be available to cover portions of costs associated with strategy implementation.

Table 3 – Summary of Potential Additional Cost of Five Hybrid Strategies (over 30-year period)

Mode of Improvement	Hybrid Strategies				
	S1: Status Quo	S2: Nudge	S3: Shift	S4: Transform	S5: Climate Change
Vehicular	$484M	$307M	$261M	$189M	$98M
Transit	$63M	$63M	$182M	$293M	$701M
Active Transportation (Walking and Cycling)	$18M	$69M	$69M	$137M	$137M
Intersection and Safety Improvements	$23M	$29M	$37M	$36M	$23M
Total (Approximate)	**$588M**	**$468M**	**$549M**	**$655M**	**$959M**

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The assumptions used to generate these costs, broken down into capital and operating costs by mode, are provided in **Table 4**.

Table 4 – Capital and Operating Cost Breakdown by Mode of Travel for the Five Hybrid Strategies (over 3-year period)

Costing Assumptions by Mode of Improvement	Hybrid Strategies				
	S1: Status Quo	S2: Nudge	S3: Shift	S4: Transform	S5: Climate Change
Vehicular • $6million per additional km of road • Operating costs of 5-6% of road construction costs	**$484M** $458 (C) $26M (O)	**$307M** $290M (C) $17M (O)	**$261M** $247M (C) $14M (O)	**$189M** $179M (C) $10M (O)	**$98M** $93M (C) ($5M (O)

Costing Assumptions by Mode of Improvement	Hybrid Strategies				
	S1: Status Quo	S2: Nudge	S3: Shift	S4: Transform	S5: Climate Change
Transit • $650,000 per additional conventional bus • $1,200,000 per additional e-bus / zero emissions bus • Additional transit garage needed to accommodate additional buses in S4 and S5 • $95 hourly operating costs	**$63M** $3M (C) $60M (O)	**$63M** $3M (C) $60M (O)	**$182M** $11M (C) $171M (O)	**$293M** $20M (C) $273M (O)	**$701M** $131M (C) $570M (O)
Active Transportation (Cycling and Walking) • $300,000 / km of cycling facility • $400 / m of sidewalk • Operating costs of 20 - 21% of walking+cycling construction costs	**$18M** $7M (C) Cycle $8M (C) Sidewalk $3M (O)	**$69M** $25M (C) Cycle $32M (C) Sidewalk $12M (O)	**$69M** $25M (C) Cycle $32M (C) Sidewalk $12M (O)	**$137M** $49M (C) Cycle $64M (C) Sidewalk $24M (O)	**$137M** $49M (C) Cycle $64M (C) Sidewalk $24M (O)
Intersection and Safety Improvements • Percentage of road construction costs	**$23M** 5% of road construction costs	**$29M** 10% of road construction costs	**$37M** 15% of road construction costs	**$36M** 20% of road construction costs	**$23M** 25% of road construction costs
Total (Approximate)	**$588M**	**$468M**	**$549M**	**$655M**	**$959M**

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The costs in this Plan are in line with historical per household spending on transportation, inclusive of all modes and operating and capital. In the past, the City of Peterborough has budgeted on average, approximately $45 million per year to operate, maintain, and improve the transportation infrastructure and services that residents and businesses rely upon.

Looking at the 30-year horizon of this TMP, the total additional annual investment in transportation is estimated at approximately $19 million to $21 million per year (as expressed in 2021-dollar amount). With the forecasted population growth, it is expected that the tax base will expand to support transportation-related investments. Additional funding sources are continued through development charges and Federal and Provincial infrastructure programs as a way to manage total investment required.

3.4 SAFE TRANSPORTATION SYSTEMS

To estimate investment in safe transportation systems, a percentage of the construction costs for road network improvements have been assumed to address safety enhancements. The percentage of funds for safe transportation systems increases from strategy 1 through strategy 5, however, since the investment in road network improvements decreases from strategy 1 through strategy 5, the safe transportation systems is not linear and peaks around strategy 3 and 4, with about $36 to $37 million in investment over the 30-year period to the year 2051, as shown in Table 4.

