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Appendix C: Priority Cycling and Multi-use Recreational Trails Network Development Supporting Technical Paper



City of Vaughan

Pedestrian and Cycling Master Plan

Network Plan

March 12, 2019

B000773

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City of Vaughan

Pedestrian and Cycling Master Plan

Active Transportation Network

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1. Introduction

CIMA+ in association with Mobycon and Lura was retained by the City of Vaughan (the City) to develop a new city-wide Pedestrian and Bicycle Master Plan based on the findings and recommendations included on the 2007 Pedestrian and Bicycle Master Plan and the 2012 Transportation Master Plan Pedestrian and Bicycle Network and considering the current and future demands for active transportation related infrastructure such as:

- The Vaughan Metropolitan Centre (VMC) which, in a relatively short time, will become a major urban area in Vaughan with a high concentration of residents and jobs. In fact, the VMC proposed cycling network plan represents the ambitions of the City of Vaughan to develop an “intense, dynamic community that in time will become the heart of the city, economically, culturally and physically.”
- “The Vaughan Super Trail Concept”. This plan, adopted by Vaughan City Council on April 19, 2017, was designed to connect local trails within a larger City-wide system.

This report summarizes the process and results of a comprehensive review of different elements of the cycling and multi-use recreational trail networks that was undertaken as part of the Pedestrian and Bicycle Master Plan update study.

2. Cycling Network Development

The Cycling Network was developed applying a collaborative planning process which included both extensive public consultation as well as technical analysis. The goal of the network is to facilitate the greatest number of bicycle trips, existing and future, in a cost-effective way that caters to riders of all ages and abilities.

This network identifies key corridors throughout the city which will serve to expand the transportation choices for residence and visitors of Vaughan through the inclusion of safe and comfortable infrastructure.

To help identify the most effective bicycle network for Vaughan, a three-step process was undertaken:

1. Identification of existing travel patterns
2. Focus on bikeable trips
3. Route allocation.

The methodology employed to inform this process was the Star Analysis. This methodology was developed as a multifaceted tool to guide the development of ideal bicycle networks within existing areas; ones that will safely and effectively accommodate the greatest number of users and trips.

This approach revolves around gaining an understanding of the travel motives and patterns of all residents and identifying trip patterns that are well suited to be completed by bicycle. This understanding of travel demand along with land use considerations, existing infrastructure and local knowledge inform the route allocation phase of the network development. This section of the document describes the process undertaken to develop the Cycling Network along the existing street network.

2.1. Identification of Existing Travel Patterns

Fundamental to developing an effective bicycle network is to understand the existing trips being taken by all modes. Regardless of how these trips are currently undertaken, they illuminate key movement patterns for people moving in and around Vaughan. While most of these trips are not currently undertaken by bicycle, they provide insight into the potential demand for cycling, and enable planning a network for people of all ages and abilities.

This analysis was initiated by mapping existing travel patterns within and around Vaughan based on the Transportation Tomorrow Origin-Destination Survey (TTS, 2011)¹. The technical analysis of travel patterns was completed in tandem and supplemented by public mapping exercises and stakeholder workshops, as well as consideration given to the building out of the Vaughan Metropolitan Centre (VMC).

¹ At the time of the analysis the 2016 TTS data had not yet been released.

The origin-destination relationships from the survey data were visualized to identify existing trip patterns. At a high level, the strongest trip demands found are trips to and from the surrounding region (specifically Toronto) rather than within Vaughan.

These findings are consistent with a general understanding that many Vaughan residents commute into Toronto for work as well as for access to a greater assortment of amenities.

While many trips to Toronto and the surrounding area are too long for most to cycle, understanding these links have important implications for the Cycling Network:

1. Many longer trips are increasingly well served by transit. Therefore, it is important the Cycling Network provides attractive, high quality access to transit connections and major points of interest.
2. Trips to adjacent communities that are within a practical cycling distance require that bicycle networks are coordinated across municipal boundaries to ensure connected routes.

2.2. Bikeable Trips

To focus on trips that are best suited to being made by bicycle, a distance filter was applied to the initial travel survey data.

This filter is based on a distance that will encompass the greatest potential for bicycle trips. Several factors were considered in setting this boundary:

- Modal share of bike trips drops off significantly for trips above about 7.5 km across cities with varying levels of cycling.
- The average Canadian commute is 31min, which is approximately 8 km by bike.
- The bicycle is time competitive with cars in urban environments for trips up to about 8.5 km.
- Generally, more than 60% of all trips taken by any mode are shorter than 8 km.

Based on the above factors, the greatest potential for cycling trips are those shorter than about 7.5 to 8.5 km. This boundary represents most trips made (by any mode), as well as a behavioural limit where an increased number of people will no longer choose a bicycle for their trip (regardless of the presence of comfortable facilities). It is noted that due to the increasing popularity of electric-assist bicycles, the average range for cycling trips is increasing. However, for this study we identified bikeable trips as less than 7.5 km.

Figure 2-1 highlights the connections that emerge from this analysis and represent the trips with the highest potential for cycling. The thickness of each line represents the relative potential for bicycle trips. The exact bicycle share achieved is dependent on a multitude of factors such as the quality of infrastructure, directness of routes, purpose of the trip, user demographics, as well as competing factors such as the cost and ease of driving.

2.3. Route Allocation

The next stage of the network development was to allocate specific routes that best facilitate the travel patterns identified, as well as provide high quality connections to key destinations and support future growth in the City. In allocating routes, the following five design principles were applied.

Cycle routes should be:

- Straight In order to be direct;
- Connected In order to be coherent;
- Separated In order to be safe;
- Flat In order to be comfortable; and
- Attractive In order to heighten user experience and encourage new users.

To achieve a network that reflects the principles set out, a two-tier network was developed. This is comprised of a Regional and a Local network of priority routes that work in tandem to support bicycle trips throughout Vaughan. Priority cycling network routes are shown in Figure 4-2 where routes in red represent recommended regional priorities and routes in blue represent recommended local priorities.

As with previous stages in the network development, the technical analysis for route allocation was complemented with public mapping exercises to help identify connections and corridors that may have been overlooked by the technical analysis.

Significant consideration was also given to the future prominence of the VMC as a trip generator within Vaughan. As with other urban cores, it stands to support the greatest number of bicycle trips within the City.

