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Dr. Patricia Collins, our faculty
encouragement helped us push through to the end of the course and produce a report that we are proud of. Your reminder to apply a critical equity lens to road safety and mobility strategies helped shape the messages presented in this report and fueled our investigations.

Our Key Informants, a group of experts in their respective fields that volunteered to help bring different perspectives to this work. These individuals included planners, traffic engineers, transportation firms, and researchers.

Staff who provided us with an opportunity to receive constructive feedback prior to the final client presentation and provided us with support throughout the project.

This report was written collaboratively by a group of six Urban and Regional Planning graduate

under the direction of Dr. Patricia Collins.

Stephanie Cantlay   Keith Holmes

Nico Koenig   Jennifer Yun Liu

Joyce

The purpose of Smart Moves is to provide the **z** **z** set of key
performance i

z **z** he

z **z**				
Rate of killed/seriously injured per 100,000 population				
Rate of killed/seriously injured per 100,000 population at intersections				
Number of engineering improvements installed in high-collision areas				
Number of community presentations given				
Number of in-service road safety reviews completed				

Number of engineering improvements for standalone active transpoan7 Tm0 g0 G[(t)4(r)-4(ef*432.43 546.46 411 01 335.Lov)

1.3 THE MOVESMART MOBILITY MANAGEMENT STRATEGY

Vaughan City Council approved the MoveSmart Strategy to provide in March 2021 with the goal of providing a transportation system that is safer, more efficient, and sustainable. It responds to the

regional roads decreased by 20-50%. With this context in mind, the YRTSR reported decreased collision statistics in Figure 1.5.1.

While data from YRTSR is only collected on regional roads, which carry higher vehicle volumes

that may have important implications for Vaughan. Although regional roads fall within the jurisdiction of the York Region, statistics from YRTSR are likely to involve Vaughan residents, employees, visitors, and those who travel through Vaughan or to nearby municipalities. YRTSR highlights the following details in Figure 1.5.2.
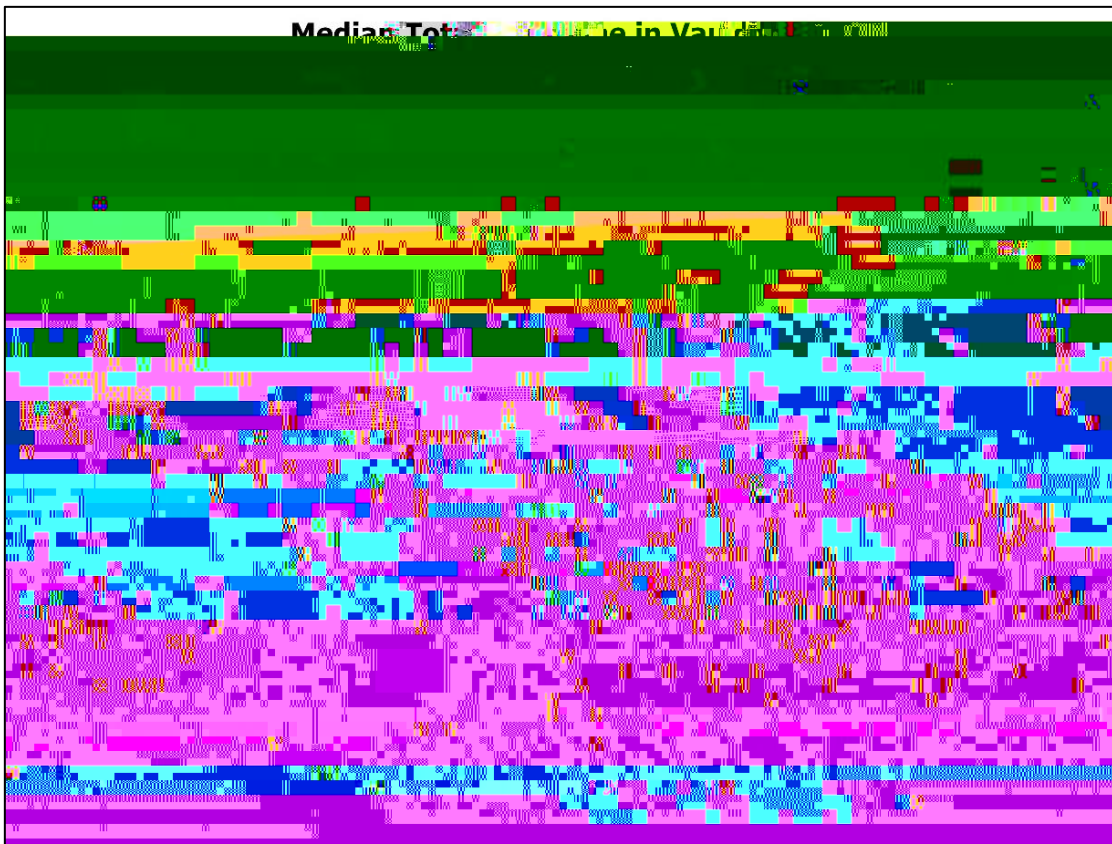
The most important data is where, when, and how the collisions are happening.

–   **Z Z**

To

Z   A choropleth map showing median income by quintile across Vaughan, ON in 2021.

To highlight the most affected populations, collision data was overlayed with select socio-economic information using 2021 Canadian Census data. By reviewing socio-economic information alongside collision density areas, four areas of concern emerge and are detailed in Map 1.6.3 and within following table. Note that percentages used are in regard to DA specific population.