Table 5 - Estimate of Budget to Address Safe Transportation Systems by Hybrid Strategy

Performance Criterion	Hybrid Strategies				
	S1: Status Quo	S2: Nudge	S3: Shift	S4: Transform	S5: Climate Change
Intersection and Safety Improvements	$23M	$29M	$37M	$36M	$23M

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4 PHASE 3 CONSULTATION HIGHLIGHTS

Consultation during Phase 3 focused on providing a technical analysis of the hybrid strategies in relation to the Council's four priority performance criteria and presenting the preliminary recommendation for the strategy to use in the TMP. These analyses and the recommendation were shared with stakeholders and the public through a series of events as part of the Phase 3 work. The events are summarized in **Table 6**.

Table 6: Phase 3 Consultation Events

Technical Advisory Committee Meeting	Engagement Date: September 15, 2021 Engagement Format: Virtual Presentation & Facilitation Focus: Hybrid strategy analysis and preliminary recommended strategy for the TMP
Steering Committee Meeting	Engagement Date: September 16, 2021 Engagement Format: Virtual Presentation & Facilitation Focus: Summary of challenges and opportunities; hybrid strategy analysis and preliminary recommended strategy for the TMP
Community Working Group Meeting	Engagement Date: September 22, 2021 Engagement Format: Virtual Presentation & Facilitation Focus: Hybrid strategy analysis and preliminary recommended strategy for the TMP
Online Public Survey	Engagement Date: September 28 to October 8, 2021 Engagement Format: Taped Presentation and Survey Focus: Hybrid strategy analysis and preliminary recommended strategy for the TMP Participation: 936 visits to ConnectPTBO website 232 survey responses
Public Information Centre #1	Engagement Date: September 29, 2021 (two identical presentations, at noon and 7pm) Engagement Format: Virtual Presentation & Facilitation Focus: Hybrid strategy analysis and preliminary recommended strategy for the TMP Participation: 40 to 50 people

The multiple meetings and public consultation events during Phase 3 resulted in considerable feedback for the Project Team regarding the assessment of hybrid strategies. The key themes included:

- The City has invested considerable effort into preparing its 2051 land use plan. Changes to the land use plan at this stage are not desirable;
- Improving cycling infrastructure (including end-of-trip facilities) would encourage more people to cycle;
- There is a need for busses to be more consistent, predictable, and trackable;
- Work-from-home or hybrid work options will become the norm for many employees;
- The TMP should emphasize climate change and greenhouse gas (GHG) reductions more. GHGs should be calculated City-wide in addition of per capita;
- More breakdown on the financial cost for residents is desired; and
- More policies could be added to strengthen the strategy and help meet modal split and GHG emission reduction goals.

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5 PRELIMINARY RECOMMENDATION

The efficient and effective movement of both people and goods is an integral part of the transportation system in the City of Peterborough. Taking the analysis of the Hybrid Strategies and comparing them against the 2051 BAU a combination of Strategy 3 “Shift” and Strategy 4 “Transform” is being presented as the preliminary recommendation. The Combination Strategy 3 & 4 uses almost all elements of the Strategy 4 “Transform” with the exception of changing land use. Although no changes to future planned land use as shown in the Official Plan will be made, the investments in expanding infrastructure and programming for sustainable modes, followed by strategic policy and roadway improvements are being recommended as a strategy to accommodate forecasted future growth. Hybrid Strategy 3 & 4 addresses Council’s four top priorities by:

5.1 HYBRID STRATEGY 3 & 4

The combination Hybrid Strategy has been selected for its ability to meet the four Council priorities with significant shift to more sustainable modes of travel, such as active transportation and transit, with enhanced safety as the primary focus of road improvement programs spanned through a 30-year period up to the 2051 planning horizon. There would be a reduced need for road widenings, but higher operating costs as the frequency of transit is increased with additional service hours. With a combined strategy, the City can expect to see a 10 to 13% reduction in greenhouse gas (GHG) emissions from transportation, and possibly higher reductions with electrification of vehicles. To better understand the approach needed to champion climate change mitigation efforts, a heavily modified scenario was analyzed for Hybrid Strategy 5: Climate Change, where the targeted mode shares were enforced to see the shift in GHG’s. The base model yields 166, 154, and 218 tonnes in the AM, Mid-Day, and PM Peak, respectively. The enforced mode splits of Hybrid Strategy 5 yield 151, 147, and 207 tonnes in the AM, Mid-Day, and PM Peak, respectively. The analysis has shown that shifting travel modes will not be able to achieve the City’s greenhouse gas emissions goals alone. The greenhouse gas emissions goals will also rely on other measures, such as an increase in zero emission vehicles in private and public fleets.

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Hybrid Strategy 3 & 4 will be transformative for Peterborough, with a connected, comprehensive cycling and walking network and buses operating every 10 minutes during peak periods. The bus service is extraordinary for a city of Peterborough’s size. Achieving a modal split where 35% of trips are by non-auto modes of travel would put Peterborough on par with areas like North York Centre in the City of Toronto, which has the benefit of a subway, much higher densities than Peterborough, an extensive bus network connecting to the subway, and a comprehensive sidewalk network.

Road Network

Preliminary observations of the forecast road network performance suggest that higher levels of traffic congestion and delay may still be experienced compared to today. Road network improvements rely on the optimization of the network with a focus on supporting improved travel times for transit. Figure 3 is a forecast of congested areas in the PM peak hour for the year 2051 for the recommended hybrid strategy 3 /4.

The technical analysis for the AM and Midday peak hours did not show systemic congestion in the road network, other than the River crossings and some roadways on the east side of the City. These are pockets of congestion that likely can be addressed through intersection capacity and safety improvements instead of widespread road construction. The technical analysis focused on the PM peak hour as the heaviest travel hour during the day. The analysis of the PM peak hour shows discretionary trips as the greatest percentage of travel. Discretionary trips are “home based others”, meaning they are trips that are not going to work or to school given that in many cases these two destinations tend to have predetermined arrival and departure times throughout the day. Discretionary trips, however, do not need to take place at a certain time and can potentially be shifted to another time that does not coincide with the peak travel hour. Shifting discretionary trips to other times of the day outside of peak travel times can help manage travel flow and reduce the need to construct more infrastructure to meet travel demand.

Based on this observation about discretionary trips and the potential to undertake those trips at another time of day, a north-south arterial road capacity improvement on the west side of the Otonabee River is not recommended. Instead, to address capacity deficiencies, emphasis is being put on prioritizing intersection capacity and safety improvements.

Figure 3 shows the forecast areas of congestion in this combination strategy as a result of the forecasted growth. Network performance was analyzed with and without a major North-South Arterial Road and although not required to support growth to 2051, there are infrastructure and intersection improvements that can support the movement of future goods and people. The recommended approach for improving capacity across the City’s transportation network is optimization, investments in transit service, and active transportation infrastructure. Areas for strategic road improvements include:

- Additional east-west capacity for crossing the Otonabee River; and
- Additional north-south arterial road capacity may be required east of the Otonabee River.

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These strategic road improvements are needed to address AM and PM deficiencies and recognize that there is less of an opportunity to shift to alternative modes on the east side of the city due to the more limited nature of the road network and the origins and destinations of trips that are less conducive to alternative modes of travel.