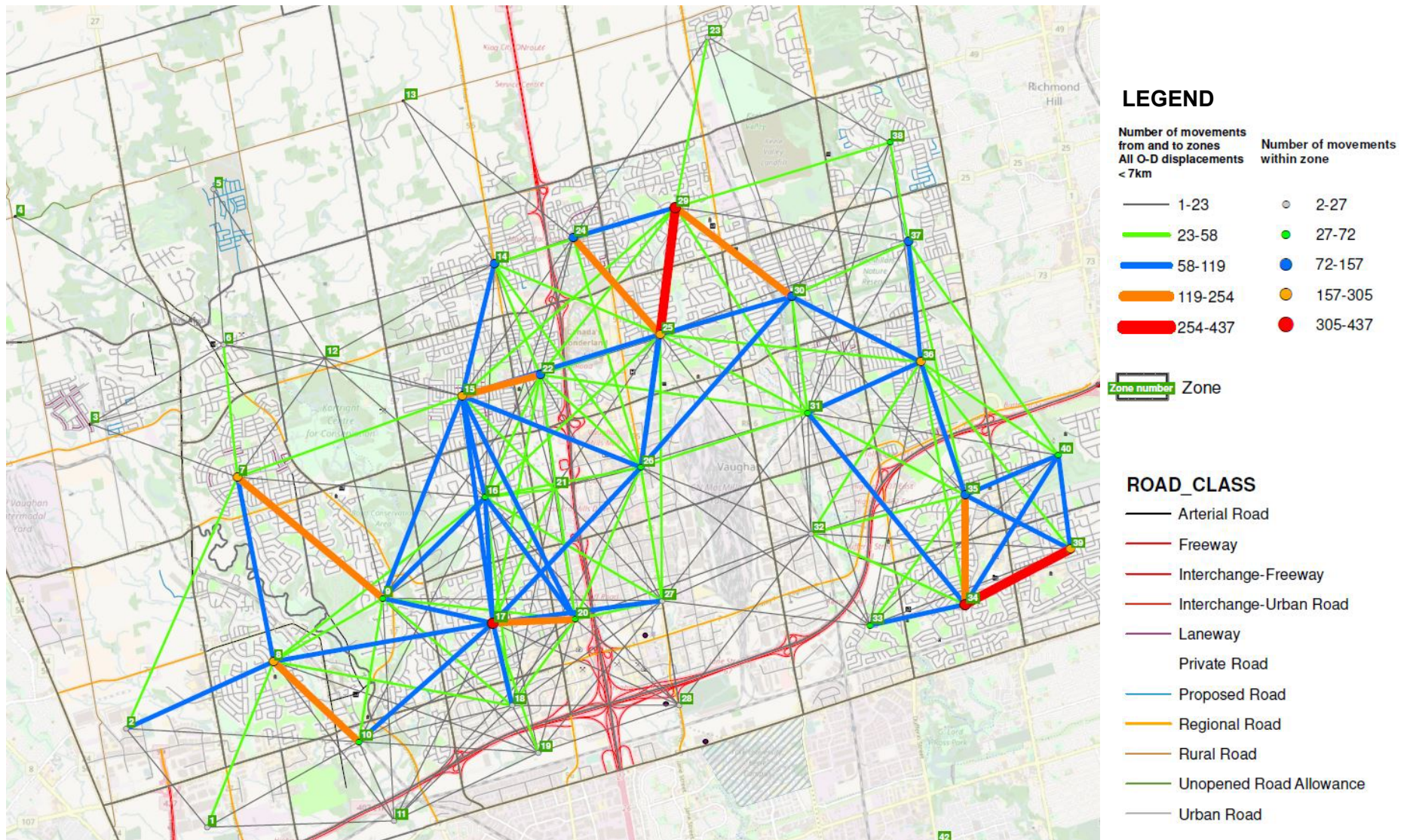


Figure 2-1: Trips in Vaughan with highest potential for cycling (TTS 2011)

2.3.1. Regional Priority Routes

The regional network priorities (red) identify cycling routes that require the highest quality of facilities and level of connectivity. It adheres most closely to the five design principles set out. This network represents a plan of how cyclists can move across the greatest distances through the city. These routes also access most key destinations throughout Vaughan and provide connectivity to adjacent communities.

Although at a large scale, the grid the Regional Network establishes serves as a backbone to the Cycling Network and is crucial to increasing the viability of cycling in Vaughan.

2.3.2. Local Priority Routes

The local network (blue) is focused on access comparatively to the regional network. These priority local routes serve to improve connections to origins and destinations not directly adjacent to the primary network. These routes are likely to see lower bicycle volumes and are less direct but extend the reach and connectivity of the regional network.

The priority local network also serves to provide alternate route choices to the regional network on streets that experience less vehicle traffic and slower speeds. While the most direct route may be the fastest, experience is an important factor for route choice while cycling and providing a variety of options in the network further improves the quality of service to users. It is especially important that the priority local network strives towards an all ages and abilities design principle as these will often be the routes used by residents and children to navigate their neighbourhood.

2.3.3. Expanding the Cycling Network

The Star Analysis methodology utilizes existing travel patterns and does not consider developing areas and future travel patterns. Secondary Plan studies, focused area and corridor studies, the development process and staff professional judgment should be utilized to build on the priority routes identified for existing areas.

2.4. Vaughan Metropolitan Centre (VMC) Focused Review

Given the rapid development occurring in the Vaughan Metropolitan Centre (VMC), a focused review of the street and cycling network was undertaken in advance of the approval of the City-wide Pedestrian and Bicycle Master Plan Update and cycling network.

2.4.1. Current Proposed Plan

The VMC vision is supported by many planning and engineering documents that set the framework for the development of a “dynamic community that in time will become the heart of the city, economically, culturally and physically.” The 2015 VMC Streetscape and Open Space Plan included a cycling network that aimed to support a multi-modal core fully accessible by bicycle.




It was developed to “incorporate cycling facilities into the street network to build a cohesive and permeable cycling network”. The proposed cycling network is shown in **Figure 2-2** and road network plan is shown in **Figure 2-3** to highlight corresponding road classifications.

The VMC cycling network plan also recognizes the importance of good connections to transit services within the VMC, including the need for quality bicycle parking at all stations and was developed to encourage walking and cycling as the main choices for everyday trips.



The review was undertaken with the understanding that the proposed road network has undergone many years of planning and is not considered to be open to any significant changes. It has the advantage of being essentially grid-like, making access within the VMC potentially convenient for all modes.

LEGEND




CYCLE FACILITIES (on-road)

-  Cycle Track
-  Bicycle Lane
-  Signed Route

CYCLE FACILITIES (off-road)

-  Multi-use Pathway (potential)
-  Long Term Cycling Facility (potential)

TRANSPORT FACILITIES

-  YRT Bus Terminal
-  TTC Station
-  VIVA NEXT Rapid Transit Stations

Encourage walking or cycling for most daily trips within the VMC
(4.0 VMC Secondary Plan)