Severe Traffic Collision Density in Vaughan 2020

Z   A map showing Vaughan's four dissemination areas with the highest levels of collisions, deprivation, and vulnerability.

Z   Areas of concern identified from collision analysis

Z	Z
Z Z	High level of collisions (136 collisions/km^2) Low median income ($31,800) Cluster of refugees nearby
Z Z	High level of collisions (98 collisions/km^2) High percentage of older adults who are low-income (38%)
Z	Medium-high level of collisions (31　62 collisions/km^2) Low median incomes ($31,000 - $40,000) High percentage of residents older than 65 (53%) Medium-high percentage of older adults as low-income (17-32%) Medium-high percentage of lone parent households (18-24%)
Z Z Z Z	Low median income ($31,800) High percentage of refugees (22%)

Z Z Z

Mapping socio-economic information with collision data can help transportation planners and engineers make equitable decisions.

Vaughan areas of concern include

1.7 NEWS MEDIA ANALYSIS

News media analysis helps

children and their grandfather

z z z

News media has been in used by Vaughan to promote municipal traffic policies, support police investigations, and notify residents regarding delays and road closures

The media accurately reports that the most frequent type of collision involves vehicles within intersections, however news media may underreport collisions made by tractor trailers and commercial vehicles

Vaughan residents have mixed opinions regarding the effectiveness of traffic calming initiatives and cycling infrastructure investments.

Speed, impaired driving, and collisions involving children are urgent concerns for Vaughan residents, which are largely portrayed as an effect of poor individual behaviours, with enforcement being promoted as an effective deterrent to these behaviours.

To outline the causes of traffic collisions and fatalities based on research to ensure that the proposed KPIs can be analysed in ways that effectively decrease the risks of collision.

There's really no way of knowing where collisions are going to happen. It's about us trying to understand what factors lead to the potential of those collisions happening.

Age-related cognitive decline, mobility contraints
School travel distance
Driving behaviour nearby to schools

Z   Z

Inattentive driving
Mobile phonse usage

Determinants of traffic fatalities categorized into themes that were found through an academic literature review.

Throughout the literature review, there were

Z The intersection between risk factors, and how they may lead to a greater risk of injury or death by collision.

Z	
Z **Z**	Pedestrian and cyclist collisions occur more frequently in areas with higher population density, largely due to increased exposure. However, it is not a linear relationship as there is a safety in numbers effect that occurs (Chakravarthy et al., 2012; Marshall & Ferenchak, 2017; Myers et al., 2013; Zhu et al., 2022).
Z Z **Z**	Pedestrian and cyclist traffic fatalities are more likely in rural environments; however, collision frequency is higher in urban areas (Marshall & Ferenchak, 2017, 2019; Myers et al., 2013).

Increased risk for traffic injury and fatality due transferring between safety cultures, transportation-

z z z

Systemic determinants of traffic injuries and collisions are more prevalent than determinants based on individual behaviours.

Vulnerable road users are at greater risk for traffic collision and fatality.

There can be multiple compounding factors that increase a vulnerable road exposure to vehicles which increases their overall risk of injury and fatality.

Designing intersections and roadways for the maximum protection of vulnerable road users is an effective strategy for improving overall road safety.

Provide insight to what municipalities in Canada and internationally have been doing in addressing road safety and mobility concerns.

Analyze how municipalities have introduced and implemented their KPIs, and where that applies to   MoveSmart Pillars.

Examine the unique features that municipalities provide in their strategies.


Jurisdictional review methodology and extended municipal performance measures and actions from Edmonton, Toronto, and Lethbridge are detailed in Supporting Documentation Section E.

The project team composed this section to introduce some of the municipalities that inspired our 20 chosen KPIs (found in Section 4 of the report). We chose to highlight seven municipalities that featured important road safety mobility strategies that were supported with KPIs, interviews, and document analysis.

Z   Z   Z

Z   Z   Z   Z   Z   Z   Z

Z

Each city has different evaluation methods, therefore, not all evaluation results are the same. It should be noted that not all cities have recorded data to prove the effectiveness of their programs or initiatives, but the majority are able to create priority lists and describe how they evaluate their progress by using data, research, and KPIs. Additionally, cities explore their outcomes by creating key actions that help frame road safety or mobility programs, listing present and future initiatives that addresses the 3Es (Engineering, Enforcement, and Education), collaborating with other municipal departments, and engaging with the public to understand their experiences as road users. The outcome section of each municipality looks at the actions taken to implement the road safety plan or mobility strategy that are related to a MoveSmart Strategy pillar. Interviews were conducted with staff members from the City of Ottawa, the City of Calgary, City of Toronto, the City of Lethbridge, and the Region of Durham, which helped inform the Project Team of project outcomes. Overall, the purpose of this section was to highlight growing, urban and suburban municipalities who align with Vision Zero within road safety goals and conducted a jurisdictional review to identify road safety KPIs to determine the socio- economic and spatial determinants of traffic-related fatalities and injuries, and how they are measured.
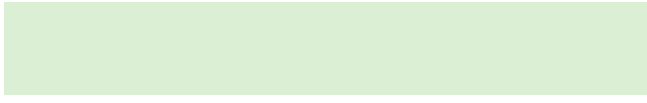
Z Z   **Z   Z**

Program   T
Background

	Z Z
Program Background	The City of Toronto *Congestion Management Plan 2016-2020* (CMP) to better manage congestion and improve safety

such as the police, in road safety initiatives since they are the ones responsible for enforcing any new regulations. These lessons can extend to mobility management since they reveal the importance of sharing information between organizations and departments to implement effective strategies.

