AURORA

You're in Good Company

TOWN OF AURORA:

TRAILS MASTER PLAN

FINAL REPORT

MMM GROUP

Ontario Ministry of Health Promotion

HS FINANCIAL SERVICES INC. 1-800-411-7979

November 2011

D16-010-38

ACKNOWLEDGEMENTS

The Town of Aurora Trails Master Plan Study Team would like to express their appreciation to the following key people that contributed to the development of this Master Plan.

Trails Sub-Committee

John Clement
Resident and Trails Sub-Committee

David Tomlinson
Resident and Trails Sub-Committee

Klaus Wehrenberg
Resident and Trails Sub-Committee

Town Study Team

Jim Tree
(Town Project Manager)
Manager of Parks,
Parks and Recreation Services

Gary Greidanus, OALA, CSLA
Landscape Architect,
Parks and Recreation Services

Jim Kyle, MCIP, RPP
Manager of Policy Planning,
Planning and Development Services

Consultant Study Team

Jay Cranstone, OALA, CSLA
(Consultant Project Manager)
Senior Landscape Architect ,
MMM Group Ltd.

Dave McLaughlin, MCIP, RPP,
Senior Project Manager
MMM Group Ltd.

Claire Basinski, B.ES
Transportation Planner,
MMM Group Ltd.

Samuel Baptiste BA, BURPl
Transportation Planner,
MMM Group Ltd.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS A-1

EXECUTIVE SUMMARY AND MASTER PLAN RECOMMENDATIONS EX-1

CHAPTER 1 INTRODUCTION 1-1

1.1 HISTORY AND BACKGROUND 1-1

1.2 PURPOSE FOR AURORA'S TRAILS MASTER PLAN 1-2

1.3 STUDY VISION AND OBJECTIVES 1-3

1.4 HOW WE COMPLETED THE STUDY 1-4

1.5 ORGANIZATION OF THE REPORT 1-4

CHAPTER 2 EXISTING CONTEXT 2-1

2.1 AURORA AND ITS EXISTING TRAIL SYSTEM 2-1

2.1.1 Existing Trails 2-3

2.2 BENEFITS OF TRAILS 2-4

2.2.1 Health and Fitness 2-4

2.2.2 Transportation 2-5

2.2.3 Environment 2-6

2.2.4 Economic 2-6
2.3 CURRENT TRAIL POLICIES AND INITIATIVES 2-8
2.3.1 Federal 2-8
2.3.2 Province of Ontario 2-10
2.3.3 Metrolinx 2-12
2.3.4 York Region 2-13
2.3.5 Town of Aurora 2-15
2.3.6 Trail Organizations 2-18
CHAPTER 3 HOW WE CONSULTED AND WHAT YOU TOLD US 3-1
3.1 PUBLIC CONSULTATION PROCESS 3-1
3.2 ONLINE WEB-BASED QUESTIONNAIRE 3-2
3.3 PUBLIC INFORMATION CENTRES 3-6
3.3.1 PICW1 – Aurora Homeshow 3-6
3.3.2 PICW2 – Town Hall 3-7
3.4 HOW WE INCORPORATED YOUR COMMENTS 3-7
CHAPTER 4 THE TRAILS MASTER PLAN 4-1
4.1 HOW WE DEVELOPED THE NETWORK 4-1
4.1.1 Network Development Process 4-1
4.1.2 Inventory and Analysis 4-2
4.1.3 Guiding Principles for Route Selection 4-7
4.1.4 The Trail Network Hierarchy 4-9
4.1.5 Aurora's Long Term Trail Network Plan 4-12
CHAPTER 5 TRAIL DESIGNER'S TOOLBOX 5-1
5.1 GUIDELINES TO PLAN, DESIGN AND CONSTRUCT TRAILS IN AURORA 5-1
5.1.1 How to Use These Guidelines 5-1
5.2 TRAIL USERS AND NEEDS 5-3
5.2.1 Pedestrians 5-3
5.2.2 Cyclists 5-5
5.2.3 In-Line Skaters, Skateboarders and Non-Motorized Scooter Users 5-5
5.3 GENERAL DESIGN PARAMETERS 5-6
5.4 ACCESSIBILITY 5-8

5.5 PERSONAL SECURITY 5-9
5.6 TRAIL LIGHTING 5-131
5.7 TRAIL TYPES 5-11
5.7.1 Multi-use Trails 5-11
5.7.2 Boulevard Multi-use Trails 5-20
5.7.3 On-road Connections 5-23
5.8 TRAIL CROSSINGS 5-25
5.8.1 A Midblock Pedestrian Signal 5-25
5.8.2 Pedestrian Refuge Islands 5-26
5.8.3 Minor and Major Roads 5-27
5.8.4 Active Railway 5-30
5.8.5 Gates and Barriers 5-31
5.9 OFF-ROAD TRAIL STRUCTURES 5-33
5.9.1 Bridges 5-33
5.9.2 Underpasses and Tunnels 5-34
5.9.3 Elevated Trailbeds and Boardwalks 5-35
5.9.4 Switchbacks and Stairs 5-36
5.10 TRAIL SIGNING 5-38
5.10.1 Signing Strategy and Branding 5-39
5.10.2 Sign Types 5-40

5.11 TRAILHEADS AND TRAIL AMENITIES 5-41
5.11.1 Seating and Rest Areas 5-42
5.11.2 Washrooms and Waste / Recycling Receptacles 5-43
5.11.3 Bicycle Parking 5-44
5.12 TRAILS IN NATURAL AREAS AND ENVIRONMENTAL BUFFERS 5-45
5.13 UTILITY CORRIDORS AND TRAILS 5-46
5.14 TRAIL ACCESS AND ACTIVE CONSTRUCTION ZONES 5-46
5.15 TRAIL CLOSURES AND REHABILITATION 5-47
5.16 TRAILS AND NEW DEVELOPMENT 5-49
CHAPTER 6 IMPLEMENTATION STRATEGY 6-1
6.1 THE IMPLEMENTATION STRATEGY 6-1
6.2 PRIORITIES AND PHASING 64-2
6.2.1 Trail Facilities 6-2
6.2.2 Grade Separated Crossings 6-4
6.3 HOW TO IMPLEMENT THE TRAILS MASTER PLAN 6-4
6.3.1 A Trails Advisory Committee 6-4
6.3.2 Who Does What? 6-6
6.3.3 A Network Management Tool 6-7
6.3.4 A Five-Step Network Implementation Process 6-8
6.3.5 Creating New Trails in Established Neighbourhoods 6-10
6.3.6 Trails in New Development Areas 6-11
6.3.7 Trails and the Development Charges By-Law (5139-09) 6-12
6.3.8 Land Acquisition / Securement Strategies 6-12
6.3.9 Public Outreach and Trail Promotion 6-20
6.3.10 Proposed Trail Policies for Inclusions in the Town's Official Plans 6-24
6.4 FUNDING STRATEGY 6-28
6.4.1 What is the Investment? 6-29
6.4.2 Where Will the Money Come From? 6-31
6.4.3 Why Should the Town Make the Investment? 6-32
6.5 MANAGING THE PLAN 6-33
6.5.1 Insurance, Liability and Risk Management 6-33
6.5.2 Monitoring Implementation and Performance Measures 6-34

6.5.3 Trail Maintenance 6-36
6.5.3.1 Winter Maintenance of Off-Road Trails 6-38
6.3.7.2 A Trail Maintenance Plan for Aurora 6-39
6.6 NEXT STEPS 6-42
CHAPTER 7 SELECT REFERENCES……..7-1

LIST OF FIGURES

Figure 3-1: Proportion of support for making investments for trail improvements in Aurora.....3-3

Figure 3-2: Motivators for trail use in Aurora.....3-4

Figure 3-3: Opinion regarding purchase of private land for the purposes of securing trail connections to complete the Aurora trail system.....3-5

Figure 4-1 Existing Trails in Aurora.....4-3

Figure 4-2 Opportunities and challenges to the development of a trail network in Aurora.....4-4

Figure 4-3 Draft Candidate Trail Route Network Aurora West.....4-5

Figure 4-4 Draft Candidate Trail Route Network Aurora East.....4-5

Figure 4-5 Draft Trail Route Network by Facility Type-Aurora West.....4-11

Figure 4-6 Draft Trail Route Network by Facility Type-Aurora East.....4-11

Figure 6-1 Draft Trail route Network Phasing and Implementation Aurora West.....6-1

Figure 6-2 Draft Trail route Network Phasing and Implementation Aurora East.....6-1

Figure 6-3 - Trails Master Plan Management Structure.....6-6

LIST OF TABLES

Table 4-1 Summary of Network Lengths by Facility Type.....4-11

Table 5-1 Trail User Operating Space.....5-6

Table 5-2 Suggested trail dimension and surface type according to location.....5-11

Table 5-3 Comparison of Trail Surfacing Materials 5-15
Table 5-4 Driveway crossings thresholds for Boulevard Multi-use Trails 5-21
Table 6-1 Proposed Length of Trails Network by Facility Type and Implementation Phase 6-3
Table 6-2 Land Securement Tools 6-13
Table 6-3 Maintenance Consideration for Off-road Trails 6-38

LIST OF APPENDICES

Appendix A – Map Legend
Appendix B – Trail Hierarchy Maps
Appendix C – Trail Construction Details
Appendix D - Unit Cost Schedule

EXECUTIVE SUMMARY AND MASTER PLAN RECOMMENDATIONS

Since the 1970's, Aurora's planners have been urged to include off-road trails in natural environments for non-motorized traffic. In 1985, a vision for a 'Trails Network Concept' was adopted in principle by Town Council, and subsequently in the mid 1990's the Town of Aurora Planning and Parks Departments created Official Plan Amendment No.2. This amendment included a schedule in the Official Plan, which has helped to further the development of the trails network. However, in recent years the Town has experienced significant growth and there have been challenges in seizing opportunities to implement the trails network in pace with the growth of the Town. In 2007 Council established a Trails Sub-Committee of the former Leisure Services Advisory Committee (renamed the Parks and Recreation Services Committee in 2011). Nearly 2 years after its creation, and consistent with its mandate, the Trails Sub-committee prepared a draft revised trails planning map, and a core document that set out the essential draft terms for updating the draft Official Plan trail schedule and policies. It was at this stage that funding became available from the Ontario Ministry of Health Promotion and HS Financial Services, which enabled Council to retain a team of trail specialists from the MMM Group in January 2010 to assist Town staff and the Trails Sub-Committee with the development of The Town of Aurora Trails Master Plan.

The Trails Master Plan is a long-term (50 year) plan that takes into account a number of pedestrian and cycling related policies including the proposed pedestrian and cycling infrastructure in the York Region Pedestrian and Cycling Master Plan. The Town of Aurora Trails Master Plan provides recommendations for a connected trails network, the design of off-road trails, policies related to trail planning, potential education and promotion programs that support trail use and healthy living; as well as a phased implementation strategy. The plan builds upon past and current trail development efforts, and is intended as a blueprint to guide the development and operation of trails throughout Aurora in the short, medium and long term.

THE VISION FOR TRAILS IN AURORA

As part of the master planning process, the original vision developed by the Trails Sub-Committee was reviewed, refined and confirmed as follows:

"To develop a connected off-road, multi-purpose and barrier free trail network that is accessible and pedestrian-oriented".

Key goals for this Plan are to:

- Improve connections between existing trails, and to provide new trails and connections between residential areas, schools, commercial, industrial and institutional establishments, and parks, greenspace and natural areas; and
- Create a connected network of trails which provide Aurora's residents with active, healthy lifestyle opportunities, the ability to travel easily throughout Town with opportunities to experience nature without having to rely on a car.

Seven key objectives for the Trails Master Plan study were developed to complement and expand on the vision:

- Consult with the public, key stakeholders, adjacent municipalities, the local tourism industry, the business community and other partners that could have a role in facilitating and promoting or benefitting from trail use in Aurora
- Build upon, enhance and improve connection to, and between previously developed Town of Aurora trails and facilities, and improve connections to adjacent municipalities
- Coordinate and link the Town's trail system with the Region's proposed on-road cycling facilities and in-boulevard multi-use trails as set out in the Region's Pedestrian and Cycling Master Plan
- Recommend actions to improve conditions for walking and cycling in Aurora for people of all ages and capacity by utilizing the off-road trails system
- Develop an implementation strategy that identifies priorities, costs, and best practices for facility design and construction
- Identify and recommend policies, strategies and programs that Aurora and its partners can support and implement to encourage more people to use the Town's trail system more often, for utilitarian and recreational purposes
- Identify roles and responsibilities for the Town and its partners in facilitating trail use and new trail development

EXISTING TRAILS AND TRAIL DEVELOPMENT CHALLENGES

One of the first steps in developing the recommended trail network was the creation of a consolidated inventory of existing and potential trail routes in Aurora. A significant portion of this work was completed by the Town's

Trails Sub-Committee prior to the commencement of the Trails Master Plan study. This information was used as the starting point by the Study Team and was supplemented by information from various reports, maps and field investigations as well as a review of key policies at the federal, provincial, regional and local levels. The following is a brief summary of the inventory findings including existing trail conditions, opportunities for future trails and some of the challenges that need to be overcome.

The Town currently supports a trail network that totals approximately 57km in length and provides connections to many of its neighbourhood parks, Town facilities and open space corridors. The majority of the existing trails within Aurora are considered multi-use, and are enjoyed by a variety of user groups including walkers, hikers, and cyclists and to a lesser extent people using mobility assistive devices, cross-country skiers and snowshoers. Most of Aurora's trails consist of a granular (gravel) surface, with some sections of asphalt through neighbourhood and community parks, whereas trails in some of the Town's woodlots and valley lands have a natural (earth) surface. Some of the more prominent trail systems in Aurora include: the Nokiidaa and Holland River Trails, Willow Farm, Lakeview and Wimpy Trail system, Case Woodlot, Sheppard's Bush and the Oak Ridges Trail.

Despite the significant work that the Town and its Trails Sub-Committee has accomplished over the years there are still a number of improvements that need to be made to the current trails system to accommodate the growing demand for trails and to serve the increasing population in Aurora, and to overcome barriers and challenges to trail development. Some of the most prominent challenges that were identified with the current trail system are:

- A lack of trail continuity;
- Challenging or non-existent road or rail crossings;
- Inadequate trail signage;
- Variation in trail width and surface type from one trail to the next; and
- Lack of garbage/recycling facilities along the trails.

Two key principles of this plan are that consideration must be given to both the recreational and active transportation function of trails, and trails should be designed to accommodate users of all ages and abilities in order to realize the wide range of benefits that trails provide for the community.

CONSULTATION

The Master Plan Study included a comprehensive consultation strategy to engage the public and stakeholders, and to draw upon the knowledge of the people who live, work and play in the Town, and the various partners who will have a role in implementing the study recommendations. This strategy included a range of consultation techniques undertaken at key points during the study process. Specifically, these included:

- A Notice of Study Commencement published in the Aurora Banner at the outset of the study;

- Regular meetings with a project Steering Committee comprised of representatives of the Trails Sub-Committee and staff from Parks and Recreation Services, Planning and Development Services and Infrastructure and Environmental Services;
- An Online Questionnaire which received a total of 124 responses;
- Notices in the Aurora Banner in advance of two Public Information Centres (PIC);
- A first PIC early in the study at the Aurora Home Show (April 16th, 17th and 18th, 2010);
- A second (PIC) later in the study at the Town Hall (August 25th, 2010); and
- A Study Webpage for the duration of the project (link on the Town of Aurora website- http://www.town.aurora.on.ca/aurora/trailsmasterplan).

The consultation process provided the study team with a wide range of comments and ideas from members of the public, Council, committees and agencies. Details regarding the consultation program and results can be found in Chapter 3 of the Master Plan report. The Project Consultation Record which has included as a separately bound appendix to the Master Plan report captures all comments received. All comments received were reviewed and where applicable, were incorporated in the Master Plan. These helped guide the study team in developing the proposed Trails Network, the phasing plan, and recommendations regarding policies promotion, branding, management and maintenance strategies.

THE RECOMMENDED TRAILS NETWORK & DESIGN FEATURES

The recommended Trails Network presented in Chapter 4 of the Master Plan report was developed using an approach which included the following steps:

1. An inventory of existing conditions;
2. The development of network guiding principles;
3. Consultation with the Project Steering Committee, stakeholders and the public;
4. The development of network candidate routes;
5. The recommendation of facility types;
6. The development of a phasing plan;
7. A review and further consultation with the Project Steering Committee, stakeholders and the public; and
8. The finalization of the network, facility types and phasing recommendations.

As a complement to the proposed network, Chapter 5 of the Master Plan report provides the Town with a compendium of trail planning and design guidelines that describe how the key elements of the trail system should be constructed. This component of the plan is meant to be used as a 'toolbox' by staff when communicating with land developers, trail builders, Council and the public. The design guidelines describe various groups of trail users and their needs, necessary design parameters to address the needs of various user

groups, and key aspects of trail design such as accessibility, personal security, trail lighting, trail types, surface characteristics, trail dimensions, trail crossings of roads and railways, signing systems and trail rehabilitation.

THE IMPLEMENTATION STRATEGY

The Aurora Trails Master Plan is a long term strategy for creating a connected network of trails over the next 50+ years. Its successful implementation requires champions and leadership as well as a proposed approach to move from the planning and design stage to funding and implementation. Implementation of the plan can only be accomplished through short, medium and long term actions under the leadership and guidance of Council, the Parks and Recreation Services Committee, Staff and the Trails Sub-Committee. Chapter 6 of the Master Plan report provides the details and recommendations for a number of strategies and techniques to help make this happen. These include:

- The integration of trail policies into the Official Plan;
- A Network Management Tool;
- A Five-Step Implementation process describing who does what, and when;
- The creation of new trails in established neighbourhoods;
- The creation of new trails in new neighbourhoods as the Town grows;
- The integration of references to trails into the Development Charges By-law (5139-09);
- A land acquisition and securement approach;
- Effective approaches to trail promotion, education and branding;
- The involvement of a local Trails Advisory Committee; and
- Effective maintenance and management of the existing system as it continues to expand.

The Master Plan is not intended to be a static document. The timing and details related to implementation, particularly the exact location and alignment of recommended routes and selection of appropriate facility types will evolve through community consultation and technical review as part of the implementation process. Notwithstanding, it must be recognized that the extensive effort that established the overall direction for the network and the trails Network Planning Map must be respected when network modifications are being contemplated.

The Implementation Strategy consists of 3 phases:

- Phase 1: 0 to 15 years;
- Phase 2: 16 to 25 years; and
- Phase 3: 26 to 50+ years.

Implementation of recommended network routes will come through a variety of means such as approved capital budgets, the creation of trail links by Developers as a requirement of new community development, the addition of in-boulevard multi-use trails and on-road cycling routes as component costs within planned road and right-of-way widening, road reconstruction and resurfacing by both the Town of Aurora and York Region. Once the

Master Plan is approved it provides the vehicle for the Town to access grants and partnership funds available through programs offered by the Federal, Provincial, and Regional government as well as private corporations that support trails and active living. Examples of those currently available are described more fully in Chapter 6 of the Master Plan report.

SUMMARY OF MASTER PLAN RECOMMENDATIONS

The Aurora Trails Master Plan contains 45 recommendations and recommended guidelines pertaining to planning, designing, implementing, maintaining and managing the trail network, as well as recommended Town practices, policies and initiatives relevant to trails in Aurora. The following is a list of all recommendations and recommended guidelines presented in the Trails Master Plan report as well as the corresponding chapter and page number.

Recommendations & Recommended Guidelines	Description	Page Number
Chapter 4 – The Trails Master Plan		
4-1	That the Town adopt the Aurora Trails Network Plan in principle.	4-8
4-2	That the Trail Network Planning and Phasing maps be adopted.	4-8
4-3	By adopting the Aurora Trails Master Plan, Council formally acknowledges the dual function of the trails network; as community infrastructure for non-motorized and self-propelled traffic, for utilitarian as well as recreational purposes.	4-8
Chapter 5 – Trail Designer's Toolbox		
5-1	The trail design guidelines presented in Chapter 5 of the Aurora Trails Master Plan be adopted as the basis for trail design in the Town.	5-3
5-2	That Town staff should be directed to remain current with best industry design practices.	5-3
5-3	That area specific design solutions that are consistent with good engineering judgment should be considered, given that the strict application of the recommended trail design guidelines in the Trails Master Plan may not be appropriate for all situations and locations, and could also limit the ability to implement a trail in a constrained corridor.	5-3

Recommendations & Recommended Guidelines	Description	Page Number
5-4	That the characteristics and preferences of trail user groups be accommodated in the application of the recommended trail design guidelines for each trail and be context sensitive to the location and type of trail planned.	5-6
5-5	That the Town adopts the minimum and preferred trail user operating space widths identified in Table 5.1 of the Trails Master Plan.	5-7
5-6	Where practical, new multi-use spine trails be designed to be wheelchair accessible and that existing and new trails be signed to indicate whether they are wheelchair accessible.	5-9
5-7	That the Town of Aurora has regard to the principles of Crime Prevention Through Environmental Design (CPTED) when designing new trails or improving existing trails.	5-10
5-8	A trail corridor will be a minimum of 12.0m in width to facilitate trail construction, buffer plantings and other constraints that may affect its implementation.	5-14
5-9	In designated open space, wildlife and trail corridors, a minimum 20m corridor width be provided that includes the trail and trail clear zone as well as a suitable buffer from the wildlife passage area in the corridor.	5-14
5-10	Trail links between residential or commercial lots that connect to the trail system will be designed with a minimum corridor width of 6.0m to accommodate a 3.0m wide trail in the centre of the corridor. If the trail link is to include a row of trees along each side of the corridor, the corridor width will be increased to 12.0m.	5-14
5-11	That the Town of Aurora's multi-use spine trail system in parks and linear corridors be designed with a trail width of 3.0m. In constrained corridors the trail width should not be less than 2.4m for a multi-use trail.	5-19

Recommendations & Recommended Guidelines	Description	Page Number
5-12	That the Town's multi-use spine trail system continues to be designed and constructed with a granular surface. However, that trail segments in parks or in areas where erosion is a concern may have an asphalt or concrete surface as a maintenance design solution or to accommodate a wider range of users.	5-19

Recommendations & Recommended Guidelines	Description	Page Number
5-13	When implementing Boulevard Multi-use Trails, utilize the following design elements: ▪ A setback from the curb is required to provide space for snow storage, to provide an adequate clear zone from site furniture and utility poles and in some cases street tree plantings. Where street tree plantings are included, the preferred setback is 3.0-4.5 m from the curb. Where no trees are included and vehicle speed is 60 km/hr or less, the preferred setback can be reduced to 2.0 m; ▪ The setback should be achieved throughout the length of the route with the exception of intersections where the trail will cross with a formal pedestrian crossing; ▪ That signing in advance of, and at roadway intersections, to inform cyclists to stop, dismount and walk across intersections as required by the Highway Traffic Act, or a suitable crossing design to permit cyclists to legally ride through intersections after stopping but without dismounting; ▪ Stop or yield signs (decision on a site-by-site basis) at driveways, depending on the number of driveways and the distance between each; ▪ A treatment at road intersections (i.e. swing gate) to separate “lanes of traffic” in each direction. The treatment must be spaced adequately to allow for the passage of bicycles with trailers; ▪ Open sight lines at intersections with driveways and roadways; ▪ A centre yellow line be considered for hard surface trails to separate directions of travel and to guide riders overtaking pedestrians and slower moving riders; and ▪ Curb ramps at driveways and roadway intersections where trails intersect.	5-22

Recommendations & Recommended Guidelines	Description	Page Number
5-14	Relative to on-road cycling and the integration of that mode of active transportation into the off-road oriented trails network, the Town of Aurora should: ▪ Prepare a Transportation Master Plan, and that it be integrated with the Town's Trails Master Plan and the Region of York's Pedestrian and Cycling Master Plan; and ▪ Establish a set of cycling facility design guidelines as part of such a Cycling Master Plan	5-25
5-15	Due consideration should be given to mid-block grade separated trail crossings of arterial and major collector roads as the most suitable and primary means for trail crossings. Should it be determined that there are compelling reasons why neither a grade separated nor a signal controlled crossing are possible then the trail crossing will be moved to the nearest signal controlled intersection.	5-33
5-16	That trail crossings of local minor roads at mid-block locations include advance advisory pedestrian crossing signs on the roadway approaches.	5-33

Recommendations & Recommended Guidelines	Description	Page Number
5-17	The following are recommended design criteria for underpasses, tunnels and trails through culverts: ▪ The minimum recommended underpass or tunnel width for a multi-use trail is 3.6 m. Where the structure exceeds 18 m in length, in high traffic and/or urban areas the minimum width should be increased to 4.2 m; ▪ For shorter length underpasses, a vertical clearance of 2.5 m is usually sufficient recommended; ▪ For longer structures a minimum vertical clearance of 3.0 m will be required. If service and/or emergency vehicles are to be accommodated within the underpass, any increased vertical clearance requirements will be governed by the requirements of such vehicles; ▪ Underpasses and tunnels can be a security concern and also present maintenance challenges. To address these issues, tunnels should be well lit with special consideration made to security, maintenance and drainage. Approaches and exits will be clear and open to provide unrestricted views into and beyond the end of the structure wherever possible; ▪ Abutments should be appropriately painted with hazard markings; ▪ Offensive graffiti and debris should also be removed promptly and regularly; and ▪ Ideally, the transition between the trail and underpass crossing should be level and provide for accessibility. In the case where an underpass crosses beneath ground-level travel ways, ramps or alternative structures will provide a transition down to the lower grade under the passage.	5-35

Recommendations & Recommended Guidelines	Description	Page Number
5-18	When slopes exceed 15%, or where there is inadequate room to develop a switchback or another accessible solution, a stairway system should be considered. In these situations the site should be carefully studied so that the most suitable design can be developed. The following are considerations for stairway design: ▪ Provide a gutter integrated into the stairway for cyclists to push their bicycles up and down (where appropriate to have bicycles); ▪ Develop a series of short stair sections with regularly spaced landings rather than one long run of stairs; ▪ For long slopes, provide landings at regular intervals (e.g. every 8-16 risers) and an enlarged landing at the mid-way point complete with benches to allow users the opportunity to rest; ▪ On treed slopes, lay the stairway out so that the minimum number of trees will be compromised or removed; ▪ Use slip resistant open treads, especially in shady locations. ▪ Incorporate barriers on either side of the upper and lower landing to prevent trail users from bypassing the stairs; and ▪ Provide signs well in advance of the structure to inform users, so that they may take an alternate route if they wish.	5-37
5-19	That the Town complete a trail signing design and branding study that builds upon the signing strategy and sign types outlined in the Trails Master Plan and establish a set of trail signing standards for the Town.	5-41
5-20	That the proposed trail signing design and branding study include consultation with the Trails Sub-Committee, local residents, artists and other interested stakeholders, and that this consultation include a public workshop or design charrette.	5-41
5-21	That the Town undertakes the proposed trail signing design and branding study in 2011 with completion in 2012.	5-41

Recommendations & Recommended Guidelines	Description	Page Number
5-22	Where seating / rest areas are planned, implement a 1.0m wide level area with a curb or other appropriate wheel stop for mobility-assisted devices. For heavily used trails it is reasonable to provide some form of seating at approximately 500 m intervals.	5-42
5-23	That information signs be provided along the trail and on the Town's Trail map to identify the location / direction to transit access and publicly accessible washrooms and waste and recycling receptacles.	5-43
5-24	That waste and recycling receptacles be located at mid-block crossing points, staging areas, trail and trail nodes, and in association with other site amenities, such as benches and interpretive signs.	5-43
5-25	Establish bicycle parking guidelines for Aurora, including bicycle parking requirements for new developments as part of the proposed Transportation Master Plan.	5-44
5-26	Where trail routes are being proposed within environmental buffers surrounding natural sensitive heritage features, the conditions in the buffer (width, slope, etc.) must be sufficient to support the development of a trail such that the intended function of the buffer is not compromised.	5-46
5-27	That the Town of Aurora require a trail management plan for all active construction zones when a trail or trail crossing is impacted. Key principles in the development of an appropriate plan include: ▪ Separate trail users from conflicts with work site vehicles, equipment and operations; ▪ Separate trail users from conflicts with the main flow of vehicular traffic moving through, around or alongside the work site; and ▪ Provide trail users with a safe, accessible and convenient route that duplicates as nearly as possible the functions of the impacted trail network portions.	5-47
5-28	When temporary trail closures are planned, inform users in advance by placing trail closure notices at all trail access points.	5-48

Recommendations & Recommended Guidelines	Description	Page Number
5-29	That the Town of Aurora include in the Trails Master Plan the following conditions: a. Prior to Draft Plan of Subdivision/Condominium approval, the Developer shall be required to prepare and submit a trail concept/layout plan and typical details for any trails within the boundaries of the plan of subdivision, to the satisfaction of the Town. The trail concept/layout plan shall be consistent with the approved Aurora Trails Master Plan, and shall be considered a part of the transportation infrastructure for the approval area. b. Prior to Final Plan of Subdivision/Condominium approval and the registration of the applicable stage of the subdivision, a Developer shall be required to prepare and submit detailed design drawings, specifications and a detailed cost estimate for trail construction, to the satisfaction of the Town. c. The Development Agreement shall outline the requirements of a Developer relating to trail construction, including the following: ▪ That the Developer agrees to construct trails within the boundaries of the applicable stage of the subdivision/condominium to a base condition, to the satisfaction of the Town, prior to any building permits being issued; ▪ The Developer shall agree to complete the finishing of trails within the boundaries of the applicable stage of the subdivision/condominium in accordance with the approved plans, to the satisfaction of the Town, prior to assumption; ▪ Notice to purchasers of the proposal to construct a municipal trail, including identification of the trail on plans displayed in a sales office, and a clause in all agreements of purchase and sale and/or lease, and registered on title, to the satisfaction of the Town.	5-51
5-30	That the Town acquire lands for key trail links that connect to or support the development of the trail network in Aurora through the subdivision planning approval process, subdivision agreements and through other means available to the Town.	5-51

Recommendations & Recommended Guidelines	Description	Page Number
Chapter 6 – Implementation Strategy		
6-1	That the Planning, Design and Development of trails in the Town are to be consistent with the Aurora Trails Master Plan, once approved by Town Council.	6-4
6-2	That in 2011 / 2012, Town Council complete a review of the mandate of the Trails Sub-Committee with the goal of broadening their role to include Active Transportation.	6-6
6-3	That the Trails Sub-Committee be renamed to reflect the additional mandate for Active Transportation.	6-6
6-4	That the Town updates the wording in Sections 2.1 d) and Schedule A of Section 4.0 of the Town's Development Charges Bylaw to read "Park Development and Trails".	6-12
6-5	That the Town develop a land securement strategy for trail development for routes that are identified on lands under private ownership.	6-20
6-6	That the Town's Trail Map be updated by 2011 to include educational information about trail etiquette and safety, as well as promote the benefits of trail use as an active lifestyle choice.	6-22
6-7	That the Town develop a volunteer trail ambassador or trail patrol /adoption program as a stewardship and public engagement initiative.	6-22
6-8	That the Town explore opportunities to develop partnerships with York Region, local partners and other public agencies to promote the health and recreational benefits of trail use.	6-24
6-9	That the Town establish a formal recognition program for individuals, businesses and organizations who contribute to the promotion, development and maintenance of the Aurora Trails Network.	6-24
6-10	That the Town review and update its annual maintenance budget for trails based on the recommended design guidelines in the Trails Master Plan, and increase this budget as additional kilometres of trails are added to the network.	6-30

Recommendations & Recommended Guidelines	Description	Page Number
6-11	That the Town establish and document, in association with the Town's legal advisors, recommended procedures for risk management as it relates to the design, maintenance and operation of trail facilities in the Town of Aurora.	6-34

EX-1: DRAFT TRAIL ROUTE NETWORK by FACILITY TYPE - AURORA WEST

LEGEND

ROUTE + FACILITY TYPES

EXISTING	PROPOSED	
		Hard Surface Multi-Use Trail
		In Boulevard Multi-Use Trail / Bike Path (Hard Surface)
		Soft Surface Multi-Use Trail
N/A		Soft Surface Multi Use Trail (Preferred Municipal Trail alignment on Land Currently Under Private or other Public Ownership)
		Special Use Trail (Soft Surface)

NOKIIDAA / OAK RIDGES TRAIL ALIGNMENTS

- Nokiidaa Trail existing alignment (Generally soft surface)
- Nokiidaa Trail proposed alignment (Generally soft surface)
- Oak Ridges Moraine Trail existing alignment (Generally soft surface for off-road sections)
- Oak Ridges Moraine Trail preferred alignment (Generally soft surface for off-road sections)

GRADE SEPARATED TRAIL CROSSINGS

EXISTING	PROPOSED	
		Primary Crossing
		Secondary Crossing
		Underpasses
		Major Railway Grade Separation

AT-GRADE TRAIL CROSSINGS

EXISTING	PROPOSED	
		Crossing
		Secondary Railway Crossing

OTHER TRAIL NETWORK INFORMATION

- Lookout
- Trail Connection to Adjacent Municipality
- General Area where there is desire to have trail link developed in the long term.