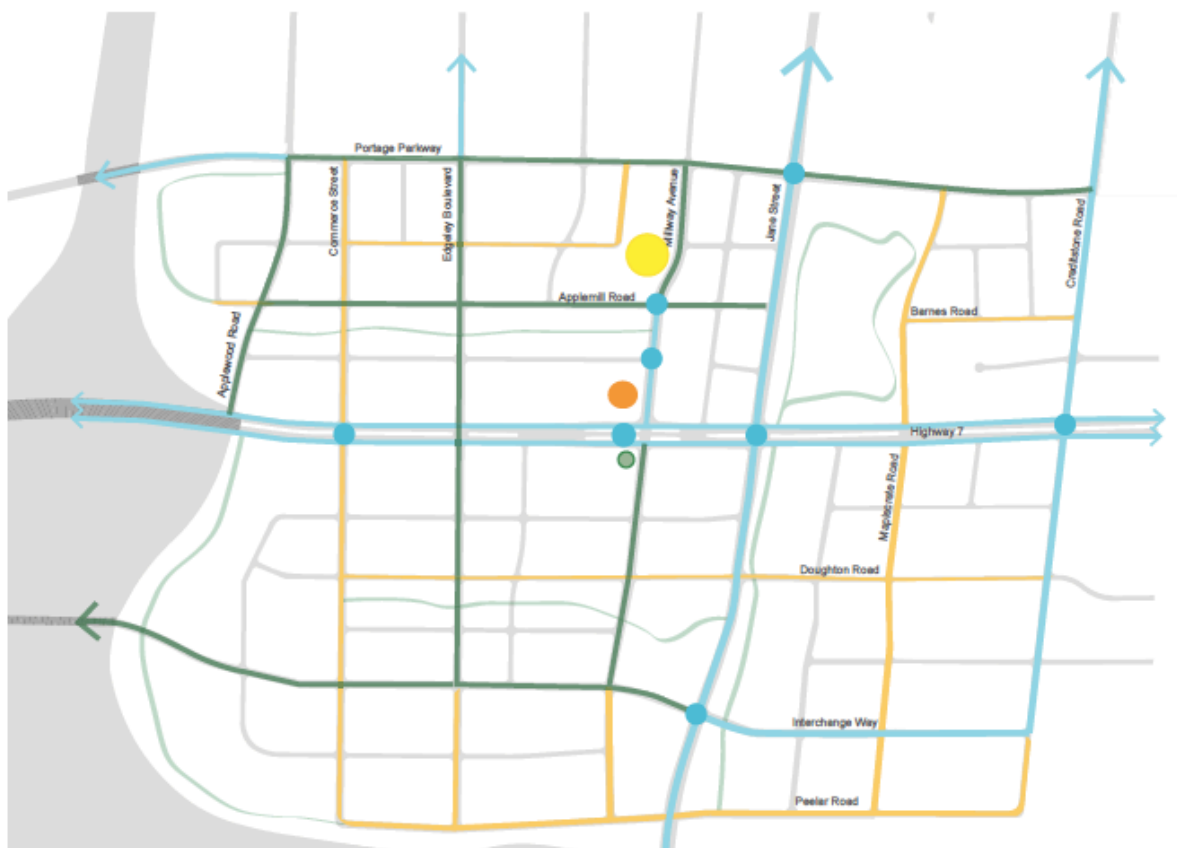


Figure 2-2: VMC Cycle Network Plan (2012 Streetscape and Open Plan)

SCHEDULE C > STREET NETWORK

LEGEND

- arterials (width to be consistent with region of york official plan)
- minor arterial (33 m)
- major collectors (28-33 m)
- special collector (33 m)
- minor collectors (23-26 m)
- local streets (20-22 m)
- mews (15-17 m) or local streets (see Policy 4.3.16)
- colossus drive overpass corridor protection area (see policy 4.3.10)
- major parks and open spaces
- see policy 4.3.2
- ✱ see policy 4.3.17
- ✱ see policy 6.3.2

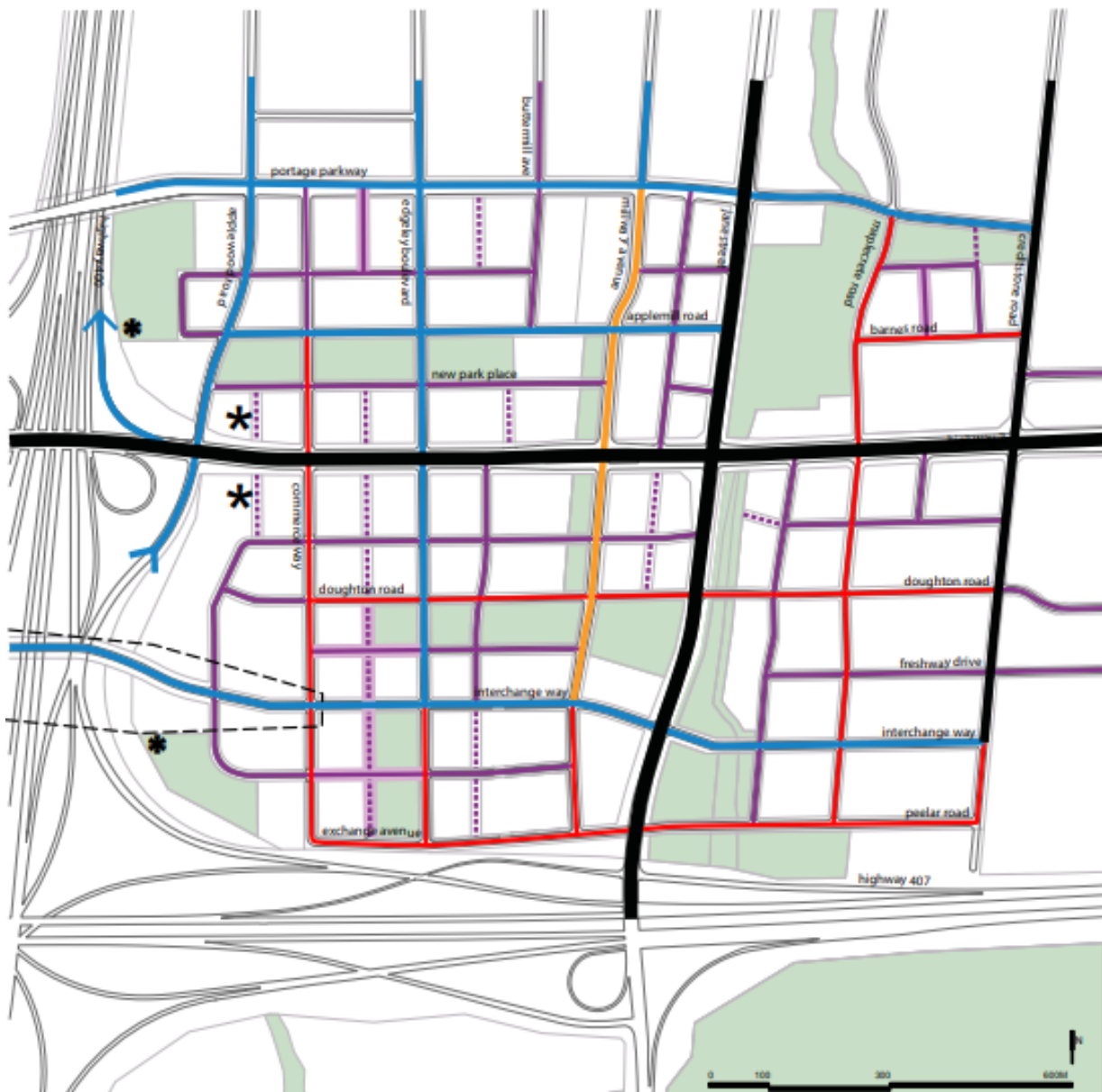


Figure 2-3: Proposed Road Network Plan (2010 VMC Secondary Plan)

2.4.2. Comprehensive Review

The element of the plan that presents the greatest potential for improvement are the proposed facility allocation and the accompanying right-of-way required – hence the focus of this review. The proposed cycling network along with the intended vehicular designation of the roadways are displayed in **Figure 2-2** and **Figure 2-3** respectively.

The review of the VMC cycling network evaluates the network on safety and access from the perspective of roadway type and functionality, drawing upon guidelines for facility selection set out in the Ontario Traffic Manual (OTM): Book 18 and drawing on best practices from neighbouring municipalities.

Arterials

Major arterial roadways are under the jurisdiction of the Region. Arterial roads have the highest speed and volumes, as well as heavy vehicles posing the highest risk to cyclists. Therefore, maximizing separation between modes should be the goal for this roadway classification.

It is recommended that in-boulevard cycle tracks be required for all arterial roadways in the plan. Any bike lanes planned for arterial roadways should be changed to cycle tracks.