The interviewee made it clear that that it can be difficult to attribute change in KPIs to initiatives undertaken by the City because of the number of variables involved and the time it takes for initiatives to affect behavior.

Program

Background   municipality in Alberta and in 2020, implemented its

S

	Halifax has implemented 25 Leading Pedestrian Intervals, 24 Rectangular Rapid Flashing Beacons, and 93 Accessible Pedestrian Signals
Lessons Learned	IMP describes how data used to measure KPIs will be obtained, how frequently KPIs will be measured, and identifying who is responsible for collecting and publishing the data (Halifax Regional Municipality, 2017) have not been achieved as of yet. This finding highlights the delay that is inherently involved in sustainable transportation projects that require long periods of time before change is reflected in the data.

Program Background	Rotterdam in the Netherlands has spearheaded efforts in developing and implementing an Intelligent Transportation System road safety to proactively identify and address the unsafe road features at high-risk locations (International Transport Forum, 2020). Using a self-learning algorithm, the model was trained with approximately 1,500 variables with data from 2014 to 2018. The first iteration of the model correlated the historical crash data with physical data such as traffic, road features, buildings, and environmental data such as weather, and time.
Implementation	The ITS works by ranking areas of the road network between 1 and 5, offering road network improvements, and indicating the risk factors of the network. The system can accommodate for changes in car traffic levels, or the presence of on-

The lessons learned from the strategies used by cities described in the section can

There is a recognition of a paradigm shift or a new way of thinking among suburban municipalities. Encouraging sustainable modes of transportation and creating a culture of road safety require refocusing attention to non-vehicle road users.
Many strategies contain long- and short-
organised by themes, policies or focus areas and it is common to identify which

4.2 CATEGORIZING KPIS

Qualitative KPIs may not specify what outcome or output is expected to happen. Relatedly, general terminology such as reporting directional changes does not quantify metrics either. These KPIs may

Outcome KPI

Rationale:

While it is calculated as an all-encompassing rate, the KPI can be divided into sub-categories such as:

- Mode of transportation (supported by background findings)
- equity deserving groups neighbourhoods identified in section 1.6)
- By ward (to focus on ec

Target:

een 15% to a more ambition goal of 50% achieved between 4 and 10 years

Outcome KPI

Inspired by:
St. Albert   Ottawa   Surrey   Lethbridge   Durham

Rationale:

- Mode of transpor

Target:

Inspired by:

ohn New York City Edmonton San Francisco Saint J

Rationale:

high collision areas, such as intersections. Examples include nork-chop islands, speed bum

This KPI measures the number of engineering projects that have been implemented to track the prog

hat are unsafe to non-vehicle road users.

Traffic Safety Automated Enforcement Reserve. The total number of projects varies from   using funds from the T

Total number of community presentations given

Output KPI

red by:

Inspir

New York City Strathcona County East Saskatchewan

Number of in-service road safety reviews completed
Output KPI

Strathcona County   St. Albert   Montreal

Output KPI

Inspired by:

Arizona   Durham   Regina   New York City   Strathcona County

Rationale:

decision makers effectively.   Vaughan council and its

Target:

cyclist safety in 2020 (New York City 2024)

Percentage change in high speeds (85th percentile speed)

Outcome KPI

Inspired by:

Related Section in this report: 1.4 | 1.5 | 1.6 | 1.7 | 2.0

Rationale:

Output KPI

Inspired by:

Rationale:

protection for the vulnerable road users.

Target:

Curbside parking utilization rate
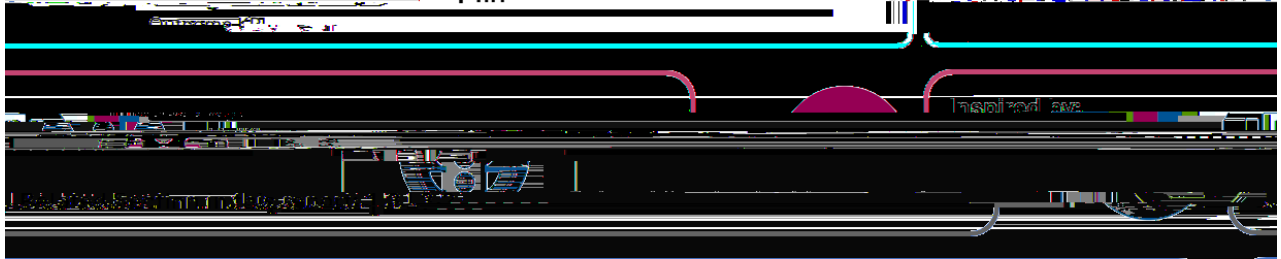
Rationale:

other priorities.

active transportation related infrastructure.

Targets:

Richard Willson suggests in *Parking in the City* (2018) that parking spaces should have a vacancy rate

Rationale:

for all road users to measure progress.

commute time

change

text

text

User perception of walking, cycling or transit as a transportation option

Outcome KPI

Inspired by:

Percentage of K-12 students using active transportation to and from school

Outcome KPI

Calgary   Edmonton

Rationale:

Mode share for all trips

Rationale:

Tracking resident travel modes can detect shifts from private vehicles to more sustainable modes of transportation.

alternative modes of transportation.

Demographics, such as age group, ...