TOWN INFORMATION

- Local Road
- Regional Road
- Public Transport Hub
- School
- Car Parks (Existing and Proposed)
- Railway

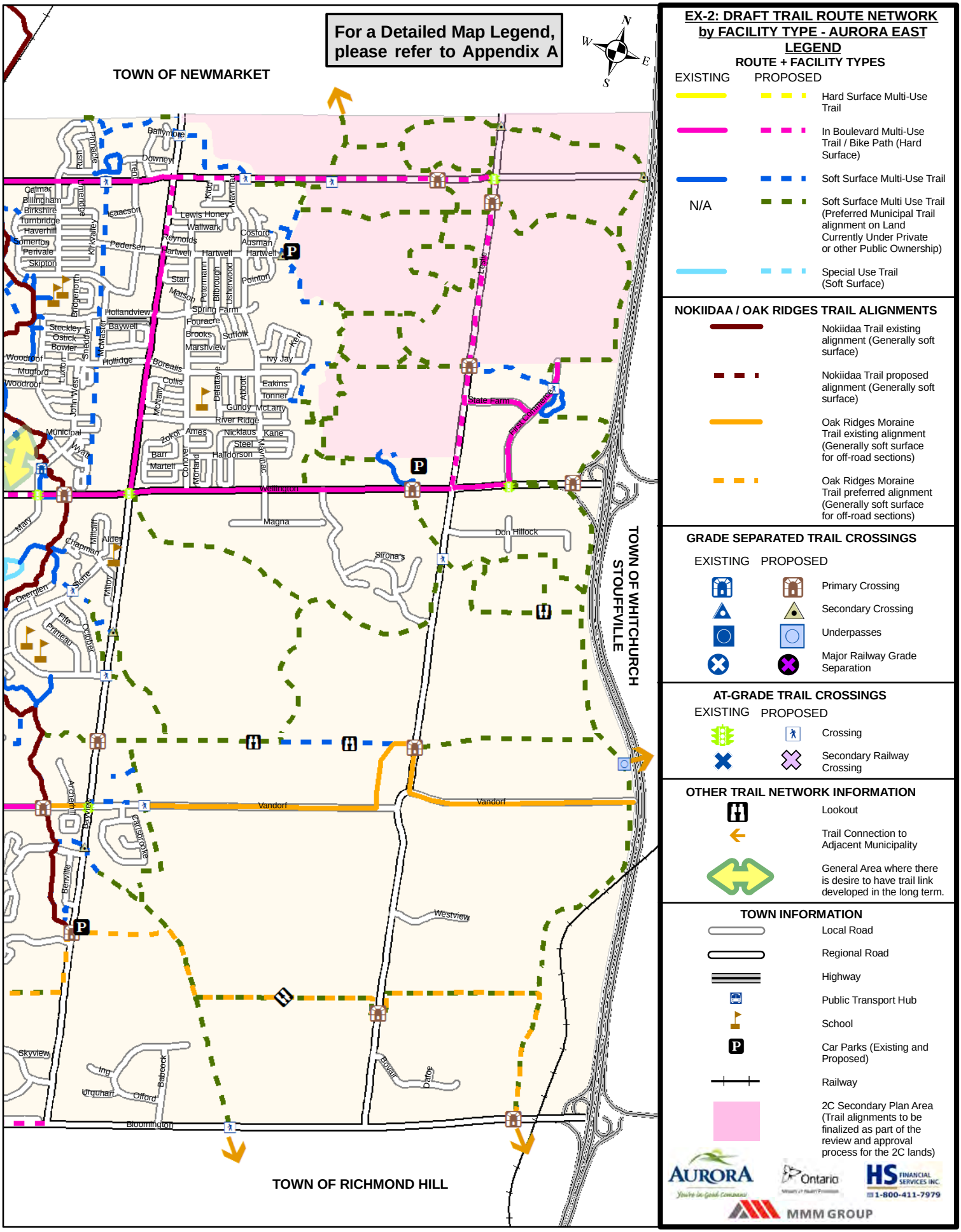
AURORA You're in good company
Ontario Ministry of Health Promotion
HS FINANCIAL SERVICES INC. 1-800-411-7979
MMM GROUP

For a Detailed Map Legend, please refer to Appendix A

TOWN OF NEWMARKET

TOWNSHIP OF KING

TOWN OF RICHMOND HILL


For a Detailed Map Legend, please refer to Appendix A
TOWN OF NEWMARKET
TOWN OF WHITCHURCH STOUFFVILLE
TOWN OF RICHMOND HILL
N
W
E
S
Ballymore
Downey
Isaacson
Lewis Honey
Wallwark
Reynolds
Pedersen
Hartwell
Costford
Ausman
Pointon
Starr
Marson
Spring Farm
Fouracre
Brooks
Suffolk
Marshview
Ivy Jay
Hollandview
Baywell
Steckley
Ostick
Bowler
Hollidge
Woodroof
Mugford
Borealis
Collis
Detattavye
Abbott
Eakins
Tonner
Gundy
McLarty
River Ridge
Nicklaus
Kane
Steel
Halldorson
Barr
Martell
Conover
Mortland
Municipal
Wellington
State Farm
First Commerce
Magna
Don Hillock
Sirona's
Mary
Chapman
Millcliff
Alder
Stone
Deergrden
Milloy
Flite
Primeau
October
Vandorf
Argentia
Bayview
Garlishcroke
Bennville
Westview
Skyview
Ing
Urquhart
Offord
Babcock
Bloomington
Bovaird
Darge
Legale
Keyes
Kirkvalley
Perivale
Skipton
Somerton
Haverhill
Birkshire
Billingham
Gatmar
Tumbridge
Bridgenorth
Woodroof
Lukito
John West
Shedden
McMaster
Hollidge
Municipal
Wyatt
Zokol
Ames
Nicklaus
Kane
Steel
Halldorson
Barr
Martell
Conover
Mortland
McLarty
Gundy
Eakins
Tonner
Abbott
Detattavye
Borealis
Collis
Ivy Jay
Suffolk
Marshview
Brooks
Fouracre
Spring Farm
Marson
Starr
Pointon
Usherwood
Bilbrough
Petermann
Hartwell
Reynolds
Wallwark
Lewis Honey
Isaacson
Pedersen
Kirkvalley
Perivale
Skipton
Somerton
Haverhill
Birkshire
Billingham
Gatmar
Tumbridge
Bridgenorth
Woodroof
Mugford
Woodroof
Lukito
John West
Shedden
McMaster
Steckley
Baywell
Hollandview
Ballymore
Downey
Trent
Rush
Primrose
Kirby
Mavrinac
Cosford
Ausman
Hartwell
Legale
Keyes
Wellington
Magna
Don Hillock
Sirona's
Mary
Chapman
Millcliff
Alder
Stone
Deergrden
Milloy
Flite
Primeau
October
Vandorf
Argentia
Bayview
Garlishcroke
Bennville
Westview
Skyview
Ing
Urquhart
Offord
Babcock
Bloomington
Bovaird
Darge
Legale
Keyes
Kirkvalley
Perivale
Skipton
Somerton
Haverhill
Birkshire
Billingham
Gatmar
Tumbridge
Bridgenorth
Woodroof
Mugford
Woodroof
Lukito
John West
Shedden
McMaster
Steckley
Baywell
Hollandview
Ballymore
Downey
Trent
Rush
Primrose
Kirby
Mavrinac
Cosford
Ausman
Hartwell
Legale
Keyes
Wellington
Magna
Don Hillock
Sirona's
Mary
Chapman
Millcliff
Alder
Stone
Deergrden
Milloy
Flite
Primeau
October
Vandorf
Argentia
Bayview
Garlishcroke
Bennville
Westview
Skyview
Ing
Urquhart
Offord
Babcock
Bloomington
Bovaird
Darge
EX-2: DRAFT TRAIL ROUTE NETWORK by FACILITY TYPE - AURORA EAST
LEGEND
ROUTE + FACILITY TYPES
EXISTING
PROPOSED
Hard Surface Multi-Use Trail
In Boulevard Multi-Use Trail / Bike Path (Hard Surface)
Soft Surface Multi-Use Trail
N/A
Soft Surface Multi Use Trail (Preferred Municipal Trail alignment on Land Currently Under Private or other Public Ownership)
Special Use Trail (Soft Surface)
NOKIIDAA / OAK RIDGES TRAIL ALIGNMENTS
Nokiidaa Trail existing alignment (Generally soft surface)
Nokiidaa Trail proposed alignment (Generally soft surface)
Oak Ridges Moraine Trail existing alignment (Generally soft surface for off-road sections)
Oak Ridges Moraine Trail preferred alignment (Generally soft surface for off-road sections)
GRADE SEPARATED TRAIL CROSSINGS
EXISTING
PROPOSED
Primary Crossing
Secondary Crossing
Underpasses
Major Railway Grade Separation
AT-GRADE TRAIL CROSSINGS
EXISTING
PROPOSED
Crossing
Secondary Railway Crossing
OTHER TRAIL NETWORK INFORMATION
Lookout
Trail Connection to Adjacent Municipality
General Area where there is desire to have trail link developed in the long term.
TOWN INFORMATION
Local Road
Regional Road
Highway
Public Transport Hub
School
Car Parks (Existing and Proposed)
Railway
2C Secondary Plan Area (Trail alignments to be finalized as part of the review and approval process for the 2C lands)
AURORA
Ontario
HS FINANCIAL SERVICES INC.
1-800-411-7979
MMM GROUP

EX-3: DRAFT TRAIL ROUTE NETWORK PHASING + IMPLEMENTATION AURORA WEST

LEGEND

- Existing Off-Road Municipal Trail
- Off-Road Municipal Trail (within 15 years)
- Off- Road Municipal Trail (within 16 to 25 years)
- Off-Road Municipal Trail (within 26 to 50+ years)
- Existing In Boulevard Multi-Use Path
- In Boulevard Multi-Use Path (within 15 years)
- Existing Nokiidaa Trail
- Nokiidaa Trail (within 15 years)
- Existing Oak Ridges Trail
- Oak Ridges Trail (within 15 years)
- Oak Ridges Trail (within 16 to 25 years)
- Oak Ridges Trail (within 26 to 50+ years)

GRADE SEPARATED TRAIL CROSSINGS

EXISTING	PROPOSED	
		Primary Crossing
		Secondary Crossing
		Underpasses
		Major Railway Grade Separation

AT-GRADE TRAIL CROSSINGS

EXISTING	PROPOSED	
		Crossing
		Secondary Railway Crossing

OTHER TRAIL NETWORK INFORMATION

- Lookout
- Trail Connection to Adjacent Municipality
- General Area where there is desire to have trail link developed in the long term.

TOWN INFORMATION

- Local Road
- Regional Road
- Public Transport Hub
- School
- Car Parks (Existing and Proposed)
- Railway

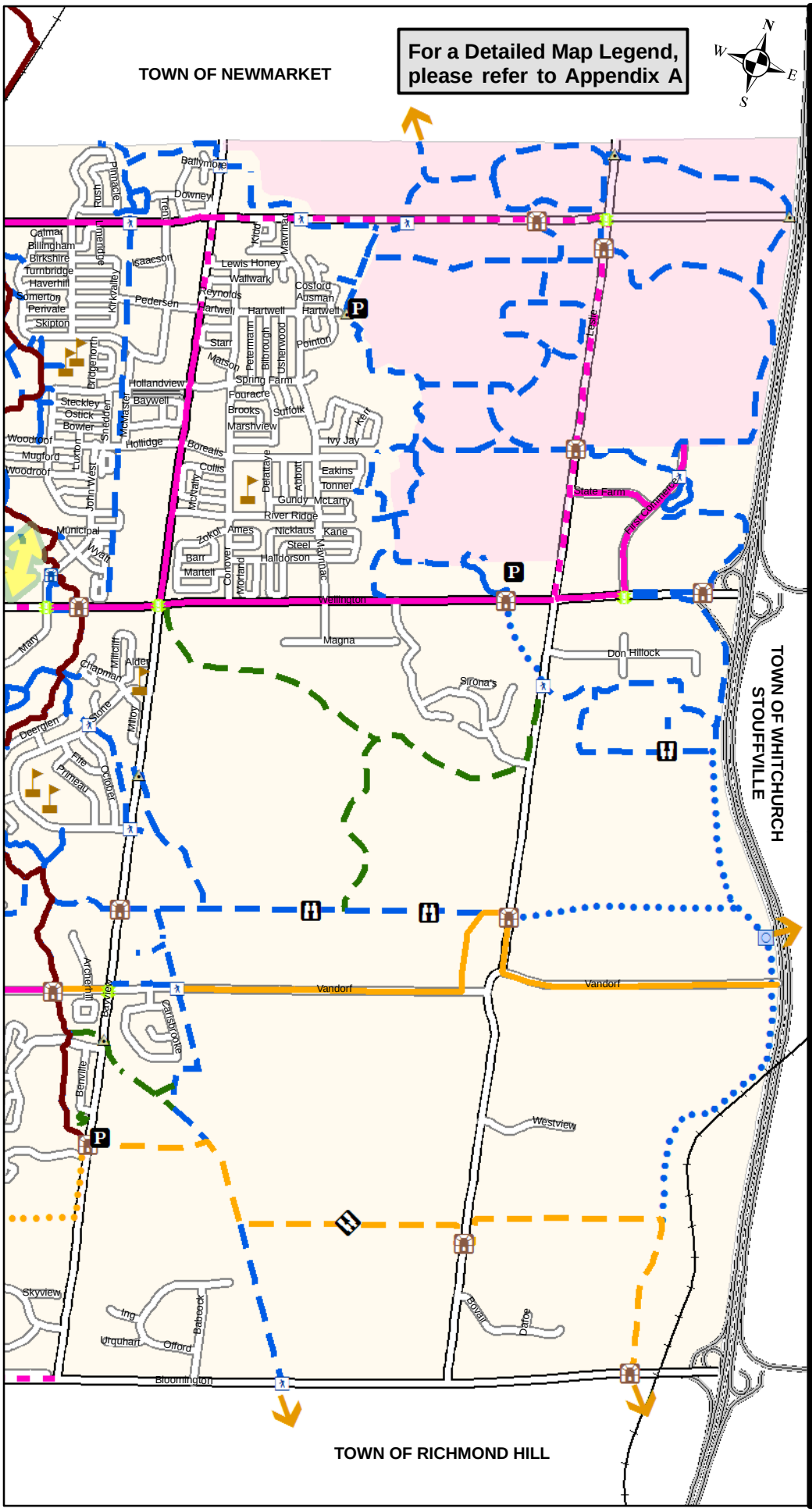
For a Detailed Map Legend, please refer to Appendix A

TOWN OF NEWMARKET

TOWNSHIP OF KING

TOWN OF RICHMOND HILL

AURORA You're in good company
Ontario Ministry of Health Promotion
HS FINANCIAL SERVICES INC. 1-800-411-7979
MMM GROUP



EX-4: DRAFT TRAIL ROUTE NETWORK PHASING + IMPLEMENTATION AURORA EAST LEGEND

PHASING / IMPLEMENTATION

- Existing Off-Road Municipal Trail
- Off-Road Municipal Trail (within 15 years)
- Off- Road Municipal Trail (within 16 to 25 years)
- Off-Road Municipal Trail (within 26 to 50+ years)
- Existing In Boulevard Multi-Use Path
- In Boulevard Multi-Use Path (within 15 years)
- Existing Nokiidaa Trail
- Nokiidaa Trail (within 15 years)
- Existing Oak Ridges Trail
- Oak Ridges Trail (within 15 years)
- Oak Ridges Trail (within 16 to 25 years)
- Oak Ridges Trail (within 26 to 50+ years)

GRADE SEPARATED TRAIL CROSSINGS

EXISTING PROPOSED

- Primary Crossing
- Secondary Crossing
- Underpasses
- Major Railway Grade Separation

AT-GRADE TRAIL CROSSINGS

EXISTING PROPOSED

- Crossing
- Secondary Railway Crossing

OTHER TRAIL NETWORK INFORMATION

- Lookout
- Trail Connection to Adjacent Municipality
- General Area where there is desire to have trail link developed in the long term.

TOWN INFORMATION

- Local Road
- Regional Road
- Highway
- Public Transport Hub
- School
- Car Parks (Existing and Proposed)
- Railway
- 2C Secondary Plan Area (Trail alignments to be finalized as part of the review and approval process for the 2C lands)

AURORA
Ontario
HS FINANCIAL SERVICES INC.
1-800-411-7979
MMM GROUP

CHAPTER 1
INTRODUCTION

1.1 HISTORY AND BACKGROUND

Since the 1970's, Aurora's planners have been urged to include off-road trails in natural environments for non-motorized traffic. In June 1985, trails advocate and Aurora citizen Klaus Wehrenberg proposed a vision for a 'Trails Network Concept' to Aurora Council. This vision for a network of trails would help link green spaces, thereby incorporating them into the 'active fabric of life' of Aurora; increase opportunities for self-propelled traffic participants; and increase safety for cyclists and walkers, by separating the motorized and non-motorized traffic. Council accepted the proposed concept in principle.

In the early and mid 1990s, a co-operative effort by staff members of the Town of Aurora Planning and Parks departments resulted in Official Plan Amendment No. 2, supporting the further development of the trails network concept, including an Official Plan schedule, in the form of a town-wide map, on which a planned trails grid was illustrated. Since that time the Town has experienced significant growth and development. However, the Town has not always been able to take advantage of opportunities to implement the trails network. Therefore, trails have not kept pace with development. This is thought to be partly because of the lack of prescriptive language in the Official Plan's trails supportive provisions.

In 2007, Aurora Town Council established a Trails Sub-Committee of the Parks and Recreation Services Committee. The committee's five members were comprised of staff representatives from the Planning and the Parks departments, citizen representatives from the Parks and Recreation Services Committee and the Environmental Advisory Committee, and one citizen-at-large. The committee was to re-evaluate and further

refine the existing Official Plan schedule for a trails network, and prepare draft terms that would advance the off-road trail network, with a special emphasis on advancing the development of a major east-west trail. After almost 2 years of substantially advancing its mandate the Trails Sub-committee had prepared a draft revised trails planning map, and a core document that set out the essential draft terms for updating the draft Official Plan trail revisions. It was at this stage that funding became available from the Ontario Ministry of Health Promotion and HS Financial Services, which helped move Town Council in January 2010 to retain the services of a team of trail specialists from the MMM Group to assist the Trails Sub-Committee with the development of this Trails Master Plan.

The Draft Aurora Trails Master Plan was completed in September 2010 and is a long-term (50 year) plan that takes into account a number of pedestrian and cycling related policies including the proposed pedestrian and cycling infrastructure in the York Region Pedestrian and Cycling Master Plan. The Town of Aurora Trails Master Plan provides recommendations for a connected trails network, the design of off-road trails, policies related to trail planning, potential education and promotion programs that support trail use and healthy living; as well as a phased implementation strategy.

1.2 PURPOSE FOR AURORA'S TRAILS MASTER PLAN

As described above, the Town of Aurora has historically embraced and supported the creation of a municipal trails system for residents and visitors as will be described in further detail in s. 1.2 of this chapter. In 2007, Aurora Town Council created a Trails Sub-Committee of the Parks and Recreation Committee to advance the development of the Master Plan. In addition to the trails sub-committee, a Study Steering Committee was formed to guide the development of the Town-wide Trails Master Plan. The team included representatives from the Trail Sub-Committee, municipal staff as well as trail planning and design specialists retained from MMM Group. The Aurora Trails Master Plan builds upon past and current trail development efforts, and is intended as a blueprint to guide the development and operation of trails throughout Aurora in the short, medium and long term. The plan identifies a strategy for developing a primarily off-road, Town-wide trails network that links, neighbourhoods, parks, schools, shopping areas, key destinations and natural areas and public open spaces, and will open up important links to the surrounding municipalities within York Region.

A statistically valid Aurora household survey undertaken in the context of the recently adopted Parks and Recreation Master Plan clearly identifies Trail based activities, walking, hiking, and cycling, as the residents' three most favored activities. In addition, the survey revealed that the Town's existing trail system is the number one priority for Aurora citizens with regard to its popularity and future expansion. It is due to the importance that aurora citizens place on trails, together with the fortuitous availability of external funds, that Town Council readily initiated the development of this Trails Master Plan (TMP), as the vehicle to establish a Town-wide, Municipal trail system, and to provide opportunities for alternative transportation for all residents.

This long-term (50 year) plan takes into account a number of trail, pedestrian and cycling related policies including the proposed pedestrian and cycling infrastructure in the York Region Pedestrian and Cycling Master Plan. The Town of Aurora Trails Master Plan defines and outlines best practices and design guidelines for off-road trails; policy guidelines for trail planning; recommendations regarding education and promotion programs that support trail use and healthy living; as well as trails planning that presents a connected trails network and a

phased implementation strategy. A key component of the Trails Master Plan is a series of trails network recommendations, policies, and priority initiatives that are being provided as input into the Town's Official Plan Review currently underway.

1.3 STUDY VISION AND OBJECTIVES

A Trails Master Plan should be guided by a clear set of objectives but it should also establish a vision that will result from the successful implementation of the plan. The following vision and objectives for the Town of Aurora Trails Master Plan were prepared during the initial stages of the study and confirmed through consultation with the study team, stakeholders as well as members of the public.

The vision for Aurora's Trails Master Plan is to:

"To develop a connected off-road, multi-purpose and barrier free trail network that is accessible and pedestrian-oriented".

Key goals for this Plan are to:

- Improve connections between existing trails, and to provide new trails and connections between residential areas, schools, commercial, industrial and institutional establishments, and parks, greenspace and natural areas; and
- Create a connected network of trails which provide Aurora's residents with active, healthy lifestyle opportunities, the ability to travel easily throughout Town with opportunities to experience nature without having to rely on a car.

Objectives of the Trails Master Plan

The vision and goal was supported by the following objectives:

- Consult with the public, key stakeholders, the Lake Simcoe Region Conservation Authority, York Region, adjacent local municipalities, local tourism industry, the business community and other partners that could have a role in facilitating and promoting, or benefitting from trail use in Aurora.
- Build upon, enhance and improve connections to, and between existing and previously developed Town of Aurora trails and facilities, and to improve connections to adjacent municipalities.
- Coordinate and link the Town's trail system with the Region's proposed on-road cycling facilities and in boulevard multi-use trails as set out in the Region's Pedestrian and Cycling Master Plan.
- Recommend actions to improve conditions for walking and cycling in Aurora for people of all ages and capacity by utilizing the trails system.
- Develop an implementation strategy that will identify priorities, costs, and best practices, for facility design and construction.
- Identify and recommend policies, strategies and programs that Aurora and its partners can support and implement to encourage more people to use the Town's trail system more often, for utilitarian and recreational purposes.
- Identify roles and responsibilities for the Town and its partners in facilitating trails use and new trail development.

The achievement of the vision and objectives for the Town of Aurora's Trails Master Plan will require ongoing effort by key agencies, organizations and individuals throughout the Town.

1.4 HOW WE COMPLETED THE STUDY

The Aurora Trails Master Plan was initiated in January 2010. MMM Group Limited was retained by the Town to assist staff in the development of a comprehensive Master Plan to identify a network of primarily off-road routes throughout the Town connecting local neighbourhoods, key destinations as well as, adjacent municipalities. The Trails Master Plan also identifies priorities for network implementation, a signage and branding strategy to connect the trails within the Town and appropriate levels of funding for operations and maintenance. The Trails Master Plan study was developed in four phases designed to reflect the needs and goals outlined by Town staff. The four phases were:

- Phase 1: Background Review and Assessment
- Phase 2: Development of the Trails Master Plan
- Phase 3: Implementation Strategy
- Phase 4: Finalize the Trails Master Plan

1.5 ORGANIZATION OF THE REPORT

The Town of Aurora Trails Master Plan study report is intended to be a "living" document that is flexible and capable of evolving over time. The report contains the following chapters:

Chapter 1- Introduction; describes the recent trail development history in Aurora, explains the purpose of the plan, the study vision and objectives and outlines the organization of the report.

Chapter 2- Existing Context; describes the existing trails conditions, facilities and policies currently in place at various levels of government (local, regional, provincial and national) that play a key role in the development of the Trails Master Plan.. In addition, this chapter outlines some of the many social, environmental and economic benefits associated with investing in trails.

Chapter 3- How We Consulted and What You Told Us; summarizes the public consultation process which was undertaken for the Aurora Trails Master Plan study and highlights the public input received as well as how the study team incorporated the comments into the plan.

Chapter 4- The Trails Master Plan; describes the process that was undertaken to develop the trail network and illustrates the recommended trail network. Aurora is geographically and environmentally diverse, with unique challenges and opportunities. Natural areas, such as the Oak Ridges Moraine and existing trail systems provide a key link between the urban and rural areas. The Master Plan provides a unified approach to trail development and where appropriate integrate alternative modes of transportation, working to create links between destinations and bridge gaps across significant barriers.

Chapter 5- The Trail Designer's Toolbox; is a set of trail planning and design guidelines. It describes what the network facilities will look like, how they will be built, and how these will connect with the existing on and off-road facilities in Aurora. Not all facilities within the network will be intended for all users in all areas of the Town. The trail planning and design guidelines describe a range of facilities intended for different user groups in a variety of urban and natural settings throughout the Town. They reflect current best practices and also include some of innovative ideas that are being explored elsewhere in North America and Europe.

Chapter 6- Implementation Strategy; focuses on the implementation of the Plan and describes strategies that can be employed to ensure that the Trails Master Plan is a success. This chapter also examines methods of

public outreach and various approaches that can be undertaken to encourage the public to choose walking and cycling as part of a healthy lifestyle. It outlines the estimated cost to implement the Plan as well as funding and partnership strategies that can assist in the overall funding of the Plan. Trail policy recommendations are presented along with ways in which the success of the plan can be measured.

CHAPTER 2
EXISTING CONTEXT

In order to fully understand and examine the area in which the Trails Master Plan is to be implemented and the potential benefits to the Town, it is important to first understand some of the existing context as well as the current state of trails in Aurora. This chapter provides a demographic profile of Aurora and summarizes the study team's assessment of the Town's current trail system and the benefits of trails to the community as well as identifies key Federal, Provincial, Regional and Local Municipal trail and active transportation related policies, and other trail organizations which can influence and support the development of trails in Aurora.

2.1 AURORA AND ITS EXISTING TRAIL SYSTEM

A demographic profile of Aurora can be a useful tool to help evaluate the facility and service level requirements of the present and future population. The Aurora Parks and Recreation Master Plan emphasizes and identifies the importance of understanding the population of Aurora as indicators such as age, characteristics, social and ethnic background, etc. have an influence on the types of facilities and services that are in demand throughout the community today, and help to predict where the demand will lie in the future[1]. This holds true for trails and has been taken into account in the development of the Trails Master Plan. The following identifies and summarizes some of these indicators based on 2006 Census (Statistics Canada) data.

According to the 2006 Census the Town of Aurora had at the time a population of 47,629, and covers a land area of 50 square kilometres, resulting in a population density of approximately 960 per square km. The growth

[1] Canada. Town of Aurora. Leisure Services Department. *Parks and Recreation Master Plan*. Town of Aurora, Jan. 2010. Web. May 2010. <http://www.town.aurora.on.ca/aurora/index.aspx?ArticleID=3287&lang=en-CA>.

in population since the last census (2001) is approximately 19% over five years. It was also estimated that Aurora's population as of mid-year 2008, had grown to approximately 52,000[2].

The median age of 37 years from the 2006 Census is slightly below the provincial average of 39 years with 78% of the population aged 15 and over. However, it is important to remember that like other communities in York Region, Aurora's population is increasing in age and this should be considered when making decisions about trail routing, signing and design.

It is also important to note the role that income and education play in the level of participation experienced by communities in leisure activities and along recreational trail networks. Research suggests that where there is a higher level of income and education, there is a higher level of participation in these activities. As identified in the 2006 census, Aurora has a median income of $36,529, higher than the provincial average.

Based on findings from the Town's recent Parks and Recreation Master Plan, there are a number of clear trends within Aurora which point to the importance and increasing demand for trails development. Some of these include:

- Trails (including natural area trails and urban multiuse trails) continue to be one of the most sought after facilities as walking for leisure, cycling, inline skating, etc. are all popular forms of leisure and active transportation facilities;
- High levels of physical inactivity and obesity observed across the country, due to lack of time and participation in more sedentary forms of leisure;
- The demand for unorganized and drop-in activities is on the rise, at the expense of most organized and structured programs which are inflexible to those with limited amounts of free time;
- The "multi-use" facility and park concept is being increasingly viewed as the preferred development model since it consolidates a number of leisure activities at a single location, thereby providing a "one-stop shopping" venue for time-pressed individuals, offering cross-programming opportunities for a wide range of ages, and reducing municipal operational costs;
- Municipalities are often entering into partnerships with community and private-sector organizations to maximize efficiencies associated with capital and operational costs which benefit the municipality and the community as a whole; and
- Adults and older adults are embracing the "active living" or "wellness" philosophy, thus municipalities are orienting their programming to respond to these demand.

It is clear that there is a growing demand and need for trails and related facilities for people of all ages and abilities. This supports the case for improving and expanding Aurora's trail system and the need for an updated comprehensive Trails Master Plan that can serve as a blueprint and guide the Town as it takes incremental

---

[2] Canada. Town of Aurora. Leisure Services Department. *Parks and Recreation Master Plan*. Town of Aurora, Jan. 2010. Web. May 2010. <http://www.town.aurora.on.ca/aurora/index.aspx?ArticleID=3287&lang=en-CA>.

steps to improve Aurora's trail system. This Trails Master Plan developed for the Town of Aurora complements and builds upon the proposed system of trails and trails facilities previously developed by the Town's Trails Sub-Committee of the Parks and Recreation Services Committee of Council. Aurora's existing trail network and facilities are summarized in the following section.

2.1.1 Existing Trails

Currently, the Town supports a pedestrian trail system that provides connections to many of its neighbourhood parks, Town facilities as well as open space corridors. In total, the Town's current pedestrian trail system is comprised of approximately 25 kilometres of trails.

The existing trails within Aurora are considered primarily multi-use and focus on walkers and hikers as their primary user group. In addition trails also accommodate other user groups such as cross country skiers and cyclists. Most of Aurora's trails consist of a granular (gravel) surface, with some sections of asphalt through neighbourhood and community parks, whereas trails in some of the Town's woodlots and valley lands have a natural (earth) surface. Some of the more prominent trail systems in Aurora include: the Nokiidaa and Holland River Trails, Willow Farm, Lakeview and Wimpy Trail system, Case Woodlot, Sheppard's Bush and the Oak Ridges Trail.

Despite the significant work that the Town and its Trails Sub-Committee has accomplished over the years there are still a number of improvements that need to be made to the current trails system to accommodate the growing demand for trails and to serve the growth in Aurora population. Two key principles of this plan are that consideration must be given to both the recreational and active transportation function of trails, and trails should be designed to accommodate users of all ages and abilities in order to realize the wide range of benefits that trails provide for the community. Some of these benefits are described in the following sections.

2.2 BENEFITS OF TRAILS

2.2.1 Health and Fitness

Sedentary lifestyles have serious health consequences. Almost half of Canadians age 12 and over report being physically inactive and 26% of youth between the ages of 2 and 17 are overweight or obese (Statistics Canada 2005). In Canada, the prevalence of obesity has more than doubled in the last 20 years (Katzmarzyk & Mason, 2006). Obesity is associated with serious health conditions, including increased risks of diabetes and cardiovascular diseases (CVD). Walking and cycling are both popular recreational activities and a means of transportation that are efficient, affordable and accessible and promote healthy lifestyles. Increasing frequency of walking and cycling and reducing reliance on cars can lower the risk of obesity, lower the risk of hospitalizations from asthma and address other health conditions such as heart disease and type 2 diabetes caused by inactivity. The following are some specific examples:

- The ability to walk or cycle safely in neighbourhoods is integral to being physically active, maintaining a healthy body weight, and increasing social interaction (Heart and Stroke Foundation of Canada, 2006);
- Trails are considered to be the safest and most preferred location to walk, cycle and use other non-motorized forms of recreation (Go for Green, National Active Transportation Survey, 2005);
- Exercise and health are seen by Canadians as the main benefit to walking and cycling. Practicality, convenience and pleasure are also frequently cited benefits (Go For Green, National Active Transportation Survey, 2005);
- A 5% increase in the walkability of a residential neighbourhood is associated with 32 more minutes of physically active travel per day (Frank, 2006a);
- Individuals who have access to trails increase their recreational activity on average by 44% (Irish Trail Strategy, 2006);
- Policy changes at the local level have the potential to encourage increased physical activity over the long term by making active transportation an easier choice for residents (World Health Organization, 2006);
- One study has estimated that 40% of chronic illness could be prevented by regular physical activity and suggested that urban planning could offer opportunities for increased physical activity by creating walking and cycling alternatives, such as trails, instead of motorized transportation (Heart & Stroke Foundation of Nova Scotia, 2004);
- Canada's 2005 Physical Activity Monitor found that the top three preferred physical activities among Canadian youth are walking (66%), jogging or running (56%) and bicycling (49%) (Canadian Fitness and Lifestyle Research Institute, 2005);
- Mixed land uses, well-connected streets, trail and sidewalk networks that promote a supportive walking and cycling environment can help to increase resident's health by affecting their travel behaviour to include more active transportation modes (Frank, Kaveage & Litman, 2006); and

- Manufacturers and suppliers of park equipment and furnishings realize the public interest in the benefits that active lifestyles can provide and have begun to develop and market products designed to increase muscle strength and endurance, and improve cardiovascular fitness, core strength and flexibility, all of which help to reduce the risk of osteoporosis in older adults, improve the ability to perform daily tasks provide psychological benefits and improved quality of life (McConkey, 2010).

2.2.2 Transportation

Canadians view environmental quality as an important factor influencing their personal health. The transportation sector is a major source of air pollution in Canada. Transport Canada (2006) identified that urban passenger travel created almost half of the greenhouse gas emission of Canada's transportation sector, which in turn produces about one quarter of Canada's total greenhouse gas emissions.

The ecological footprint is a measure of human demands on natural resources such as land, water and air, and is reduced when people choose to travel by walking and cycling. "The greatest contributing factor to a large ecological footprint is carbon intensive fuel supplies for transportation, electricity and heating" (Ontario College of Family Physicians, 2005, p. 20). The average greenhouse gas intensity for light duty vehicles was 295 grams CO_2 per km in 2005. Promoting trail use, especially walking and cycling, can result in significant greenhouse gas emission reductions, approximately 1KT of CO_2 for each 3,500 km of trail use. Walking and cycling curb greenhouse gas emissions and global climate change and save valuable green space (National Active Transportation Roundtable, 2003).

Walking and cycling have negligible effects on the size of the ecological footprint. Providing infrastructure that supports alternative modes of transportation, such as an integrated trail network for walking and cycling, can reduce vehicle traffic volumes, cause little or no congestion and result in no greenhouse gas emissions. Compact communities with mixed land use serviced by trails provide excellent active transportation choices,

decrease the need to drive to daily destinations and will decrease the vehicle emissions that contribute to air pollution (CMHC, 2006). Automobile dependent communities require more land for road right-of-way and parking than communities that are not as reliant on the automobile. Making communities less auto-dependant by providing infrastructure for recreation and as alternative transportation modes, such as walking and cycling, can reduce the amount of land required to construct new communities, thus creating more compact subdivisions that are easier to manage from a transportation perspective.

There is strong evidence that given complete high-quality cycling route networks, a significant number of people will use bicycles as a mode of transportation as demonstrated in Davis, California and Boulder, Colorado. With 20% of trips by bicycle, these communities have the highest levels of bicycle usage in North America. This high level of cycling is facilitated by mature networks, which include extensive on-road cycling facilities complemented by extensive off-road trail routes. Residents can simply get on their bicycles with confidence knowing there will always be a safe route to their destination (British Columbia Cycling Coalition Budget Submission, 2007).

2.2.3 Environment

Walking and cycling are energy-efficient, non-polluting modes of travel. Short distance, motor vehicle trips are the least fuel-efficient and generate the most pollution per kilometre. These trips have the greatest potential of being replaced by walking or cycling trips and integrated walking-transit and cycling-transit trips. Shifting to these modes can mitigate ozone depletion, the greenhouse effect, ground-level air pollution, photochemical smog, acid rain, water pollution and hydrologic disruptions, land use and noise pollution.

Reducing the number of vehicles on the road reduces the number of hazardous pollutants that are emitted into the atmosphere by motor vehicles. Climate change is another problem that can be mitigated by encouraging drivers to use other modes, or to travel outside rush hours. Motor vehicles, roads and parking facilities are major sources of water pollution and hydrologic disruptions due to such factors as road de-icing, air pollution settlement, roadside herbicides, road construction along shorelines, and increased impervious surfaces.

In addition, motor vehicles can be a large cause of noise pollution within communities. Motor vehicles generate various types of unwanted noise and vibration that cause disturbance and discomfort to residents. This includes engine acceleration, tire/road contact, braking, horns and vehicle theft alarms etc. Bicyclists and pedestrians make little or no noise, and are not disruptive to communities from a noise perspective.

2.2.4 Economic

Trails across North America have created numerous benefits and opportunities for the communities that they pass through. Communities benefit from trail development through increases in business activity, and by providing services to an increasing number of trail users.

In order to identify tourism opportunities, and to recognize the types of businesses, services and amenities that users will demand, it is important to also acknowledge the preferences and characteristics of trail users. Gaining an understanding of these preferences and characteristics could assist in developing a tourism development strategy and plan that markets trail use in Aurora.

A 2004 comprehensive study completed by Price Waterhouse Coopers investigated the economic benefits of developing trail systems as part of a study to project the economic benefits of developing the Trans Canada Trail in Ontario. Some of the information collected regarding economic benefits to other jurisdictions included the following:

- A study of the "T" Railway in Newfoundland (2002) found that the total annual economic impacts associated with this trail are estimated to be as high as $17.4 million in new income generated, upwards of 850 new jobs and millions of dollars in additional taxation revenue for both the provincial and federal governments;
- A survey of users of the Georgian Trail in Collingwood, Ontario estimated that the direct expenditure associated with the trail users was $5.2 million in 1999; and
- The Economic Impact Study for the Allegheny Trail Alliance (1999) found that trail business accounts for more than 10% of annual receipts for a third of business respondents in the region, and that approximately half of all businesses in the area have plans to expand their business as a result. There is ample evidence that trails provide significant economic benefits for adjacent landowners and local businesses. Trails provide benefits to the local economy during both construction and operation. Trail construction results in direct benefits such as jobs, including the supply and installation of materials. Following construction, benefits emerge in the form of expenditures by trail users. A few examples include:
    - Trails in New Brunswick employ around 1,500 people for an average of six months per year;
    - 70% of users of the Bruce Trail cite the trail as the main reason for visiting the area. They spend an average of about $20.00 per user per visit within a 10 km corridor on either side of the trail;
    - The Riverwalk is considered the anchor of the tourism industry in San Antonio, Texas and contributes $1.2 billion annually to the local economy;

- In 1988, users of the Elroy-Sparta Trail in Wisconsin averaged expenditures of USD $25.14 per day for trip related expenses for a total of over $1.2 million annually;
- More than 600,000 Americans took a bicycle vacation in 1985, and when travelling in a group, spent $17 per day camping or $50 per day staying in motels. Cyclists travelling alone spent an average of $22 per day camping or $60 per day staying in motels;
- In Ontario, the Eastern Ontario Trails Alliance estimated that at the end of a 10 year build-out period, 320 km of their system, constructed at a cost of $5.4 million will generate approximately $36 million in annual economic benefits in the communities through which it passes, and create or sustain over 1,100 jobs; and
- In Surrey, British Columbia a 2001 study compared the impact to single-family property values over 20 years for properties that bordered a greenway or trail versus properties that did not. The study found that introducing a greenway in four Surrey neighbourhoods increased property values bordering the trail by 1% to 10%, and did not result in any measurable increase in crime.