Major Collectors

The 2012 VMC Cycling Network Plan shows cycle tracks on all major collectors in the VMC road network. Based on best practices, this is considered the appropriate facility type for this road classification. Major Collectors generally have high speeds, volumes and heavy vehicle counts which necessitate greater separation. It is recommended that in-boulevard cycle tracks to the sidewalk be considered for all major collector roadways.

Minor Collectors

The minor collectors identified in the plan indicate a ROW between 23m to 26m, operating as 'signed routes' (no bicycle facilities provided) or with an on-road bike lane, respectively.

Generally, minor collectors operate at ≥ 50 km/h with moderate traffic volumes, **it is recommended that cycle tracks be implemented on all roadways with this classification, similar to major collectors. As such a 26m ROW should be secured to avoid significant reductions in boulevards, parking lanes or lane widths. If placed adjacent to the curb, with or without on-street parking, it is suggested that a 1.0 m buffer be provided.**

Local Streets

The primary function of a local street is to provide access to the adjacent properties, which does not require high speeds and benefits from lower speeds. In-line with a target of lower speeds (and volumes) separated bicycle facilities are not typically the preferred approach on these streets.

The primary recommendation for this class of roadway is that these roadways are designed to achieve low vehicular speeds (≤ 30 km/h) to allow bicycles, pedestrians and vehicles to mix more easily in a reasonably safe manner. Roadway design is especially important on these streets as simple reductions in the posted speed limit are not shown to yield sufficient speed reduction.

Revised Network Plan

Based on the foregoing discussion(s) related to roadway classification, speed, safety, best practices from other municipalities, anticipated development, population density and land use mix, an updated network plan is shown in **Figure 2-4**.

The recommended priority cycling routes including the VMC Cycling Network are shown in **Figure 2-5**.