Time of day, including on-peak ...

Target:

Halifax ... Brantford ... Lethbridge ...

Rationale:

where biking ... This KPI collected over time can contribute towards creating the cultural shift in an environment ...

Bike lanes and associated infrastructure will communicate the program of moves ... expansion.

Guelph   Strathcona County
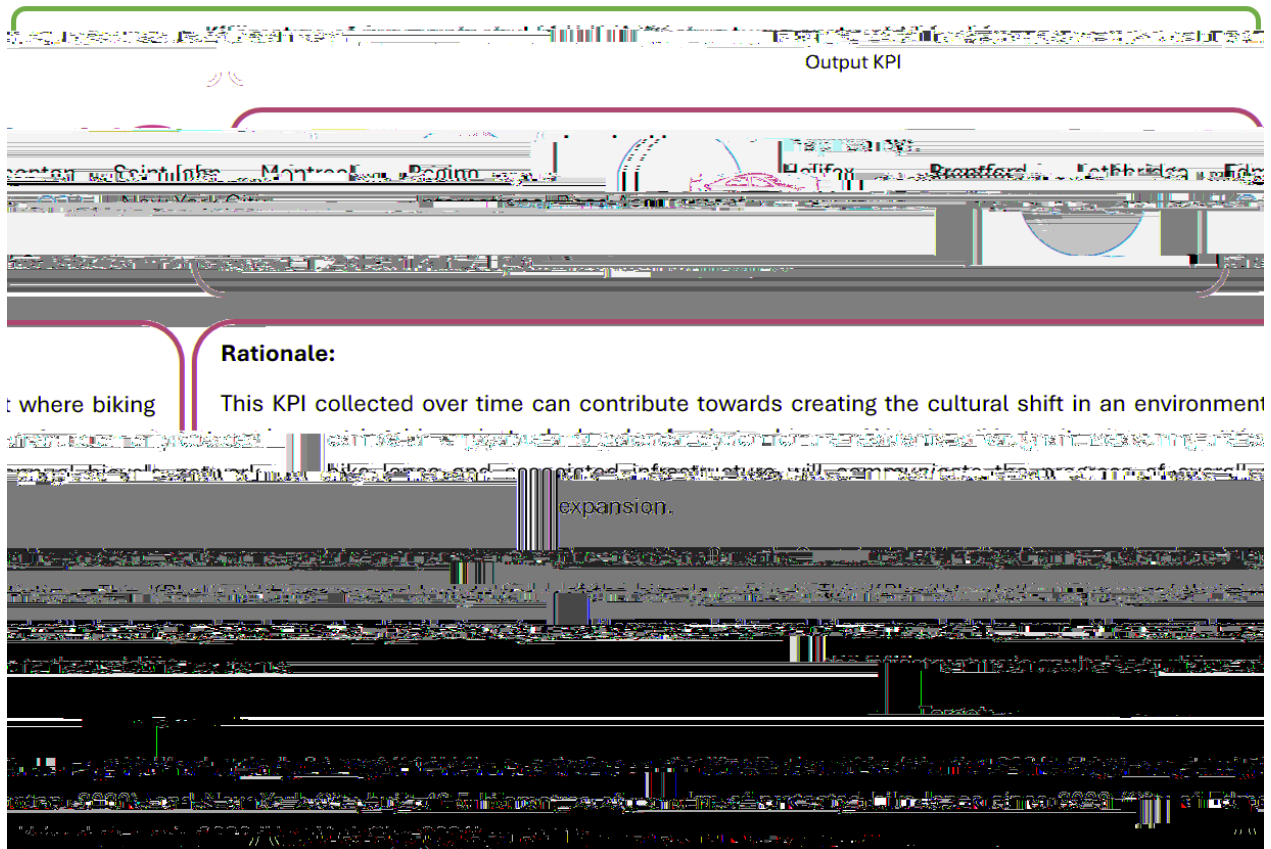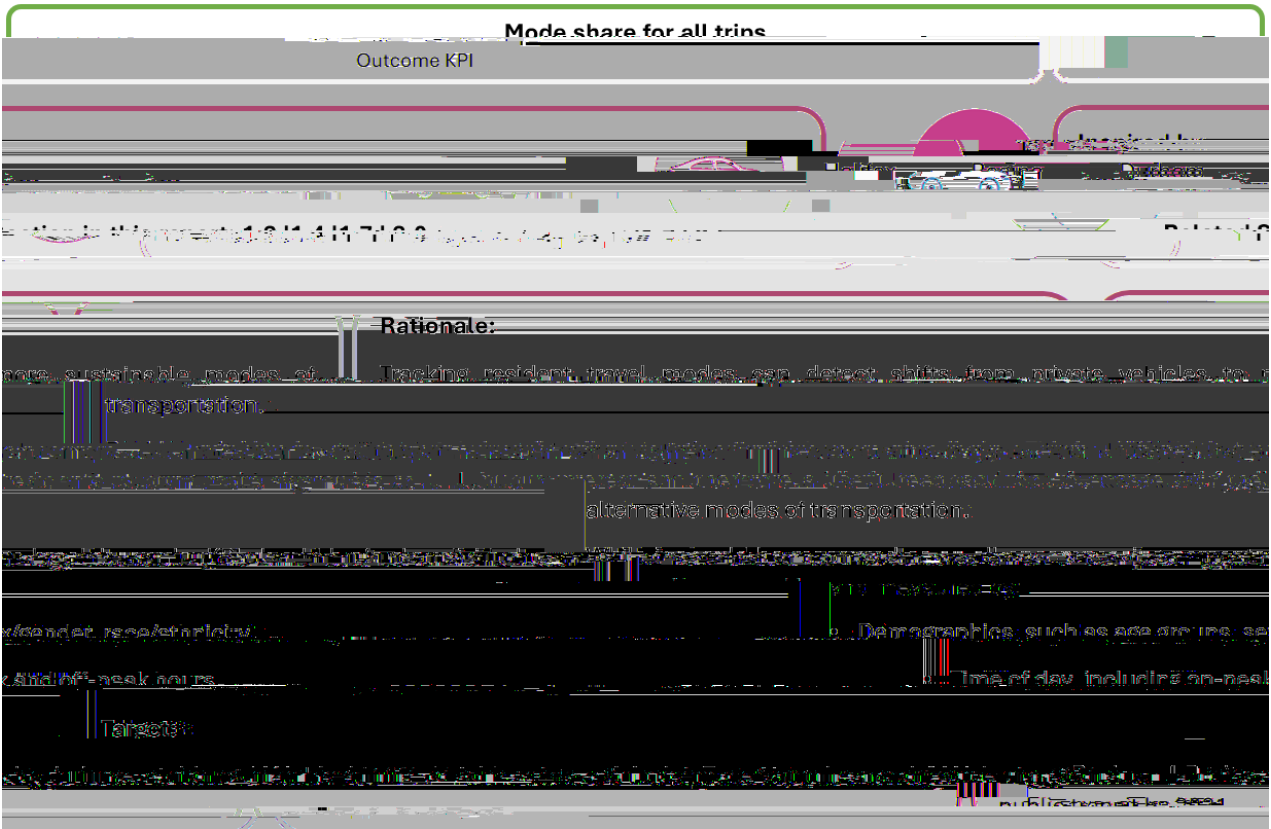
Related Section in this report: 1.3.4.1