Trail systems can have varied levels of attraction for tourists. They can be travel destinations in themselves, encouraging visitors to extend their stay in the area or enhancing business and pleasure visits. By increasing the "level of tourist draw", travelers can be expected to stay longer, resulting in additional nights' lodging and meals, a major direct new benefit to local businesses.

2.3 CURRENT TRAIL POLICIES AND INITIATIVES

In addition to understanding the potential benefits experienced by implementing a trails master plan it is also important to understand the support for such development from a Federal, Provincial, Regional and at the Local Municipal policy level. The following outlines the key policies at each of these levels which support the provision / development of trails networks and facilities.

2.3.1 Federal

Transport Canada

The 2005 "Strategies for Sustainable Transportation Planning: A Review of Practices and Options" released by Transport Canada provides a foundation on which to build guidelines for incorporating sustainable transportation principles into municipal transportation plans.[3] Some of these principles include the creation of policies related to walking and cycling that can be used to develop effective and implementable transportation plans that promote sustainable transportation on a federal level. Some relevant strategies and policies are listed below:

[3] IBI Group. "Strategies for Sustainable Transportation Planning: A Review of Practices and Options." Editorial. *Transport Canada: Transportation Planning* Summer 2005. Print.

Integration with Land Use Planning

- Encourage desirable land use form and design (e.g. compact, mixed-use, pedestrian/bike-friendly) through transportation plan policies.

Environmental Health

- Identify strategies to mitigate the air impacts of transportation activities;
- Identify strategies to mitigate the noise impacts of transportation activities;
- Identify ways that transportation systems influence the achievement of the community's economic and social objectives. Provide support in the plan's strategic directions;
- Recognize the importance of ensuring access to opportunity for disabled and low-income persons, recent immigrants, youth and the elderly. Set goals and objectives for reducing the need to travel, improving transit mobility, and preserving minimum levels of service on roadways. Identify related strategies;
- Address the transportation needs of persons with disabilities, notably with regards to public transit service and barrier-free design in public rights-of-way;
- Recognize the public health impacts of transportation activity arising through road safety, pollution and physical activity levels. Identify effective strategies to strengthen positive impacts and lessen negative ones; and
- Recognize the impact of transportation related death and injury on quality of life and the economy. Set goals and objectives for multimodal road safety. Identify effective road safety strategies.

Modal Sustainability

- Identify strategies, policies, facilities and services to increase walking, cycling, other forms of active transportation, transit, ridesharing and teleworking;
- Recognize synergies and tensions among different modes (e.g. potential for multimodal cycling-transit trips and/or modal shift from transit to ridesharing). Address possible implications for transportation objectives; and
- Include objectives, strategies, policies, facilities and services to make transit operations more sustainable.

The publishing of this document and the recommended policies and strategies identified within it illustrate the federal initiatives currently being undertaken to develop national standards and practices and improve conditions for active transportation (walking and cycling) across Canada.

2.3.2 Province of Ontario

The following section summarizes the key Provincial Policies that impact walking and cycling in the Town of Aurora. The key policies are organized by themes. The policy areas that focus on active transportation, pedestrian, trails, cycling, transit and alternative modes of transportation include: Land Use and Development, Bicycle and Trail Networks; Transit, Coordination, Enforcement; Integration; Maintenance; Transportation Efficiency; and Transportation Demand Management (Alternative Modes). The following details provide highlighted information on relevant provincial policies.

Bill 51 – Plan Reform

Bill 51 includes reforms to the Planning Act, which provides the legislative framework for land use planning in Ontario. Bill 51 includes changes to the planning process that are intended to support intensification, sustainable development and protection of green space by giving municipalities greater powers, flexibility and tools to use land, resources and infrastructure more efficiently.

Bill 51 is in line with Ontario's recent policy shift towards sustainable land use development and planning. For instance, Bill 51 permits municipalities to require environmentally sustainable design for both individual buildings and entire neighbourhoods. It also adds sustainable development as a provincial interest in the Provincial Policy Statement.

Provincial Policy Statement

The Provincial Policy Statement (PPS) sets the foundation for regulating land use and development within the Province and supports provincial goals. The PPS provides for appropriate development and protects resources of provincial interest. The vision of the land use planning system in the PPS is that the "long-term prosperity and social well-being of Ontarians depend on maintaining strong communities, a clean healthy environment and a strong economy"[4]. The PPS promotes transportation choices that facilitate pedestrian and cycling mobility and other modes of travel.

[4] Provincial Policy Statement, Ministry of Municipal Affairs and Housing, 2005.

Municipal Act, 2001

The Municipal Act, 2001 gives municipalities a broad new flexibility to deal with local circumstances, and to react quickly to local, economic, environmental or social changes. It recognizes municipalities as responsible and accountable governments with respect to matters within their jurisdiction[5]. The Municipal Act, 2001 also provides policies relating to municipal jurisdiction over municipal highway rights-of-way.

Ministry of Health Promotion

The Ministry of Health Promotion has been designated the lead ministry for trails in Ontario and has the responsibility for the coordination of recreational trail issues, policy development and planning. The Ministry of Health Promotion has a draft vision for Ontario Trails: "A world-class system of trails that captures the uniqueness and beauty of Ontario's vast open spaces and natural and built cultural/heritage resources. People and places are connected through quality, diverse, safe, accessible and environmentally sensitive urban, rural and wilderness experience trails for recreational enjoyment, active living and tourism development".

The Ontario Trails Strategy

The government of Ontario has developed the *Ontario Trails Strategy* in response to the popularity of trail activities and infrastructure, the desire of trail organizations for government leadership, the need to protect provincial investment in trails and the significant trail issues or challenges that confront the future of Ontario's trails. The *Ontario Trails Strategy* is a long-term plan that will establish a strategic direction for government and stakeholders on the planning, management, promotion and use of trails, toward a healthier and more prosperous Ontario. Developed in collaboration with other ministries and a wide range of stakeholders in the community, the strategy supports continued cooperation among governments and the not-for-profit and private sectors.

[5] Ministry of Municipal Affairs and Housing: ww.mah.gov.on.ca/userfiles/HTML/mts_1_7748_1.html

There are five strategic directions that comprise the Ontario Trails Strategy:

- Improving collaboration among stakeholders;
- Enhancing the sustainability of Ontario's trails;
- Enhancing the trail experience;
- Educating Ontarians about trails; and
- Fostering better health and a strong economy through trails.

A number of goals and strategies have also been identified to support each of the five strategic directions.

The Ontario Trails Strategy recommends that trail organizations should develop common standards to guide the development and use of trails. This will help the trail system evolve to meet the particular needs of new users. Trail organizations also need more effective tools and better ways of distributing information to more Ontarians. As these challenges require coordination at all levels, the provincial government and the public, not-for-profit and private sectors will continue to collaborate on priorities, roles and responsibilities, timeframes, and methods to strengthen and enhance existing and future trails in Ontario.

2.3.3 Metrolinx

Metrolinx, formerly known as the Greater Toronto Transportation Authority, was established in 2006 by the Government of Ontario. This agency of the Provincial Government was created in response to the need for a centralized organization to improve the coordination and integration of all modes of transportation in the Greater Toronto and Hamilton Area (GTHA). Metrolinx was tasked with developing a Regional Transportation Plan (RTP) for the GTHA based on a seamless, integrated transportation network, with a real focus on public transit, that will allow people and businesses to move more easily from York and Durham, through Toronto, Peel, Halton and onward to Hamilton.

The RTP, adopted in November 2008 and entitled The Big Move: Transforming Transportation in the Greater Toronto and Hamilton Area, is primarily focused on enhancing and expanding public transit. In addition, the Plan includes a number of proposed initiatives related to sustainable transportation, and in particular to active transportation (walking and cycling). The Plan explicitly notes that the active transportation network includes on and off-road trails that accommodate non-motorized travel. Included among the 10 "strategies" in the Plan are:

#2 – Enhance and Expand Active Transportation; and

#7 – Build Communities that are Pedestrian, Cycling and Transit-Supportive.

Within each of these "strategies", the Plan lists a series of specific priority actions and supporting policies that relate directly or indirectly to the important role that trails can play in a municipal transportation system. For instance:

- Plan and implement complete, integrated walking and cycling networks for the GTHA, including Toronto's PATH system, that address key barriers such as bridges over 400-series highways, rail corridors and major rivers, and missing sidewalks on major roads. The cycling networks will bring every

GTHA urban resident to within a maximum of one kilometre of a dedicated bicycling facility. This will be supported by a provincial funding commitment increased over time to at least $20 million per year for municipalities to complete the walking and cycling networks;

- Research, standardize and promote best practices to integrate walking and cycling in road design; and
- Undertake Active Transportation Master Plans and incorporate them into municipal Transportation Master Plans.

2.3.4 York Region

York Region Pedestrian and Cycling Master Plan

York Region has a role in the planning and design of trail facilities that are within the Regional Road Rights-of-Way as well as those trails that cross Regional Road Rights-of-Way. York Region could be a partner to trail facilities consistent with those outlined in the Regional Pedestrian and Cycling Master Plan. The York Region Cycling and Pedestrian Master Plan (2008) is set to guide the Regional Municipality of York and its municipalities over the next 25 years and beyond to implement a comprehensive pedestrian system and an on and off-road region-wide cycling network. The primary vision of the Master Plan is to create a pedestrian and cycling supportive environment that encourages both utilitarian and recreational travel by walking, cycling and using public transit. The cycling and pedestrian infrastructure is also included in the plan's implementation schedule. The plan will be implemented in three phases based on feasibility, infrastructure and political support. These include:

- The first two phases from a recommended ten-year implementation plan, and includes both infrastructure and program initiatives and associated costs; and
- Third phase: longer-term strategy (year 10 to 25).

Through the early stages of the implementation of this plan, the Region has developed a number of routes in Aurora, typically associated with arterial roads. These include in-boulevard multi-use trails for pedestrian and cycling uses and on-road facilities for bicycles. Existing and future routes associated with the York Region Pedestrian and Cycling Master Plan are included in the network mapping presented in Chapter 4. Some of the key recommendations from this plan include:

- Improve pedestrian and bicycle access at major transit stops and terminals;
- Investigate what other jurisdictions have learned in developing their own trail and cycling maps;
- Work in conjunction with local municipalities to encourage pedestrian and cycling friendly land development, urban and streetscape design through the proposed inter-Municipal Working Group, the Municipal Streetscape Partnership Policy, the Municipal Pedestrian and Cycling Partnership Policy as well as planning/design studies and development review where the Region and local municipalities and conservation authorities together have a role;
- Investigate and establish a position and a process for working with local municipalities and interest groups who wish to designate a specific section of the Regional Pedestrian and Cycling Network as a recreational destination; and
- Work in conjunction with local municipalities to develop segments of the Regional network that are under local municipal ownership.

Regional Official Plan

The York Region Official Plan (ROP) is a set of policies intended to help guide economic, environmental and community-building decisions affecting the use of land to the year 2026. The ROP provides two objectives that are relate to the use of trails by pedestrians and cyclists:

- To promote and facilitate walking, cycling and trails; and
- To ensure that roads are improved in a manner that is supportive of all modes of transportation including walking, cycling, automobile, transit and truck and that minimizes conflicts between these different modes (i.e. underpasses/overpasses).

York Region's Vision 2026 Strategy

York Region's Strategic Plan (Vision 2026) acts as a blueprint for York by outlining key areas of focus and providing the framework for more detailed plans that will be undertaken by the Region.

The vision statement for Vision 2026 is: "York Region: Creating Strong, Caring and Safe Communities". This vision statement is supported by the following eight goals, which are further supported by a number of action areas. The action areas related to walking and cycling, which are intended to be the focus of municipalities in York Region, include:

- Encouraging pedestrian-friendly and transit-oriented neighbourhoods;
- Promoting and providing alternative transportation methods that improve air quality, such walking, public transit and cycling; and

- Encourage the development of compact communities where people can walk to services

York Region Sustainability Strategy (2007)

The purpose of York Region's Sustainability Strategy is to provide a long-term framework for making smarter decisions about growth management and all municipal responsibilities that better integrate the economy, environment and community. In addition to developing a Regional Pedestrian and Cycling Master Plan, that has since been completed (2008) and approved by Regional Council, the Region's Sustainability Strategy recommends the following trail related action:

"Identify and adopt an updated linked natural heritage system for York Region in collaboration with the stakeholders, area municipalities and conservation authorities"[6].

2.3.5 Town of Aurora

Town of Aurora Official Plan Consolidation (2009)

The Town's Official Plan was in the process of being updated in 2010 and the existing (2009 Consolidation) and updated versions of the Official Plan were consulted and utilized throughout the development of the Trails Master Plan. Specifically, focus was placed on the sections that reference parks and open space, transportation and mobility. The Town's Open Spaces, Parks policies outline the provision of sufficient public open spaces as well as a continuous public open space system. In addition, great consideration should be given to the potential development of the Open Space System into the Oak Ridges Moraine located within the Town. It is important to note the definition of public and private open space areas which involves active and passive outdoor recreation

[6] Canada. Regional Municipality of York. Planning and Development Services. *York Region Sustainability Strategy*. Markham: Regional Municipality of York, 2007. Print

and walking and bicycle paths, among others. Regarding section 3.10 of Transportation, Mobility of People and Goods, the Town clearly identifies trails to be developed as means of achieving a safe, efficient and environmentally friendly network and to promote the use of alternative modes of transportation. Through further assessment of the Official Plan, there is clearly a movement towards a more diversified transportation network which could include trails, pedestrian and cycling facilities.

The Official Plan outlined only general statements which spoke to trails development within the Town. In 1995, the Town amended the policies pertaining to passive and linear open spaces in OPA #2 which provided more details for the future development of trails. The following are a number of key themes and policies from OPA #2 which speak to this.

Town of Aurora Official Plan Amendment #2 (1995)

Official Plan Amendment #2 is specific to passive and linear open spaces. It discusses:

- links to regional and provincial trails;
- utilizing the Oak Ridges Moraine, creek valleys and woodlots;
- the use of easements to provide critical links in the open space network;
- layout, design and operation of the linear open space system; and
- defines various trail components that make up the Town wide system including; neighhourhood trails, a main "Aurora Trail" loop, the concept of a trail grid, a "Heritage Trail" and Regional / Provincial equestrian trails.

Official Plan Amendment #2 also included a schedule illustrating the Aurora Trail Network Concept. Official Plan Amendment #2 was reviewed in detail as part of the policy development for the Trails Master Plan, with some revisions suggested for consideration as part of the 2010 Official Plan Review. These revisions are presented in Chapter 6 of the Aurora Trails Master Plan.

Town of Aurora Accessibility Plan (2009)

In 2009, the Town of Aurora completed an Accessibility Plan based on extensive work done by the Town of Aurora Accessibility Committee. The plan was developed in response to the increasing number of people with disabilities throughout the Province, including the Town of Aurora. Based on the requirements set out in the Ontarians with Disabilities Act (ODA) enacted by the Province of Ontario in 2002, the first accessibility plan was developed between 2003 and 2004 and was adopted in 2003.

The 2009 plan was designed to build on the previously adopted Accessibility Plans, and continues to identify, and recommend actions to remove and prevent existing barriers to people with disabilities. The purpose of this Accessibility Plan is to provide a focus for the Town's initiatives in implementing standards for the provision of services to persons with disabilities. In addition, the plan looks to improve the quality of services and to allow people with disabilities to participate and avail themselves of the services offered by the Town of Aurora.

When developing the Trails Master Plan for the Town of Aurora, it is important to consider the goals and objectives as set out by the Town's Accessibility Plan. One of the goals of the proposed trails network and facilities is to provide accessibility to people of all ages and abilities. The Accessibility Committee is a key

stakeholder in all future developments throughout the community to increase awareness and understanding for those with accessibility challenges.

2008 Leisure Services Business Plan and Budget

In 2008, the Parks and Recreation Department (formerly the Leisure Services Department) for the Town of Aurora submitted a review of their accomplishments for the year 2007 as well as future actions / initiatives to undertake between 2008 and 2011 and their associated costs. The Parks and Recreation Department is responsible for a number of programs and services primarily focused on Culture, Recreation and Leisure Services Delivery System, Leisure Facilities, Parks and Open Space as well as Recreational and Cultural Programming and Services. The Business Plan sets out details for future developments which directly relate to trail facilities and complementary programs and initiatives. Some key action steps include the update to the Parks and Recreation Master Plan, expanding education and awareness programs which promote low impact use of the natural environment, implementing new maintenance procedures and incorporating new technologies to reduce costs.

Parks and Recreation Master Plan (2010)

Completed in January 2010, the Parks and Recreation Master Plan was developed to guide and direct leisure service activities, programs, services and facilities up to and until year 2013. The plan was developed based on research, understanding of demographics and relevant trends, outreach initiatives with the community, consultations with local stakeholders and a detailed needs assessment. The Parks and Recreation Master Plan study provides strong support for the development of the Trails Master Plan. Research conducted as part of this study clearly identifies the current use of walking and hiking facilities and growing demand for facilities with an 86% household participation in such activities.

Trails Sub-Committee Report for a Trails Master Plan and Core Document / Trail Policy Directions

In November of 2009, the Trails Sub-Committee of Council report to the Parks and Recreation Services Committee (formerly the Leisure Services Advisory Committee) for the Town of Aurora, with the help of the Parks and Recreation Department (formerly the Leisure Services Department), undertook an in-depth review of existing and proposed municipal trails within the Town of Aurora, in accordance with the Trails Sub-Committee mandate. The primary objective of the sub-committee was to identify opportunities to establish off-road, barrier-free, multi-purpose trails in a natural setting, in keeping with the policies of Official Plan Amendment #2 and the Town's existing trails system. Their report sets out an up to date, site-specific, framework for the continued development of an Aurora Trails System and identifies opportunities, constraints and barriers. In addition, a series of maps were developed that illustrate a hierarchy of trails and phased implementation plan. This information was used as the starting point for the Aurora Trails Master Plan.

2.3.6 Trail Organizations

There are a number of trail organizations in Ontario, including the Bruce Trail Association, the Trans Canada Trails, the Rideau Trail Association and more locally, the Oak Ridges Trail Association and Nokiidaa Trail Association. These associations promote and maintain trails, provide hiking information and, in some cases, also provide guided hikes.

Ontario Trails Council (OTC)

The Ontario Trails Council (OTC), a not for profit organization, promotes the development of trails in Ontario. The Trillium Trail Network (TTN) is an initiative of the OTC and represents an opportunity for trails to link together between regions and communities in Ontario. The TTN consists of OTC member trails registering their trail as a network member. Trillium Trail Network (TTN) is designed to be a province-wide network of trails; overall, the TTN works to:

- Make Ontario a more attractive place to live and visit;
- Promote trail travel and tourism;
- Increase the number of trails available for use;
- Improve trail management as TTN trails will work to implement accepted trail standards;
- Promote ecological conservation;
- Provide access to local history and community culture; and
- Promote accessibility and use to disabled persons.

There are a number of key local organizations that have a role in the development of trails in the Town of Aurora and are members of the Ontario Trails Council. These include the Nokiidaa Trail Association as well as the Oak Ridges Trail Association.

The Nokiidaa Trail Association

The Nokiidaa Trail Association represents the Nokiidaa Trail which links three communities, Aurora, Newmarket and East Gwillimbury and follows the East Holland River. The trail itself passes through town parks and green

spaces, past wetlands and historical cultural sites and has links to numerous other Town trails. As the Ojibwa term meaning "walking together" the Nokiidaa Trail Association promotes the continual linking of the three municipalities through the development and promotion of trails.

The Oak Ridges Trail Association

The Oak Ridges Trail Association, established in 1973, was developed over the years as a detailed guide and system for public recreational trails along the full length of the Moraine, from Albion Hills in the west, to the Nothumberland Forest in the East. The Trail association was official inaugurated in May 1992 with the main objective to developing and securing the Oak Ridges Trail, "thereby promotion an appreciation and respect for the Moraine's ecological, cultural and scenic integrity, with the aim of retaining a trail corridor in its natural state".

The Federation of Canadian Municipalities (FCM)

The Federation of Canadian Municipalities (FCM) considers itself the national voice of municipal government since 1901. The organization fosters sustainable communities enjoying a high quality of life by promoting strong, effective and accountable municipal government. There are currently more than 1,775 members as the organization represents the interest of municipalities on policy and program matters that fall within the federal jurisdictions. Members include Canada's largest cities, small urban and rural communities, and 18 provincial and territorial municipal associations. FCM recently developed the Communities in Motion: Bringing Active Transportation to Life initiative. This document is a key resource for all Canadian municipalities with the goals of promoting active transportation options, eliminating barriers to different travel mode choices and following a new path to promote active transportation such as cycling and walking as a part of every day life. More specifically, the document outlines and promotes the inclusion of potential facilities such as off-road options. The document notes that "some pedestrians and cyclists stick to city streets to reduce travel time and distance. Others, however, prefer less stressful off-road routes that let them connect with nature. Lit trails improve safety and security, wayfinding systems help people get where they're going, bike ramps let cyclists get up and down staircases with ease, and dedicated bridges help everyone cross waterways, ravines and railway lines. Off-road

routes are also important for recreation, and many communities are expanding their trails systems to boost tourism"[7].

As presented in this chapter, the existing context for trails includes policy frameworks at all levels of government as well as through organizations that serve as advocates and stewards for trails in Ontario, and in Aurora. This Trails Master Plan is designed to complement and build upon these existing policies, organizations and initiatives. The Federal and Provincial governments and a number of these organizations such as the FCM, have in the past been partners in trail projects. Securing funding through partnerships with these types of agencies / organizations forms part of the implementation strategy for the Aurora Trails Master Plan that is documented in Chapter 6 of this report.

[7] Canada. Federation of Canadian Municipalities. Centre for Sustainable Community Development. *Communities in Motion: Bringing Active Transportation to Life*. Ottawa: Federation of Canadian Municipalities. Print

CHAPTER 3
HOW WE CONSULTED AND WHAT YOU TOLD US

3.1 PUBLIC CONSULTATION PROCESS

Public consultation was an important component in the development the Aurora Trails Master Plan. Drawing upon the knowledge of the people who live, work and play in Aurora, and the various partners who will have a role in implementing the study recommendations, a comprehensive consultation strategy was developed at the outset of the study and confirmed by the project Steering Committee. The consultation strategy was designed to build upon the exemplary consultation work previously completed by the Trails Sub-Committee to:

- Engage Town staff, Councillors, residents and stakeholders about the purpose, approach and findings of the Aurora Trails Master Plan study;
- Encourage stakeholders to participate in the study process;
- Promote trails, particularly walking and cycling for residents of all ages; and
- Provide information related to the benefits of investing in trails and encourage behaviours that help to reduce unnecessary single occupant motor vehicle use.

The primary consultation techniques that were undertaken throughout the study process included:

- Steering & Trails Sub-Committee (Parks and Recreation Services-formerly Leisure Services, Planning and Development Services and Infrastructure and Environmental Services) Meetings;
- A Notice of Study Commencement published in the Aurora Banner at the outset of the study;
- An On-line Questionnaire;

- Two Public Information Centres; and
- A Study Webpage (link on the Town of Aurora website- http://www.town.aurora.on.ca/aurora/trailsmasterplan).

Over the course of the study, a Project Record was maintained which documents all of the input received from various stakeholders and the public. The Project Record is provided as a separately bound appendix to the Trails Master Plan Final Report.

Steering and Trails Sub-Committee Meetings

The Steering and Trails Sub-Committee Meetings were attended by representatives from the Town including the Town's project manager, representatives from Town departments including Parks and Recreation Services, Planning and Development Services and Infrastructure and Environmental Services, members of the consultant team, as well as members of the Trails Sub-Committee. This committee reviewed study materials through the course of the project and provided direct input to the study through regularly scheduled meetings.

Study Webpage

An information page on the Town of Aurora website (http://www.town.aurora.on.ca/aurora/trailsmasterplan) was developed and maintained exclusively for the Trails Master Plan study. Study updates and materials developed over the course of the study were posted on the Town's website for public review. This included the study vision and objectives, reference information, internet links, and background documents. The website also served as a source of contact information for community members and stakeholders who required further information.

Notice of Study Commencement

A Notice of Study Commencement was published on the Town's website and was used to inform the public of the vision and objectives of the study. In addition, the notice was a means of providing the public with contact information for any further questions regarding the study undertakings.

3.2 ONLINE WEB-BASED QUESTIONNAIRE

As part of the Trails Master Plan Study, a web-based questionnaire was developed and hosted using the online service SurveyMonkey (http://www.surveymonkey.com/Aurora_Trails_Questionnaire). The questionnaire was issued early in the study and was available for respondents until the final stage of the study in August 2010. It was accessible from the Trails Master Plan study webpage and a questionnaire station was also set up for use at PIC #1 at the Aurora Homeshow Booth.

Although not statistically valid, the survey results provided the study team with important information that was used to inform the study input to the study, including:

- Frequency of participation in trails related activities;
- Potential uses to be considered for the trails system;
- Factors that encourage people to use the trails; and
- Locations or corridors for the trails network within the Town of Aurora.

The final survey results are based on 124 respondents. The following is a summary of the key findings from the survey and all responses are summarized in a separately bound appendix (Project Record).

Over 96% of survey respondents agreed that the Town of Aurora should invest in trail improvements in the Town as illustrated in **Figure 3-1**.

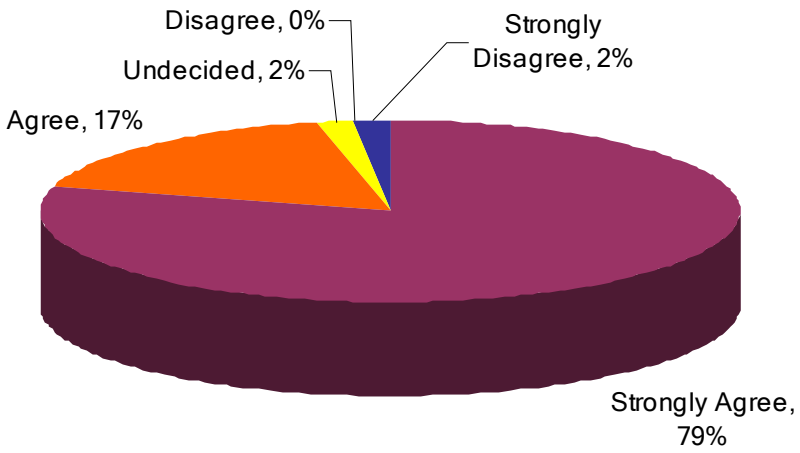


Figure 3-1: Proportion of support for making investments for trail improvements in Aurora

The primary uses for existing trails in Aurora are walking, jogging and cycling. Almost 84% of respondents indicated that they walk or jog at least a few times a week. Cycling (36%) and hiking (26%) are less common occurrences on a weekly basis, while 6% of respondents noted that they cross country ski and only 3% noted they inline skate on Aurora's trails on a regular basis.

Recreation or fitness is a primary motivator for trail use with over 95% of respondents indicating that it motivates them at least sometimes to use existing trails in Aurora. However, trips for commuting to work or destination oriented trips which includes trips to and from shops, visiting friends or running errands are generally not motivators for using trails in Aurora today. The comparison of responses is illustrated in **Figure 3-2**.

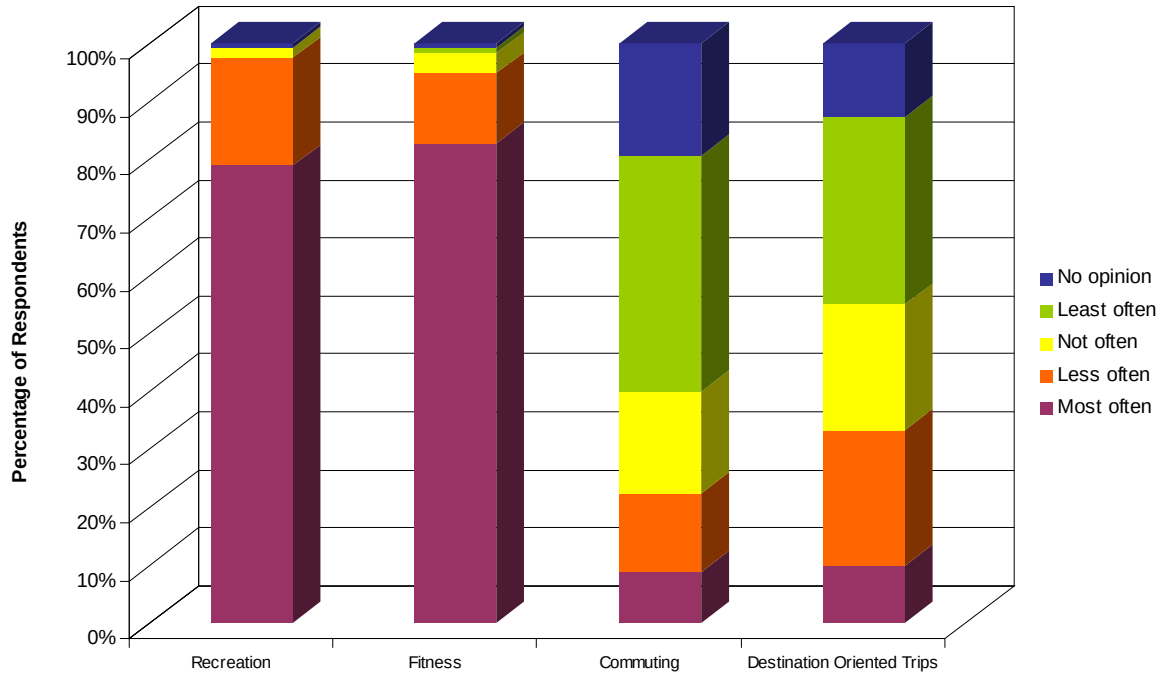


Figure 3-2: Motivators for trail use in Aurora

An overwhelming 94% of respondents feel that walking or jogging should be considered the first priority in the development of a Trails Master Plan for the Town of Aurora followed by cycling (56%) and hiking (44%).

Respondents are most comfortable with walking or hiking (88%) and cycling (66%) on multi-use trails typically found in parks, natural areas and hydro corridors. The majority of respondents (over 70%) are comfortable with walking on sidewalks along local streets and on in-boulevard multi-use trails found in road rights-of-way. In contrast, 66% of respondents are least comfortable with cycling on busier Town / local roads without bike lanes or paved shoulders.

The majority of respondents feel that a comprehensive multi-use trail system should be developed for the Town of Aurora for the following reasons (listed in order from greatest importance to least importance):

- To provide places to walk and cycle within neighbourhoods for recreation (92% of respondents);
- To improve quality of life and health of Aurora residents (90% of respondents);
- To provide access to natural areas (87% of respondents);

- To improve walking and cycling as transportation options (80% of respondents);
- To connect neighbourhoods to each other (67% of respondents); and
- To provide access to historic / cultural destinations and support tourism (44% of respondents).

Almost 90% of survey respondents agreed that the Town of Aurora should purchase private land for the purposes of securing trail connections to complete the Aurora Trail System as illustrated in **Figure 3-3**.

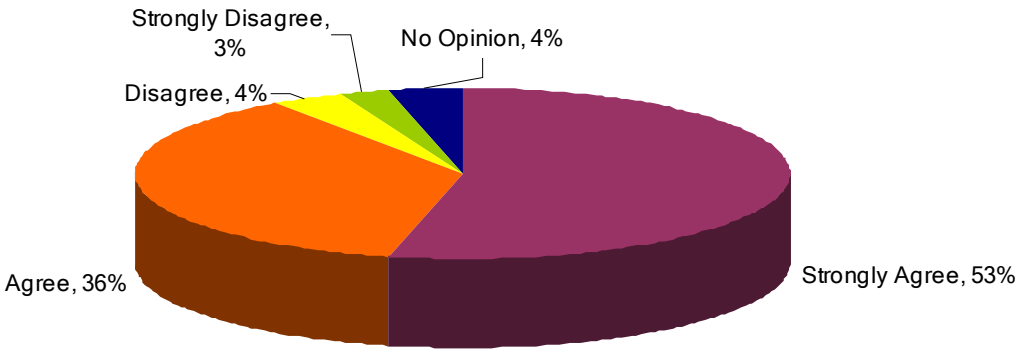


Figure 3-3: Opinion regarding purchase of private land for the purposes of securing trail connections to complete the Aurora trail system

Respondents were also given the opportunity to highlight key destinations and connections that should be considered within the overall trail network. These comments were taken into consideration during the network development process outlined in Chapter 4. All responses from the online survey are summarized and presented in a separately bound appendix.

3.3 PUBLIC INFORMATION CENTRES

Two Public Information Centres (PIC) were held during the course of the study. The first PIC was held at the Aurora Home Show on April 16, 17 and 18th, 2010 and focused on the study vision, background, an inventory of existing trail routes, and presented draft route selection principles and trail facility types. The second PIC was held in the lower lobby of the Town Hall on August 25, 2010 and presented the preferred network, implementation plan, branding strategy, facility types and the trails master plan policies and recommendations. Figures were presented which illustrated the proposed network, facility types and implementation plan. Attendees at both PICs were given the opportunity to provide input on the proposed network, implementation plan and recommendations. Comment forms were also available at each PIC and a computer station was available, giving attendees the opportunity to fill in the online questionnaire. Following each of the PICs, display materials were posted on the Town of Aurora website to assist those who were unaware of, or unable to attend the sessions. The dates for both PICs were advertised in the Aurora Banner in advance of each of the events. All comments received were considered in the development of the Trails Master Plan.

3.3.1 PICW1 – Aurora Homeshow

A number of comments were provided to the study team prior to the PIC and additional comments were documented on the maps displayed at the Homeshow. Many of these comments provided specific references to potential locations for trails in Aurora and suggestions as to how the trails system could benefit the community the most. Additionally, figures presented the trail context, and gave residents the opportunity to comment on candidate alternative trail routes as well as provide opinions on trail locations requiring improvements. In general, public comments from the first PIC were very positive and supportive about the Town's decision to undertake the study, and also noted the need to improve off-road trail connections between neighbourhoods and key destinations within the community.

Some specific comments included:

- Improve access for seniors along St. John's Sideroad and locations with no sidewalks;
- Increase the number of marked trails so the network can be navigated;
- Implement longer trails to better connect the trails throughout the Town;
- Increase the safety on routes for users; and
- Increase signage for leash free trails as well as signage to remind owners to pick up after their animals.

With regards to the candidate trails network, the following comments were provided:

- Build trails south on Bathurst Street at Bloomington Road and East along Bloomington Road;
- Develop Trails on the southeast lots at the intersection at Bathurst Street and Henderson Drive; and
- Implement a boardwalk on the off-road municipal trails east of Bayview off Stone Road.

3.3.2 PICW2 – Town Hall

The second Public Information Centre was held on August 25, 2010 at the Town Hall between the time of 6:00 p.m. and 8:00 p.m. This Public Information Centre was used to provide the public and members of the Town of Aurora Staff and Trails sub-committee with a chance to provide their comments on the proposed trails network as well as the recommendations for the master plan, the implementation strategy, phasing plan, Official Plan policies as well as the proposed facility types. There were a number of attendees including representatives of the Trails Sub-Committee, members of the public as well as several local Councilors and Town Staff. Participants were provided an opportunity to document their comments on the network maps on display as well as fill out the public opinion survey and comment form. Each of the comments provided by the attendees were documented in the consultation record and incorporated in the finalization of the Aurora Trails Master Plan.