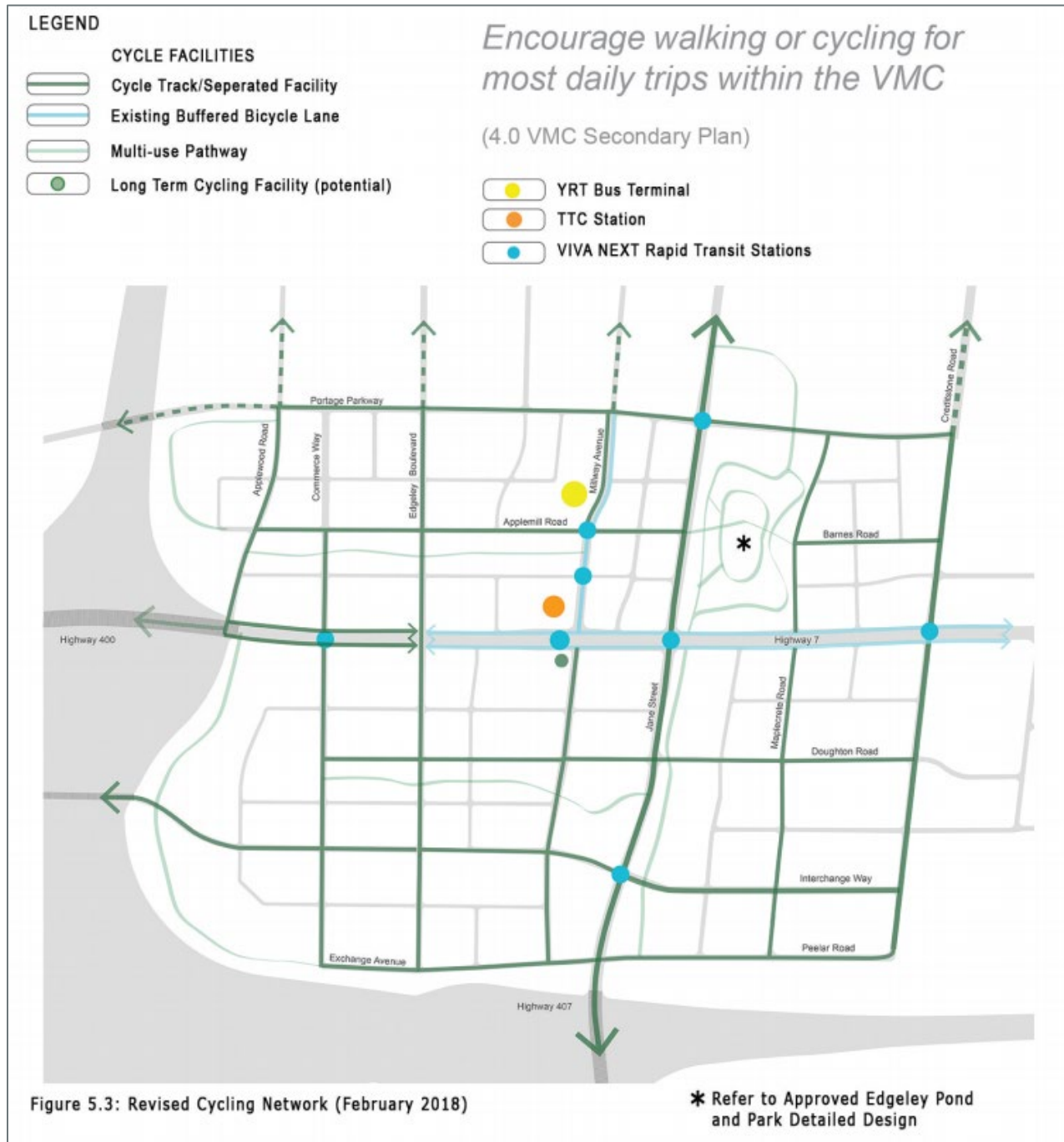


Figure 2-4: VMC Separated Cycling Network

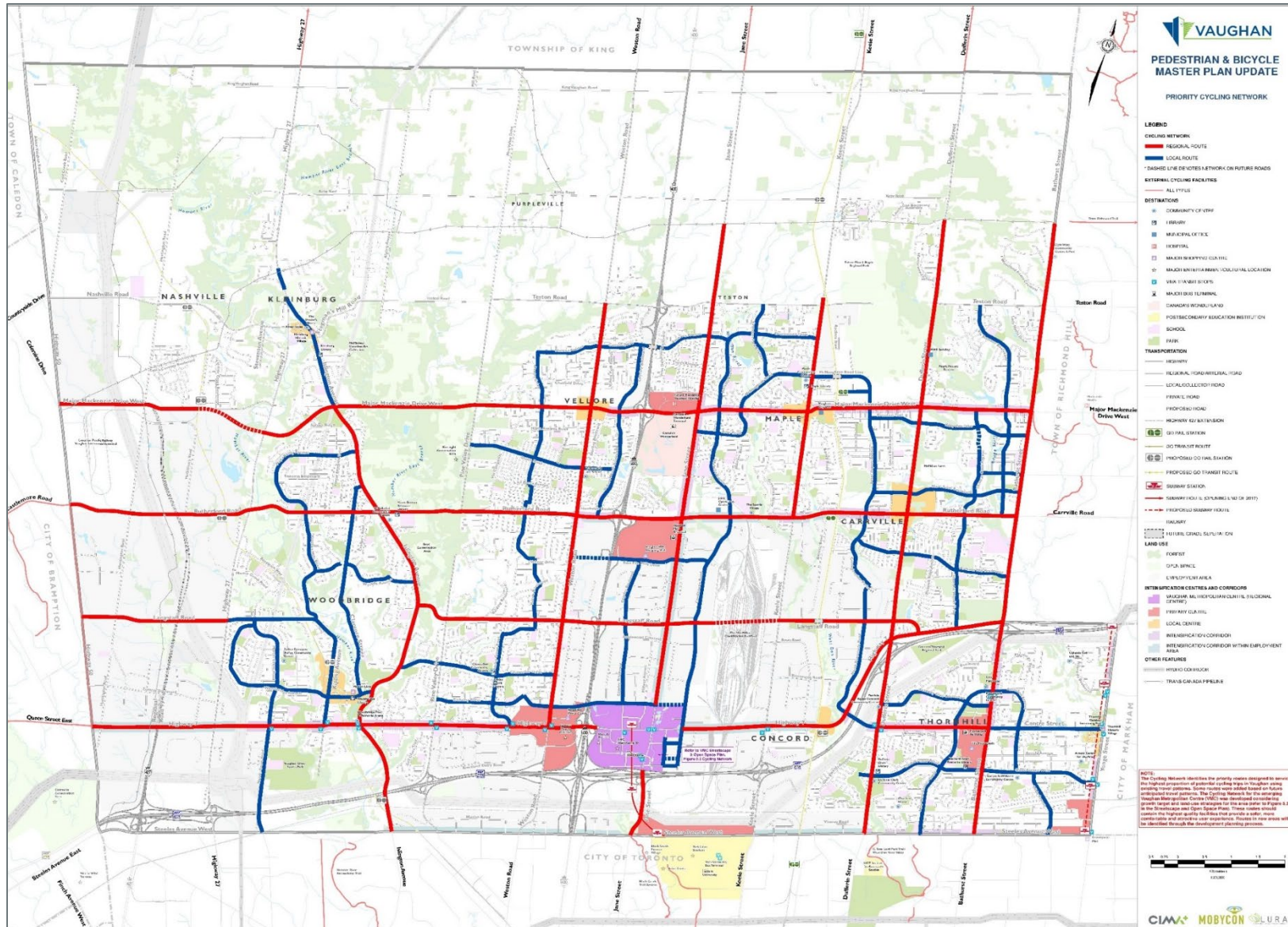


Figure 2-5: Priority Cycling Network

2.4.3. Summary of Proposed Improvements to the VMC Network

It should be noted that, in general, the recommended changes to the plan will not increase capital infrastructure spending significantly and may reduce construction costs as some on-street pavement (bicycle lane) is effectively replaced by off-street paving (cycle track) which uses a lesser depth of paving. Some cycle track retrofit recommendations (should they prove feasible) will cause an increase in spending but may save in maintenance costs over the longer term. To provide a safer cycling environment for residents and visitors to the VMC, the following recommendations are made:

1. A cycle track should be planned for all arterial roadways in the VMC, i.e. Jane Street, Highway 7 (cycle track currently under construction) and Creditstone Road;
2. The following minor collector roads be constructed with cycle tracks in a 26m ROW rather than bicycle lanes in a 23 or 26 m ROW as shown in the current VMC network plan:
 - Maplecrete Road
 - Barnes Road
 - Commerce Way
 - Doughton Road
 - Exchange Avenue/Peelar Road
 - Edgeley Boulevard (south of Interchange Way)
 - Millway Avenue (south of Interchange Way)

A revised network plan is shown in **Figure 3-3**.

3. Through design treatments, local streets in the VMC should provide access as a primary function while accommodating low vehicular speeds (30 km/h being the target). Appropriate design features should also provide for safe cycling maneuvers at intersections.
4. A feasibility study be undertaken to examine options for implementing a cycle track on the Portage Parkway bridge crossing of Highway 400 and the connection to Weston Road.
5. As planning proceeds for the Edgeley Park trail, it is essential that good connections be made to the road-based network that is planned.

2.5. Facility Choice

A fundamental component to creating a cycling network that caters to riders of all ages and abilities is implementing appropriate facility type to the traffic environment. It is well understood that the simple presence of a bicycle facility is not sufficient to encourage widespread use if it is not perceived as safe and comfortable.

To aid in appropriate facility selection during the implementation of the Cycling Network, **Table 2-1** lays out a decision guide that responds to the needs of users of all ages and abilities.

Table 2-1: Contextual guidance for selecting bicycle facilities (NACTO 2017)

Contextual Guidance for Selecting All Ages & Abilities Bikeways				
Roadway Context				
Target Motor Vehicle Speed	Target Max. Motor Vehicle Volume (ADT)	Motor Vehicle Lanes	Key Operational Considerations	All Ages and Abilities – Bicycle Facility
Any			Any of the following: High curbside activity, frequent buses, motor vehicle congestion or significant turning conflicts***	Cycle Track (Class 1)
≤15km/h	Less relevant	No centerline, or single lane one-way	Pedestrians share the roadway	Shared Street
≤30km/h	≤1,000 – 2,000		Single lane each direction or single lane one-way	Low curbside activity or low congestions pressure
	≤500 – 1,500			
≤40 km/h	≤ 1,500 – 3,000	Multiple lanes per direction	Low curbside activity, or low congestion pressure	Conventional or Buffered Bicycle Lane or Cycle Track (Class 2)
	≤ 3,000 – 6,000			Buffered Bicycle Lane or Cycle Track (Class 1)
	Greater than 6,000	Protected Cycle Track (Class 1)		
>40 km/h	≤ 6,000	Single lane each direction	Low curbside activity, or low congestion pressure	Protected Cycle Track (Class 1), or Reduce Speed
		Multiple lanes per direction		Protected Cycle Track (Class 1), or Reduce to Single Lane & Reduce Speed
	Greater than 6,000	Any		Protected Bicycle Lane, or Bicycle Path (Class 1)
High-speed limited access roadways, natural corridors, or geographic edge conditions with limited conflicts	Any		High pedestrian volume	Bike Path with Separate Walkway or Protected Bicycle Lane (Class 1)
			Low pedestrian volume	Shared-Use Path or Protected Bicycle Lane (Class 1)

* While posted or 85th percentile motor vehicle speed are commonly used design speed targets, 95th percentile speed captures high-end speeding, which causes greater stress to bicyclists and more frequent passing events. Setting target speed based on this threshold results in a higher level of bicycling comfort for the full range of riders.

**Setting 40 kph as a motor vehicle speed threshold for providing protected bikeways is consistent with many cities' traffic safety and Vision Zero policies. However, some cities use a 50 kph posted speed as a threshold for protected bikeways, consistent with providing Level of Traffic Stress level 2 (LTS 2) that can effectively reduce stress and accommodate more types of riders.

***Operational factors that lead to bikeway conflicts are reasons to provide protected bike lanes regardless of motor vehicle speed and volume.

This framework provides the standard to which new bicycle facilities implemented are to meet. This allows for context sensitive design on implementation while ensuring a minimum standard of user experience is maintained across the priority Cycling Network as well as along other corridors. This is in line with current best practices.

2.6. Signature Projects

To help inspire bicycle use in Vaughan, signature projects have been identified to represent the ambitions of the Cycling Network and the City's desire to expand transportation and recreation choices for residence and visitors.