Rationale:

communicate the county's yearly road safety context to its citizens.

Number of active transportation volume counts administered
Output KPI

Inspired by:

Lethbridge   Brantford   Saint John   New York City

Rationa

Active transportation volume data is extremely important in measuring the success of Vaughan's active transportation

To complement the proposed KPIs, it is equally important for Vaughan to consider the following:

z z   z   It is commendable for Vaughan to take up the KPI monitoring and evaluation framework as part of the MoveSmart Strategy, as the evaluation exercise will hold the City more accountable with its effort and progress. It is therefore important to start with simple KPIs, invest in engagement and education with key stakeholders ranging from the council members, planners and engineers, local school boards, and communities and resident groups. Focus on building information consistency and transparency is important to establish a credible monitoring and evaluation framework around the MoveSmart Strategy for its long-term success.

z   z   z   It is impossible to measure and evaluate any MoveSmart Strategy initiative with the use of one KPIs. All implemented initiatives should ideally to be working in convergence towards the strategy objectives.

z z z z z   **z**   Data availability is essential to evaluating the progress of initiatives. Our review identified multiple ways to collect data for KPIs such as traffic volume, speeds, enforcement, collisions, and public engagement. The calculation of any KPI depends heavily on data availability and integration, as well as hardware infrastructure capacity dedicated human resources. At the same time, the suitability of the KPIs should not be restricted by current data and resource availability, given that the MoveSmart Strategy is set to improve the overall road safety condition in Vaughan in the long term.

Metrics are driven by data availability, which shouldn't be the case, but unfortunately it is.

z   z   z   z   z   z z

z   Combine the usage of both outcome and output KPIs to address the temporal nature of the road safety monitoring and evaluation framework.

z   z   municipalities do not always collect the data themselves. This could be because they are not responsible for data collection or because they do not have the resources. This can be addressed by collaborating with organizations and entering into data-sharing agreements. Examples include police-reported collision statistics or hospitalization and ambulatory data from traffic-related injury admissions. Increased partnership with school boards, police, social services, and hospitals within York Region will contribute towards a successful delivery of the MoveSmart Strategy, not only for the data and information sharing, but also for the long-term public transit planning and implementation.

To provide Vaughan with a set of recommendations that are based on the previous
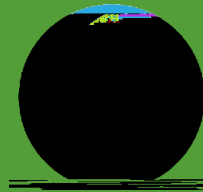
DIFFICULTIES IN IMPLEMENTATION

One of the difficulties noted by interviewees was a discrepancy between resident and city staff knowledge of transportation planning. One example used by an interviewee was how some residents ask their councillor to have speed

Z A map showing dissemination areas with high densities of severe collisions in bright red.

Map B-1 shows the density of severe collisions across dissemination areas (DAs) in Vaughan since 2020. Severe collisions are classified as motor vehicle collisions that include a fatality, an injury, or a hit and run. The map displays a general trend of severe collisions occurring along busy arterial roads such as Highway 7, Rutherford Road, Major Mackenzie Drive, Bathurst Street and Centre Street.