Some specific comments included:

- Look into facilities to accommodate and improve bicycle safety;
- Implement means of promoting trail awareness and education throughout the Town;
- Ensure a wide range of users and increased accessibility;
- Review the surface types for the proposed network; and
- Increase pedestrian and cyclist friendly development requirements.

3.4 HOW WE INCORPORATED YOUR COMMENTS

The consultation program provided the study team with a wide range of comments and ideas from members of the public, Council, committees and agencies. These comments were reviewed and where applicable, they were incorporated in the Master Plan. Based on the study team's review of the comments received from the Public

Open Houses, Online Questionnaire and the posted Draft Final Report, some common themes were confirmed. These included:

- Increase the number of connections to increasing multi-modal transportation choices throughout the Town by providing trails that connect key destinations, transit facilities etc.;
- Provide adequate accessibility to existing and proposed trails facilities;
- Improve signage throughout the Town by implementing a more detailed set of signage with a cohesive branding strategy;
- Implement a wide range of facilities for both pedestrians and cyclists throughout the Town;
- Ensure the preservation and promotion of key natural features throughout the Town; and
- Increase the level of safety for pedestrians and cyclists throughout the Town by implementing a range of facility types.

CHAPTER 4
THE TRAILS MASTER PLAN

4.1 HOW WE DEVELOPED THE NETWORK

This chapter describes in detail, the proposed trail network for the Town of Aurora. The intent of the Aurora Trails Master Plan is to build upon the work that has already been completed by the Town's Trail Sub-Committee and through the Official Plan Review as well as the Transportation Master Plan and Pedestrian and Cycling Master Plan for the Region of York.

The following sections describe the recommended trails network, including a description of the network development process, the guiding principles for route selection as well as opportunities and challenges for trail development throughout the Town. In addition, the chapter also outlines the network hierarchy and facility types. This chapter should be read in conjunction with Chapter 5, Trail Designer's Toolbox, which outlines potential trail types and a number of other design guidelines to be utilized throughout the development and implementation of the network. In addition, Chapter 6 outlines the implementation for the proposed network plan which has been developed along with proposed phasing and cost estimates for the trail network.

4.1.1 Network Development Process

The proposed trails network presented in this chapter, along with the process undertaken to develop it, was guided by the vision created for trails throughout the Town, the route selection principles as well as the following network development process.

1. Inventory of Existing Conditions: Using the Town's Geographic Information System (GIS) database, this step included a compilation of digital mapping and background documents for existing or previously planned trails, existing walking routes, future development areas etc. within the municipality.

2. Develop Network Guiding Principles: Guiding Principles were established, which helped to translate the vision into the trail hierarchy concept, and the trail design guidelines for the various types of trails in different locations.

3. Consultation with the Project Steering Committee, Stakeholders and the Public: Extensive consultation was undertaken in order to receive feedback on the network vision, guiding principles, existing trail resources, trail user needs and potential trail routes.

4. Develop a Network of Candidate Routes: A list of candidate trail routes were examined in the field and considered for inclusion in the recommended network.

5. Undertake Network Analysis: To develop and assess the proposed trail network, the Municipality's high resolution aerial imagery was studied and this was accompanied by a field investigation of potential routes.

6. Recommend Facility Types: Trail facility type recommendations were made for each of the on and off-road route segments that together form the comprehensive network.

7. Develop the Phasing Plan: A detailed phasing plan for short, mid and long term projects were developed for the staged implementation of the trail network.

8. Review and Consult with the Steering Committee, Stakeholder and Public: Stakeholders, members of the Steering Committee and the public were consulted to gauge feedback on the recommended network, facility types and implementation plan.

9. Finalize the Network, Facility Types and Phasing: Based on feedback from the Steering Committee and public, the proposed trails network, facility types and phasing were finalized.

The following sections provide further detail for each of the steps within the network development process as outlined above as well as the current state of trails and trails development in the Town.

4.1.2 Existing Trails & Trail Development Challenges

One of the first steps in developing the recommended trail network was the creation of a consolidated inventory of existing and potential trail routes in Aurora. A significant portion of this work was completed by the Town's Trails Sub-Committee prior to the commencement of the Trails Master Plan. This information was used as the starting point by the consultant team and was supplemented by information from various reports, maps and field investigations. In addition, consultation with the Trails Sub Committee and members of the public provided the study team with input throughout the development of the plan regarding the condition of trails, the positive and negative aspects of the existing trail system, and necessary improvements that should be made. As the draft network was developed, stakeholders and the general public were given the opportunity to provide their opinions and suggestions regarding route preferences and construction priorities.

Preliminary investigations of existing and potential trails were completed using aerial imagery and GIS mapping data provided by the Town of Aurora. Field work was also undertaken to confirm the status of existing trails, as well as identify future trail opportunities and potential connections to adjacent municipalities. As part of the Master Plan field work, a photographic inventory was undertaken to document existing elements of the existing trail system, as well as potential trail opportunities and challenges. **Figures 4-1 and 4-2** illustrate just a few of these.

Figure 4-1 Existing Trails in Aurora

The Nokiidaa Trail is the primary north-south regional trail in the Town of Aurora, and is a vital trail link that allows Aurora residents and visitors to travel to neighbouring municipalities as well as areas of interest within York Region. The trail is a key connection to the Towns of Newmarket and East Gwillimbury.

Sheppards Bush Conservation Area is home to a network of granular soft-surface single track trails.

Figure 4-1 Existing Trails in Aurora

Many of the Town / Municipal trails run through neighbourhood parks such the Graham Parkette. These trails allow for key connections to areas of interest such as community centres and schools.

Aurora has many trails located within the greenway system. This existing network lays the foundation for a network of off-road trail connections throughout the Town in the future.

Figure 4-2 Opportunities and challenges to the development of a trail network in Aurora

The hydro corridor in the north-central part of the Town provides for a potential trail opportunity. However, crossing Regional roads and local streets may be difficult for users; hence crossing improvements should be explored in key locations.

Railways such as the GO Transit line running through Aurora are significant barriers to trail users, though there is a strong desire to cross the line in a few locations as indicated by worn footpaths. Grade separated crossings should be considered in these locations as part of the goal to create a comprehensive and connected trail network.

Trail routes that were in existence at the time the study was undertaken are included in the recommended trail network, illustrated in **Figures 4-3 and 4-4**. This information was gathered from a number of sources including background digital data, plans for newly constructed and registered subdivisions, information gathered during field reviews, and additional routes identified by municipal staff, stakeholders and the public. The information was organized according to the following categories:

Existing and Proposed Trails; consisting of those routes that are formally recognized by the Town as trails and designated walking routes. These include trails that have been designed and constructed in municipal parks, and scenic or historic walking routes identified in the urban centres. Examples include the trails located at both the Fleury and Machell Parks. Also included within this group are trails on public lands (other than those owned by the Town), and privately owned lands where public access is permitted such as a portion of the Oak Ridges Trail, and trails that connect adjacent municipalities which connect to Aurora are included in this group, such as the Nokiidaa Trail,. In addition to the existing trails, the maps also identify and illustrate proposed trails that had been identified by the Town's Trails Sub-Committee prior to the commencement of the Trails Master Plan study. These include those on public lands and preferred trails on land currently under private or other public ownership. These trails will require land parcels to become available in the future, or easements to be negotiated with property owners. The map also illustrates the preferred off-road alignment for the Oak Ridges Trail and the Nokiidaa Trail.

4.1.2.1 Barriers to Trail Development

Barriers to trail continuity and trail development are natural and constructed features that create a physical impediment to the development of an interconnected trail system. Regional roads, the GO railroad tracks and golf courses are the most significant barriers to off-road trail development in Aurora. To a lesser extent, some of Aurora's subdivisions can be considered barriers to trail connectivity and continuity. The hydro corridor in north-central Aurora provides a trail opportunity; however, crossing streets such as Pedersen and Hollandview Trail may be difficult for users thus requiring the consideration of crossing improvements. Based on extensive field investigation and the assessment of the aforementioned existing trails throughout the Town of Aurora, a number

4-3: DRAFT CANDIDATE TRAIL ROUTE NETWORK AURORA WEST LEGEND

EXISTING TRAILS

- Off-Road Municipal Trail
- Nokiidaa Trail
- Oak Ridges Moraine Trail (ORTA)
- Boulevard Bike Path or Boulevard Multi-Use Trail

PROPOSED TRAILS

- Municipal Trail on Public Land
- Preferred Municipal Trail on Land Currently Under Private or other Public Ownership
- Nokiidaa Trail
- Preferred Oak Ridges Moraine Trail (ORTA) alignment
- Boulevard Bike Path or Boulevard Multi-Use Trail

POTENTIAL GRADE SEPARATED TRAIL CROSSINGS TO BE INVESTIGATED

- Primary Crossing
- Secondary Crossing
- Underpasses
- Major Railway Grade Separation

AT-GRADE TRAIL CROSSINGS

- Existing Crossing Signal
- Proposed Crossing Signal
- Secondary Railway Crossing

OTHER INFORMATION

- Lookout
- Desired Trail Connection to Adjacent Municipality
- General Area where there is desire to have trail link developed in the long term.
- Local Road
- Regional Road
- Public Transport Hub
- School
- Car Parks (Existing and Proposed)

For a Detailed Map Legend, please refer to Appendix A

TOWN OF NEWMARKET

TOWNSHIP OF KING

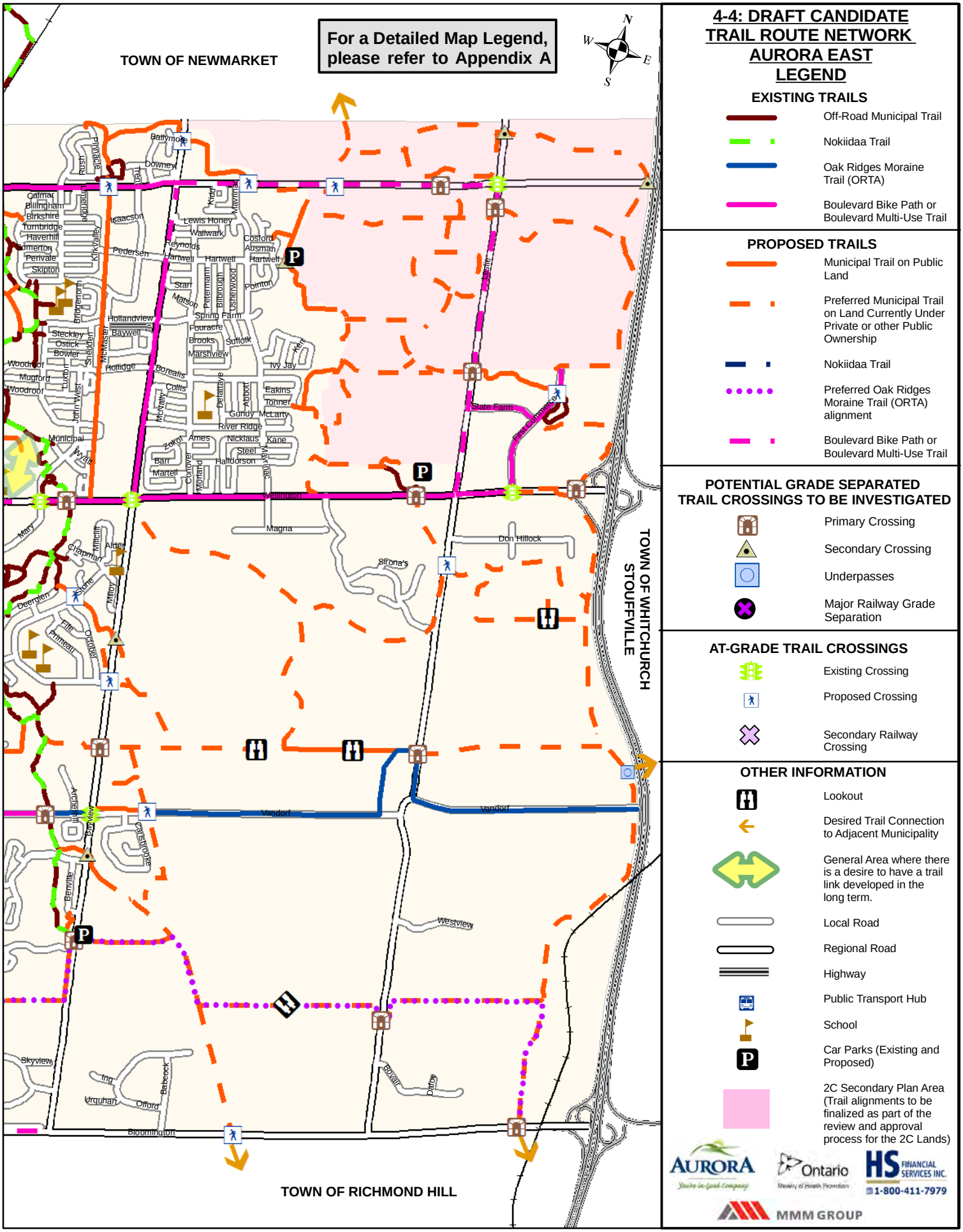
TOWN OF RICHMOND HILL

AURORA
You're in Good Company

Ontario
Ministry of Health Promotion

HS FINANCIAL SERVICES INC.
1-800-411-7979

MMM GROUP


TOWN OF NEWMARKET
For a Detailed Map Legend, please refer to Appendix A
N
W
E
S
TOWN OF WHITCHURCH STOUFFVILLE
TOWN OF RICHMOND HILL
Bellymore
Downey
Isaacson
Lewis Honey
Wallwark
Costford
Reynolds
Pedersen
Hartwell
Starr
Marson
Spring Farm
Pointon
Holland View
Baywell
Steckley
Ostick
Bowler
Woodroof
Mugford
Hollidge
Borealis
Collis
Brooks
Suffolk
Marshview
Ivy Jay
Eakins
Tonner
McLarty
Gundy
River Ridge
Nicklaus
Kane
Steel
Ames
Zekol
Barr
Martell
Corfover
Hallidorson
Municipal
Wellington
Magna
Don Hillock
Sirona's
State Farm
Fiber Commerce
Mary
Chapman
Alder
Deergleen
Elite
Primeau
Oakridges
Vandorf
Andrew
Bayview
Gatsbrooke
Bennville
Westview
Skyview
Ing
Urquhart
Offord
Bethbeck
Bloomington
Bovaird
Darroch
Joshua Creek
Kirby
Maxima
Bridgemorth
Kirkvalley
Perivale
Skipton
Haverhill
Birkshire
Billingham
Calmar
Rushendale
Trenbridge
Turnbridge
Peterman
Bilbrough
Usherwood
Hartwell
Costford
Abusman
Foxracre
Ivy Jay
Deltaray
Abbott
Eakins
Tonner
McLarty
Gundy
Nicklaus
Kane
Steel
Newmarket
Morland
Corfover
Hallidorson
Martell
Barr
Zekol
Ames
Municipal
Wyatt
John West
Lukton
Woodroof
Mugford
Hollidge
Borealis
Collis
McNally
Deltaray
Abbott
Eakins
Tonner
McLarty
Gundy
River Ridge
Nicklaus
Kane
Steel
Newmarket
Morland
Corfover
Hallidorson
Martell
Barr
Zekol
Ames
Municipal
Wyatt
John West
Lukton
Woodroof
Mugford
Hollidge
Borealis
Collis
Brooks
Suffolk
Marshview
Ivy Jay
Kerr
Steckley
Ostick
Bowler
McMaster
Shedden
Holland View
Baywell
Starr
Marson
Spring Farm
Pointon
Peterman
Bilbrough
Usherwood
Hartwell
Costford
Abusman
Foxracre
Reynolds
Pedersen
Isaacson
Lewis Honey
Wallwark
Bellymore
Downey
Trenbridge
Rushendale
Calmar
Billingham
Birkshire
Turnbridge
Haverhill
Somerton
Perivale
Skipton
Kirkvalley
Bridgemorth
Joshua Creek
Kirby
Maxima
Trenbridge
Rushendale
Calmar
Billingham
Birkshire
Turnbridge
Haverhill
Somerton
Perivale
Skipton
Kirkvalley
Bridgemorth
Isaacson
Pedersen
Lewis Honey
Wallwark
Costford
Abusman
Hartwell
Starr
Marson
Spring Farm
Pointon
Peterman
Bilbrough
Usherwood
Foxracre
Ivy Jay
Kerr
Steckley
Ostick
Bowler
McMaster
Shedden
Holland View
Baywell
Woodroof
Mugford
Hollidge
Borealis
Collis
Brooks
Suffolk
Marshview
Deltaray
Abbott
Eakins
Tonner
McLarty
Gundy
River Ridge

of issues / barriers have been identified which must be mitigated in order to successfully implement the proposed trails network. The following key issues noted during the inventory and expressed by the public as part of the consultation, will have to be overcome in the ongoing evolution of trails in Aurora:

- Lack of trail continuity in many locations. This may be due to physical barriers, constraints, lack of a network plan, or lack of an implementation strategy for these locations. The trail network, implementation schedule and commitment to fund projects in a step-by-step manner will, over time result in a more continuous system.
- Challenging or non-existent road or rail crossings. The intersection of trails and roads or rail crossings can often be one of the key contributors to trail discontinuity. This is especially the case with major arterial roads and provincial highways. The trail network identifies these locations so that crossings can be designed and implemented at the appropriate time, often in conjunction with road improvement projects. With respect to the crossing of local streets, design consistency is important so users know what to expect and how they should interact with motorists at these locations.
- Inadequate trail signage. Information and wayfinding is an important aspect of a successful trail network, it helps users understand where they are and plan their route for where they want to go. The design and layout of an effective trail signage program must be carefully thought out so that important information can be conveyed without creating unnecessary visual clutter.
- Variation in trail width and surface from one trail to the next. This can be addressed with a trail hierarchy which relates location and, width and surface type.
- Lack of garbage and recycling facilities in appropriate locations which can lead to trail users leaving garbage behind on the trail. This can be addressed through trail design guidelines, trail signage and trail user education strategies.

Solutions to address each of these key issues are contained throughout the following chapters of the Aurora Trails Master Plan.

4.1.3 Guiding Principles for Route Selection

When making decisions about future locations for the proposed trails network, the following route selection principles were used to help define the character of the cycling network as well as assist in the selection of trail routes proposed in the Aurora Trails Master Plan:

Barrier Free: Wherever possible, trails should have barrier-free crossings of railway lines, major arterial roads, valleys and rivers.

Off-road: Wherever possible trail routes will be off-road. On-road links will be utilized where necessary and some on-road links may be considered short-term or interim, until such time as an appropriate off-road link can be developed.

Connected: Trails should be connected to form a continuous, linked network within the Town and should be seamlessly connected with neighbouring municipalities. They should provide access to important destinations such as parks, natural areas, community centres, schools, shopping and employment areas.

Visible: Trails should be a visible component of the Town's recreation and transportation system.

Safe: Reducing risks to users and providing comfortable facilities will be key considerations when selecting routes for the network. The confidence and acceptance of the network can be instilled in users by reducing real and perceived risks.

Accessible: Trails should be accessible from all neighbourhoods within the Town. Specific trails that can be designed to be accessible for those who require wheelchairs will be identified and appropriately signed.

Cost Effective: The cost to implement and maintain the proposed trail network facilities and supporting programs should be phased over time and designed to be affordable and appropriate in scale for the Town. Opportunities for partnership funding with other agencies and organizations should be pursued (e.g. Regional,

Provincial and Federal governments, Lake Simcoe Region Conservation Authority (LSRCA), Toronto Regional Conservation Authority (TRCA) and the private sector).

Diverse: The trail system should appeal to a range of user abilities and interests. As such the network should consist of various route types, in a variety of locations throughout the Town.

Sustainable: Ecological sensitivity will be a key consideration in the alignment, design and selection of materials for Aurora's trails.

Natural and Cultural Heritage: Trail routes should provide opportunities for users to experience and learn about Aurora's natural and cultural heritage assets. "Natural heritage" refers to features such as woodlands, valley lands, wetlands and vistas. "Cultural heritage" refers to features such as historic buildings and structures and cultural artifacts.

Context-Sensitive: Trails should be appropriately located when associated with natural heritage features. Each site's characteristics should be carefully considered when the alignment and design details are being developed.

Link to Other Modes: The trails network should link to other modes of transportation, particularly public transit.

Supportive Facilities: Supportive facilities such as directional and educational signage, trail furniture and separate receptacles for garbage should be provided and the provision of strategically located washroom facilities will be investigated. Bicycle and car parking should be available at trail nodes and key destinations.

These principles should also be referred to in the future when network changes may be contemplated, new opportunities are identified and when individual routes are entering into the detailed planning and design stage.

Recommendation 4-1: That the Town adopt the Aurora Trails Network Plan in principle.

Recommendation 4-2: That the Trail Network Planning and Phasing Maps be adopted.

Recommendation 4-3: By adopting the Aurora Trails Master Plan, Council formally acknowledges the dual function of the trails network; as community infrastructure for non-motorized and self-propelled traffic, for utilitarian as well as recreational purposes.

4.1.4 The Trail Network Hierarchy

A hierarchy is proposed as the organizing tool for the Aurora trail network. It serves as the basis for different trail design criteria according to trail location and user group. The hierarchy concept builds on the "Accessible" principle discussed in Section 4.1.3., specifically: "Trails should be accessible from all neighbourhoods within the Town. Specific trails that can be designed to be accessible for those who require wheelchairs will be identified and appropriately signed."

The hierarchy consists of Town-wide Spine Trails, Local Neighbourhood Trails and Special Use Trails. The following sections describe the hierarchy and an illustration is contained in **Figures B-1 and B-2**, in Appendix B of this report. As discussed in Chapter 1, the entire trail network will be off-road, utilizing parks, natural and open spaces, and boulevards along some roads. In areas where there is extensive linear public open space the development of continuous off–road multi-use trails to serve a wide range of users can be achieved with relative ease. As an interim measure until a suitable off-road trail facility can be created, it may be necessary to develop some trail links within the road right-of-way. Trail connections in these areas may include signed cycling routes on streets where traffic volume and speed is low. This applies to both the Town-wide Spine trails and the Local Neighbourhood Trails. In these locations cyclists would be directed to use the road (shared with motorists) and pedestrians would be directed to use sidewalks where they exist. Where sidewalks do not exist along designated signed routes, the Town should work towards providing a sidewalk link to accommodate pedestrian users. These routes would be maintained as part of road and sidewalk maintenance policies and practices. Trail design criteria according to user group and trail location are discussed in detail in Chapter 5.

4.1.4.1 Town-wide Spine Trails

The town-wide spine routes act as the "skeleton" of the network offering opportunities to move throughout Aurora along major corridors and also provide the connections/gateways to Aurora's neighbouring municipalities. The primary system consists of off-road trails wherever possible and on-road bicycle routes (where links are needed). The town-wide system is expected to accommodate:

Potentially high volumes of use:

- Trail user traffic that may be more destination-oriented and/or utility focused than those using local or special-use trails;
- The widest range of trail users; and
- Links to major destinations such as community centres, schools, significant commercial nodes, and significant tourist destinations.

Off-road Facilities Characteristics:

- Would be designed to accommodate multiple uses such as cycling, walking, users with mobility-assisted devices, strollers, small wheeled uses such as skateboarding, in-line skating and scooters (where appropriate), cross country skiing (where possible and appropriate);
- Would prohibit motorized and equestrian activity;
- Would typically consist of a compacted granular surface. Hard surfaced (e.g. asphalt) trails would generally only be found where the trail is located in the public boulevard (i.e. multi-use trails along regional roads), on slopes where erosion of the surface is an ongoing problem, or in parks where paved trails are intended to accommodate a wider range of users such as inline skating;
- May include shared use sidewalks in key locations;
- Would offer the highest density of trailside amenities including benches, signing, washrooms, and trail access nodes (staging areas); and
- Depending on volume and type of use; some sections may be maintained for year-round use.

4.1.4.2 Local Neighbourhood Trails

The local system links with the municipal-wide system, creates access to local points of interest, and offers neighbourhood or community recreational loop opportunities. The local system will be designed to accommodate:

- Potentially high volumes of use;
- Trail traffic that tends to be more locally oriented; and
- Connecting routes for users wanting to access the primary system.

Off-road Facilities Characteristics:

- Would be designed to accommodate multiple uses such as cycling, walking, and running; and other uses such as mobility-assisted devices/strollers, skateboarding, in-line skating and scooters will be accommodated where appropriate;
- Would prohibit motorized and equestrian uses;
- Would typically consist of a compacted granular surface, but may include hard surfacing (e.g. asphalt) on slopes where erosion is a problem and parks where paved trails are intended to accommodate a wider range of users such as inline skating; and

- Would offer a moderate density of trailside amenities including benches, signing, and trail access nodes/staging areas.

4.1.4.3 Special Use Trails

The special use trail system includes routes in designated locations or those that are implemented for a specific use such as "hiking only". They are directly connected to local and, in some cases, Town wide spine routes. These routes may have a local neighbourhood focus, but more often are a destination for specific user groups.

The special-use system consists of only off-road trails and will typically be designed to accommodate:

- Single or restricted use(s);
- Moderate to low volumes of use; and
- Components of the special-use system may not all be linked, potentially including "stand-alone" loops or solitary trail segments for specific purposes.

Off-road Facilities Characteristics:

- Would be designed to accommodate single or limited uses such as hiking. Other uses such as mobility-assisted device users/strollers, skateboarders, in-line skaters and scooter users are typically restricted by the nature of trail alignment, width and surface type;
- Motorized and equestrian uses would be prohibited;
- Typically are narrower and consist of a natural earth or woodchip surface and hard surfacing with appropriate trail hardeners where necessary or dictated by environmental conditions (i.e. boardwalk);
- May use "low-tech" design techniques that are appropriate for the location and volume of use;
- Trail obstructions such as deadfall trees and rocks may remain in place, depending on the setting and intended nature of the trail;

- Typically would offer a low density of trailside amenities including benches, signing, and trail access nodes (staging areas). Site/route specific interpretive signing programs may be implemented where deemed appropriate; and
- May include minor nodes at junction points with features such as bicycle parking, and information signage to inform users of permitted and restricted uses.

The Special Use trail is typically narrower than both Town Wide Spine and Local Neighbourhood Trails to ensure that the facility is in scale and context within the area through which it passes. This creates a challenge from a maintenance point of view as is it not possible to travel these routes with much of the equipment that Aurora is likely to currently have. Local partners will be invaluable in assisting with maintenance of special-use trails.

4.1.5 Aurora's Long Term Trail Network Plan

The recommended trail network, including facility types across the town is illustrated in **Figures 4-5** and **4-6 – The Trails Planning Map.** **Table 4-1** provides a summary of network facilities by type and length. Descriptions for the map legend have been included in Appendix A of this Plan. The estimated costs of developing the network and other details related to implementation are discussed in Chapter 6 of this report. Infrastructure priorities were assigned based on a logical build-out of the network over time, input by the Steering Committee and public, and field observations with the following objectives in mind:

- Developing or enhancing the trail network in locations where a greater number of users are anticipated;
- Establishing main corridors between to important community destinations such as schools, community centres and recreation complexes, major sports fields, employment lands and key points of interest throughout Aurora;
- Making or completing key connections that form part of regional trail routes;
- Making connections between existing facilities in locations where the completion of a small missing link results in the creation of a significantly longer continuous trail;
- Developing trail loops throughout the community;
- Establishing spine trail routes in new subdivisions as part of the subdivision planning and design approval process that minimizes or avoids, where possible, at-grade trail crossings of roads; and
- Scheduling implementation with planned municipal capital projects where possible to take advantage of possible cost savings.

4-5: DRAFT TRAIL ROUTE NETWORK by FACILITY TYPE - AURORA WEST

LEGEND

ROUTE + FACILITY TYPES

EXISTING	PROPOSED	
		Hard Surface Multi-Use Trail
		In Boulevard Multi-Use Trail / Bike Path (Hard Surface)
		Soft Surface Multi-Use Trail
N/A		Soft Surface Multi Use Trail (Preferred Municipal Trail alignment on Land Currently Under Private or other Public Ownership)
		Special Use Trail (Soft Surface)

NOKIIDAA / OAK RIDGES TRAIL ALIGNMENTS

- Nokiidaa Trail existing alignment (Generally soft surface)
- Nokiidaa Trail proposed alignment (Generally soft surface)
- Oak Ridges Moraine Trail existing alignment (Generally soft surface for off-road sections)
- Oak Ridges Moraine Trail preferred alignment (Generally soft surface for off-road sections)

GRADE SEPARATED TRAIL CROSSINGS

EXISTING	PROPOSED	
		Primary Crossing
		Secondary Crossing
		Underpasses
		Major Railway Grade Separation

AT-GRADE TRAIL CROSSINGS

EXISTING	PROPOSED	
		Crossing
		Secondary Railway Crossing

OTHER TRAIL NETWORK INFORMATION

- Lookout
- Trail Connection to Adjacent Municipality
- General Area where there is desire to have trail link developed in the long term.

TOWN INFORMATION

- Local Road
- Regional Road
- Public Transport Hub
- School
- Car Parks (Existing and Proposed)
- Railway

AURORA You're in good company

Ontario Ministry of Health Promotion

HS FINANCIAL SERVICES INC. 1-800-411-7979

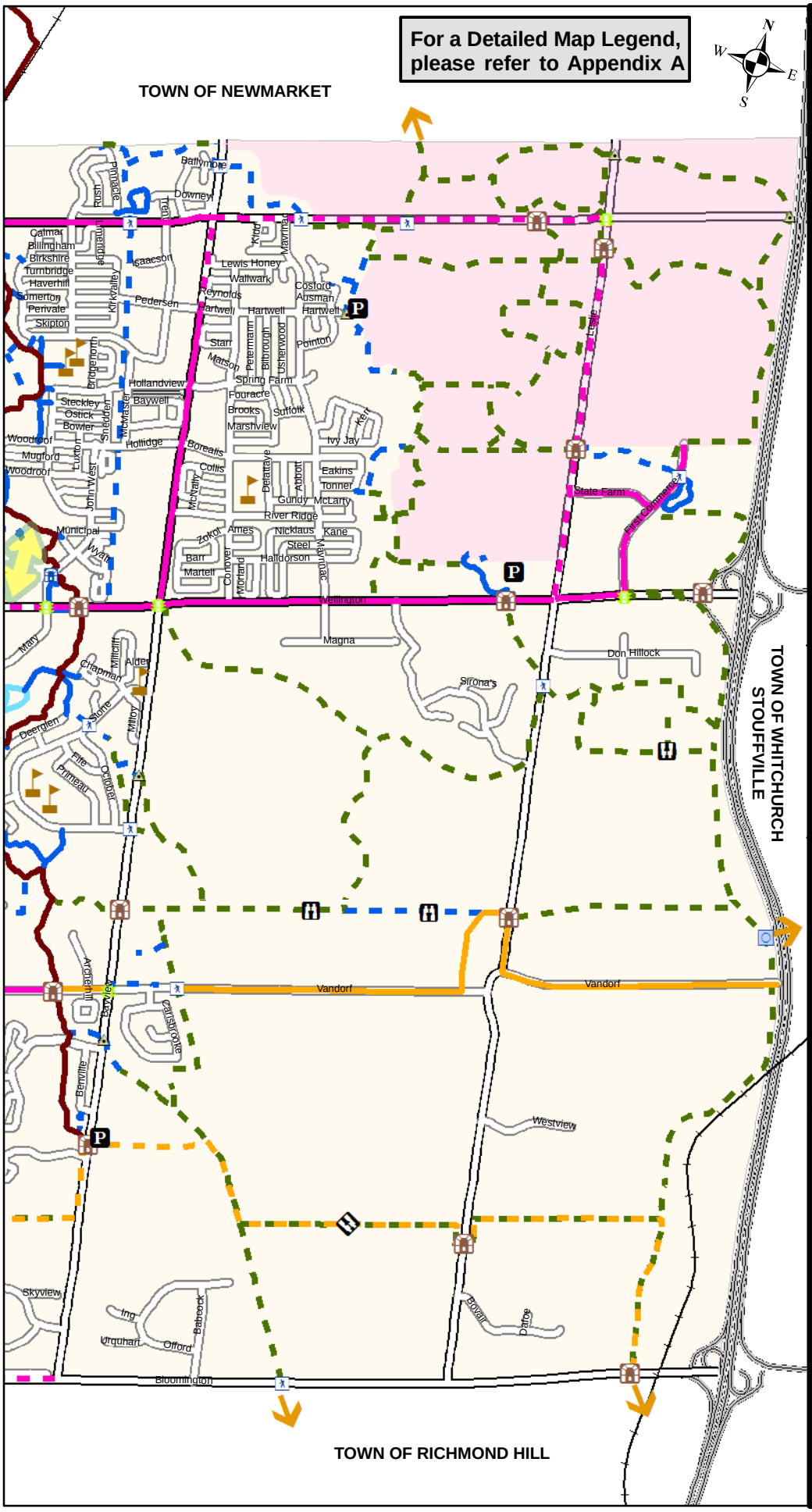
MMM GROUP

For a Detailed Map Legend, please refer to Appendix A

TOWN OF NEWMARKET

TOWNSHIP OF KING

TOWN OF RICHMOND HILL



4-6: DRAFT TRAIL ROUTE NETWORK by FACILITY TYPE - AURORA EAST

LEGEND

ROUTE + FACILITY TYPES

EXISTING	PROPOSED	
		Hard Surface Multi-Use Trail
		In Boulevard Multi-Use Trail / Bike Path (Hard Surface)
		Soft Surface Multi-Use Trail
N/A		Soft Surface Multi Use Trail (Preferred Municipal Trail alignment on Land Currently Under Private or other Public Ownership)
		Special Use Trail (Soft Surface)

NOKIIDAA / OAK RIDGES TRAIL ALIGNMENTS

- Nokiidaa Trail existing alignment (Generally soft surface)
- Nokiidaa Trail proposed alignment (Generally soft surface)
- Oak Ridges Moraine Trail existing alignment (Generally soft surface for off-road sections)
- Oak Ridges Moraine Trail preferred alignment (Generally soft surface for off-road sections)

GRADE SEPARATED TRAIL CROSSINGS

EXISTING	PROPOSED	
		Primary Crossing
		Secondary Crossing
		Underpasses
		Major Railway Grade Separation

AT-GRADE TRAIL CROSSINGS

EXISTING	PROPOSED	
		Crossing
		Secondary Railway Crossing

OTHER TRAIL NETWORK INFORMATION

- Lookout
- Trail Connection to Adjacent Municipality
- General Area where there is desire to have trail link developed in the long term.

TOWN INFORMATION

- Local Road
- Regional Road
- Highway
- Public Transport Hub
- School
- Car Parks (Existing and Proposed)
- Railway
- 2C Secondary Plan Area (Trail alignments to be finalized as part of the review and approval process for the 2C lands)

AURORA
You're in Good Company
Ontario
HS FINANCIAL SERVICES INC.
1-800-411-7979
MMM GROUP

Table 4-1 Summary of Network Lengths by Facility Type

	Hard Surface Multi-Use Trail	Soft Surface Multi-Use Trail	Special Use Trail	In-Road Boulevard Bike Path	Nokiidaa Trail	Oak Ridges Moraine Trail (ORTA)	**Totals**
Existing	0.7 km	21.9 km	7.2 km	9.2 km	6.7 km	11.7 km	**57.4 km**
Proposed	0 km	78.3 km	0 km	14.0 km	1.2 km	11.1 km	**104.6 km**
Totals	**0.7 km**	**100.2 km**	**7.2 km**	**23.2 km**	**7.9 km**	**22.8 km**	**162.0 km**

Notes
1. Trails are multi-use and intended for a wide range of users. Some user groups may not be accommodated on some trails (i.e. wheelchair users will not be accommodated on all Special Use trails, and bicycle users may be prohibited from using Special Use Trails).
2. The total length of the Oak Ridges Trail reflects the conversion of sections of the current route to the ultimate/preferred route as illustrated in Figures 4-3 to 4-6. It is assumed that the current sections of the Oak Ridges Trail that are replaced by the ultimate route would remain in place as part of the Town of Aurora network (i.e. they would not be decommissioned).