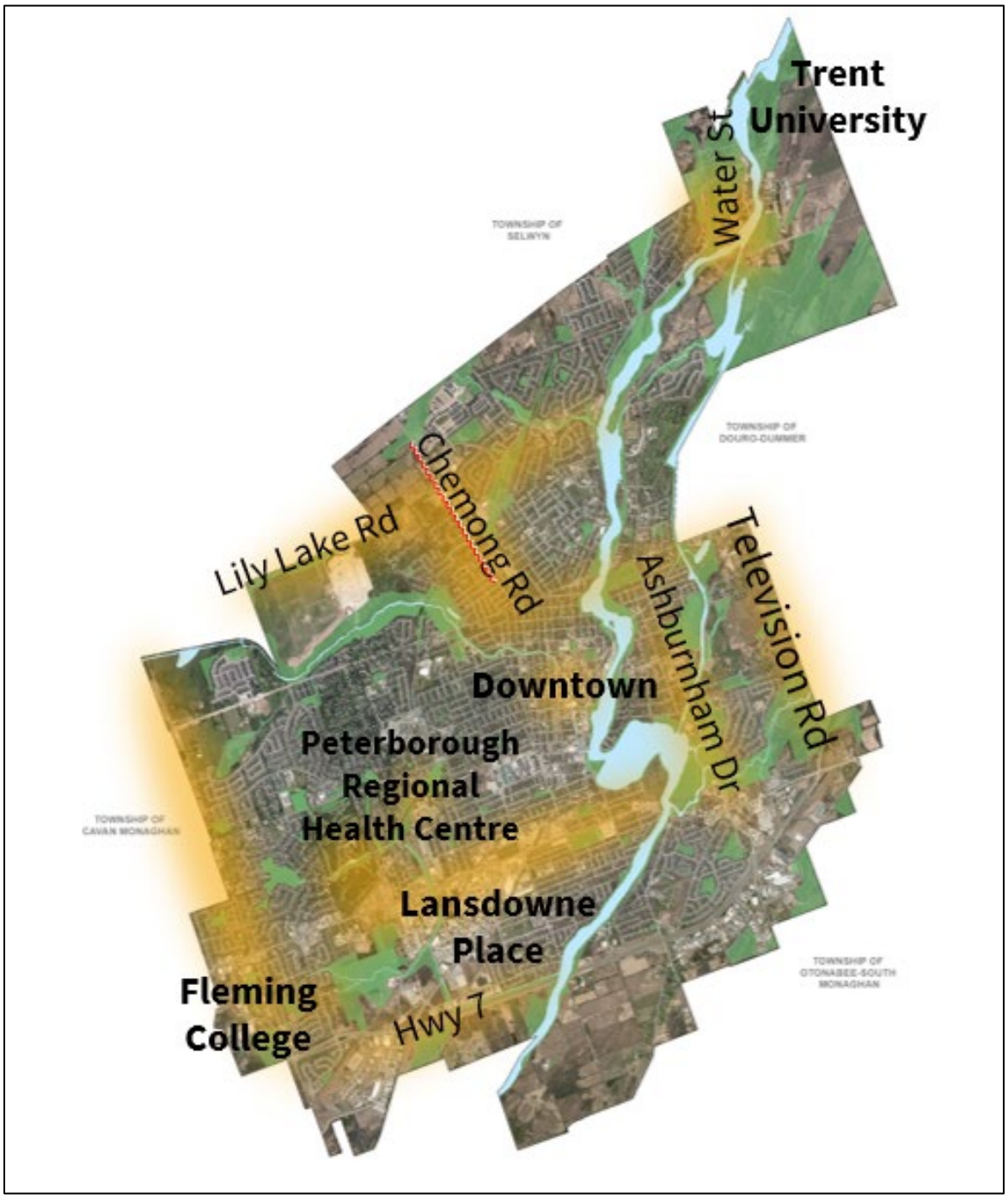

Figure 3 - Forecast of Congested Areas, 2051 (PM Peak Period)

The areas circled in Figure 4 are areas where operational issues at key intersections are expected to occur and localized improvements may be needed to create a system where road links accommodate future demand. Factors such as new development, urbanization, and growth would likely require active transportation infrastructure and intersection improvements along roadways such as Lily Lake Road and Brealy Drive. Additional opportunities for intersection road improvements or localized road widenings in other areas of the City will be examined as part of the next phase in the TMP.