The three DAs with the highest collision density are:
1. The Fossil Hill Road and Alba Ave neighbourhood with 136 collisions per square kilometre (27 collisions total)
2. Ashley Grove Road and Windflower Gate neighbourhood with 98 collisions per square kilometre (35 collisions total)
3. Crestwood Ave and Yonge Street neighbourhood with 85 collisions per square kilometre (17 collisions total)

The collision density information gathered from Map B-1 can be combined with vulnerable population data to identify specific areas of traffic-related deprivation.
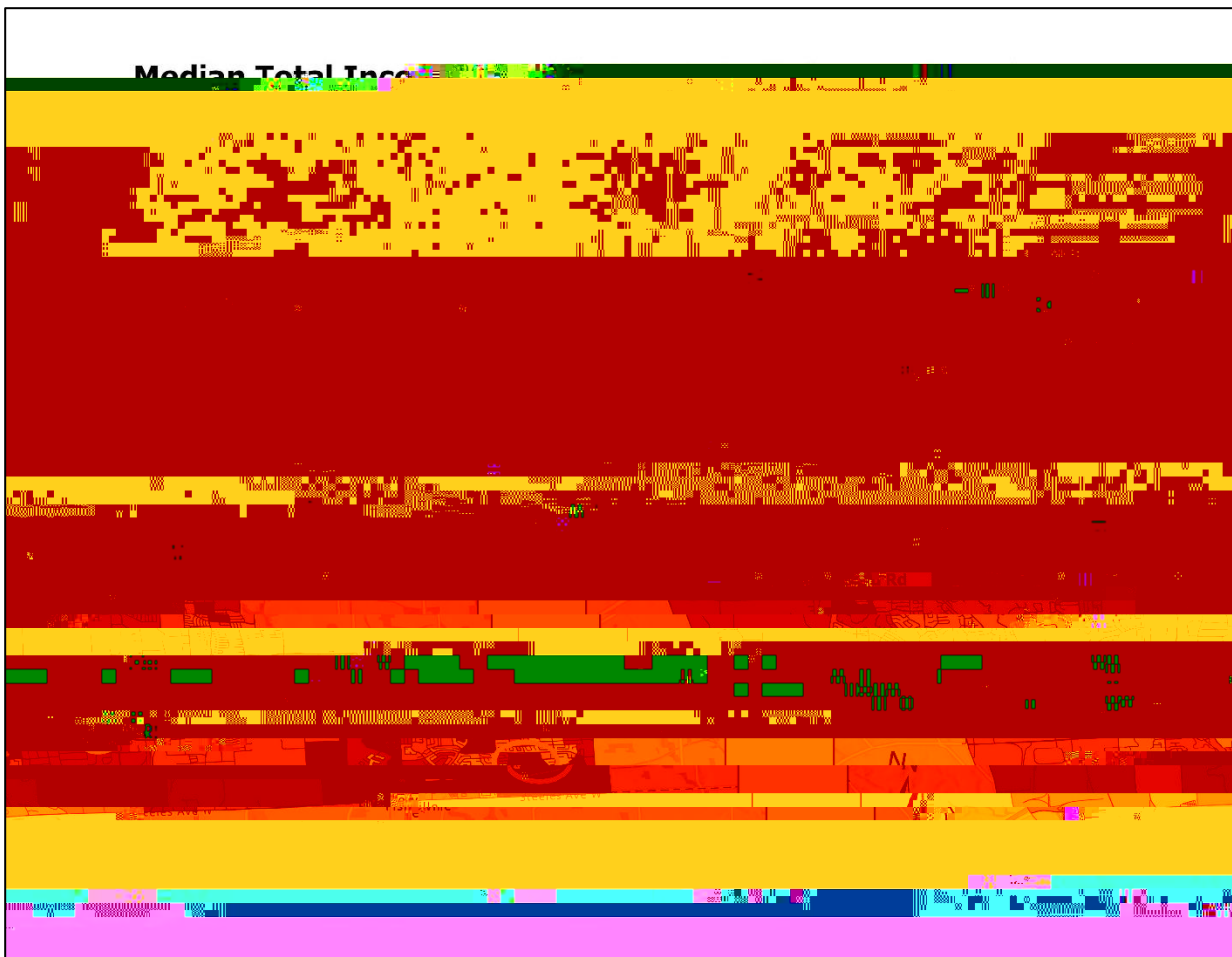
z   A choropleth map showing median income by quintile across Vaughan, ON in 2021.

Map B-2 shows the total median income of DAs in Vaughan. The three DAs with the lowest median income are circled in light blue. The map shows that DAs along HWY 400, HWY 7, Centre Street, and Bathurst Street often have lower median incomes. The three DAs with the lowest median income are the ones surrounding:

1. Alba Avenue and Fossil Hill Road with a median income of $31,800 per resident
2. Mosque Gate and Ahmadiyya Avenue with a median income of $31,800 per resident
3. Yorkhill District Park with a median income of $32,000 per resident

z   A map of Vaughan, ON showing the percentage of the dissemination area population older than 65 years old and make less than 50% of DA median income after-tax.

Map B-4 shows the percentage of low-income adults over 65(e)-2(s)-233ldov4 me me-

	Z
Fossil Hill and Alba Avenue	High level of collisions (136 collisions/km^2) Low median income ($31,800) Cluster of refugees nearby
Ashley Grove and Windflower Gate	High level of collisions (98 collisions/km^2) High percentage of older adults who are low-income (38%).
Promenade Shopping Centre	Medium-high level of collisions (31 62 collisions/km^2) Low median incomes ($31,000 - $40,000) High percentage of residents older than 65 (53%) Medium-high percentage of older adults as low-income (17-32%) Medium-high percentage of lone parent households (18-24%)
Mosque Gate and Ahmadiyya Avenue	Low median income ($31,800) High percentage of refugees (22%)

adjusting driver mirrors, and York Regional Police recommended using properly working headlights, defensive driving, courteous driving, and wearing seatbelts (Vaughan Citizen, 2017a, 2017b). However,   **Z**   **Z Z**
   Z   Z   **Z**   .