CHAPTER 5
TRAIL DESIGNER'S TOOLBOX

5.1 GUIDELINES TO PLAN, DESIGN AND CONSTRUCT TRAILS IN AURORA

A well-designed and properly maintained trail system is a critical part of the users' experience and enjoyment. For some users, the way a trail has been designed and maintained will significantly influence their decision to return and use that trail at a later date. Trails that have been thoughtfully designed and constructed also perform better over their lifespan, provide minimal impacts to the surrounding environment, are easier to maintain and may result in fewer concerns or issues of liability. The better the quality of the trail design and construction, the more attractive it will be to users, the more it will be used, and the longer it will be before requiring upgrades.

Trail users vary widely in terms of age and physical ability, and have a their own sense of what the trail experience should be, depending on the type of use they are interested in or what user group they consider themselves to be a part of. A "one size fits all" design approach does not apply to trails, and it is important to try and match the trail type and design with the type of experience that is desired. A recognizable and consistent high quality design will create a community asset where user experience, enjoyment and safety are maximized.

5.1.1 How to Use These Guidelines

The purpose of these guidelines is to assist trail planners, designers and managers in making informed decisions about trail design. The guidelines provide general information about trail users and their needs. Where appropriate, summary tables are provided to highlight recommended design treatments and/or considerations in addressing key features associated with various trail types.

A number of the individual guidelines contained in the Trail Designer's Toolbox provide an indication of "minimum" and "preferred" conditions or dimensions for proposed trail alignments and facilities.

"**Minimum recommended**" conditions typically reflect a situation that is at the lower end of the spectrum in terms of user level of service and an in some cases user safety. The minimum recommended condition may be considered a threshold that the design or condition should not fall below, and the minimum recommended condition may be considered in locations where anticipated use is very low, and/or significant constraints do not enable the provision of the preferred condition.

"**Preferred**" conditions or treatments reflect conditions that typically serve a broader range of uses and a greater number of trail users. Achieving the preferred condition or treatment may also provide a longer service life span.

The application of these guidelines in the development, implementation, and operation of individual sites will require specific consideration of a number of factors including public safety, local and/or provincial jurisdiction requirements, building codes and by-laws.

Where existing on and off-road trails and facilities are to be incorporated as part of the Aurora Trail system but do not meet the minimum recommended conditions described in these Guidelines, the following approach should be considered:

1. Examine the trail or route to identify any design issues, or areas that may be seen as a potential risk to trail users.

2. Assess whether the trail is reasonably capable of handling anticipated levels of use.

3. Set up a monitoring program to identify emerging problems.

4. If necessary, establish an upgrading program to addresses areas of risk and/or emerging problems, as this helps to create awareness and appreciation towards the issue(s), and determines ways in which they can be resolved so that at least the minimum recommended guidelines can be achieved over time.

Information included in these guidelines is based on currently accepted design practices in North America, and ongoing research and experience gained during the initial years of trail implementation. The guidelines are not intended to be prescriptive, rather should be treated as a reference to be consulted during the development and construction of the trail network. They are not meant to be inclusive of all design considerations for all locations, nor are they meant to replace "sound engineering judgment". These guidelines are not intended as detailed solutions to specific problem areas. A site-specific design exercise involving a detailed site inventory should be applied as part of the analysis to arrive at final decisions for any section of the trail. Therefore, care should be given in the strict application of these guidelines to all situations and location because it may limit the ability to implement a trail in a constrained corridor when an area specific design solution might be more appropriate.

Recommendation 5-1:	The trail design guidelines presented in Chapter 5 of the Aurora Trails Master Plan be adopted as the basis for trail design in the Town.
Recommendation 5-2:	That Town staff should be directed to remain current with best industry design practices.
Recommendation 5-3:	That area specific design solutions that are consistent with good engineering judgment should be considered, given that the strict application of the recommended trail design guidelines in the Trails Master Plan may not be appropriate for all situations and locations, and could also limit the ability to implement a trail in a constrained corridor.

5.2 TRAIL USERS AND NEEDS

When developing and applying guidelines, it is important to consider the characteristics and preferences of potential users. In Aurora, the potential user groups include pedestrians, cyclists, in-line skaters, users with mobility aids, all of which are self-propelled. The following sections briefly describe each of these user groups, how they tend to use the trails and some of the design parameters/needs that should be considered.

5.2.1 Pedestrians

Pedestrians can generally be divided into several sub categories:

- Walkers;
- Hikers; and
- Joggers and Runners.

Walkers

A study conducted by Environics International on behalf of Go for Green (1998) reported the following top five reasons for walking in Canada:

- Exercise / Health (62%);
- Pleasure (30%);
- Practicality / Convenience (24%);
- Environmental Concern (10%); and

- Saving money (9%)[1].

Because walking is such a basic activity and a freedom that is enjoyed by most people, guidelines that facilitate this activity must be established for all potential trail users. Planners and designers should also consider the needs of walkers with baby strollers or walking aids, carrying picnic baskets or other equipment, and walkers in pairs or in groups, such as a class of school children. Planners and designers need to be aware that potential users may have sensory, cognitive or ambulatory difficulties.

Walkers represent a wide range of interests and motives such as leisure, relaxation, socializing, exploring, making contact with nature, meditation, fitness, or dog walking. It is also important to consider pedestrians who walk for utilitarian or transportation purposes. This group tends to be more urban-focused, with trips focusing on shopping and errands and walking to work and school. In addition to using sidewalks, parking lots and urban plazas, the utilitarian walker will use trails where they are convenient, well designed and properly maintained. In many cases trails may provide a convenient "short cut" to traveling the sidewalk network to get to their destination. This group may represent a significant portion of trail users in the urban areas of Aurora. Where no sidewalks are provided and there are no road shoulders, the Ontario Highway Traffic Act allows pedestrians to walk on the edge of the roadway, facing oncoming traffic[2].

Hikers

Hikers are often considered more of the elite of the recreational walking group and may challenge themselves to cover long distances and be willing to walk on sections of rural roadway shoulder considered less safe or less interesting by the majority of leisure walkers. Trail planners should assume that there will be keen pedestrian users, even in remote or highway environments, despite the fact that the frequency may be very low. Some of the characteristics of this group include:

- Day trips that may range between 5 and 30 km in length;
- They may be more keenly interested in natural features;
- They are often more adept at map reading;
- Are more self sufficient than leisure walkers;
- May expect fewer amenities; and
- Are often attracted to challenging terrain and rural areas.

Runners and Joggers

Although the motive for runners and joggers is primarily fitness and exercise, they may share more in terms of profile characteristics with distance hikers than they do with leisure walkers. They tend to be accomplishment oriented and often enjoy the trails at higher speed and over distances between 3 and 15 km or more. They will

---

1 Go for Green, and Environics. Rep. 1998. Print.

2 Ministry of Transportation. *Ontario Highway Traffic Act*. Rep. 1990. Print.

often avoid hard surfaces such as asphalt and concrete and prefer to run on granular, natural (earth) and turf surfaces as they provide more cushioning effect.

5.2.2 Cyclists

Recreational cyclists would be considered to have the similar motives as leisure or fitness walkers. The mechanical efficiency of bicycles allows users of all ages to significantly increase their travel speed and distance, often allowing them to experience much more countryside by cycling rather than walking.

Some bicycles, including the "mountain" or "hybrid", can travel easily over stonedust and gravel surfaces, whereas traditional narrow-tired touring and racing bicycles require well compacted granular surfaces or asphalt pavement. Distances covered vary widely from a few kilometers to well over 100, depending on the fitness level and motivation of the individual cyclist. Although cyclists have the right to access the extensive existing public roadway system, with the exception of the 400-series and major highways, many inexperienced cyclists feel unsafe sharing the road with automobiles. Some do not have the desire or skill level to ride in traffic. Off-road trails, shared with pedestrians, can offer recreational and commuter cyclists a more secure environment to enjoy the use of their bicycles. Those that travel the longer distances are more likely to focus a significant portion of their route on the roadway network, and often seek out quieter, scenic routes over busier roads.

When using roads, cyclists generally travel 0.5-1.0 m from the curb or other obstruction because of the possibility of accumulated debris, uneven longitudinal joints, catch basins, or concern over hitting a pedal on the curb or handlebar on vertical obstacles. However, when cyclists use or cross a public roadway they are considered vehicles by law and are expected to follow the same traffic laws as motorized vehicles.3

Although the average travel speed for a cyclist on a trail is in the range of 15-20 km/hr and on a road 18-30 km/hr, speeds in excess of 50 km/hr can be attained on descents on roads and some hard surface trails. Speed limits and warnings should be posted along the trail to discourage fast riding and aggressive behaviour. Cyclists other than young children should be discouraged from cycling on sidewalks because of potential conflicts with pedestrians and dangerous conditions resulting from driveways and intersections. Many municipalities have prohibited sidewalk cycling through by-laws.

5.2.3 In-Line Skaters, Skateboarders and Non-Motorized Scooter Users

In-line skating, skateboarding and the use of non-motorized scooters are becoming increasingly popular among all age groups, particularly in urban areas. Although in-line skaters may have more in common with cyclists than pedestrians when considering travel motive and speed, they are not considered "vehicles" by the Ministry of Transportation for Ontario (MTO). Some municipalities have responded on an individual basis to the question of where to allow in-line skaters to travel through by-laws. No obvious solutions have emerged, and no standards have been widely adopted. In some municipalities, in-line skaters, skateboarders and scooter users have been

---

[3] Region of Hamilton-Wentworth Transportation, Operations & Environment Division. *Shifting Gears: A New Cycling Plan for Hamilton-Wentworth*. Rep. Hamilton-Wentworth, December 1999. Print

prohibited from using either roadways or sidewalks by local by-laws. Consequently, they are avid users of hard-surface off-road facilities and may travel some distance to reach a facility that suits their needs.

This user group prefers a very smooth, hard surface, and loose sand, gravel, twigs, branches, fallen leaves and puddles can be significant hazards. Though skateboarders and scooter users can quickly become pedestrians by dismounting, they too are vulnerable to the effect of grades (both up and downhill) and require ample maneuvering space. An inability to come quickly to a complete stop can be a significant concern for all but the most experienced users in this group. Long or steep hills with limited visibility may be viewed as either challenging or terrifying depending on an individual's level of experience.

Recommendation 5-4:	That the characteristics and preferences of trail user groups be accommodated in the application of the recommended trail design guidelines for each trail and be context sensitive to the location and type of trail planned.

5.3 GENERAL DESIGN PARAMETERS

Careful consideration should be given to the physical, aesthetic and environmental requirements for each trail type. In many instances physical design criteria related to operating space, design speed, alignment and clear zones are often governed by the needs of the fastest, most common user group on the majority of the trails, that being the cyclist. Therefore, many of the physical design criteria outlined in the following sections are recommended in relation to cycling. This is not to say that all trails should be designed to meet the requirements for cyclists, however when multi-use trails are being designed it is prudent to use parameters for the cyclist. When considering single or specialty uses where part of the trail experience involves maneuvering through challenging conditions, such as BMX or freestyle biking, the parameters outlined below may not apply. In these instances designers should consult directly with the user group and/or design manuals that are specific for that use.

Trail user operating space is a measurement of the horizontal space that the user requires. In the case of in-line skating and cycling, the space includes room required for side to side body motion used to maintain balance and generate momentum. **Table 5.1** outlines minimum and preferred operating space for different uses.

Table 5.1 Trail User Operating Space

Operating Condition by Trail User Type	Minimum (metres)	Preferred (metres)
One way travel (one wheelchair user)	1.2	1.5
One way travel (two pedestrians)	1.5	2.0
One way travel (one cyclist)	1.2 (in constrained locations)	1.5+
One way travel (one in-line skater)	2.3	3.0
Two way travel (two cyclists)	3.0	3.0+
Two way travel (two wheelchair users)	3.0	3.0+

Recommendation 5-5: That the Town adopts the minimum and preferred trail user operating space widths identified in Table 5.1 of the Trails Master Plan.

Roads are designed to accommodate vehicles that move at a significantly higher rate of speed than bicycles, therefore it is assumed that horizontal alignment of on-road routes will be ample to accommodate cyclists and other trail users.

Sight stopping distance is defined as the distance required for a trail user to come to a full controlled stop upon spotting an obstacle. It is a function of the user's perception and reaction time. Once again, stopping sight distances for off-road trails are typically governed by the distance required for cyclists since pedestrians and other trail users (with the exception of in-line skaters) can typically stop more immediately than cyclists, regardless of the trail configuration. In terms of in-line skaters however, no definitive data currently exists concerning stopping distance, the experiences and observations of in-line skaters, representatives and manufacturers corroborate that a proficient in-line skater travelling near the same speed as a bicycle can stop in a distance equal to or less than that of a cyclist. Therefore, basing stopping distance on the distance required for a cyclist should accommodate all other expected self propelled trail users including in-line skaters.

5.4 ACCESSIBILITY

Approximately one in eight Canadians suffer from some type of physical disability. Mobility, agility, and pain-related disabilities are by far the most common types, each accounting for approximately 10% of reported disabilities nationally[4]. Disability increases with age: from 3.3% among children, to 9.9% among working-age adults (15 to 64), and 31.2% among seniors 65 to 74 years of age. Disability rates are highest among older seniors (75 and over), with fully 53.3% in this age group reporting a disability.

The Accessibility for Ontarians with Disabilities Act (ODA) states that "The people of Ontario support the right of persons of all ages with disabilities to enjoy equal opportunity and to participate fully in the life of the province."[5] Within the ODA, Bills 118 and proposed Bill 125 recognize the need to provide for accessibility standards, improve opportunities and facilitate the removal of barriers in order to enable persons with disabilities to fully participate in the life of the province[6].

Universal Trail Design is a concept that takes into consideration the abilities, needs, and interests of the widest range of possible users. In regards to trail design, it means planning and developing a range of facilities that can be experienced by a variety of users of all abilities.

Principles of universal trail design can be summarized as follows:

- Equitable use: provide opportunity for trail users to access, share and experience the same sections of trail rather than providing separate facilities;
- Flexibility in use: provide different options for trail users in order to accommodate a variety of experiences and allow choice;
- Simple, intuitive and perceptible information: whether conveying trail information through signage, maps or a web site, communicate using simple, straightforward forms and formats with easy to understand graphics and/or text;
- Tolerance for error: design trails and information systems so as to minimize exposure to hazards, and indicate to users any potential risks or challenges that may be encountered;
- Low physical effort: trails may provide for challenge but should not exceed the abilities of the intended users; where appropriate, rest areas should be provided; and
- Size and space for approach and use: trails and amenities should provide for easy access, comfort and ease in their usage.

---

4 Canada. Canadian Social Research Links. *Social Development Canada*. Web. Spring 2010. <http://www.canadiansocialresearch.net/index.htm>.

5 Canada. Province of Ontario. Minitry of Community and Social Services. *Accessibility for Ontarians with Disabilities Act*. By Ministry of Community and Social Services. 2005. Web. Spring 2010. <http://www.mcss.gov.on.ca/en/mcss/programs/accessibility/OntarioAccessibilityLaws/2005/index.aspx>.

6 Ontarians with Disabilities Act - Bill 118 and 125, 2001

Ontario's Best Trails – Draft (2006)[7] provides an in depth discussion of the application of Universal Design principles and their application.

Where possible and practical, trails should be designed to be accessible to all levels of ability. It must be recognized however, that not all trails throughout the system can be fully accessible. Steep slopes are one of the most significant barriers for those with physical disabilities. Designing trails to be within the threshold (5%) for universal access will not only overcome this significant barrier but it will help to reduce the potential for erosion of the trail surface. The following are some additional considerations for making existing and new trails accessible:

- Designers should consult the most current standards available;
- Where the trail requires an accessibility solution that is above and beyond what is normally encountered, a representative of the local accessibility advisory committee should be consulted early on in the process to determine if it is practical and desirable to design the specific trail to be fully accessible;
- Where it has been determined that full accessibility is appropriate, the accessibility representative should be consulted during the detailed design process to ensure that the design is appropriate; and
- Work collaboratively with the local accessibility advisory committee to consider developing signage/content to clearly indicate trail accessibility conditions, which allow users with mobility-assisted devices to make an informed decision about using a particular trail prior to travelling on it.

Recommendation 5-6:	Where practical, new multi-use spine trails should be designed to be wheelchair accessible and that existing and new trails be signed to indicate whether they are wheelchair accessible.

5.5 PERSONAL SECURITY

To the extent possible, trails should be designed to allow users to feel comfortable, safe, and secure. Although personal safety can be an issue for all, women, the elderly and children, are among the most vulnerable groups. Principles of Crime Prevention Through Environmental Design (CPTED) should be considered and applied to help address security issues concerning trail use, particularly in locations where trails are infrequently used, isolated or in areas where security problems have occurred in the past.

---

[7] *Accessibility News*. Trails for All Ontarians Collaborative (TAOC), 2006. Web. Spring 2010. <http://www.accessibilitynews.ca/cwdo/resources/resources.php?resources=72>.

The four main underlying principles of CPTED are:

- Natural Access Control: deters access to a target and creates a perception of risk to the offender;
- Natural Surveillance: the placement of physical features and/or activities that provides for natural visibility or observation;
- Territorial Reinforcement: defines clear borders of controlled space from public to semi-private to private, so that users of an area develop a sense of proprietorship over it; and
- Maintenance: allows for the continued use of space for its intended purpose[8].

Some specific design considerations that have been employed by others such as the City of Toronto Safe City Committee and Planning Department have identified include:

- Good visibility by others by having routes pass through well-used public spaces;
- Provide the ability to find and obtain help: Signage that tells users where they are along the trail system;
- Provide "escape" routes from isolated areas at regular intervals;
- Maintain sight lines and sight distances that are appropriately open to allow good visibility by users;
- Provide trailhead parking in highly visible areas;
- Minimize routing close to features that create hiding places such as breaks in building facades, stairwells, dense shrubs and fences;
- Design underpasses and bridges so that users can see the end of the feature as well as the area beyond; and
- Signs near entrances to isolated areas can be used to inform users that the area is isolated and suggest alternative routes.

Recommendation 5-7:	That the Town of Aurora has regard to the principles of Crime Prevention Through Environmental Design (CPTED) when designing new trails or improving existing trails.

[8] Crowe, Timothy D. "Crime Prevention Through Environmental Design." *CPTED Ontario Home Page*. CPTED Ontario, 2002. Web. 30 Sept. 2010. <http://www.cptedontario.ca/>.

5.6 TRAIL LIGHTING

Lighting of Aurora trails must be carefully considered. Very few municipalities make the decision to light their entire trail system for a number of important reasons, including:

- The cost of initial installation can be prohibitive. Some general budget figures reported exceed $40,000 per kilometer not including power supply;
- Staff time and material cost to properly monitor, maintain lamp fixtures and replace broken and burned out bulbs on an ongoing basis;
- A tendency for vandals to target light bulbs;
- Energy consumption;
- Excessive light pollution, especially in residential rear yards and adjacent to natural areas (though this can be controlled with proper shielding);
- Potential detrimental effects on flora and fauna, especially with light pollution in natural areas such as woodlots;
- The potentially false sense of personal security created by lighting in the nighttime environment; and
- Inability of the human eye to adapt to the high contrast resulting from brightly lit and dark shadowed areas adjacent one another.

Lighting the entire trail system is not recommended, however there may be some locations where attractions and facilities such as major parks or heavily used routes to major destinations where lighting might extend the hours of use and enjoyment by the community and visitors. The decision to light or not, should be made on a site specific basis, and where it has been determined that lighting is appropriate, the quality and intensity of lighting should be consistent with prevailing standards for the setting being considered.

5.7 TRAIL TYPES

5.7.1 Multi-use Trails

Main **multi-use trails** are typically designed to accommodate the widest spectrum of users. A variety of materials may be selected to surface a multi-use trail. **Table 5.2** provides recommended guidelines for trail width and surface treatments for Major and Minor trails according to location type throughout Aurora. **Spine or main trails** are wider, typically have a granular surface (i.e. limestone screenings) and may have an asphalt surface where warranted in places of high trail use or areas of high erosion. **Local Neighbourhood or secondary trails** are generally narrow and follow the topography more closely than main trails. Intended trail uses should be considered when selecting trail surface as some surfaces tend to exclude certain uses.

Table 5.2 Trail Hierarchy

	Trail Hierarchy	
Trail Location	**Spine Trail Network**	**Local Neighbourhood Trails / Special Use Trails**
	Recommended/Preferred Guideline*	**Recommended/Preferred Guideline***
Major Town Wide Destination (i.e. Major Town Park, Community Centre , Civic complex, trails in utility / linear green corridors)	3.0-3.5m wide, to accommodate small wheeled users and urban rail trails where they pass through core areas and major town wide destinations. Generally granular surface. Hard surfaces will be used for in-boulevard multi-use trails, trails where erosion in an ongoing problem or for locations where a wide range of uses (i.e. small wheeled uses) are intended. Consider width and turning radii of service access vehicles when designing trails in utility corridors	2.4-3.0m wide granular surface Hard surfaces will be used for in-boulevard multi-use trails, trails where erosion in an ongoing problem or for locations where a wide range of uses (i.e. small wheeled uses) are intended.
Minor Town Parks, stormwater management areas with trails	2.4-3.0m wide granular surfaced Hard surfaces will be used for in-boulevard multi-use trails, trails where erosion in an ongoing problem or for locations where a wide range of uses (i.e. small wheeled uses) are intended.	2.4m wide granular surface Hard surfaces will be used where erosion in an ongoing problem.

Table 5.2 Trail Hierarchy

Trail Location	Trail Hierarchy	
	Spine Trail Network	Local Neighbourhood Trails / Special Use Trails
	Recommended/Preferred Guideline*	Recommended/Preferred Guideline*
Natural Area Buffers, Rural Areas,	2.4m wide granular surface Trail hardening for maintenance concerns only – use soil bonding agents.	1.5m wide granular surface Trail hardening for maintenance concerns only-use soil bonding agents.
Woodlots and Conservation Areas (urban and rural areas)	2.4m wide granular or woodchip surface	0.5 – 1.5m wide woodchip surface May be granular (compacted stonedust/limestone screenings) or smooth earth surface where disabled access is desired.
Wetlands: includes Treed Swamps, Marshes, Shrub Thickets/ Meadow Marshes, Marshes (urban and rural areas)	Width and surface type to be considered in the context of site conditions	Width and surface type to be considered in the context of site conditions

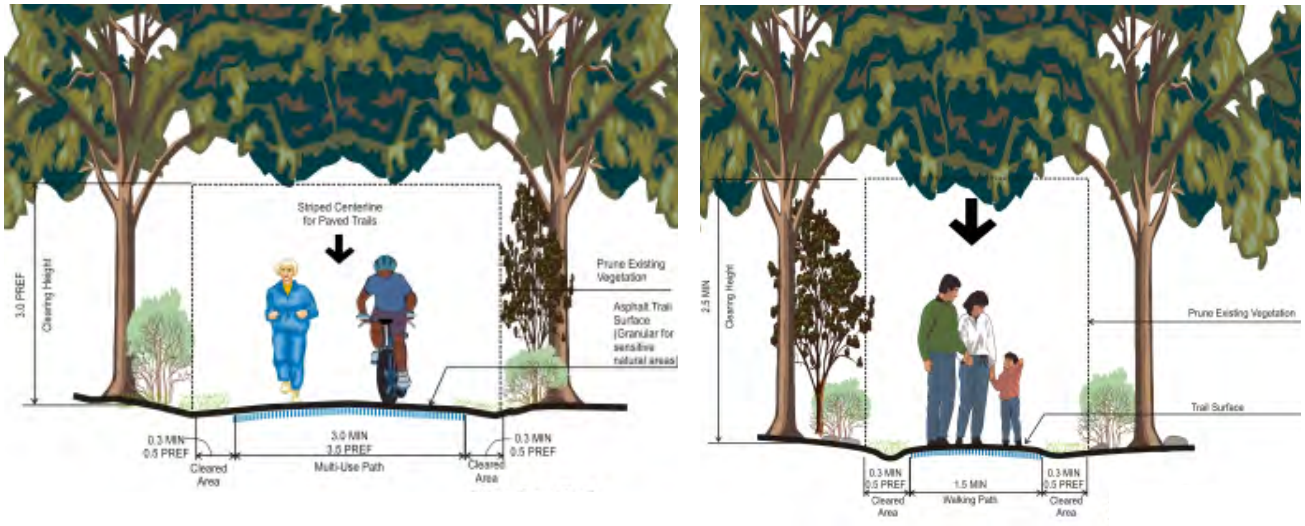
* = Standards are to be achieved where possible. Some variation from standard width and surface type will be applied on a site by site basis when considering local environmental constraints and/or access needs for people using mobility devices.

Minimum trail corridor widths will vary based on the location of the trails and whether it is located in a constrained linear corridor or a wildlife corridor.

- Where trails are to be located within designated wildlife corridors, a minimum 20m corridor width will be provided, which includes the trail and trail clear zone as well as a suitable buffer from the wildlife passage area in the corridor.
- Trails links between residential or commercial lots that connect to the trail system should be designed with a minimum 6.0m corridor width and a minimum 3.0m trail in the centre of the corridor. If the trail link is to include a row of trees along each side of the corridor, the corridor width should be increased to 12.0m.
- Walkway connecting links that consist of a 2.0m concrete sidewalk are to be located in a minimum 6.0m corridor.

In some areas, where trail use is high and adequate space exists, it may be appropriate to provide physically separated but parallel trails within the same corridor to create opportunities for faster traveling users as well as slower travelling users (e.g. cyclists and pedestrians). Where this design treatment is appropriate, separation of the two trails can be created by distance, grade, or planted buffers, the trail surface may be different, as an example one may be asphalt or a granular surface trail. Signs to identify permitted uses for each trail should be used to communicate the intent of the separated system. A utility corridor is one example of the type of location where a separated trail may be feasible and appropriate.

Recommended Guideline 5-8:	A trail corridor will be a minimum of 12.0m in width to facilitate trail construction, buffer plantings and other constraints that may affect its implementation.
Recommended Guideline 5-9:	In designated open space, wildlife and trail corridors, a minimum 20m corridor width be provided that includes the trail and trail clear zone as well as a suitable buffer from the wildlife passage area in the corridor.
Recommended Guideline 5-10:	Trail links between residential or commercial lots that connect to the trail system will be designed with a minimum corridor width of 6.0m to accommodate a 3.0m wide trail in the centre of the corridor. If the trail link is to include a row of trees along each side of the corridor, the corridor width will be increased to 12.0m.



Examples of a Multi-Use Trail section – Typical Corridor Width of 12.0 m

There are a number of options for trail surface materials, each with advantages and disadvantages related to cost, availability, ease of installation, lifespan and compatibility with various trail users groups. **Table 5.3** provides a summary of the most commonly used trail surfacing materials along with some advantages and disadvantages of each. There is no one trail surface material that is appropriate in all locations, and material selection during the design stage must be considered in the context of the anticipated users and location. Asphalt is the most commonly used hard surface and Stonedust / "Screenings" is likely the most widely accepted granular surface.

Appendix C provides details for the construction of trails according to the recommended trail hierarchy.

Table 5.3 Comparison of Trail Surfacing Materials

Type	Advantages	Disadvantages
Concrete	Smooth surface, can be designed with a variety of textures and colours, providing flexibility for different urban design treatments. Long lasting, easy to maintain.	High cost to install. Requires expansion joints which can create discomfort for users with mobility aids. Must be installed by skilled trades people. Is not flexible and cracking can lead to heaving and shifting, sometimes creating large step joints.

Table 5.3 Comparison of Trail Surfacing Materials

Type	Advantages	Disadvantages
Asphalt	Smooth surface, moulds well to surrounding grades, and is easily negotiated by a wide range of trail user groups. Relatively easy to install by skilled trades. Patterned and coloured surface treatments are available; however patterning in surface may be difficult for some user groups to negotiate.	Moderate-high cost to install. Must be installed by skilled trades people. Has a lifespan of 15-20 years depending on the quality of the initial installation. Poor base preparation can lead to significant reduction in lifespan. Cracking and "alligatoring" occurs near the edges, grass and weeds can invade cracks and speed up deterioration. Must be appropriately disposed of after removal.
Granulars	Pit Run: Mixed granular material "straight from the pit" containing a range of particle sizes from sand to cobbles. Excellent for creating a strong sub base, relatively inexpensive.	Not appropriate for trail surfacing.
	'B' Gravel: Similar characteristics to Pit Run with regulated particle size (more coarse than 'A' Gravel). Excellent for creating strong, stable and well drained sub bases and bases. Relatively inexpensive.	Not appropriate for trail surfacing.
	'A' Gravel: Similar characteristics to 'B' Gravel, with smaller maximum particle size. Excellent for trail bases, may be appropriate for trail surfacing of in rural areas and woodlots. Easy to spread and regrade where surface deformities develop.	Subject to erosion on slopes. Some users have difficulty negotiating surface due to range in particle size and uneven sorting of particles that can take place over time with surface drainage.

Table 5.3 Comparison of Trail Surfacing Materials

Type	Advantages	Disadvantages
Granulars	Clear stone: Crushed and washed granular, particles of uniform size, no sand or fine particles included. Excellent bedding for trail drainage structures and retaining wall backfilling, if properly leveled and compacted, makes an excellent base for asphalt trails. Recycled Crushed Concrete: Concrete from curbs and sidewalks that have been demolished can be crushed to meet specifications for recycled concrete. When properly compacted it creates an excellent base for hard surfaced trails.	Not appropriate for trail surfacing.
	Stone fines (Screenings): Mixture of fine particles and small diameter crushed stone. Levels and compacts very well and creates a smooth surface that most trail users can negotiate easily. Easy to spread and regrade where surface deformities develop. Inexpensive and easy to work with. Widely used and accepted as the surface of choice for most granular surfaced trails.	Subject to erosion on slopes Wheelchair users have reported that stone shards picked up by wheels can be hard on hands. May not be suitable as a base for hard surfaced trails in some locations.

Table 5.3 Comparison of Trail Surfacing Materials

Type	Advantages	Disadvantages
Mulches and Wood Chips	Bark or wood chips, particle size ranges from fine to coarse depending on product selected, soft under foot, very natural appearance that is aesthetically appropriate for woodlot and natural area settings. Some user groups have difficulty negotiating the softer surface, therefore this surface can be used to discourage some uses such as cycling. May be available at a very low cost depending on source, and easy to work with.	Breaks down over time, therefore requires "topping up". Source of material must be carefully researched to avoid unintentional importation of invasive species (plants and insects).
Earth/Natural Surface	Native soils existing in situ. Only cost is labour to clear and grub out vegetation and regrade to create appropriate surface. Appropriate for trails in natural areas provided that desired grades can be achieved and that soil is stable (avoid organic soils).	Subject to erosion on slopes. Different characteristics in different locations along the trail can lead to soft spots. Some user groups will have difficulty negotiating surface.
Soil Cement, and soil binding agents	Soil Cement (a mixture of Portland Cement and native/parent trail material). When mixed and sets it creates a stable surface that can be useful for "trail hardening" on slopes, particularly in natural settings. Soil Binding Agents (a mix of granulars and polymers that create a solid, yet flexible surface that may be appropriate for "trail hardening" on slopes in natural areas). Limits volume and weight of materials to be hauled into remote locations.	Useful for specific locations only. Soil binding agents tend to be expensive and have been met with mixed success.

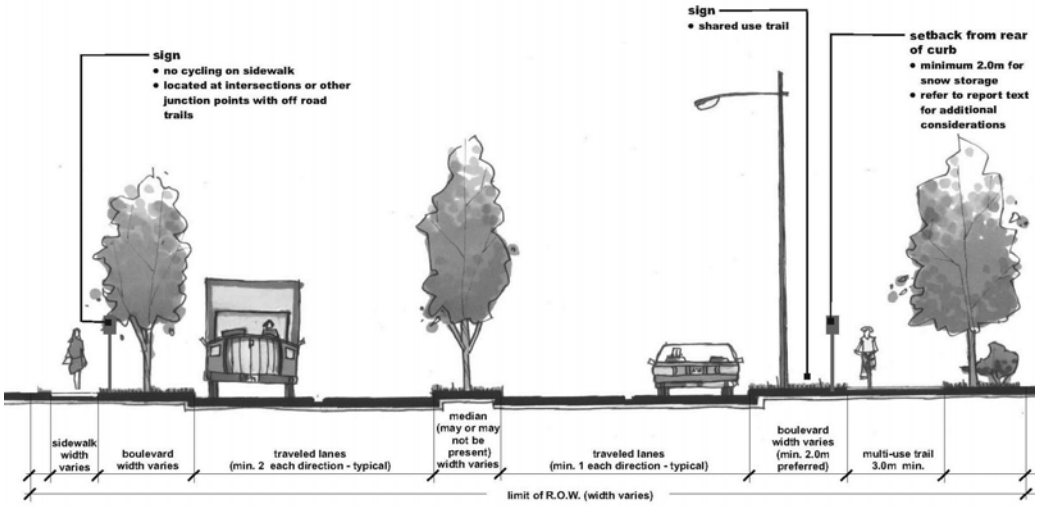
Table 5.3 Comparison of Trail Surfacing Materials

Type	Advantages	Disadvantages
Wood (i.e. bridges and boardwalks)	Attractive, natural, renewable material that creates a solid and level travel surface. Choose rough sawn materials for deck surfacing for added traction.	Requires skill to install, particularly with the substructure. Gradually decomposes over time, this can be accelerated in damp and shady locations, and where wood is in contact with soil. Expensive to install.

Recommended Guideline 5-11: That the Town of Aurora's multi-use spine trail system in parks and linear corridors be designed with a trail width of 3.0m. In constrained corridors the trail width should not be less than 2.4m for a multi-use trail.

Recommended Guideline 5-12: That the Town's multi-use spine trail system continue to be designed and constructed with a granular surface. However, that trail segments in parks or in areas where erosion is a concern may have an asphalt or concrete surface as a maintenance design solution or to accommodate a wider range of users.

5.7.2 Boulevard Multi-use Trails



An Example of a Boulevard Multi-use Trail Cross Section

A boulevard multi-use trail can be used where the characteristics of the boulevard are suitable. Intersections, including driveways and intersecting roadways are a potential conflict point. Intersecting roadways are a particular concern as motor vehicles making right hand turns may not be anticipating the speed at which some users of the boulevard multi-use trail may be traveling (i.e. cyclists and in-line skaters). Therefore, the boulevard multi-use trail has limited application. The following are some general roadway characteristics where the application of a boulevard trail may be considered:

- Urban arterial, collector or rural roads where there is ample right of way between the edge of the road (curb for urban cross section and shoulder for rural cross section) and the limit of the right of way to maintain a minimum separation between the road and the trail;
- Routes that provide connections between important destinations or links between off-road trails where no parallel route(s) exist nearby;
- Routes that are intended to provide short connections between long off-road trail segments (i.e. 4 – 6 blocks or less where other alternatives are not available); and
- Along corridors where there are limited commercial or residential driveway cros. The following guideline thresholds have been applied in several other municipalities and are suggested for Aurora.

Table 5.4 Driveway crossings thresholds for Boulevard Multi-use Trails

Number of Driveway Crossings / Intersections Per km	Guideline Recommendation for Boulevard Multi-use Trail
0-3	An ideal application for boulevard multi-use trail.
4-10	Consider applying on-road paved shoulders or bike lanes, where other conditions noted above can't be met.
>10	Boulevard trail not recommended. Pedestrian trail users should be directed to follow sidewalks, bicycle lanes should be installed on-road for cyclists.