Neighbourhood Networks

Facilitating bike trips within Vaughan's neighbourhoods is an important part of developing a culture of active transportation. Resultantly, four neighbourhoods have been identified as primary locations for developing localized networks:

- Maple
- Thornhill
- East Woodbridge (East of Humber River)
- Woodbridge

While each localized network serves as a valuable component to the entire network, these neighbourhood networks should attempt to reflect a unique identity through signage and other design elements. Attention should be paid to providing access to and identifying key destinations in each neighbourhood and building out these localized networks with connectivity and safety as the primary focus.

Jane Street

The 2010 Vaughan Official Plan identified Jane Street as an intensification corridor. Intensification areas have been established through the City's Official Plan to make efficient use of underutilized sites served with high-level of existing or planned transit and are envisioned as linear places of activity. They will be developed with a mix of uses and mid to high densities generating increased walking, cycling and transit use as a mode of transportation. The ongoing development of the City's emerging downtown along with existing importance of Jane Street as a corridor that provides access to significant local and regional destinations including York University in Toronto, VMC, Vaughan Mills, Canada's Wonderland, Mackenzie Health Hospital, make it a critical north/south connection for Vaughan and the region. York Region Transit / Viva Strategic Plan plans to operate high-frequency transit along this corridor with connections between the Vaughan Metropolitan Centre (VMC) and the Richmond Hill GO Station. To reflect the significant role Jane Street plays, it has been identified as a key priority and signature project for the Cycling Network.

Kleinburg Gateway

Vaughan's location positions it to serve as a gateway for many of its residents as well as visitors looking to cycle north towards popular cycling destinations throughout King Township. Existing Strava data shows that Islington Ave is the most commonly used corridor and attracts significant bicycle traffic throughout the summer months. Kleinburg currently benefits from the existing economic activity brought by cyclists. By recognizing this opportunity for further economic development through fostering this demand for cycling and tourism, Vaughan stands to put itself on the map as a destination for cycle tourism.

Transforming Islington Avenue into a corridor that caters to cyclists, responds to a growing segment of the population that are looking to cycle beyond the urbanized areas found in Vaughan and the GTA. Creating safe, comfortable facilities that also reflect the unique needs of cycling stand to create a unique experience for those traveling through the corridor.

3. Multi-Use Recreational Trail Network Development

3.1. Existing Network

The existing multi-use recreational trail network is comprised of fragments except for the following two key trail segments:

- The Barley Smith Greenway - A 15 km trail following the course of the West Don River through Maple and Concord; and
- The William Granger Greenway - This Trail follows the course of the East Humber River and is part of the historic Carrying Place Trail used by the Aboriginal people. The trail runs uninterrupted from Kleinburg to the Boyd Conservation Area.

Using existing GIS information, a map of current cycling conditions was created, and information was updated based on input from staff and field reviews. **Figure 5-1** illustrates the existing multi-use recreational trail network in Vaughan at the time the plan was developed.

There are several well connected existing multi-use trail systems outside of City of Vaughan boundary that come to the City border such as:

- City of Toronto - Humber River Recreational Trail
- City of Toronto - Black Creek Trail System
- City of Toronto - G. Ross Lord Park Trail/West Don River Valley Trail System
- City of Richmond Hill - Trans Richmond Trail

3.2. User Profiles and Activity Types

Active Transportation describes all human powered forms of travel, such as walking, cycling, horseback riding, in-line skating, skate boarding, cross country skiing, scooters etc. Modes of travel are becoming more diverse where walking and cycling are still most popular, however designing multi-use recreational trails should accommodate different users. The intent is to develop a multi-use recreational trail network to be used for all purposes, and not only focused on recreational and commuter purposes.

Providing a high level of accessibility is important for the success of Vaughan's multi-use recreational trails. Compliance with legislated requirements and best practices for accessibility are critical for determining trail designs.

The majority of the multi-use trails must accommodate emergency vehicles, maintenance vehicles and/or waste removal trucks wherever possible. This will influence minimum trail widths and trail construction requirements, and have impact on loading requirements for trail structures, and the cover required over culverts and drains.

It is not always possible to make accurate calculations of user volumes for planned trails. However, a generalized comparison with other, similar trails in the Greater Toronto Area is possible. Some factors to consider are ratio between size of catchment area and length of trail, population density of catchment area, number of entry points, and availability of alternative trail options within a given area or the cycling network.

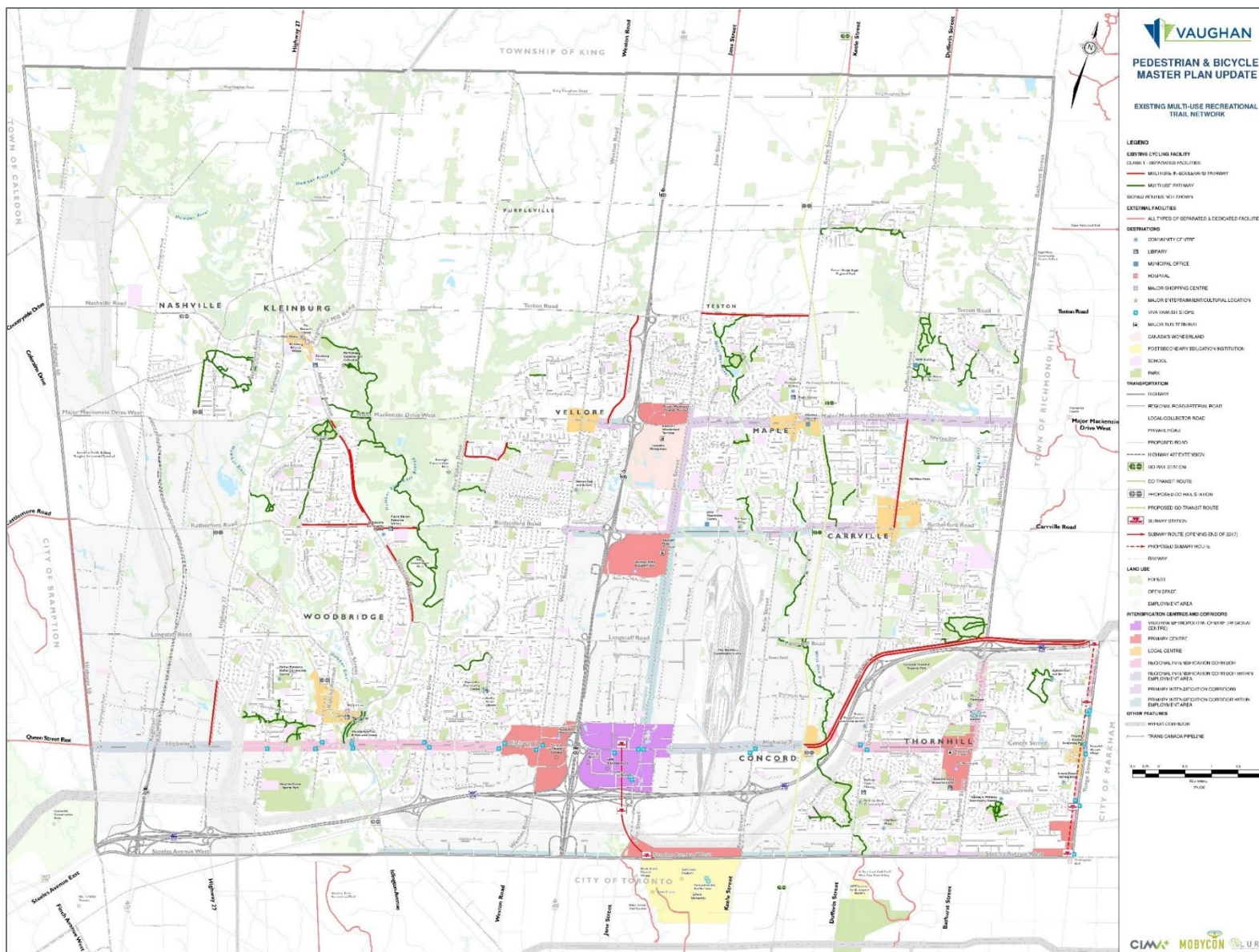


Figure 3-1: Existing Multi-Use Recreational Trails Network

3.3. Network Development Approach

3.3.1. The Vaughan Super Trail

The idea of The Vaughan Super Trail was endorsed through the Cycling and Pedestrian Advisory Task Force recommendations in early 2017. The Task Force recommendations included several goals and objectives, which have been further developed through this study:

- Identified by the City as a key component of the future multi-use recreational trail network;
- Strong Marketing Tool to promote Active Transportation within the City of Vaughan;
- Branded as the “Vaughan Super Trail” and becomes a Regional attraction itself;
- Provides a platform for City-wide initiatives & programs such as charity bike rides & marathons;
- Increase connectivity options within the Vaughan boundary by adding connections within the Vaughan Super Trail;
- Provide alternative route options for both commuters & recreational trail users; and
- Potential to increase Municipal connections & Regional systems such as the Pan Am Path and the Lake to Lake Trail.

It should be noted that the development of the planned trail network had broad input from the public during the development of the network plan. During the community outreach programme strong support for the ‘Vaughan Super Trail’ concept as a multi-use recreational trail network and recreational opportunity/destination was noted as being valuable.

Residents acknowledged their enjoyment of the current trail system and encouraged the City to provide a more extensive and connected network. As a result of this feedback, the key guiding principles for the multi-use recreational trail network are as follows;

- Promote the Vaughan Super Trail as a signature project;
- Enhance the existing multi-use recreational trail network and support the proposed cycling network;
- Provide connections to well established trail networks in surrounding Municipalities;
- Maximize continuous cycling routes in Primary and Secondary loops; and
- Provide safe cycling routes and crossing locations.

The Vaughan Super Trail (Primary Network) was modified slightly in the course of this study to better fit the needs of the community and also the connectivity with all parts of the trail system and cycling network. The revised network connects key destinations and areas within the City with continuous connected loops. The Vaughan Super Trail will be integrated with existing land use patterns optimizing the use of utility & transportation corridors, existing trail facilities, and the cycling network. Proposed additions to the trail network will connect the missing links in order to achieve a continuous network.

3.3.2. Secondary Network

The Secondary Network was developed building upon the existing trail facilities, the primary trail network (Vaughan Super Trail), and proposed additions, to create a cohesive and continuous system of on and off-road cycling facilities throughout the City (**See Figure 3-2**).

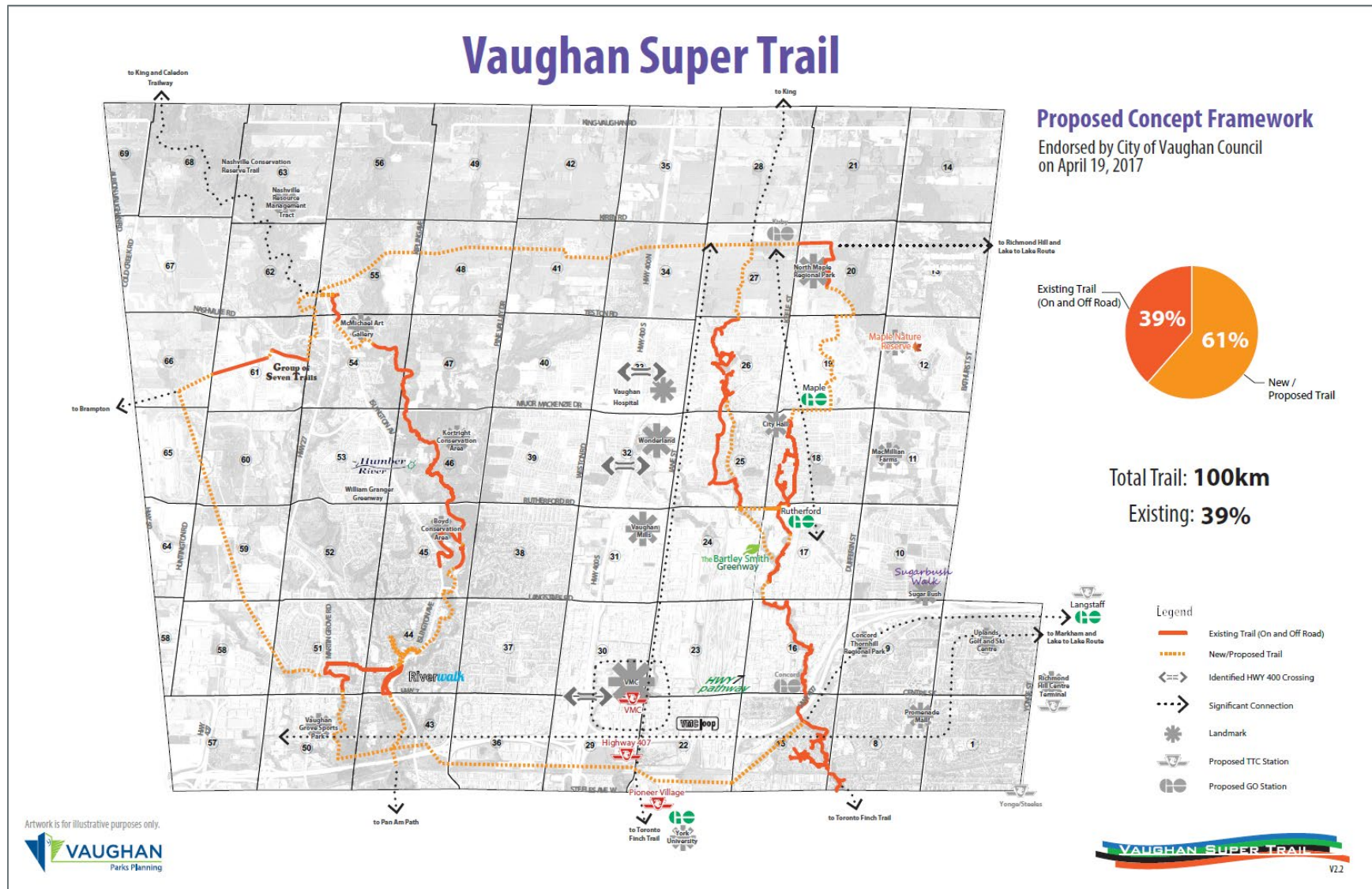


Figure 3-2: Multi-use Recreational Trail Network Concept

A series of Secondary Network connections supports shorter local secondary loops for access from neighbourhoods. These routes will also be interconnected with the cycling network and multi-use trail networks of adjacent municipalities. The proposed network does not preclude possible opportunities to connect across the City of Vaughan limits to adjacent cities and towns at other locations.