Overall traffic collisions in York Region are declining on regional roads, yet the relationship is reversed when the traffic collisions involve cyclists and pedestrians (Toronto Star, 2019). One author suggested local roads do not have the necessary cycling infrastructure (See Figure C-2), which may result in fewer cyclist fatalities due to less volume rather than safety (Vaughan Citizen, 2018b). Another opinion piece suggested that even with the presence of cycling infrastructure, cyclists are not using bike lanes and instead opting to ride on sidewalks (Vaughan Citizen, 2020b). This suggests that existing cycling infrastructure may not be high-quality or designed for the cyclist to feel safe, or that   **Z Z**   **Z**   **Z**
   Z Z   .

Given the presence of speeding and collisions involving pedestrians, it is unsurprising that traffic calming measures aimed at reducing vehicular speed were mentioned. These included line painting to make the road appear smaller to drivers, floppy bollards , speed limit0.00001a5h2 612 7( )-170(

S

To better understand how to minimize traffic collisions and fatalities in our cities, we first must

Pedestrians are the most at risk of serious injury and fatality in the event of vehicular collision (Yannis et al., 2020).

SPEED, VEHICLE KILOMETERS TRAVELLED, AND VEHICLE SIZE
Risk factors: Speed over 45 km/hr and 50km/h, Vehicle Size

As the speed of a vehicle increases, the fatality risk of a pedestrian increases when a collision occurs. In well-publicized research, it was found that pedestrians were five to eight times more likely to die from collisions when the vehicle was traveling 50km/h as compared to 30km/h (ITF, 2012; Khorasani-Zavareh et al., 2015).

Vehicle speeds over 45km/hr increase the likelihood for cyclist fatalities (Cushing et al., 2016).

All else being equal, traffic fatalities increase with vehicle kilometers travelled, displaying

Indigenous peoples living on reserve and in non-metropolitan areas in British Columbia experience greater risk of transportation injury, largely due to socioeconomic disparities (Brussoni et al., 2018).

Those with a lower level of education are at greater risk of injury from a traffic collision, as they are more likely to be pedestrians and live in dense neighbourhoods (Haghighi et al., 2020; Saeednejad et al., 2020).

- o Conversely, countries with higher education rates have lower rates of traffic fatalities (Haghighi et al., 2020)

Newcomers have an increased risk for traffic injury and fatality due to multiple factors, such as (Davison et al., 2013; Vanlaar et al., 2016):

- o Transferring between safety cultures and transportation-planned environments
- o Increased traffic exposure due to higher rates of active transportation

AGE-SPECIFIC

Risk factors: School distance, driving behaviour in school zones, non-local traffic, child exposure to traffic, older adult pedestrians

School-aged children using active transportation to school are more likely to be involved in a traffic collision. Distance of the walk and built environment features are two important factors in the involved risk (Chakravarthy et al., 2012; Davison et al., 2013; DiMaggio et al., 2016; Rothman et al., 2014; Yiannakoulias & Scott, 2013).

High population density, greater traffic exposure, and high-traffic speeds contribute to a (Chakravarthy et al., 2012; Davison et al., 2013; Harmon et al., 2020).

Children from visible minority groups or lower income families are at a greater risk of being involved in traffic collisions due to being more likely to live in a densely populated

Risk factors: High pedestrian activity, land-uses, school density, urban form, auto-dependant cities

Areas with high levels of pedestrian activity, such as commercial zones in urban areas, and large institutional areas such as universities, experience a higher frequency of pedestrian collisions compared to areas with lower levels of pedestrian activity (Pulugurtha et al., 2013; Ukkusuri et al., 2012; Zhu et al., 2022).

Traffic collisions are the least likely in single-family residential areas (Pulugurtha et al., 2013).

Cyclist collisions are less likely to occur in areas with mixed land use, due to the higher probability of appropriate bicycle infrastructure (Chen & Shen, 2019).

Auto-dependant American cities have greater traffic casualty rates than in cities where a greater portion of trips are by means of walking, bicycling and public transit (Frederick et al., 2018).

to human determinants. However, it should be noted that a greater number of determinants does not necessarily mean that there are a greater number of collisions attributed to them.

A key determinant that was pervasive throughout the review was motorist speed. While speed itself was shown to be a significant determinant of the collision severity, speed was also shown to be influenced by road geometry, intersection geometry, density, and identity tied to the specific area (non-locals versus locals). It is suggested that to reduce the frequency of speeding, that it may be useful to address the systematic determinants that could influence speeding as a method of human behaviour change. Lastly, an equity lens must be applied to understand the populations who are experiencing an increased risk of collision and fatality. Youth and seniors are more vulnerable road users due to multiple systematic factors (Chakravarthy et al., 2012; Davison et al., 2013; DiMaggio et al., 2016; Fang et al., 2018; Harmon et al., 2020; Kim, 2019; Rothman et al., 2014; Vanlaar et al., 2016; Yiannakoulias & Scott, 2013). Neighbourhoods with lower socioeconomic status are more likely receive non-local traffic, which is more prone to driving at greater speeds despite the potential unfamiliarity of the area (Morency et al., 2012; Yiannakoulias & Scott, 2013). This may be due to neighbourhood street design, or the location of the neighbourhood to major roadways. Implemented KPIs and policies utilizing a road safety lens should address the determinants of traffic collisions to achieve the most important measures and data.