Recommended Guideline 5-13: When implementing Boulevard Multi-use Trails, utilize the following design elements:

- A setback from the curb is required to provide space for snow storage, to provide an adequate clear zone from site furniture and utility poles and in some cases street tree plantings. Where street tree plantings are included, the preferred setback is 3.0-4.5 m from the curb. Where no trees are included and vehicle speed is 60 km/hr or less, the preferred setback can be reduced to 2.0 m;
- The setback should be achieved throughout the length of the route with the exception of intersections where the trail will cross with a formal pedestrian crossing;
- That signing in advance of, and at roadway intersections, to inform cyclists to stop, dismount and walk across intersections as required by the Highway Traffic Act, or a suitable crossing design to permit cyclists to legally ride through intersections after stopping but without dismounting;
- Stop or yield signs (decision on a site-by-site basis) at driveways, depending on the number of driveways and the distance between each;
- A treatment at road intersections (i.e. swing gate) to separate "lanes of traffic" in each direction. The treatment must be spaced adequately to allow for the passage of bicycles with trailers;
- Open sight lines at intersections with driveways and roadways;
- A centre yellow line be considered for hard surface trails to separate directions of travel and to guide riders overtaking pedestrians and slower moving riders; and
- Curb ramps at driveways and roadway intersections where trails intersect.

When new roads are being built or existing roads are being reconstructed, the alignment of the centre line of the road within the right-of-way should be examined where the Trails Master Plan recommends an off-road connection. For example, when a road is being reconstructed from a two lane rural to a three or four lane urban cross section and the potential for a boulevard trail has been identified, an offset road centreline within the road right-of-way can provide additional boulevard space on one side. This will provide more space for the development of the boulevard trail and/or increased separation distance between the road and the trail. Where boulevard trails are implemented on one or both sides of a road, it is reasonable to assume that they can perform the same function as the sidewalk, therefore it is not necessary to install both a trail and sidewalk on the

same side of the road. The boulevard trail should be clearly signed (i.e. trail and shared use signage) so that users are aware that the segment is multi-use and not pedestrian only.

Boulevard Multi-use Examples

Where boulevard trails are provided as multi-use primary or secondary trail connections, some cyclists may still prefer to, and have the legal right to, cycle on the road. The addition of bicycle lanes or cycle tracks should be evaluated during the design stage for new roads and upgrading of existing roads even where boulevard trails are provided. Where it is not appropriate or feasible to include bicycle lanes, consideration should be given to providing a wide curb lane to accommodate cyclists, along with other improvements to make the street more bicycle friendly (e.g. bicycle friendly catch basin covers and sharrow pavement parkings).

5.7.3 On-road Connections

One of the objectives of the Aurora Trails Master Plan is to develop a trail network that is off-road wherever possible, recognizing that in some cases an off-road alignment is not possible even in the long term. Where public land (other than the road right-of-way) is not available and access agreements for trails on private lands

are not feasible, it is necessary to provide connecting links using the road network. Where this is the case, pedestrians and other small-wheeled users (strollers, in-line skaters, users with mobility-assisted devices etc.) are expected to use sidewalks in urban areas and road shoulder in rural areas, whereas cyclists are expected to use the road. Bicycles are designated as a vehicle under the Highway Traffic Act (HTA) and as such are required to obey all of the same rules and regulations as automobiles when being operated on a public roadway. The Ministry of Transportation (MTO) and the Transportation Association of Canada (TAC) have developed standards for the design of on-road facilities and signing for on-road-bike system. In Aurora, a number of options exist for on-road cycling routes including bicycle lanes, paved shoulders, wide curb or shared lanes and signed routes. In addition to the commonly encountered situations to which relatively simple guidelines can be applied, there are often situations where the proper design requires a bicycle system design specialist who is familiar with not only the common guidelines, but also with innovative techniques that have been successfully applied elsewhere.

Signed Routes

Signed routes are typically found along roads where traffic volumes and vehicle speeds are low. Typical of quieter residential streets (low volume and low speed) and urban areas (higher volume and low speed), cyclists can share the road with motor vehicles and there is no need to create a designated space for cyclists. Signs located at intersections and at regular intervals in rural areas help trail users find their way. Along signed routes where the street is very narrow, “share the road” signs can also be erected to encourage cooperative behaviour between cyclists and motorists. In some areas, particularly urban residential neighbourhoods, traffic calming techniques such as through travel restrictions for cars, traffic circles and reduction in the number of stops signs can be used to create “bicycle priority streets” which allow the cyclist to travel more efficiently by not having to stop at frequently placed four way stops.

Shared Use Lanes

Wide shared use lanes, sometimes also referred to as wide curb lanes are used on roads where vehicle speeds or traffic volumes are higher than those associated with signed routes (e.g. arterial and collector roads). Where necessary or desirable, the shared use arrow or “Sharrow” can be painted on the road at regular intervals to inform road users to expect cyclists, and to assist the cyclist in understanding the preferred location to travel.

Paved Shoulders

Paved shoulders provide a space for cyclists on rural cross-section roads (with shoulders, no curb and gutter). Pedestrians can use paved or granular shoulders where necessary (traveling in a direction facing traffic). Paved shoulders are typically recommended on rural cross section roads where traffic volume and speed are high. Roads with poor sight lines and high truck volumes are additional situations where paved shoulders should be considered.

Bike Lanes

Bike lanes are typically located on urban cross-section roads (with curb and gutter) to create a physical space reserved for cyclists. In many municipalities, persons who use mobility-assisted devices also use this space. The diamond symbol and bicycle symbol painted on the pavement, in addition to roadside signs are useful on higher volume and higher traffic roadways. In areas where on-street parking is permitted, continuing the bike lane is the ideal method where space permits. Where road right-of-way widths are limited, where narrowing or removing traffic lanes is not feasible, and/or where the relocation or removal of parking is not an option, the bike lane must be properly terminated, which includes proper signage. The Bikeway Traffic Control Guidelines for Canada (Transportation Association of Canada 1998), should be consulted for additional details and specifications.

Recommended Guideline 5-14: Relative to on-road cycling and the integration of that mode of active transportation into the off-road oriented trails network, the Town of Aurora should:

- Prepare a Transportation Master Plan, and that it be integrated with the Town's Trails Master Plan and the Region of York's Pedestrian and Cycling Master Plan; and
- Establish a set of cycling facility design guidelines as part of such a Cycling Master Plan

5.8 TRAIL CROSSINGS

A significant challenge when implementing a trail system is how to accommodate trail users when crossing roads. In the case of arterial and busier collector roads, options generally include:

- Grade separated crossings (bridges and underpasses including both shared and pedestrian/trail only facilities);
- Directing users to cross at an existing signalized or stop-controlled intersection;
- Utilizing a mid-block pedestrian signal or Intersection Pedestrian Signal (IPS); and
- At a mid block location with a pedestrian island or refuge.

The implementation of a grade separated trail crossing typically requires multi-agency/government approvals and a detailed design feasibity and cost assessment. Timing is an important factor to consider, and implementing a grade separation can be most efficiently accomplished as part of the redesign and reconstruction of a road. Coordination of timing improves the opportunity for a grade-separated crossing to be seamlessly integrated into the road design which can also result in cost-savings if implemented as part of a larger project. Missing the opportunity to consider a grade-separated crossing at the time of redesign and reconstruction usually means that it will be many years down the road before the opportunity arises again at that same location.

The IPS and pedestrian refuge are described in further detail in the following sub-sections.

5.8.1 A Midblock Pedestrian Signal

A midblock pedestrian signal is a device to assist pedestrians crossing major streets and is a more positive and effective pedestrian crossing device than a pedestrian crossover (PXO).

A midblock pedestrian signal includes:

- Standard traffic signal indications to control traffic on the major street; and
- Standard pedestrian "Walk" and "Don't Walk" indications, activated by push buttons, for pedestrians wishing to cross the major street at the trail crossing.

Midblock pedestrian signals should be considered when:

- A trail crosses a high volume and / or multi-lane road;
- A grade separated crossing has been rejected; and
- There is no other controlled crossing within 150 m of the trail crossing.

Vehicles approaching from the side street will be permitted to turn onto the main street only when it is clear and safe to do so, yielding the right-of-way to both pedestrians crossing the main street as well as vehicles traveling along the main street.

5.8.2 Pedestrian Refuge Islands

Pedestrian refuge islands are medians that are placed in the centre of the roadway separating opposing lanes of traffic. They allow trail users to cross one direction of traffic at a time, with a location in the centre of the roadway to wait for a gap in traffic for the other direction. They are particularly suited for roadways with four to five lanes since the cognitive requirements to select a gap in traffic traveling in two direction in four lanes is considerably higher than that required for cross two lanes of traffic. A number of jurisdictions have implemented Pedestrian Refuge Islands.

Guidelines for the typical design elements for a pedestrian refuge island are as follows[9]:

- Islands are typically a minimum of 6 m in length;
- Island width should be at least 1.8 m wide, but 2.4 m is preferred to accommodate wheelchairs in a level landing 1.2 m wide plus 0.6 m wide detectable warning devices on each side. The 2.4 m width will also accommodate bicycles in the refuge;
- Curb ramps are provided to allow access to the roadway and island for wheelchair users, and detectable warning devices (0.6 m in width) should be placed at the bottom of the curb ramps;

---

[9] Traffic Engineering Council Committee TENC-5A-5, *Design and Safety of Pedestrian Facilities: A Recommended Practice of the Institute of Transportation Engineers*, Institute of Transportation Engineers, Washington, D.C., March 1998.

- The pathway on the island is constructed of concrete, not asphalt. The visually impaired can better detect the change in texture and contrast in colour supplemented by the detectable warning devices to locate the refuge island;
- Appropriate tapers are required to diverge traffic around the island based on the design speed of the roadway;
- The pathway on the island can be angled so that pedestrians are able to view on-coming traffic as they approach the crossing;
- Illumination should be provided on both sides of the crossing;
- Signage associated with the pedestrian refuge island includes “Keep Right” and “Object Marker” warning signs installed on the island facing traffic, and “Pedestrian Crossing Ahead” warning signs installed on the roadway approaching the crossing. “Wait for Gap” warning signs can be installed on the far side of the crossing and on the refuge island is pedestrians are failing to cross in a safe manner;
- Crosswalk markings are not provided unless the crossing is at an intersection controlled by signals, stop or yield signs, or controlled by a school crossing guard; and
- Railings on the island to control pedestrian access are not recommended because they are a hazard in potential collisions (spearing of driver or pedestrian). Some pedestrians will walk in front of or behind the island to avoid the railings, a less safe refuge location than on the island.

Example of a Pedestrian Refuge Island, Guelph, ON

5.8.3 Minor and Major Roads

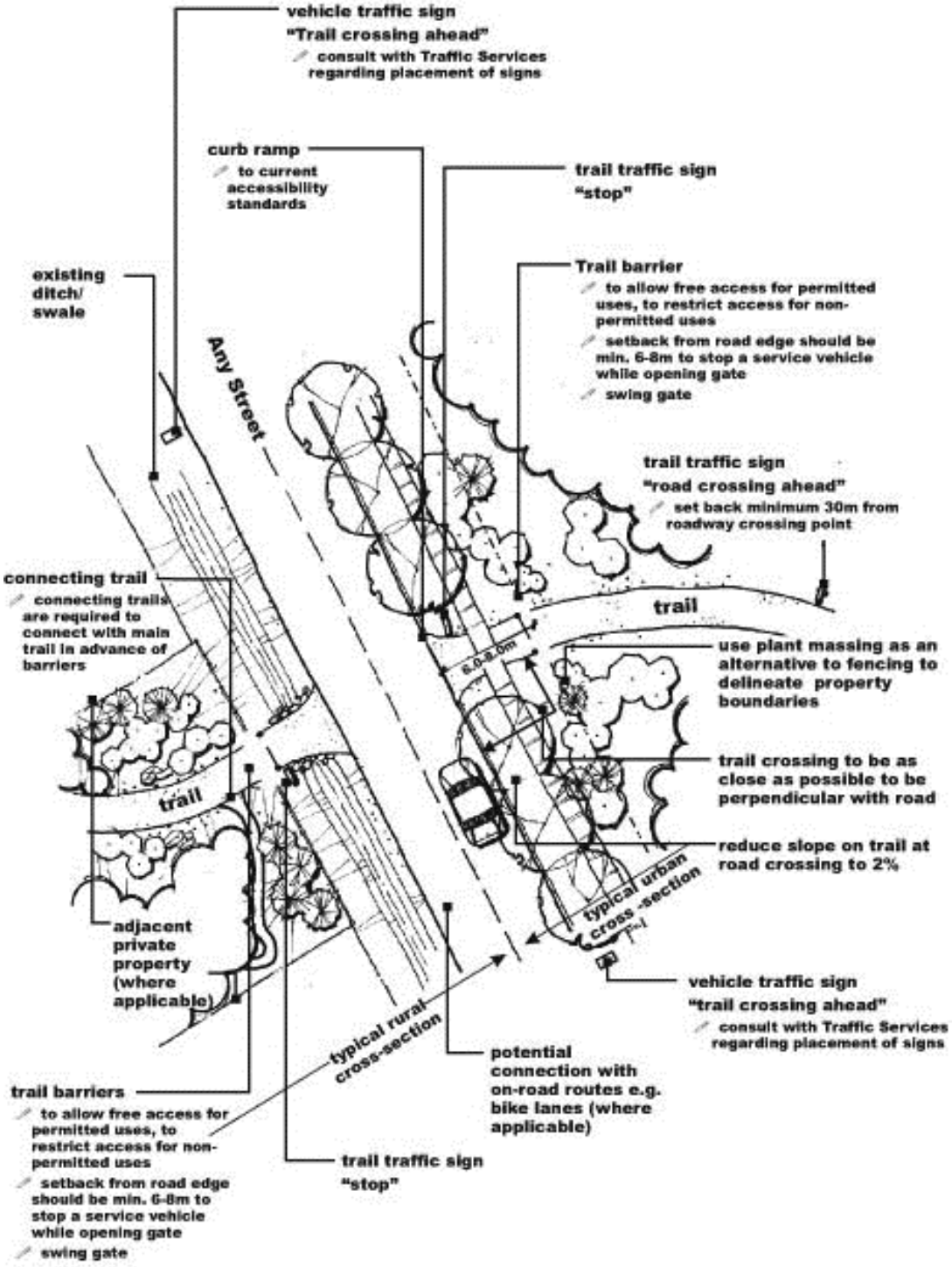
In the case of lower volume, lower speed roads the crossing can be accomplished with greater ease. The figure on the following page illustrates the key aspects of trail crossings of roadways.

Trail crossings of minor roads should include the following:

- Creation and maintenance of an open sight triangle at each crossing point;
- Trail access barriers;
- Signing along the roadway in advance of the crossing point to alert motorists to the trail crossing (advisory signs);
- Signing along the trail to alert trail users of the upcoming roadway crossing;
- Alignment of the crossing point to achieve as close to possible a perpendicular crossing of the roadway, to minimize the time that trail users are in the traveled portion of the roadway; and
- Curb ramps on both sides of the road.

Pavement markings, to delineate a crossing, should not be considered at "uncontrolled" trail intersections with roads as trail users are required to wait for a gap in traffic before crossing at these locations. Pavement markings designed to look like a pedestrian cross over may give pedestrian and trail users the false sense that they have the right-of-way over motor vehicles, which is contrary to the Highway Traffic Act of Ontario for uncontrolled intersections.

In some locations signing on the trail may not be enough to get trail users to stop before crossing the road. Under these circumstances or in situations where the sight lines for motorists are reduced and/or where there is a tendency for motorists to travel faster than desirable, the addition of other elements into the trail crossing may be necessary. Changing the trail alignment may help to get trail users to slow and stop prior to crossing. Changes to the streetscape may also provide a cue and traffic calming effect for vehicles.



Elements of a Typical Trail Crossing

5.8.4 Active Railway

Currently, in order to establish a pathway crossing of an active rail line, proponents must submit their request directly to the railroad company. Submissions need to identify the crossing location and its basic design. Designs should be consistent with Draft RTD-10, Road/Railway Grade Crossings: Technical Standards and Inspection, Testing and Maintenance Requirements (2002) available from Transport Canada. In the event that an agreement cannot be reached on some aspect of the crossing, then an application may be submitted to the Canadian Transportation Agency, who will mediate a resolution between the parties. Where a grade-separated crossing of a railway is desired, completing this would be most efficiently done at the same time as repairs to the rail line are being completed. Otherwise the Town would negotiate with the railway owner to have the work completed as a stand-alone project. Further information can be obtained from the.

Canadian Transportation Agency
Ottawa, ON
K1A 0N9
Telephone: 1-888-222-2592

Example of an At-Grade Trail Crossing of a Railway, Newmarket, ON

5.8.5 Gates and Barriers

Access barriers are intended to allow free flowing passage by permitted trail user groups, and prohibit access by others. Barriers typically require some mechanism to allow access by service vehicles and emergency access. Depending on site conditions, it may also be necessary to provide additional treatments between the ends of the access barrier and limit of the trail right of way to bypassing of the barrier altogether. Each access point should be evaluated to determine if additional treatments are necessary. Additional treatments can consist of plantings, boulders, fencing or extension of the barrier treatment depending on the location. There are many designs for trail access barriers in use by different trail organizations, some are more successful than others.

They can be grouped into three categories:

- Bollards;
- Offset Swing Gates; and
- Single Swing Gates.

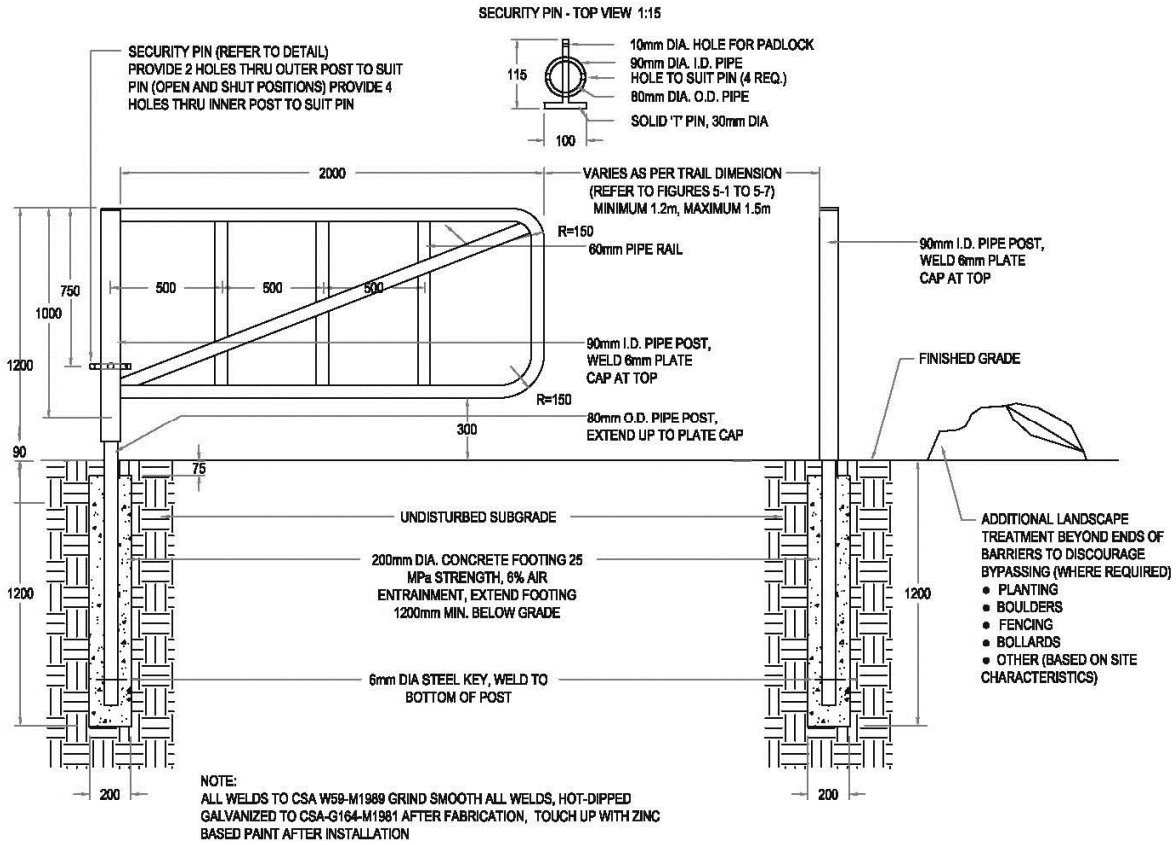
Bollards

The bollard is the simplest and least costly barrier, and can range from permanent, direct buried wood or metal posts, to more intricately designed cast metal units that are removable by maintenance staff. An odd number of bollards (usually one or three) are placed in the trail bed in order to create an even number of "lanes" for trail users to follow as they pass through the barrier. Although the removable bollard system provides flexibility to allow service vehicle access, they can be difficult to maintain as the metal sleeves placed below grade can be damaged by equipment and can become jammed with gravel and debris from the trail bed.

Example Trail Crossing with Bollards, Aurora, ON

Swing Gates

The single swing gate combines the ease of opening for service vehicle access, with the ease of passage of the bollard. Gates also provide a surface/support for mounting signage. The swing gate should provide a permanent opening as shown in the illustration below to allow trail users to flow freely along the trail.



Light Duty Swing Gate Trail Barrier – City of Guelph

The offset gate is similar to the single swing gate, except that barriers are paired and offset from one another. Although they can be effective in limiting access by unauthorized users and can be easily opened by Operations staff, some groups including cyclists, especially cyclists pulling trailers and wheelchair users, can have difficulty negotiating the offset swing gate if the spacing between the gates is not adequate.

An Example of a Swing Gate, Aurora, ON (note that this gate does not provide a permanent opening to allow trail users to flow through freely.)

In urban areas the single swing gate is recommended for most applications. In some locations bollards may be sufficient. In rural locations, a more robust single swing gate should be used.

Recommended Guideline 5-15:	Due consideration should be given to mid-block grade separated trail crossings of arterial and major collector roads as the most suitable and primary means for trail crossings. Should it be determined that there are compelling reasons why neither a grade separated nor a signal controlled crossing are possible then the trail crossing will be moved to the nearest signal controlled intersection.
Recommended Guideline 5-16:	That trail crossings of local minor roads at mid block locations include advance advisory pedestrian crossing signs on the roadway approaches.

5.9 OFF-ROAD TRAIL STRUCTURES

5.9.1 Bridges

Where possible, the trail network should make use of existing bridges, including pedestrian bridges, vehicular bridges and abandoned railway bridges in appropriate locations. In cases where this is not possible a new structure will be needed and the type and design of a structure needs to be assessed on an individual basis. The following are some general considerations:

- In most situations the prefabricated steel truss bridge is a practical, cost effective solution;
- In locations where crossing distances are short, a wooden structure constructed on site may be suitable;
- Railings should be considered if the height of the bridge deck exceeds 60 cm above the surrounding grade;
- Where cycling is not permitted, railing design should conform to criteria outlined in the Ontario Building Code (e.g. height, picket spacing etc.);
- Where cycling is permitted railing height should be increased to a minimum height of 1.4m to accommodate the cyclist's higher centre of gravity, and horizontal "rub rails" should be incorporated into the design which prevent bicycle pedals and handlebars from becoming entangled in the pickets;
- When considering barrier free access to bridges, an appropriate hardened surface should be employed on the trail approaches and bridge decking should be spaced sufficiently close to allow easy passage by a person using a mobility-assisted device; and
- Decking running perpendicular to the path of travel is preferred over decking running parallel, as the latter is more difficult for use by wheelchairs, strollers, in-line skates and narrow tired bicycles.

A Pedestrian Trail Bridge, Aurora, ON

Trail Underpass, Aurora, ON

5.9.2 Underpasses and Tunnels

Often an underpass or tunnel is the only way to cross significant barriers such as elevated railways and multi-lane highways. Designing trails through underpasses and tunnels can be challenging because of the confined space. Underpasses should be wide enough to accommodate all trail users whether they are traveling by foot, bicycle, in-line skates, wheelchair or other forms of transportation. Where feasible, it is suggested that trail widths through underpasses be equal to or greater than that of the approaching trail.

Recommended Guideline 5-17: The following are recommended design criteria for underpasses, tunnels and trails through culverts:

- The minimum recommended underpass or tunnel width for a multi-use trail is 3.6 m. Where the structure exceeds 18 m in length, in high traffic and/or urban areas the minimum width should be increased to 4.2 m;
- For shorter length underpasses, a vertical clearance of 2.5 m is usually sufficient recommended;
- For longer structures a minimum vertical clearance of 3.0 m will be required. If service and/or emergency vehicles are to be accommodated within the underpass, any increased vertical clearance requirements will be governed by the requirements of such vehicles;
- Underpasses and tunnels can be a security concern and also present maintenance challenges. To address these issues, tunnels should be well lit with special consideration made to security, maintenance and drainage. Approaches and exits will be clear and open to provide unrestricted views into and beyond the end of the structure wherever possible;
- Abutments should be appropriately painted with hazard markings; and
- Ideally, the transition between the trail and underpass crossing should be level and provide for accessibility. In the case where an underpass crosses beneath ground-level travel ways, ramps or alternative structures will provide a transition down to the lower grade under the passage.

Boardwalk over McKenzie Wetland, Aurora, ON

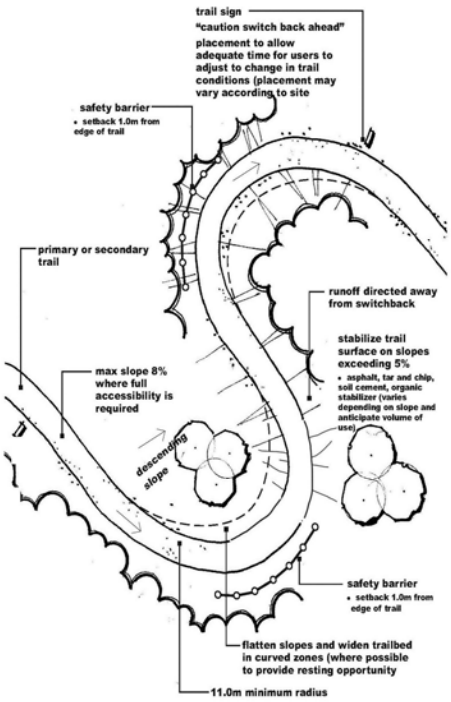
5.9.3 Elevated Trailbeds and Boardwalks

Where trails pass through sensitive environments such as marshes, swamps, or woodlands with a large number of exposed roots, an elevated trailbed or boardwalk is usually required to minimize impacts on the natural feature. If these areas are left untreated, trail users tend to walk around obstacles such as wet spots, gradually creating a wider, often braided trail through the surrounding vegetation. The turnpike and low profile boardwalk are two relatively simple yet effective methods for secondary and special use (i.e. hiking only) trails.

The turnpike is a low tech, low cost method that works very well in areas where organic soils are encountered. Various geosynthetic products have also been successfully used to overcome difficult soil conditions. The United States Department of Agriculture (Forest Service) has evaluated many products and design applications in the construction of trails in heavily used parks and on backcountry trails[10].

Low Profile Boardwalk, Guelph, ON

Low profile boardwalks have been successfully employed by trail managers across Ontario. In some cases, the simple construction method provides a great opportunity for construction by supervised volunteers where precast "deck blocks" have been used for the foundation of the boardwalk. Where the trail is in a high profile location, where it is necessary to provide a fully accessible trail, or where the trail surface must be greater than 60 cm above the surrounding grade, a more sophisticated design and installation is necessary. This is likely to include engineered footings or abutments, structural elements and railings. A professional who is trained in structural design and approval requirements should be retained for these types of applications.



Switchback

5.9.4 Switchbacks and Stairs

Pedestrian, motorized and some self-propelled users are capable of ascending grades of 30% or more whereas some users are limited to grades of less than 10%. For example, a slope of 5% is the threshold for a fully accessible facility. Once trail slopes exceed this threshold and slopes are long (i.e. more than 30 m) it is important to consider alternative methods of ascending slopes. Two alternatives to consider are switchbacks and stairs.

---

[10] United States Department of Transportation - Federal Highway Administration. "Environment - HEP - FHWA." *Federal Highway Administration: Home*. Administration. Web. 30 Sept. 2010. <http://www.fhwa.dot.gov/environment/>.

Where construction is feasible, switchbacks are generally preferred because they allow wheeled users such as cyclists to maintain their momentum, and there is less temptation to create shortcuts, as might be the case where stairways are used. Switchbacks are constructed with turns of about 180 degrees and are used to decrease the grade of the trail. A properly constructed switchback also provides outlets for runoff at regular intervals, thus reducing the potential for erosion. Switchbacks typically require extensive grading and are more suited to open locations where construction activity will not cause major disruption to the surrounding environment. Switchbacks can be difficult to implement in wooded areas without significant impacts to surrounding trees.

Recommended Guideline 5-18: When slopes exceed 15%, or where there is inadequate room to develop a switchback or another accessible solution, a stairway system should be considered. In these situations the site should be carefully studied so that the most suitable design can be developed. The following are considerations for stairway design:

- Provide a gutter integrated into the stairway for cyclists to push their bicycles up and down (where appropriate to have bicycles);
- Develop a series of short stair sections with regularly spaced landings rather than one long run of stairs;
- For long slopes, provide landings at regular intervals (e.g. every 8-16 risers) and an enlarged landing at the mid-way point complete with benches to allow users the opportunity to rest;
- On treed slopes, lay the stairway out so that the minimum number of trees will be compromised or removed;
- Use slip resistant open treads, especially in shady locations;
- Design handrails to meet the requirements of the Ontario Building Code;
- Incorporate barriers on either side of the upper and lower landing to prevent trail users from bypassing the stairs; and
- Provide signs well in advance of the structure to inform users, so that they may take an alternate route if they wish.

5.10 TRAIL SIGNING

Aurora is a community made up of both urban and rural landscapes/populations which have their own identity. Local identity has evolved over time, in some cases the result of the architecture, landscape, land use, cultural history and residents. Trail themes can add a local flavour to individual trails or loops, creating an overall unique quality to the trail network. It also provides an additional opportunity and incentive for neighbourhood associations and interest groups to become unified as partners in developing and maintaining the trails throughout the entire Town.

Example of Trail Signage along the Ottawa-Carleton Rail Trail (Trans Canada Trail), Stittsville, ON

Other jurisdictions have taken this approach using a variety of methods including:

- Adding a distinct trail name or additional logo plate while maintaining other common design elements of the signs;
- Creating neighbourhood/district gateway nodes in key locations where the edges of neigbourhoods are considered to be; and
- Creating distinct interpretive themes for different neighbourhoods.

Signage is a critical element of the trail network and serves many important functions including:

- Providing instruction regarding traffic operations (for both motorists and trail users);
- Providing information regarding safety while traveling (i.e. maximum travel, upcoming hazards, junctions and crossings);
- Advertising the network to attract new users;
- Orienting and guiding trail users as they travel throughout the network, which can also be used as reference points to guide Emergency Services personnel to a specific trail location;
- Providing information about the routes, nearby services and trail–related events;
- Informing users of their responsibilities while on the network; and
- Providing interpretation of local historical, cultural, natural and other resources.
- Good signing systems have common characteristics, including:
- Clearly, concisely and consistently communicate information related to identification, direction, regulation and operation of the trail;
- Informing, but not distracting, trail users and detracting from the visual quality of overall trail experience;
- Graphics and internationally recognized symbols instead of excessive text to overcome language barriers;

- Visibility at night through the use of reflective materials should also be considered in locations where low light and night use is anticipated;
- A design that is timeless, in-scale and visually integrated with the landscape without creating unnecessary clutter; and
- High quality, durable (including resistance to ultraviolet radiation), vandal resistant quality materials and finishes.

5.10.1 Signing Strategy and Branding

An effective way of coordinating trails throughout the Town is to develop a continuous theme which connects the network routing, signage, facilities and features. This theme is best achieved by developing a branding and signage strategy which work together to promote the trails network. The Branding Strategy would implement a logo which represents and depicts trail use throughout the Town of Aurora. This logo will be strategically used on the signs along the network, maps and guides which promote the trails and on websites etc. which will increase awareness and use of the trail system. The logo is versatile enough to be used on multiple sign types and promotional materials and will be attractive and effective for trail users of all ages and abilities. A brand can also be used to draw visitors or trail users to different attractions and destinations along the trail or within the Town of Aurora which will promote note only the use of the trail system but also draw new visitors to local activities and venues.

There have been many municipalities which have successfully implemented and effective branding strategy such as the City of Brampton which has been using their pathways logo as a key branding element as part of their recent trail signing strategy.

Example of Designation Signage from Brampton Pathways Plan

5.10.2 Sign Types

The design and construction of the network should incorporate a hierarchy of signs each with a different purpose and message. This hierarchy is organized into a "family" of signs with unifying design and graphic elements, materials and construction techniques. The unified system becomes immediately recognizable by the trail user and can become a branding element. Consistent with this approach is the correct use of signage, which in-turn reinforces the trail's identity. Generally the family of signs includes:

Example of 'Rules of the Trail' Signage by the Ontario Heritage Trust, Aurora, ON

Orientation and trailhead signs, which are typically located at key destination points and major network junctions. They provide orientation to the network through mapping, other appropriate network information as well as any rules and regulations. Where network nodes are visible from a distance, these can be a useful landmark. In some municipalities, orientation signing has also been used as an opportunity to sell advertising space. This not only provides information about local services that may be of interest to trail users, but it may also help to offset the cost of signs and/or trail.

"Rules of the Trail" signs, which should be posted at public access points to clearly articulate which trail uses are permitted, regulations and laws that apply, as well as trail etiquette, safety and emergency contact information. Reminder signs may be needed at some locations such as "Please stay on the Trail". At trailheads, this information can be incorporated into trailhead signs. In other areas, this information can be integrated with access barriers.

Regulatory signs which are required throughout the system. Where traffic control signs are needed (stop, yield, curve ahead etc.), it is recommended that recognizable traffic control signs be used (refer to the Ministry of Transportation for Ontario's (MTO) Manual of Uniform Traffic Control Devices, 1996).

Interpretive signs which should be located at key trail features having a story to be told. These features may be cultural, historical, or natural. Interpretive signs should be highly graphic and easy to read. They should be located carefully in highly visible locations to minimize the potential for vandalism.

Route marker and trail directional signs, which should be located at regular intervals throughout the network and at intersections. The purpose of route marker signs is to provide a simple visual message to users that they are on an approved network route.

Recommendation 5-19:	That the Town complete a trail signing design and branding study that builds upon the signing strategy and sign types outlined in the Trails Master Plan and establish a set of trail signing standards for the Town.
Recommendation 5-20:	That the proposed trail signing design and branding study include consultation with the Trails Sub-Committee, local residents, artists and other interested stakeholders, and that this consultation include a public workshop or design charrette.
Recommendation 5-21:	That the Town undertake the proposed trail signing design and branding study in 2011 with completion in 2012.

5.11 TRAILHEADS AND TRAIL AMENITIES

Major trailhead areas are generally proposed for important community destinations such as community centres. Because of their high visibility and proximity to other recreation facilities, they help to raise the profile of the trail system, and some of the necessary facilities and amenities may already be present or located nearby. In some locations it may be possible to share parking and washrooms with other community facilities or other partners (e.g. School Boards for parking, Conservation Authority for parking and washroom facilities). A well-designed trail staging area typically incorporates the following elements:

Example of a Trailhead Sign, Sheppard's Bush Trailhead, Aurora, ON

- Regular and accessible (handicapped) parking with an appropriate number of spaces in relation to the anticipated level of use of the nearby trail, with the flexibility to increase the number of spaces where warranted by future demand;
- Trail access barriers;
- Easy access to and from the trail;
- Ample room to load and unload equipment;

- Secure bicycle parking facilities;
- Waste receptacles;
- Lighting (may or may not be included, depending on location and site context);
- Signing;
- Washrooms;
- Seating and or picnic/informal activity space (more often associated with a major trailhead); and
- A food concession and/or other entrepreneurial facilities (i.e. canoe rentals, bicycle rentals) may also be available, depending on the size and setting.