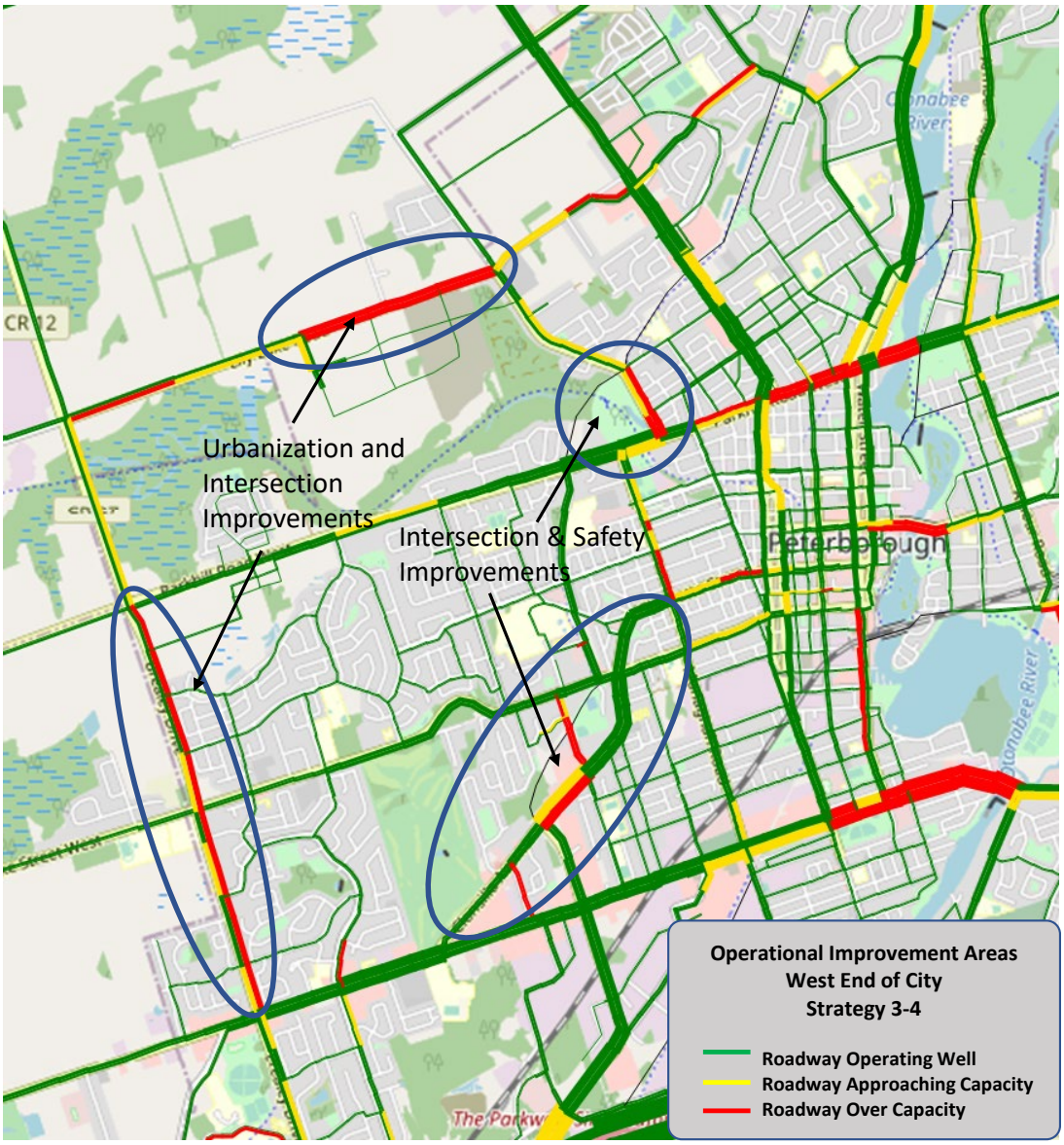

Figure 4 - Preliminary Areas of Improvement in Combination Strategy 3 & 4

Active Transportation Network

A combination of Strategy 3 & 4 will focus on an aggressive investment in sidewalk expansion with an emphasis on the downtown area, new growth areas, and major intensification corridors. One of the