Secondary Network trails connect destinations within a small geographic area and provide feeder links between neighbourhoods and the primary trail. The Secondary Network will be made up of existing neighbourhood trail facilities and proposed additions that will connect to the Super Trail network.

3.4. Route Determination

The preferred multi-use recreational trail routes were ultimately selected based on input provided from residents and stakeholders through the public information process, stakeholder meetings and the information collected through field and desktop investigations.

Route determination for the multi-use recreational trail network is further guided by user experience and the following principles:

- Inspiring and creating awareness: A User Experience that is inspiring and memorable
- Maximize connectivity for continuous multi-use recreational trails and commuter benefit;
- Integrate trail connections and crossings with cycling routes;
- Provide alternatives to cycling routes;
- Maintainable and sustainable infrastructure
- Maximize use of City-owned lands and integrate natural and parkland corridors, and available spaces in utility and transportation corridors;
- Meet Accessibility for Ontarians with Disabilities Act (AODA) requirements;
- Enhance access and use of parks and open spaces in an environmentally sensitive manner;
- Provide key amenities along the network (seating, parking, washrooms, bicycle parking etc.); and
- Ensure route aesthetics in order to heighten user experience and encourage new users by being diverse and multi-seasonal.

3.5. Multi-use Recreational Trail Network - Overall Map

The overall recommended multi-use recreational trail network is shown below in **Figure 3-3**. The following should be noted with respect to the network map:

- The map does not show all local and tertiary local connections and therefore does not preclude developing tertiary and local connections where warranted through future development.
- The map does not show all potential barrier crossings at local, arterial and highway points, rail ways, and other infrastructure. Additional crossings will be determined through feasibility and detailed studies of particular trail segments through implementation.

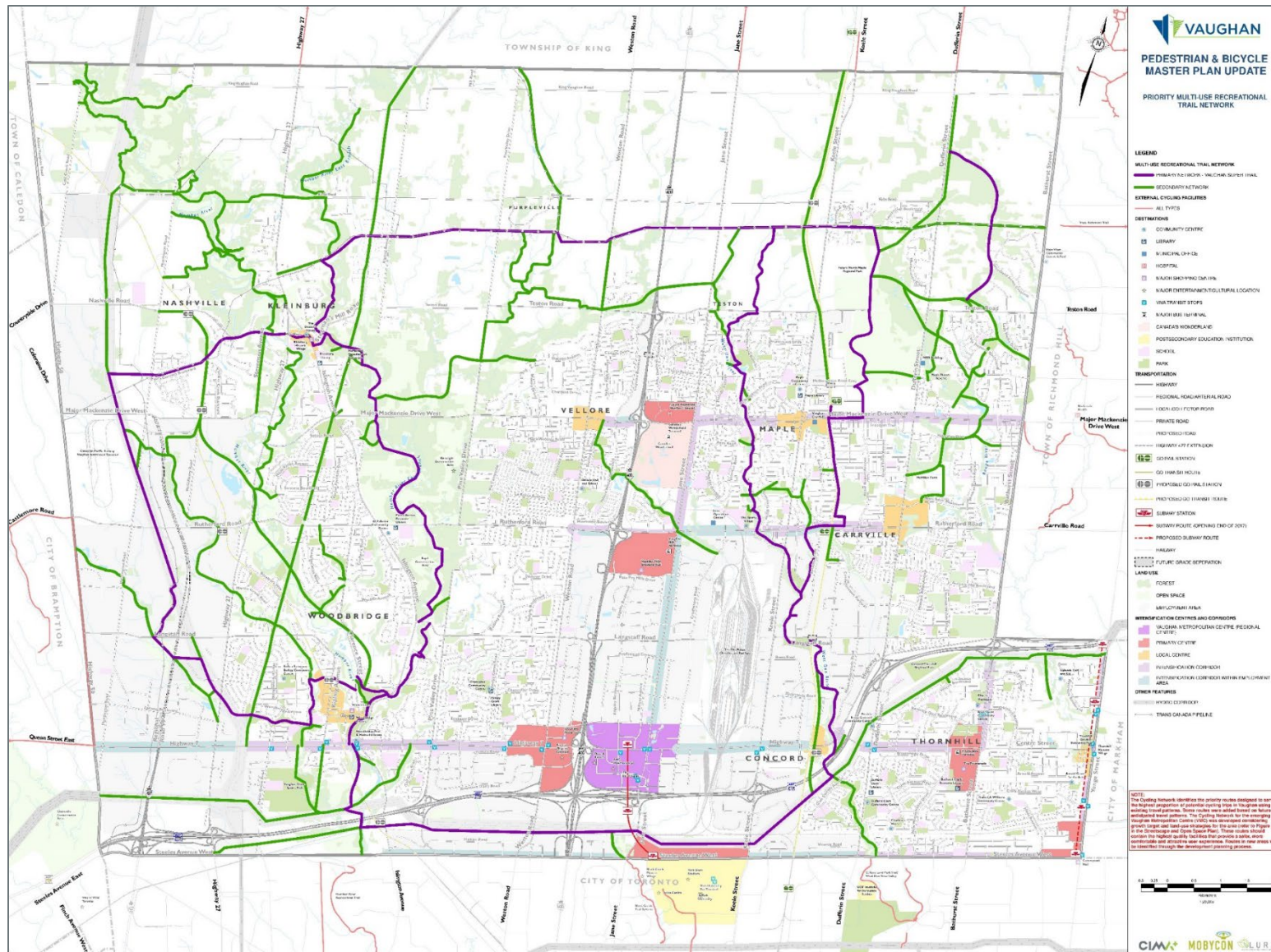


Figure 3-3: Priority Multi-Use Recreational Trail Network

Where a continuous trail system is not possible without a cycling network connection, (on-road) segments should be designed to match the trail facility as much as possible through features such as width, material and markings. TAC Guidelines should be followed for sight distances, horizontal curves, illumination, road crossings, bicycle parking, signs, and pavement markings on curves and at bollards.

In cases where trail serve a dual purpose of both recreational and commuter in nature, the aim should be to develop a seamless and integrated system.

3.5.1. Network Barriers

The existing road and rail network serving Vaughan is comprised of provincial 400-series highways; such as Highway 400 separating Vaughan East and West, Highway 407 separating Vaughan and the City of Toronto to the south, a section of Highway 427 to the south western border towards Brampton, the GO Train Line to Barrie and existing rail line connecting the Town of Caledon (future GO Train Line), Canadian Pacific Railway Vaughan Intermodal Terminal, the MacMillan classification rail yard, and Canadian National (CN) line running parallel south of Highway 407. These physical barriers result in very limited safe crossings for active transportation users within the pedestrian and bicycle network and restrict access to and from Vaughan. Especially Highway 400 creates an east to west connection challenge

3.5.2. Regional Stakeholders

Regional stakeholders such as the Ministry of Transportation, Ontario by Bike, Trans Canada Trail Association and Share the Road Cycling Coalition should be engaged as the plan is implemented. Opportunities to partner with these organizations exist to promote, encourage and support recreational and commuter cycling and active and healthy lifestyles, help municipalities advance safe cycling networks, enhance infrastructure to make Ontario's roads safer for all road users and to build on cycling tourism.

Potential connections can be made into local conservation areas and opportunities to highlight local natural areas. The Conservation Authority also has other activities which they are required to undertake based on the Conservation Authorities Act Regulation (Section 28).

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