Z Z Z

Determinants of traffic fatalities can be a result of human or systematic factors. Vulnerable road users such as pedestrians, active transportation users, children, older adults, and those with low socioeconomic status are at greater risk for traffic collision and fatality.
A deep understanding of the determinants of traffic fatalities can help guide action to greater road safety policies and initiatives.

INTERVIEW METHODOLOGY

One of the key tasks required to enhance the research project was to conduct interviews with industry, government, professionals, and academic contacts who would offer perspective on key performance indicators and other related Road Safety measures. The research team started

featured outcomes from its Congestion Management Plan highlight the success that the city has seen since its implementation. Many of these initiatives have been extended or built upon in response to their successful outcomes.

Z outcomes.

Z	
Z **Z** **Z** **Z** **Z**	In the Spring of 2015, the City installed 43 new traffic cameras (primarily along the Pan Am Games Route Network) that were instrumental in managing traffic during the Games. The city installed 80 between 2015 and 2016 and then proposed to expand this program by an additional 40 cameras in each of 2018 and 2020 (City of Toronto, 2015).
Z	The City completed 15 optimization studies using CMP funding

Z **Z**	Annual reports on the progress and success of the communication strategy Number of contest submissions received Number of stickers issued Number of reports of positive behaviours Number of drivers thanked for positive behaviours
Z **Z** **Z**	Number of people participating in survey Transportation safety culture index Change in transportation safety culture index over time

The jurisdictional review revealed an abundance of KPIs with 378 publicly reported from during the jurisdictional review of twenty-four Canadian municipalities and four international cities with methodology detailed in Supporting Documentation Section E.

After removing duplicates and grouping of similar KPIs based on available explanation, the total number of KPIs was reduced to 144. By adhering to the goals and objectives of the pillars within the MoveSmart Strategy, the number was further condensed to 50.

Careful considerations were given to the fifty KPIs to derive the final twenty to ensure they are rall context, current mobility approaches and issues which the MoveSmart Strategy is attempting to address. As the MoveSmart strategy evolves, additional or alternative KPIs may be required. The project team has provided 50 KPIs grouped by collision, transportation behaviour, high-risk driving and enforcement, engagement and education, land-use, infrastructure and engineering projects, maintenance, municipal policy and development, review and audit, and data management. Similar KPIs are grouped together while still maintaining the nuances and local context of the municipality.

Z Fifty key performance indicators identified during jurisdictional review.

	Z	**Z**	**Z**
	Z	**Z**	
1.	Rate of killed and seriously injured per 100,000 population		Surrey, British Columbia, City of Ottawa, Manitoba, Fort Saskatchewan, St. Albert

Z	**Z**	**Z**

	Z Z	Z
16.	Perceptions of Transportation User perception of walking, bicycling, and taking transit as a transportation option; Comfort levels with cycling for people by gender, age, ability; Public reactions to bike lanes	Calgary, Edmonton, Spruce Grove, Strathcona County, Halifax, New York City
17.	On-street parking utilisation rates	Halifax
18.	Usage of the bicycle infrastructure and programs by gender, age, ability	Edmonton
	Z Z Z	

19.

	z **z**	**z**
	at 40km/h (25mph) or more have dedicated bicycle facilities;	
36.	Pedestrian Crossings Number of pedestrian crossovers installed; Distance between controlled pedestrian crossings; Number of new safe pedestrian crossings; Number of crossovers; Number of safe crossings projects completed; Number of traffic signals; Percentage of roads where pedestrians cross and traffic flows at 40km/h (25mph) or more have pedestrian crossing facilities	Toronto, Saint John, International Road Assessment, Lethbridge, Brantford, Arizona, Montreal, Edmonton
37.	Safety Zones Number of community safety zones implemented; Number of senior safety zones implemented; Number of school safety zones implemented; Number of school safety projects completed	Toronto, Saint John, Montreal, Edmonton

The term *sustainable*
vision. It could be interpreted that mobility needs should be achieved in ways that support sustainable development, for example by lowering carbon emissions, replenishing natural resources, or more broadly, ensuring health, peace, and prosperity for its citizens. Alternatively, it may be interpreted that mobility should be achieved in a way that is financially sustainable. In either case, there are ways to **Z** **Z** **Z** **Z** **Z** **Z** **Z** **Z** **Z** **Z** . For example, by stating that the MoveSmart Strategy supports emission and air quality targets, physical activity levels, and social equity considerations, it both strengthens MoveSmart Strategy as interdepartmental policy, and increases public awareness as a communication strategy.

Walking, bicycling, e-bikes, and public transit are more affordable than automobile travel (Litman, 2022a).

It may also be beneficial to **Z** **Z** **Z** **Z** **Z** **Z** **Z** For example, significant individual user savings are likely to occur with shifts towards sustainable modes of transportation, as noted in Figure G-2 and Table G-2. A different emphasis on financial

z

implications, MoveSmart Strategy requires a capital investment of nearly $8 million, but how this investment is allocated based on travel mode or user vulnerability is unclear. Overall, the MoveSmart Strategy could

program areas is to incism092 reW* nB18i-24(f)-22(

Atlantic Collaborative on Injury Prevention. (2011). *The Social Determinants of Injury*. http://www.acip.ca/Document-Library/ACIP%20Publications%20(All)/ACIP%20Social%20Determinants%20of%20Injury%202011.pdf

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