A trail gateway is articulated with a sign indicating to the trail user that they have entered Aurora. This is the first opportunity to introduce the Aurora trail logo and character of the trail system as expressed through the design of the sign and the trail gateway. In cases where the trail gateway is located in a rural setting it may be limited to simply a sign. Where the trail gateway is in an urban setting or in a prominent location, a more elaborate treatment may be desirable and include a plaza setting with hard surfacing, kiosks, landscape treatments and furnishings.

5.11.1 Seating and Rest Areas

Seating provides the opportunity to pause along the trail at points of interest or just to rest. Young children, older adults and those with disabilities will need to rest more frequently than others. Benches are the most common form of seating, but walls of appropriate height and width, large flat boulders, and sawn logs are some alternatives depending on the trail setting. Where seating/rest areas are planned, the design should consider a 1 m wide level area with a curb or other appropriate wheel stop for mobility-assisted devices. Staging areas, trail nodes and heavily used trails typically require a higher density of seating opportunities. For heavily used trails it is reasonable to provide some form of seating at approximately 500 m intervals.

Example of a Trail Rest Area, Aurora, ON

Recommended Guideline 5-22:	Where seating / rest areas are planned, implement a 1.0m wide level area with a curb or other appropriate wheel stop for mobility-assisted devices. For heavily used trails it is reasonable to provide some form of seating at approximately 500 m intervals.

5.11.2 Washrooms and Waste / Recycling Receptacles

Washrooms must be provided along the trail. Typically, they are located at major trailheads and where possible make use of existing facilities (i.e. at community centres and in major parks). As trail use continues to increase, and as the network becomes denser, it may be necessary to provide additional facilities. Where this is necessary, they must be placed where they can be easily accessed for maintenance and surveillance. Many trail groups have used portable washrooms prior to installing permanent facilities, which provides the opportunity to determine the most appropriate location for permanent washroom facilities before the investment is made in design and construction.

Waste and recycling receptacles are an absolute necessity throughout the trail network. Generally they should be located at regular intervals and in locations where they can be easily serviced. Mid block crossing points, staging areas, trail nodes and in association with other site amenities such as benches and interpretive signs are ideal locations. They must be monitored and emptied on a regular basis to prevent unsightly overflow. Several municipalities are reporting good success with below ground trash receptacles in heavily used areas. These have a larger capacity, are "out of sight" and may result in fewer odours as trash is stored at cooler temperatures.

Example of a Trail Lookout/Interpretive Node, Ottawa-Carleton Trailway near Stittsville, ON

Recommended Guideline 5-23:	That information signs be provided along the trail and on the Town's Trail map to identify the location / direction to transit access and publicly accessible washrooms and waste and recycling receptacles.
Recommended Guideline 5-24:	That waste and recycling receptacles be located at mid block crossing points, staging areas, trail and trail nodes, and in association with other site amenities, such as benches and interpretive signs.

5.11.3 Bicycle Parking

Adequate bicycle parking facilities at key locations throughout the network will allow trail users to confidently secure their bicycles while pausing along the trail, enjoying nearby attractions, reaching their destination, or taking a trail journey on foot. Key locations for bicycle parking include trailheads, major trail nodes and lookouts. Proper bicycle parking facilities should be considered where multi-use trails intersect with pedestrian-only trails. The provision of bicycle parking facilities in these locations along with signing explaining the reasons for restricting bicycle use will help to discourage cycling on unsuitable trails, reinforce trail etiquette and encourage the proper use of the trail system.

Racks, whether as single units or grouped together, should be securely fastened to a mounting surface to prevent the theft of a bicycle attached to a rack. Another alternative is to create a bicycle rack that is large enough that it cannot be easily lifted or moved from its position with bicycles attached. Bicycle racks should be placed as close as possible to the trail facility that it serves, but not in a location where they would inhibit trail user flow.

Generally bicycle parking devices/facilities should:

- Enable the bicycle to be securely locked to the device without damaging the bicycle, and be easy to use without the need for detailed instructions;
- Be placed along key trail routes, connections and other destinations where cyclists are expected;
- Be placed in public view where possible, where they can be viewed by passers-by, trail attendants, fellow workers, etc.;
- Present no hazard to pedestrians;
- Be easily accessible from the road or trail; and
- Be arranged so that parking maneuvers will not damage adjacent bicycles.

Post and Ring Bicycle Parking Facility Example, Toronto, ON

Recommendation 5-25: Establish bicycle parking guidelines for Aurora, including bicycle parking requirements for new developments as part of the proposed Transportation Master Plan.

5.12 TRAILS IN NATURAL AREAS AND ENVIRONMENTAL BUFFERS

Trail users often seek natural areas such as woodlots and wetlands where they can find some relief from the urban environment. Natural areas provide opportunities to enjoy and interpret nature, and to pursue some trail activities that are not possible in more traditional parks. In many cases, trails are compatible with natural areas,

in some cases they are not. Creating the balance between providing public access and the need to conserve and/or protect the resource itself can be a difficult goal, especially in situations where there is a large population of residents nearby or surrounding the feature. This often serves to increase the pressure on the very resource that users seek and enjoy.

Where trails are to be located in natural areas it is important that they be sited and designed appropriately and that the area be monitored for the effects of inappropriate use and/or overuse. If trails are not carefully planned, designed, constructed and maintained in these areas, people will create their own trail routes sometimes in sensitive locations where it would be preferable not to have trails at all. Proper planning, design and construction of trails, coupled with public education can go a long way to achieving the balance between use and protection.

Change in natural systems is inevitable, especially where there are significant changes in the character of lands surrounding the natural area. Managing change is the key and this involves deciding what an acceptable limit of change should be, and having a plan in place should the change exceed the acceptable limit. Using background ecological data such as the Ecological Land Classification (ELC) system, a natural area can be divided into different zones based on sensitivity to disturbance. Using sensitivity mapping, decisions can be made regarding trail closures, rerouting, design strategies as well as a definition of indicators of disturbance over and above an acceptable threshold. Critical wildlife habitat may also be used in delineating management zones. Consultation with the Lake Simcoe Region Conservation Authority and the Toronto Regional Conservation Authority and the local branch of the Ministry of Natural Resources is recommended as part of the trail design process where sensitive vegetation communities and significant wildlife habitat occur.

In some cases trails (and people) should not be in natural areas. Vegetation communities that are highly sensitive to disturbance and narrow, constrained wildlife corridors are two examples where trails may not be appropriate. In these cases, it is advisable to provide alternative trail routes and information (e.g. signing, public information campaigns, etc.) explaining the management decision to exclude trails from the area. When designing trails through sensitive natural heritage features the following general considerations should include:

- Route or reroute to avoid the most sensitive and/or critical habitats;
- Interpret sensitive species away from their location;
- Consider and evaluate alternative routes and design treatments;
- Balance the effect of alternatives;
- Use previously disturbed areas where possible and appropriate;
- Maintain natural process;
- Limit accessibility;
- Incorporate habitat enhancements; and
- Complement and highlight natural features.

Recommended Guideline 5-26:	Where trail routes are being proposed within environmental buffers surrounding natural sensitive heritage features, the conditions in the buffer (width, slope, etc.) must be sufficient to support the development of a trail such that the intended function of the buffer is not compromised.

5.13 UTILITY CORRIDORS AND TRAILS

Pipeline and hydro corridors, are examples of linear corridors that provide excellent opportunities for trail development and should be considered for the development of trails in Aurora. Utility lines in urban areas often have a substantial easement, and in many cases are used informally as trail routes as they tend to provide direct connections to a variety of destinations over and long distance. A number of municipalities have recently adopted practices and policies whereby emergency service access must be provided to manholes along sanitary sewer lines along river corridors in the event of an emergency. For example the City of London now provides emergency service access to sanitary sewer lines running through their valley lands, and these routes are also used as main or trunk trails throughout the city.

5.14 TRAIL ACCESS AND ACTIVE CONSTRUCTION ZONES

Planning for the safety and movement of trail users through construction zones is as important as planning for vehicular movement, and should be considered an integral part of the construction staging and traffic management plan for any project. The Institute of Transportation Engineers' (ITE) manual for Design and Safety of Pedestrian Facilities[11] and the American Association of State Highway and Transportation Officials' (AASHTO) Guide for the Planning Design and Operation of Pedestrian Facilities[12] provide guidelines for the development, management and monitoring of pedestrian walkways through construction zones. The Ontario Traffic Manual Book 7: Temporary Conditions provides guidelines and requirements in the Ontario context for pedestrian and cyclist access through road construction sites. These guidelines can be applied to trail construction zones in areas outside road rights-of-way as well. .

Planning for the safe passage of trail users through or beside active construction zones may vary depending on the proximity of the route to the active construction zone, the type and duration of construction and the volume of pedestrian traffic expected.

---

[11] Donaldson. G.A., in Design and Safety of Pedestrian Facilities: A Recommended Practice of the Institute of Transportation Engineers, March 1998

[12] American Association of State Highway and Transportation Officials. Guide for the Planning, Design and Operation of Pedestrian Facilities, July 2004

The designated route must not be used for storage of construction equipment, materials, or vehicles. Furthermore, stopping or parking of work vehicles beside the temporary route should be discouraged as this may indirectly encourage the movement of workers, materials and equipment across the pedestrian path of travel.

Crossings of the temporary route should be minimized. Where construction access routes must cross the path of travel, signals, flag persons or police officers should be considered as a means to control movements. This is most important in high volume trail zones and near locations that children and seniors frequent.

Daily inspection of the temporary route is required. Modifications should be made to adapt to changes in the nature of the construction site, to further direct trail user movement where the route is not functioning as planned or where unanticipated conflict points are observed. Good engineering judgment should always be employed.

Recommended Guideline 5-27: That the Town of Aurora require a trail management plan for all active construction zones when a trail or trail crossing is impacted. Key principles in the development of an appropriate plan include:

- Separate trail users from conflicts with work site vehicles, equipment and operations;
- Separate trail users from conflicts with the main flow of vehicular traffic moving through, around or along side the work site; and
- Provide trail users with a safe, accessible and convenient route that duplicates as nearly as possible the functions of the impacted trail network portions.

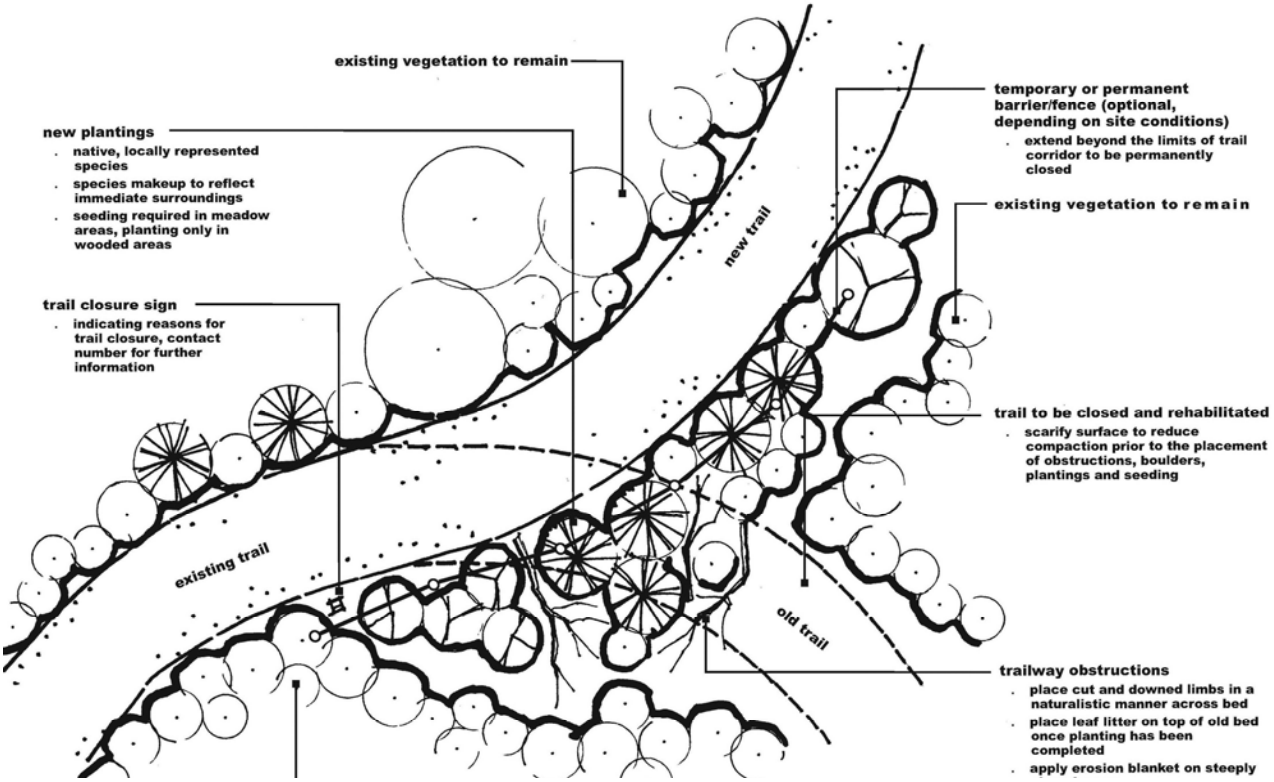
5.15 TRAIL CLOSURES AND REHABILITATION

From time to time it will be necessary to temporarily close sections of trails or entire routes to public access. Situations such as inundation by water, culvert washout or general trail construction are typical reasons for temporary trail closures. As these situations arise, users must be informed well in advance of the closure. If the closure is planned, advance notices should be placed at all access points for the affected section(s). In the event of an emergency closure, notices must be placed at these locations immediately following the discovery of the problem. Signing and temporary barricades, notification in community newspapers, on local radio stations and the Aurora website are possible methods of informing users of about temporary trail closures.

Recommended Guideline 5-28: When temporary trail closures are planned, inform users in advance by placing trail closure notices at all trail access points.

Permanent trail closures may be required at some point in the life cycle of the trail, especially in the case of trails in woodlots and other natural settings. It is important when closing a trail to rehabilitate the landscape to match the surrounding conditions, inform trail users that it has been closed, and to provide reasons for the closure. The following illustration describes the key elements of a typical permanent trail closure and rehabilitation in a naturalized setting, which include:

- Slope stabilization, using engineered material and methods for severely eroded slopes;
- Terracing, using locally collected low-tech materials for eroded slopes of moderate and low severity;
- Live staking using locally collected cuttings from appropriate species;
- Plantings with appropriate native species (may include plants salvaged from nearby sites that will be cleared for development, roadway widening etc.);
- The application of erosion blankets and mulches;
- Seeding with mixes that are appropriate for the site in which they are to be applied;
- Scarification of the surface of the trail to be closed and covering it with forest litter (leaves, branches, and limbs) in a naturalistic manner which can help to reinforce the message that the trail is closed, reduce erosion, and supply nutrients to plants during establishment;
- Placement of a detector object at the beginning of the closure area so that the closure can detected by visually impaired users; and
- Erecting signage describing the closure to inform users of the conditions and “Water Me” signs for newly planted trees.



Typical Trail Closure and Rehabilitation in a Naturalized Setting

5.16 TRAILS AND NEW DEVELOPMENT

Community trails are an integral part of the urban fabric and are a key component of the recreation and transportation system. New developments must be planned for the efficient movement of people for utilitarian and recreation purposes. This includes not only roads and sidewalks, but also trails that must make connections among neighbourhood destinations and the town-wide trail network.

Developers are expected to work through an iterative process with Town staff, beginning early in the planning stages to create a trail network within their development area that reflects the intent of the Aurora Trails Master Plan. Providing developers with information about the network, desired connections and design expectations will only serve to strengthen this relationship.

It is expected that proposals for new development areas (both greenfield and infill) will contain a network of on-road bikeways and off-road trails that reflect the density, variety, hierarchy and character that is consistent with the Trails Master Plan.

Specifically this implies the planning and development of:

- A network of trails that overcome physical barriers, make appropriate connections to important destinations and enhance connectivity with the existing or planned system of trails surrounding the development area; and
- A network of trails that is both sensitive to, and takes advantage of, inherent qualities of the natural and cultural landscape features within the development area.
- A careful examination of a variety of factors including topography and drainage, slopes, soil conditions, plant and animal communities, microclimate and human comfort, historic/cultural resources, public education opportunities, significant views and vistas should be part of the process to integrate trails in new developments.

In new development areas trails should be constructed prior to or concurrently with the construction of other infrastructure and homes. Where trail construction will not take place until a later date, there is often conflict as residents claim that they were not aware of plans for trail construction even if this intention has been clearly indicated in municipal planning documents. Developers should be encouraged to be very proactive about notifying prospective buyers where trails are to be located at the time they are selling lots. Providing information at sales offices, including information in sales packages and erecting signs in locations where trails are to be constructed may help to alleviate difficulties at a later date.

Recommendation 5-29: That the Town of Aurora include in the Trails Master Plan the following conditions:

a. Prior to Draft Plan of Subdivision/Condominium approval, the Developer shall be required to prepare and submit a trail concept/layout plan and typical details for any trails within the boundaries of the plan of subdivision, to the satisfaction of the Town. The trail concept/layout plan shall be consistent with the approved Aurora Trails Master Plan, and shall be considered a part of the transportation infrastructure for the approval area.

b. Prior to Final Plan of Subdivision/Condominium approval and the registration of the applicable stage of the subdivision, a Developer shall be required to prepare and submit detailed design drawings, specifications and a detailed cost estimate for trail construction, to the satisfaction of the Town.

c. The Development Agreement shall outline the requirements of a Developer relating to trail construction, including the following:

- That the Developer agrees to construct trails within the boundaries of the applicable stage of the subdivision/condominium to a base condition, to the satisfaction of the Town, prior to any building permits being issued;
- The Developer shall agree to complete the finishing of trails within the boundaries of the applicable stage of the subdivision/condominium in accordance with the approved plans, to the satisfaction of the Town, prior to assumption;
- Notice to purchasers of the proposal to construct a municipal trail, including identification of the trail on plans displayed in a sales office, and a clause in all agreements of purchase and sale and/or lease, and registered on title, to the satisfaction of the Town.

Recommendation 5-30: That the Town acquire lands for key trail links that connect to or support the development of the trail network in Aurora through the subdivision planning approval process, subdivision agreements and through other means available to the Town.

CHAPTER 6
IMPLEMENTATION STRATEGY

6.1 THE IMPLEMENTATION STRATEGY

The Implementation of Aurora's Trails Master Plan will be accomplished through both short and long-term actions. Short-term actions include Council adopting the Trails Master Plan. The key polices and network strategy in the Trails Master Plan should then form a schedule in the next update to the Town's Official Plan. The Town has already taken an important step by establishing a Recreational Trails Sub-Committee within the Town's Parks and Recreation Services Advisory Committee. This sub-committee acts as an Advisory Committee of Council on all matters relating to the future planning and implementation of a system of linked recreational trails within the Town of Aurora.

Other recommended actions include committing to annual funding to construct the Trails network generally in keeping with the phasing illustrated in **Figures 6-1** and **6-2**; implementing the education, promotion and enforcement strategies, and providing operational support, such as staff resources, management and administrative functions as outlined in this chapter.

The Trails Master Plan is a long-term strategy that consists of three phases. Phase 1 (short term) spans the initial 15 years of the plan. Phase 2 (mid-term) is a 10 year period from year 16 to 25. The third and final phase (long-term) covers years 26 through 50 and beyond. This chapter discusses the Implementation Plan, and includes prioritized projects for initial development and program initiatives, as well as associated costs.

6-1: DRAFT TRAIL ROUTE NETWORK PHASING + IMPLEMENTATION AURORA WEST

LEGEND

- Existing Off-Road Municipal Trail
- Off-Road Municipal Trail (within 15 years)
- Off- Road Municipal Trail (within 16 to 25 years)
- Off-Road Municipal Trail (within 26 to 50+ years)
- Existing In Boulevard Multi-Use Path
- In Boulevard Multi-Use Path (within 15 years)
- Existing Nokiidaa Trail
- Nokiidaa Trail (within 15 years)
- Existing Oak Ridges Trail
- Oak Ridges Trail (within 15 years)
- Oak Ridges Trail (within 16 to 25 years)
- Oak Ridges Trail (within 26 to 50+ years)

GRADE SEPARATED TRAIL CROSSINGS

EXISTING PROPOSED

- Primary Crossing
- Secondary Crossing
- Underpasses
- Major Railway Grade Separation

AT-GRADE TRAIL CROSSINGS

EXISTING PROPOSED

- Crossing
- Secondary Railway Crossing

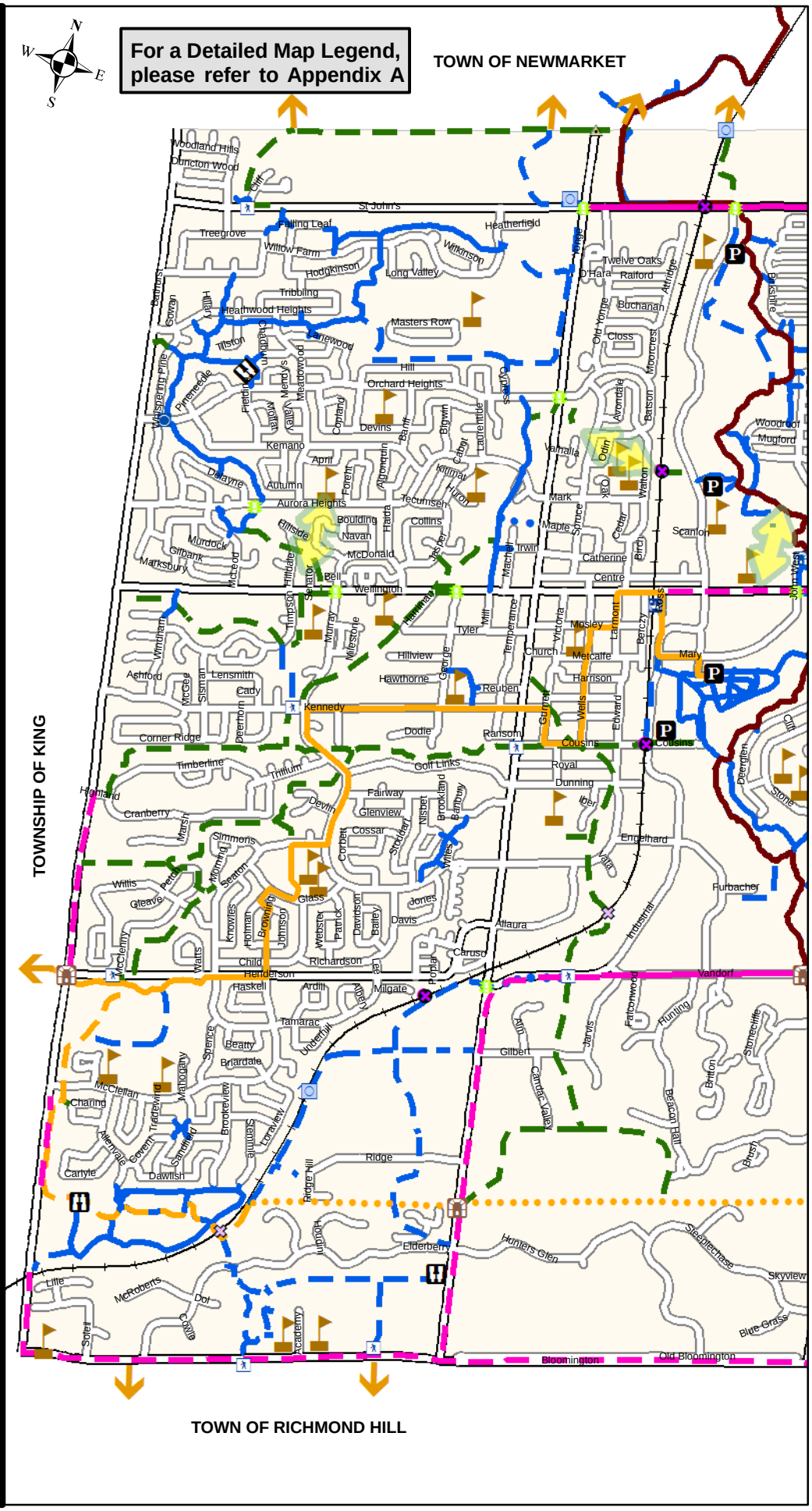
OTHER TRAIL NETWORK INFORMATION

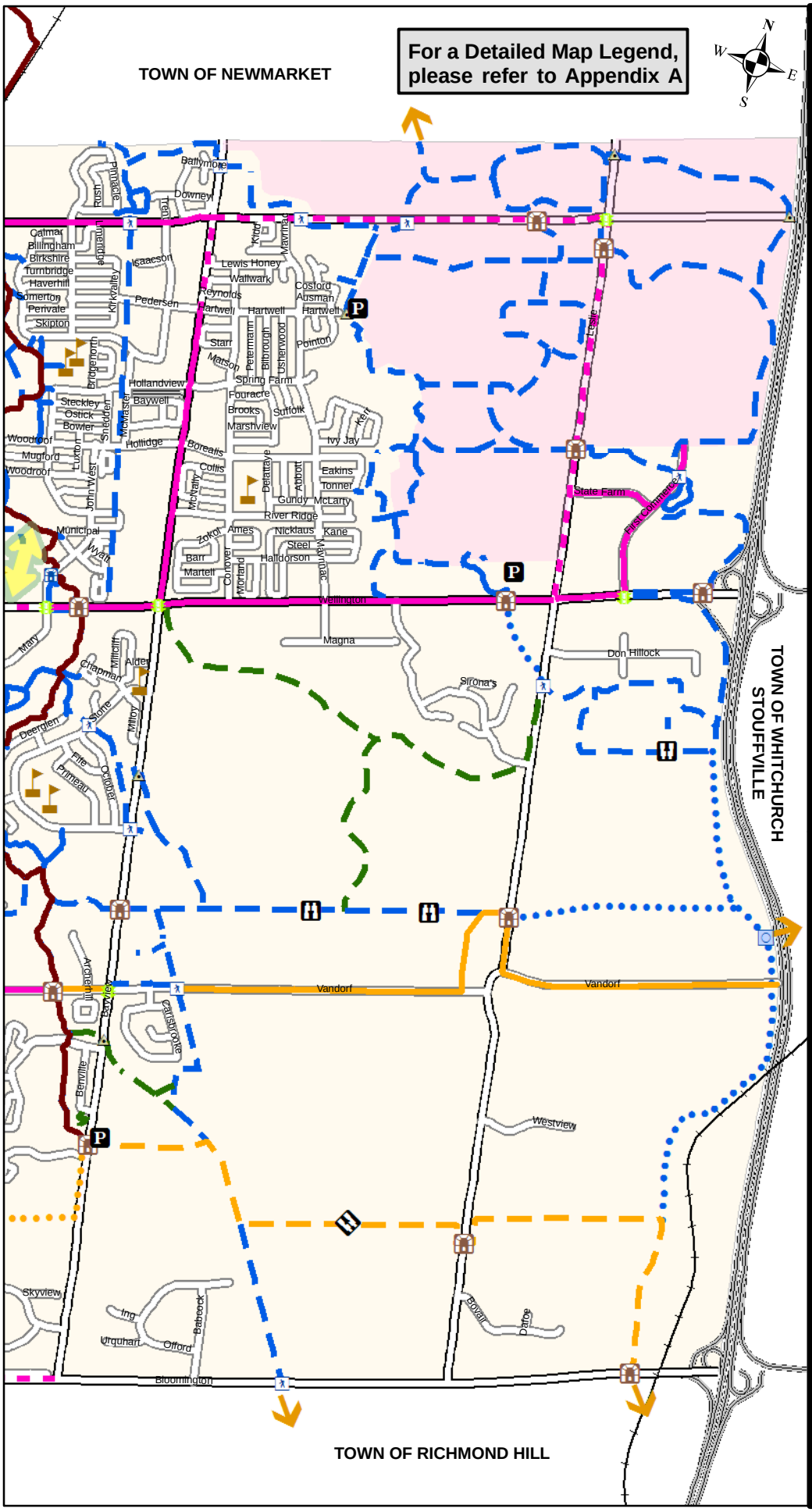
- Lookout
- Trail Connection to Adjacent Municipality
- General Area where there is desire to have trail link developed in the long term.

TOWN INFORMATION

- Local Road
- Regional Road
- Public Transport Hub
- School
- Car Parks (Existing and Proposed)
- Railway

AURORA You're in good company
Ontario Ministry of Health Promotion
HS FINANCIAL SERVICES INC. 1-800-411-7979
MMM GROUP





6-2: DRAFT TRAIL ROUTE NETWORK PHASING + IMPLEMENTATION AURORA EAST LEGEND

PHASING / IMPLEMENTATION

- Existing Off-Road Municipal Trail
- Off-Road Municipal Trail (within 15 years)
- Off- Road Municipal Trail (within 16 to 25 years)
- Off-Road Municipal Trail (within 26 to 50+ years)
- Existing In Boulevard Multi-Use Path
- In Boulevard Multi-Use Path (within 15 years)
- Existing Nokiidaa Trail
- Nokiidaa Trail (within 15 years)
- Existing Oak Ridges Trail
- Oak Ridges Trail (within 15 years)
- Oak Ridges Trail (within 16 to 25 years)
- Oak Ridges Trail (within 26 to 50+ years)

GRADE SEPARATED TRAIL CROSSINGS

EXISTING PROPOSED

- Primary Crossing
- Secondary Crossing
- Underpasses
- Major Railway Grade Separation

AT-GRADE TRAIL CROSSINGS

EXISTING PROPOSED

- Crossing
- Secondary Railway Crossing

OTHER TRAIL NETWORK INFORMATION

- Lookout
- Trail Connection to Adjacent Municipality
- General Area where there is desire to have trail link developed in the long term.

TOWN INFORMATION

- Local Road
- Regional Road
- Highway
- Public Transport Hub
- School
- Car Parks (Existing and Proposed)
- Railway
- 2C Secondary Plan Area (Trail alignments to be finalized as part of the review and approval process for the 2C lands)

AURORA
Ontario
HS FINANCIAL SERVICES INC.
1-800-411-7979
MMM GROUP

6.2 PRIORITIES AND PHASING

Chapter 4 identifies a comprehensive trails network consisting of existing and proposed multi-use trails in-boulevard rights of-way and trails on lands outside of road rights-of-way. This section of the master plan recommends an implementation (phasing) strategy for all new components of the trails network that is based on a logical build out of the network over time, field observations and the application of the following criteria:

- Developing or enhancing the trail network in locations where a greater number of users are anticipated;
- Establishing main corridors between/to important community destinations such as schools, community centres and recreation complexes, major sports fields, stores, employment lands and key points of interest throughout Aurora;
- Making or completing key connections that form part of the Town and regional trail routes;
- Making connections between/to existing facilities in locations where the completion of a small missing link results in the creation of a significantly longer continuous trail;
- Developing trail loops throughout the community;
- Taking advantage of the re-development of lands, including intensification of the downtown;
- Linking trail sections to affect Active Transportation/commuting access to frequently visited destinations, and to stores;
- Allowing for off-road trail access to current and planned transit nodes and stops;
- Establishing spine trail routes in new subdivisions as part of the subdivision planning and design approval process that minimizes or avoids at-grade trail crossings of roads where at all possible; and
- Scheduling implementation with planned Provincial, Regional and Local capital projects where possible to take advantage of possible cost savings, especially in respect of establishing grade separated or rail line crossings for off-road trails.

6.2.1 Trail Facilities

Figures 6-1 and **6-2** illustrate the implementation of trail facilities by phase: short-term (Phase 1: 0 to 15 years), mid-term (Phase 2: 16 to 25 years) and longer term (Phase 3: 26 to 50+ years). Each of the facility type and phases is distinguished according to colour and line type. The ultimate network (following build-out) would be represented by the combination of all of the colours and lines.

A number of route segments and related facility types proposed for implementation in Phases 2 and 3 may not prove to be feasible because of other circumstances (e.g. funding constraints, outcome of an Environmental Assessment or detailed design, negotiations for easements and purchase of land). In these situations, an interim solution may be possible and should be investigated by Town staff.

Table 6-1 identifies the proposed Fifty Year Implementation Plan by facility type and implementation phase.

Table 6-1 Proposed Length of Trails Network by Facility Type and Implementation Phase

	Hard Surface Multi-Use Trail	Soft Surface Multi-Use Trail	Single Track Hiking Trail	In - Road Boulevard Bike Path	Nokiidaa Trail	Oak Ridges Moraine Trail (ORTA)	Total (km)	%
Existing	0.7	21.9	7.2	9.2	6.7	11.7	**57.4**	**35.4%**
Short Term (0-15 Years)	0.0	49.0	0.0	14.0	1.2	7.6	**71.8**	**44.3%**
Mid Term (16-25 Years)	0.0	5.2	0.0	0.0	0.0	0.0	**5.2**	**3.2%**
Long Term (1) (26-50+ Years)	0.0	24.1	0.0	0.0	0.0	3.5	**27.6**	**17.1%**
Total (km)	**0.3**	**100.2**	**7.2**	**23.2**	**7.9**	**22.8**	**162.0**	**100.0%**

Notes:
(1). The majority of new trails identified for implementation in the Long Term are on land currently under private or other public ownership. In the event that opportunities become available to develop these trails in advance of the long term (i.e. through the application of various land securement strategies discussed later in this chapter), the Town should take seek to develop these trails in the earlier term.

6.2.2 Grade Separated Crossings

It is intended that if design feasibility and available funding is confirmed, that the proposed grade separated crossings be constructed at the same time the connecting trail segment(s) are constructed. However, should an opportunity arise in advance of the timing identified in the master plan, the Town should work with appropriate agencies to implement the crossing. For example, the Town should work with York Region when a Regional road is being upgraded and a grade separation has been identified in the master plan as the preferred method of achieving the crossing. In these cases, the schedule will be dependent on the Region's schedule for Environmental Assessment and construction. In some locations it may be possible and preferable to develop an interim solution such as a pedestrian activated signal or median refuge island.

6.3 HOW TO IMPLEMENT THE TRAILS MASTER PLAN

A successful trails master plan requires champions and leadership to move from the plan and design stage to the funding and implementation stage. The formal relationships between individuals and organizations and their operational practices are important factors in determining whether trails initiative will proceed and be successful. Maximizing participation and removing obstacles to the flow of information between participants are two of the main objectives in managing implementation.

Aurora's Trails Master Plan is more than a proposed network of off-road trail facilities and in boulevard multi-use bike trails. It is a Plan that includes a set of recommendations to promote safe trail use in Aurora and to recognize, realize and share in the economic, health and quality of life benefits that trails can offer.

While Town staff, led by the Parks and Recreation Services Department, will oversee the implementation of the Trails Master Plan, they will also require ongoing support from and communication with the Town's advisory committees, York Region, the Nokiidaa and Oak Ridges Trail Associations, adjacent local municipalities, and other organizations and advocacy groups. The successful implementation of the Trails Master Plan will require a strong working relationship between Town and Regional municipal staff as well as conservation authorities, developers and the public.

Recommendation 6-1	That the Planning, Design and Development of trails in the Town are to be consistent with the Aurora Trails Master Plan, once approved by Town Council.

6.3.1 A Trails Advisory Committee

The Trails Sub-Committee has had an important role in advancing trail initiatives to where they are today. This includes not only assisting with the planning of trail routes, but also with trail advocacy and promotion, construction of some trails and trail amenities and with trail maintenance. This role should continue and be expanded. In addition to areas where the committee currently assists, an expanded role could include integrating active transportation into their mandate. Many urban municipalities have been finding in recent years

with the growth in active transportation and the role that a trail network plays in active transportation, that it is most sensible and efficient to have one committee to deal with active transportation and trails. Combining these roles avoids duplication of effort and provides one committee voice through which advice can be provided to Council. Active Transportation Committees often have representation from trails, cycling, transportation and public health. Sub-committees can be designated for various areas of work such as off-road trails, on-road cycling, promotion and communication etc. This model would require updating and expanding the mandate for the Town's current Trails Sub-Committee to include additional members with an interest in active transportation and trails. It is also proposed that the name of the Trails Sub-Committee be revised to reflect this new change. One option might be the Trails and AT Sub-Committee.