underlying goals of this investment will be to connect segments along transit routes to improve accessibility to alternative modes of travel. Similarly, increased investments in cycling infrastructure should be made by focusing on the Council approved hybrid Accelerate/Spark Scenario from the Cycling Master Plan. This combination is intended to implement 80 to 160km of new cycling infrastructure with facilities being focused in denser areas as well as major expansion of the off-road trail system. A significant increase in programming cost is required to shift to cycling as a mode of travel. With this degree of investment, a push can be made for separated cycling facilities on all major collector and arterial roads. Phasing of the proposed active transportation infrastructure, both walking and cycling, would take place over a 30-year period through a prioritization approach and availability of financial opportunities.

Transit Network

As one of the primary focus of this preliminary recommendation, investments in transit would focus on a 71% increase in service hours, where peak period frequency would improve to 10 minutes on key corridors, 15 minutes elsewhere, and 30 minutes during off-peak period. Through the combination strategy, further consideration should be given to subsidized or free transit passes to increase equity and accessibility. A factor of success for transit is roadway improvements focused on improved services, inclusive of queue jump lanes, transit signal priority, and transit-dedicated lanes for improved travel times.

Cost Analysis

The cost estimates in this Plan are in line with historical per household spending on transportation, inclusive of all modes and operating and capital. In the past, the City of Peterborough has budgeted on average, approximately $45 million per year to operate, maintain, and improve the transportation infrastructure and services that residents and businesses rely upon.

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Looking at the 30-year horizon of this TMP, the total annual investment in transportation is estimated at approximately $19 million to $21 million per year (as expressed in 2021-dollar amount). With the forecasted population growth, it is expected that the tax base will expand to support transportation-related investments. Additional funding sources are continued through development charges and Federal and Provincial infrastructure program as a way to manage total investment required.

Supportive Policies

The supply of parking and the cost of parking play a significant role in how people choose to travel. The recommended hybrid strategy includes parking policy measures to limit the supply of parking and to increase parking rates for all-day parking in the downtown. Shorter term, high turnover parking would retain lower parking rates to support businesses. Additionally, the areas for paid parking need to be expanded beyond the downtown and institutions (like hospitals and post-secondary institutions). Paid parking in a greater portion of the city will help discourage travel by car and encourage more sustainable travel choices.

6 RECOMMENDATION SUMMARY

The recommended hybrid strategy 3 / 4 will be truly transformative for the City of Peterborough. Implemented over a 30-year timeframe, this strategy focuses on sustainable transportation. It brings peak period travel by transit with frequencies on par with major Canadian urban centres. It delivers a comprehensive, interconnected network of dedicated facilities for pedestrians and cyclists. While travel times by car may be longer in peak periods, travel by bus, foot, or bike will be vastly improved compared to existing conditions.

Investments in sustainable travel will move the City toward its goals for greenhouse gas emissions and will help create the modal shift desired in travel behaviour. The recommended strategy has a considerable investment in safe transportation systems to benefit all modes of travel. Significant financial investment is envisioned to implement this strategy; however, the federal and provincial governments have shown a willingness in recent years to invest in transportation infrastructure, specifically sustainable infrastructure, and there are likely to be funding sources to help Peterborough implement its active transportation and transit plans.

The recommended hybrid strategy 3 / 4 embraces the TMP vision and is responsive to public feedback heard throughout the project. This is a bold strategy to chart a new course for travel in Peterborough. The next step in the TMP process will be to identify the specific projects and policies included in this strategy as the project moves toward the recommended transportation plan and implementation schedule. The transportation-related policies include recommendations to develop a Complete Streets Policy, a Goods Movement Strategy, a Road Safety Plan, and a Parking Strategy (which would address parking supply and paid parking).

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