In view of the popularity of trails, and the many health, environment and safety related benefits, as well as the importance of developing comprehensive infrastructure for Aurora's self-propelled recreational and utilitarian traffic participants, the trails and AT Sub-Committee would remain as a sub-committee of the Parks and Recreation Services Advisory Committee. The committee's membership should represent the following Town departments and local stakeholders:

- Parks Department
- Planning Department
- Department of Environmental Services and Infrastructure
- Parks and Recreation Services Advisory Committee
- Accessibility Advisory Committee
- Local or regional trails clubs
- Member(s) of the public.
- The AT Sub-Committee would have a secretary (Town staff).

Recommendation 6-2:	That in 2011 / 2012, Town council complete a review of the mandate of the Trails Sub-Committee with the goal of broadening their role to include Active Transportation.
Recommendation 6-3:	That the Trails Sub-Committee be renamed to reflect the additional mandate for Active Transportation.

6.3.2 Who Does What?

An efficient reporting and implementation structure is vital to ensure that the decision-making process associated with the implementation of the Trails Master Plan is managed and all relevant municipal departments are appropriately engaged. A suggested structure for managing and implementing the Trails Master Plan is illustrated in **Figure 6-3**.

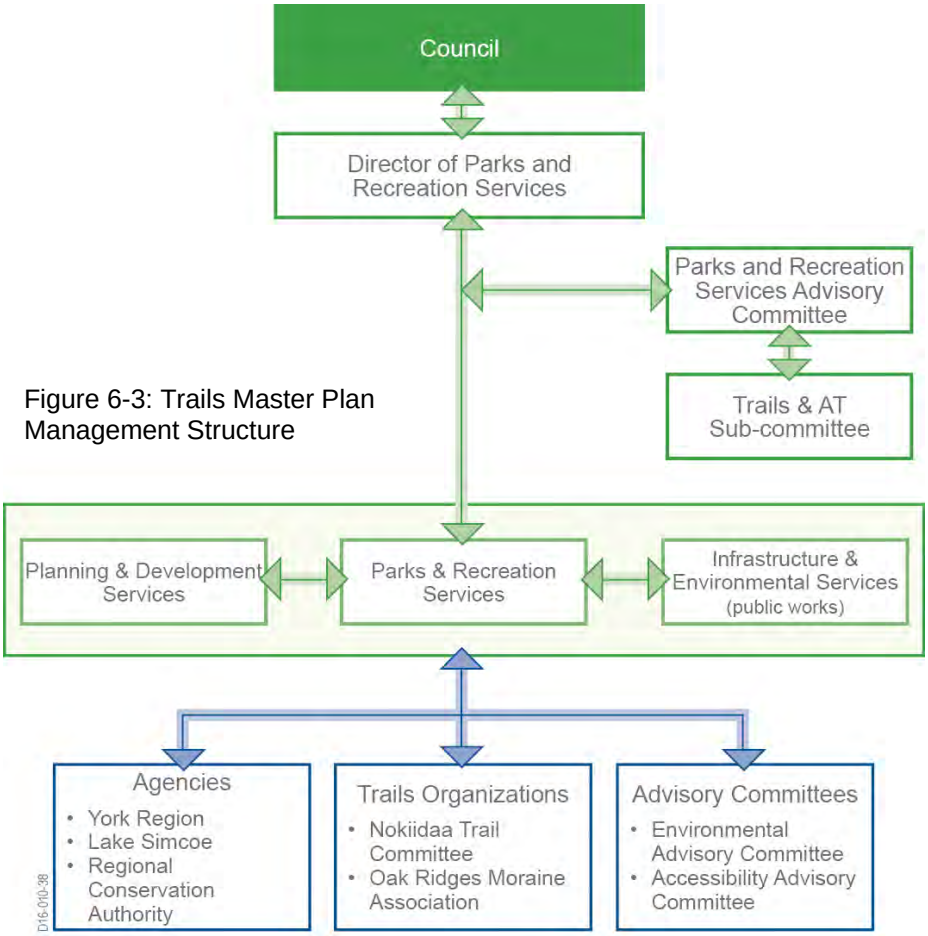


Figure 6-3: Trails Master Plan Management Structure

(1) The Trails and Active Transportation Sub-Committee name is the suggested replacement name for the current Trails Sub-Committee, as recommended in this report.

Led by the Town's Parks and Recreation Services Department (through the Parks and Recreation Services Committee), a core team would be formed with representation from the Town's Infrastructure and Transportation Services, Planning and Development Services and Parks and Recreation Services. The core group of this recommended reporting structure would oversee and make recommendations regarding funding and priorities associated with the Trails Master Plan, as well as other Town Active Transportation initiatives, as required.

The proposed structure identified in **Figure 6-3** is intended as a suggestion only and Town staff should select the right reporting model that is inclusive of affected departments and is efficient.

6.3.3 A Network Management Tool

The proposed Trails network for the Trails Master Plan was developed using the Town's Geographic Information System (GIS) base. This digital GIS based network map provided to the Town as part of the Trails Master Plan can also be used as a pedestrian and cycling facility management tool. A database is associated with the map information and includes a number of different attributes. For example, the network has been divided into segments, each specifying a length of the segment and the trail facility type proposed, as well as the phase in which the route and facility is proposed to be implemented.

During the implementation process, Town staff can use this tool to assist in confirming the feasibility of pedestrian and cycling routes and facilities and the proposed schedule (Phases 1, 2 or 3) for implementation. The GIS tool can also be used to track and document new segments as they are implemented. Updating the facilities component of the Trails Master Plan on a regular basis will significantly reduce the effort and cost to update the entire Trails Master Plan, which is recommended to occur every five years. If the Town chooses, this GIS information, with some programming, could also be posted on the Town's website in an interactive map format. This would be useful to the public and developers and would also serve as a 'quick reference'.

Recognizing that not all Town staff will have access to GIS software, key components of the database and map provided in a KML format will allow anyone with access to Google Earth digital aerial photography over the

internet (this is currently a free service) to overlay the network route and facility information on a aerial photo of the Town of Aurora.

6.3.4 A Five-Step Network Implementation Process

The Aurora Trails Master Plan is not intended to be a static document. The timing and details related to implementation, particularly the location of recommended routes and facility types should and will evolve through community consultation and technical review during the implementation. At the same time, however, the extensive effort that established the overall direction for the network and the trails network planning map must be respected when network modifications are being contemplated.

The following 5 step process is a step-by-step mechanism to confirm the feasibility of each route recommended in this report at the time implementation is proposed. It will assist municipal staff from affected departments to work together, to share information and to facilitate the implementation of the Plan. Each part of the network implementation process is described in the following sections.

Part I: Preliminary Review

The first step in implementing segments of the network is to identify and communicate opportunities. As such, municipal infrastructure projects including the capital works forecast should be monitored. When a project identified in the Master Plan is advanced to the planning stage, or an opportunity to establish a new route not identified in the Master Plan comes forward, staff responsible for the implementation of the Master Plan network should undertake a preliminary review. This review should:

- Compare the timing of the project to the short , mid and long term implementation priorities identified in the Aurora Trails Master Plan;
- Assess whether the nature of the project may permit implementation of the recommended facility type in a cost effective manner; and
- Inform the project lead and affected departments whether or not a feasibility assessment should be undertaken to confirm the feasibility and costs for implementing the proposed route as part of the subject project.

The key aspect of this initial step is communication. Staff from various departments should report all upcoming projects that may involve or impact a trail route identified in the Master Plan.

Part II: Feasibility Assessment

If a network route is confirmed through the preliminary review process (Part I), a brief feasibility assessment should be undertaken, which includes the following:

- Confirm the feasibility of the route based on a review of the Master Plan and supporting route selection and planning and design criteria, and conduct a field check for off-road trails segments to identify any other issues that should be explored in the future;

- Determine if further public consultation should be conducted and to what level it is required (i.e. Environmental Assessment in the case of watercourse crossings versus notification of neighbouring residents in the case of a local connection or upgrade);
- Undertake a functional design for the segment and estimate implementation costs, including construction and signing;
- Identify any less costly alternatives and how they may fit within the intent of the overall network plan, and this may include alternative parallel routes that meet the intent of the Master Plan; and
- Provide a recommended course of action.

Part III: Detailed Design, Tender and Implementation

Once determination has been made to proceed the necessary detailed design should be completed. The final step involves tendering the project (if not undertaken in-house) and then construction / implementation. It is also possible that following detailed design the decision is made not to proceed with the facility or preferred facility type because of the cost, other constraints that arise through the detailed design process or based on direction from Council. If this occurs, the network should be updated and an alternative route should be proposed.

Part IV: Monitoring Phase

Once facilities have been constructed, their design and use should be monitored to ensure they function in the manner intended. When necessary, the facilities should also be upgraded and maintained to ensure continued safe use. A set of performance measures to assist in monitoring and evaluating the implementation of the plan should be developed by the Trails/AT Sub-Committee and Town staff. Examples of such measures are outlined further on in this chapter.

Part V: Municipal Official Plan

The fifth part of the implementation process includes updating the Municipality's Official Plan to account for changes in policy and network routes.

6.3.5 Creating New Trails in Established Neighbourhoods

It is often challenging to implement trails in established neighbourhoods, even if the intent to do so has been clearly documented in strategic plans like the Aurora Trails Master Plan. It is sometimes difficult to obtain public opinion related to specific trail segments at the strategic/master planning stage and it is not until a project reaches the implementation stage that residents who perceive themselves as being directly affected become more involved and vocal. Real and perceived concerns over increased neighbourhood traffic, access to their rear yards, invasion of privacy, a perception that there may be an increased potential for vandalism and theft are often cited as key concerns.

One aspect of a program to overcome this challenge is to engage residents in an open, public consultation process in the earliest possible stages of the project. In some cases, the most vocal opponent can become the greatest supporter if the process provides an effective avenue to address concerns. Some keys to success include:

- Notifying adjacent landowners early in the process and taking the time to understand and respond to their concerns. Some successful techniques include:
- Their participation in the design process through events such as local design workshops to determine trail layout, design, materials and privacy features, as well as site meetings to examine and refine proposed layouts);
- Emphasizing the benefits of trails for their neighbourhood and community, including themselves and their children; and
- Emphasizing successful examples and effective solutions where similar problems were overcome.

6.3.6 Trails in New Development Areas

Growth in Aurora includes both the development of new land areas around the periphery of the urban areas as well as the redevelopment of under-utilized lands within existing urban areas. In both cases, the planning of the trail system is seen as a critical component of the land development process. Community trails are an integral part of the urban fabric and are a key recreation and transportation asset. Developers should be expected to work through an iterative process with City staff, beginning early in the planning stages to create as traffic free a trail network as possible within their development area that reflects the intent of the Trails Master Plan. Many developers recognize the value of integrating trails into their projects and often use trails as a selling feature for their neighbourhoods. Providing the development community with information about the network, desired connections and design expectations will help to improve communication among all parties involved. It is expected that proposals for new development (both greenfield and infill) will contain a network of trails that reflect the density, variety, hierarchy and character that is consistent with the Trails Master Plan. Proposed networks should provide:

- Trails that overcome physical barriers, make appropriate connections to important destinations and enhance connectivity with the existing or planned system of trails surrounding the development area; and
- Trails that are both sensitive to, and take advantage of, inherent qualities of the natural and cultural landscape features within the development area.

A careful examination of a variety of factors including topography and drainage, slopes, soil conditions, plant and animal communities, microclimate and human comfort, historic/cultural resources, public education opportunities, significant views and vistas should be part of the process to integrate trails in new developments.

Ideally, in new development areas trails should be constructed prior to or concurrently with the construction of other infrastructure and homes. When trail construction / implementation is deferred until homes are built there

can be conflict when residents adjacent to a planned trail corridor claim that they were not aware of plans for trail construction even if this intention has been clearly indicated in municipal planning documents. Developers should be encouraged to be very proactive about notifying prospective buyers where trails are to be located at the time they are selling lots. Providing information at sales offices, including information in sales packages and erecting signs in locations where trails are to be constructed may help to alleviate difficulties at a later date.

6.3.7 Trails and the Development Charges By-Law (5139-09)

By-law 5139-09 pertains to Development Charges in the Town of Aurora. The Development Charge by-law enables Town to collect a fee from a development proponent, based on a set amount per new development unit. These fees are used by the Town to offset the cost of providing public infrastructure to meet the needs of the community as it grows. By-law 5139-09 is not "area specific", meaning that a portion of Development Charges collected for projects in a new neighbourhood can be used elsewhere in the Town under certain circumstances. Development Charge funds can be applied to projects in other parts of the town provided that it can be clearly demonstrated that the project(s) are for new public infrastructure that is growth related. In many instances the owner (Town) requires or negotiates with the developer to provide some of the infrastructure in their subdivision that would otherwise be implemented in the future by the Town using Development Charge funds. In these instances it is not uncommon for the developer to seek a Development Charge credit related to the infrastructure provided.

Section 2.1 of the by-law 5139-09 describes categories of services for which Development Charges are imposed. Park Development is included under subsection d. Though trails are often part of park development, the by-law does clearly state that trails are included with parks. When this by-law is next amended, the Town should add "trails" to Section 2.1 d) and Schedule A Section 4.0 of the Town's Development Charges By-Law.

Recommendation 6-4:	That the Town updates the wording in Sections 2.1 d) and Schedule A of Section 4.0 of the Town's Development Charges Bylaw to read "Park Development and Trails".

6.3.8 Land Acquisition / Securement Strategies

Although the majority of the recommended trail network lies on lands that are currently in public ownership there are some areas of the town where a trail connection is desired, yet there is no public land available at the present time. Some of these connections are located along natural heritage corridors (i.e. creeks and valleys) in land that is presently rural. At some time in the future it is anticipated that many of these tracts will become part of the urban fabric and at that time these corridors would be set aside along with a suitable buffer because of their natural heritage. These corridors could accommodate trails at that time.

There are a number of other locations throughout the town where the land has already been urbanized, yet a future trail connection is desired and no public land exists. To realize the full build out of the network and complete the connections across these lands may require permission for access or a strategy to secure ownership. A range of strategies are available to accomplish this, from "handshake" access agreements such as those used for portions of the Bruce and Oak Ridges trails, to purchase of these lands by the Town. Regarding the purchase option, as reported in Chapter 3, almost 80% of respondents to the online survey conducted as part of the Aurora Trails Master Plan study felt that it was a good idea for the Town to purchase lands needed to make key connections in the trail network.

Table 6-2 is a summary of some of the land securement techniques available to the Town of Aurora for making key connections in the trail network over lands that are not currently in public ownership. The Town should review these potential strategies and use them as a starting point for developing an access/acquisition policy for key trail links.

Table 6-2 Land Securement Tools

Techniques	Description	Advantages/ Disadvantages	Legislative Basis	Who/How Administration	Type of lands
Purchase includes "First Right of Refusal" Local Area Levies and Local Improvement Charges	Purchase of land at fair market value.	Municipal or other group directly acquires land. Permanent protection and public access. Options exist to recover costs through levies or charges on benefitting owners.	Municipal Act (right of municipality to acquire and dispose of own land) and right of municipality to levy local improvement charge on benefiting land.	Municipal government Land Trusts Non-Profit Groups (e.g. Nature Conservancy) Community Co-operative Partnerships	Any greenspace, particularly those requiring environmental protection.
Land Exchange (Equivalent to Outright Purchase)	Lands or interest in land can be traded to achieve mutual interests, and net differences in values can then be settled.	Same cost as purchase; permanent protection; public access possible. Must be equitable for both parties.	Municipal Act (right of municipality to acquire and dispose of own land).	Municipal most common – public ownership.	Any land or land use greenspace or other type of use including housing.
Donation/ Bequest, Including a Life Estate	Land or interests in land donated during an individual's lifetime or by private corporation or as a bequest as part of an estate. The donor may opt to retain use of land until death.	Low cost/ permanent protection and public access. Tax benefits for donor. Lands must meet Federal Tax rules for donation in order to qualify for tax exemptions.	Municipal Act Income Tax Act	All of the above Both public and private ownership.	Any greenspace or other type of lands including housing.

Techniques	Description	Advantages/ Disadvantages	Legislative Basis	Who/How Administration	Type of lands
Parkland Dedication	Lands dedicated to municipality for parkland purposes as a result of subdivision development. Usually relates to recreation land but may be used to acquire natural areas.	Provides parkland in growing communities: Can be converted to cash for more flexibility. Planning Act limits amount of land that can be required at no charge.	Planning Act	Municipal ownership	Any greenspace, but usually active parkland.

Techniques	Description	Advantages/ Disadvantages	Legislative Basis	Who/How Administration	Type of lands
Traditional Land Use and Other Regulatory Controls	Use of land use planning (Official Plan/Zoning/ Subdivision Watershed and Sub-watershed Plans) and other regulatory controls. Land Ownership does not change.	Intent for the land is provided in the Official Plan. Permanent protection can be achieved. May not be popular and does not provide for public access. May trigger requests for financial compensation or purchase.	Planning Act Conservation Authorities Act Fisheries Act Aggregate Resources Act	Municipal, Province, Conservation Authorities. Usually private ownership or public ownership other than the City.	Any greenspace if designation or zoning is not successfully challenged.
Sale with Restrictions (Including acquisition and resale)	Land can be sold with restrictions in place to control future uses.	Generates revenue while maintaining greenspace; permanent protection; public access can be negotiated. Restricted land more difficult to sell, limited market and reduced value.	Municipal Act Conservation Land Act	Municipal/Provincial Government	Greenspaces requiring environmental protection where public access may not be as critical.
Land Trust	Non-profit organizations dedicated to conserving open space, natural areas, etc.	High profile grass-roots organization. Provides permanent protection and public education. Limits public access. Needs high profile and independence to get funds.		Generally non-profit, incorporated community organization or a chapter within an existing organization.	Usually land needing environmental protection or recreational trails.

Techniques	Description	Advantages/ Disadvantages	Legislative Basis	Who/How Administration	Type of lands
Corporate Landowner Agreement/ Condominium Agreement	Similar to Land Trust Conservation land can be owned by a shareholder's corporation or condominium devoted to the protection and management of the lands.	An alternative to government ownership and management; no cost; flexible; management costs borne by those directly benefiting. Protection not guaranteed. Little used; no guarantee of public access, needs a willing corporate entity.	Corporations Act Condominium Act	Private landowners, would not involve public ownership.	Any greenspaces.
Conservation Easement	An agreement that restricts uses for conservation purposes, and when registered on title they bind both current and future landowners.	Low cost; may be more acceptable to landowner; can provide permanent protection. Cost of easements may be as great as purchase; public access may be limited; requires ongoing monitoring; not extensively used in Ontario.	Ontario Heritage Act; Ministry of Government Services Act Ontario Conservation Land Act	Only government agencies and registered charities including land trusts. Private ownership	Usually land needing environmental protection as well as heritage buildings.

Techniques	Description	Advantages/ Disadvantages	Legislative Basis	Who/How Administration	Type of lands
Restrictive Covenant	A condition on title that restricts the landowner's use of land or assigns certain rights or access to an adjacent landowner. Applicable where a government wishes to control land use but not own the land.	Low cost; can provide permanent protection. Can only be used under certain conditions; unlikely to be able to specify long-term management obligation. Public access not likely.	Common Law	Any government or conservation authority. Private ownership	Usually land needing environmental protection.
Lease /License	A lease gives exclusive rights to use land for a specified term and cost. Licenses give permission to use a property for a purpose but not exclusive rights and does not bind future owner.	Public access can be negotiated Agreement must be renewed periodically; may not protect land in perpetuity.		Legal lease or license agreement between parties. Private or public ownership.	Any land

Techniques	Description	Advantages/ Disadvantages	Legislative Basis	Who/How Administration	Type of lands
Incentives/ Assistance i.e. Tax Rebates/ Credits/ Management Agreements/ Funding Assistance	Tax or management incentives to encourage retention/ restoration of natural areas. Usually linked to land use restrictions such as Provincial policy and zoning.	Lower cost and non-confrontational; willing landowner agreement. Difficult to monitor compliance; does not provide public access or permanent protection. Lost tax revenue.	Woodlands Improvement Act; Games and Fish Act; Conservation Authorities Act; Conservation Land Act	Ministry of Natural Resources; Conservation Authorities Private ownership	Usually land needing environmental protection.
Stewardship Support/ Education	Private land owner care and protection of land. Can be linked to incentives.	Voluntary. Least costly; non-threatening; builds rapport. Not permanent. No public access or protection.	N/A	Private although all levels of government publicize and provide support.	Usually land needing environmental protection.

Source: City of Ottawa. Department of Planning and Growth Management. *Greenspace Master Plan - Strategies for Ottawa's Urban Greenspaces*. City of Ottawa, 2006. Print

Recommendation 6-5:	That the Town develop a land securement strategy for trail development for routes that are identified on lands under private ownership.

6.3.9 Public Outreach and Trail Promotion

Interpretive programs and signs, brochures, either self guided or as part of a wider natural and cultural heritage education program, offer endless opportunities to raise awareness about the privilege of using trails. More importantly, the need to educate users about their obligations as responsible trail users is an integral part managing the network. Posting signs is a useful way to get messages out to trail users and can be a good tool for building positive relations where neighbours have raised concerns about trail use. Public Service campaigns, information signs and interpretive signs are also useful ways to send messages to trail users and neighbours that the municipality is aware of particular concerns, that situations are being monitored and actions are being taken.

Aurora's Trail Map and Marketing Trails in Aurora

Trail maps are one of the most overlooked opportunities to spread the word about trails. Maps inform users where the routes are, plus they provide an opportunity to educate trail users through messages such as "rules of the trail" and trail user etiquette. Though expensive to produce initially, maps can be updated with the release of new additions as the system grows, making the initial investment pay for itself over time. The GIS Network Management Tool prepared as part of this Trails Master Plan is being used as the basis for an update to the Town's current trails map, and when complete it will become an excellent tool to communicate to residents and

visitors about the location of trails, provide educational information about trail etiquette and to promote the Aurora as trail users destination and a place where healthy, active lifestyles can be enjoyed. To assist in offsetting the cost of producing trail maps, many other municipalities have been very successful at selling advertising space on their map. Many have found that once local businesses become aware of the opportunity, they "line up" to have their space on the map as they see the benefit of being associated with an activity that promotes green and active lifestyles.

As part of the development of the map a trail branding strategy has been undertaken. A key component of the branding strategy is the preparation of a trail logo that would be used on maps, brochures, trail signage, and advertisement related to Aurora's trails.

HOLLAND RIVER VALLEY TRAIL

AURORA
Trails Network

Town Park

AURORA
trails

Aurora Trails
AURORA

Aurora Trails
AURORA

Aurora Trails
AURORA

Recommendation 6-6:	That the Town's Trail Map be updated by 2011 to include educational information about trail etiquette and safety, as well as promote the benefits of trail use as an active lifestyle choice.

Trail Ambassadors

Many municipalities have successfully implemented trail ambassador programs. These often involve teaming a staff leader with summer students who attend events and functions organized by private businesses and agencies, camps and related recreation programs, where they promote the use of the trails and in some cases teach certain skills such as cycling. In addition, ambassadors ride the routes and trails, hand out trail brochures, provide assistance to users, and monitor the condition of facilities.

Trail patrols travel the entire trail system on a regular basis and can be trained to take note of, and report observations related to trail surface conditions, vandalism, user-conflicts, environmental degradation and overgrown vegetation to Parks Operations staff. In addition, the ambassadors are available to the public and can gather important data on user satisfaction, and can educate trail users about proper trail etiquette.

A trail ambassador program is more typical of a mature, urban trail system. As the trail system in Aurora continues to grow and mature, the Town should explore the merits of a trail ambassador program. In the interim, training park maintenance staff (including seasonal staff) to carefully observe and take note of trail conditions as part of their day-to-day maintenance role is an effective way to assist Parks Operations in keeping track of trail conditions. Members of the Town's Trails Sub-Committee are already serving informally as trail ambassadors and should included in future formal initiatives related to a trail ambassador program.

Recommendation 6-7:	That the Town develop a volunteer trail ambassador or trail patrol/adoption program as a stewardship and public engagement initiative.

Partnering with Others

Opportunities exist for the Town to develop partnerships with businesses and other agencies that provide services to a large sector of the population. In many municipalities there is a strong interest in partnering with other agencies in promoting trails and trail use as a healthy lifestyle choice. Partnerships with agencies can include jointly produced promotional or educational literature in magazines, materials distributed through offices, materials on or linked to corporate/agency websites. The local Health Unit delivers important messages on healthy living choices and active living and is one such organization where there is a great opportunity for the Town to develop a strong and mutually beneficial partnership for the purposes of promoting and educating the public about trails in Aurora.

Partnerships with agencies can also include co-participation in annual events related to trail use. Events such as the Terry Fox Run and other fundraisers, and events such as Ride to Work Week, the Clean Air Campaign and Earth Day are natural matches. Allowing time for key staff to contribute to the organization of these events that use the trails is a simple, cost effective way to spread the word about using the trail system. The Manulife Ride for Heart in Waterloo and the Tour de Grand in Cambridge for example, attract thousands of cyclists to one-day fundraisers that use trails extensively, providing visibility through extensive media coverage at essentially no cost to the owners of the trail.

It is mutually beneficial to recognize the efforts of private business when they partner with the Town on initiatives related to the development and use of the trail system. Recognition through the media for efforts that encourage more trail use is a very positive way of showing partners that their contribution is appreciated. Furthermore, media recognition is a simple and cost- effective way to raise awareness and encourage use. Where contributions are made that improve conditions of the trail, such as the provision of trail amenities, creation of links across private properties, the Town should recognize the effort which has been displayed for these contributions. This can be done with donor signs and plaques that are tastefully designed and carefully located. Many trails across the country have been built this way.

Recommendation 6-8:	That the Town explore opportunities to develop partnerships with York Region, local partners and other public agencies to promote the health and recreational benefits of trail use.
Recommendation 6-9:	That the Town establish a formal recognition program for individuals, businesses and organizations who contribute to the promotion, development and maintenance of the Aurora Trails Network.

In addition to recognizing those individuals and businesses that make a contribution to the development of actual trail routes, some municipalities have developed incentive programs to recognize businesses that, through their actions indirectly encourage more user participation on trails. For example, the City of Toronto hosts an annual "Bicycle Friendly Business Awards" program, which recognizes businesses that have made considerable effort to improve their facilities for cyclists through things that may be as simple as providing high quality and conveniently located bicycle parking. Winners are presented with a plaque and are recognized in the local media for their participation.

6.3.10 Proposed Trail Policies for Inclusion in the Town's Official Plan

The Town of Aurora updated their Official Plan in 2010. As previously discussed in Chapter 2, Official Plan Amendment 2 (1995) contains policies related to trail development in Aurora. The consultant team was asked to review these policies and provide suggestions for strengthening and improving the current policies as an input to the Official Plan Update. The current policies in OPA 2 were found to be quite comprehensive. The following sections are excerpted from what was previously the Official Plan for the Town. As part of the analysis suggestions for revisions and additions to the existing policies were made. Suggested additions to existing policies are underlined. These recommendations were considered and utilized as part of the 2010 Official Plan update, he wording determined wording should be referred to in the Town's new Official Plan.

Section 3.5.1 Policies Common to Public and Private Open Space Areas

a. The following uses may be permitted in areas designated as open space: active and passive outdoor recreation, parks, walking and bicycle paths and off-road trail networks. Trails are intended for both active recreation and non-motorized active transportation. Other permitted uses may include nature and wildlife conservation, forestry, agriculture, horticulture, cemeteries, and other uses which preserve the natural landscape and/or the environment. Uses and structures, accessory to the above uses and utilities, may be permitted. Where such accessory uses are proposed in environmental protection areas, approval by the appropriate Conservation Authority, the Ministry of the Environment and the Ministry of Natural Resources shall be required and, where applicable, the York Region Medical Officer of Health.

b. Where Environmental Protection Areas such as flood prone areas, wetlands, forest or fishery resource areas are approved for active or passive recreation activities and off-trail use, appropriate buffers from such elements as streams, wetlands or forests shall be maintained. Where such key natural heritage or hydrologically sensitive features are located on the Oak Ridges Moraine, as shown on Schedule "K", appropriate minimum vegetation protection zones shall be established in accordance with the Table of Minimum Areas of Influence and Minimum Vegetation Protection Zones as set out in the *Oak Ridges Moraine Conservation Plan*, and the policies of Subsection 3.13.5.d of this Plan.

Section 3.5.2 Public Open Space Policies

a. Public Open Spaces are lands owned or proposed for public acquisition or access by the municipality or other public authority which shall be used for active or passive recreation, including off-road trails. Such lands may include both table lands and environmental protection areas such as flood prone areas, wetlands, forest or fishery resource areas or lands within the Oak Ridges Moraine.

Section 3.5.2.1 Acquisition

a. To meet the public open space goal and objectives of this Plan Council may acquire land under the provisions of Sections 41 and 50 of the Planning Act, through purchase, trade, inheritance, easements or lease, bonusing and the Development Charges Act of 1989.

   i Lands, used for drainage of a subdivision or other development, through an open natural or constructed water course, are not acceptable as part of the open space dedication under the Planning Act.

   ii Where possible, open space dedications shall be integrated into the open space system, especially the pedestrian/bicycle paths system.

   iii Council may, where possible, acquire easements over private property to enable the construction and maintenance of public open spaces which lack adequate access from a public road.

iv. Where consistent with the Trails Master Plan and deemed appropriate, the Town should acquire private land for the purpose of eliminating missing links in the trail network if no public land exists.

Section 3.5.2.5 Passive and Linear Open Spaces deals most directly with trails. The following are some suggested revisions and additions to these policies. For reference, Section 3.5.2.5 as modified by OPA #2 is included in its entirety.

Section 3.5.2.5 Passive and Linear Open Spaces

All references to the "Aurora Trail Network Concept" should be replaced with the approved "Aurora Trail Network" and an updated schedule(s) should be included. The updated schedule(s) would be those contained in the Aurora Trails Master Plan once it is approved by Council.

a. Linear open spaces shall provide primarily passive recreation and trails for the entire community. Such an open space network shall serve non-motorized movement such as walking, jogging, cycling, cross county skiing or snowshoeing as outlined in the Town of Aurora Trails Master Plan. It will link the Open Space including the existing and proposed off-road trails with destinations such as schools, recreation, service, employment, shopping areas, and the Historic Core. The trail network shall be conducive to an urban form and structure which is friendly to non-motorized users, and the environment. Schedule I of this Plan shows the Aurora Trail Network as recommended in the Town of Aurora Trails Master Plan.

g. To establish new linear open spaces which complement and link the Open Space System, Council may obtain easements:

add the following clause

g. iv. to eliminate missing links in the network.

h.ix. investigate and provide grade separated crossings over water courses where feasible and necessary, subject to approval from the Ministry of Natural Resources and Transport Canada (Aids in Waterways, Coast Guard, Marine Group and the appropriate Conservation Authority);

h.x. investigate and explore providing grade separated crossings at key intersections of trails with railways and arterial roads; where trails cross roads at grade between intersections, signs and where appropriate pedestrian activated signals shall be considered to assist safe crossing and orientation; at grade crossing of trails at Regional roads should only be made at controlled intersections;

i.v. receive priority in tree planting, landscaping and street furniture such as lighting, benches, waste bins which include garbage, recycling, and green bins, public phones, appropriate signing to nearby public washrooms, and other features to enhance the safety and amenity of the trail.

In addition to the modifications proposed above, the following are a number of new policies which should be further explored and integrated into Section 3.5.2.5 Passive and Linear Open Spaces as part of the Town's Official Plan update:

1. The Town of Aurora shall require the development of passive and linear open spaces and trails within new developments and redevelopments within the Town consistent with the Town's Trails Master Plan.
2. The Town shall work in collaboration with local stakeholders and members of the public to implement and maintain the network and facilities as proposed in the Town of Aurora Trails Master Plan.
3. The Town shall pursue grant and partnership opportunities to fund the implementation and future maintenance of trails in Aurora.

Other Policies Related to Trails

As part of the overall update to the Official Plan the following additional policies, which do not necessarily fit in Section 3.5.2.5, should also be incorporated. They should be placed in the appropriate location in the updated Official Plan.

The Town of Aurora shall routinely consider and wherever possible accommodate the needs of trail users in the design and construction of all infrastructure undertakings such as roadways, linear utilities such as hydro and pipeline corridors, bridges and underpasses, and crossings of physical barriers such as waterways, railways, existing and future highways.

All development applications, including, but not limited to, plans of subdivision, severances, plans of condominium, Official Plan Amendments, zoning by-law amendments, site plans shall be reviewed by staff to ensure that they are consistent with the Town of Aurora Trails Master Plan.

The planning, design and development of trails in Aurora shall be consistent with the Aurora Trails Master Plan, once approved by Council.

These final policy suggestions relate to the creation of trails as part of the land development process

Prior to Draft Plan of Subdivision/Condominium approval the Developer shall be required to prepare and submit a trail concept plan and typical details for any trails within the boundaries of the plan of subdivision, to the satisfaction of the Town. The trail concept plan shall be consistent with the approved Aurora Trails Master Plan.

Prior to Final Plan of Subdivision/Condominium approval and the registration of the applicable stage of the subdivision, the Developer shall be required to prepare and submit detailed design drawings, specifications and a detailed cost estimate for trail construction, to the satisfaction of the Town.

The Development Agreement shall outline the requirements of the Developer relating to trail construction, including the following:

- The Developer shall agree to construct trails within the boundaries of the applicable stage of the subdivision/condominium to a base condition, to the satisfaction of the Town, prior to building permits being issued;
- The Developer shall agree to complete the finishing of trails within the boundaries of the applicable stage of the subdivision/condominium in accordance with the approved plans, to the satisfaction of the Town, prior to assumption;
- Notice to purchasers of the existence of the municipal trail, including identification of the trail on plans displayed in a sales office and a warning clause in all agreements of purchase and sale and/or lease agreements and registered on title, to the satisfaction of the Town.

In addition, the following definitions are suggested and should be defined and included in the appropriate location in the updated Official Plan. The following definitions are proposed:

1. Active Recreation: An activity or pastime with the primary intention of physical exertion and enjoyment, not for transportation to a specific destination. Active recreation may include but is not limited to jogging, cycling, playing sports, and dog walking. These activities may occur in a number of locations such as parks, trails, and pathways.
2. Active Transportation: A method of transportation where human muscle power is used for utilitarian purposes and destination oriented trips. Active transportation modes may include but are not limited to all forms of non-motorized transportation such as: walking, hiking, running, cycling, rollerblading, and skateboarding.

6.4 FUNDING STRATEGY

Aurora's Trail Master Plan can only be successful if funding and staff resources are committed by Council on an annual basis. The annual implementation budget for implementing the Trail Master Plan should be identified in an annual report prepared by Town staff and based on implementation objectives and opportunities for the coming year. This report could also comment on projects and trail related initiatives completed from the following year.

The Trails Master Plan is an integrated body of components, and requires a strategic approach for implementation and a funding commitment. Focusing efforts on individual elements of the Trails Master Plan in isolation of the others will not result in the level of success that it has been designed to achieve. For example,

funding a paved/stonedust trail in the short-term but not the development and delivery of programming or promotional campaigns, is not an efficient or recommended strategy.

The public and stakeholder input received during the preparation of the Trails Master Plan indicate that both residents and visitors to Aurora support improving trail facilities and programs to promote trail usage in the Town.

6.4.1 What is the Investment?

The Trails Master Plan is both an infrastructure and operations plan. Therefore, it requires infrastructure, program development and operations (maintenance) funding to ensure successful implementation and monitoring. These types of improvements should be included in the Town's capital budget and forecasts.

6.4.1.1 Capital

It is estimated that the total capital investment to implement the network is slightly more than $13M over the 50 year horizon of the plan, exclusive of proposed grade separated crossings and maintenance (the unit prices assumed are summarized in **Appendix D**). This conservative estimate is based on stand-alone unit prices. However, it is assumed that in-boulevard right-of-way components of the network will typically be included as part of the same tender for a road resurfacing, reconstruction or widening project. Therefore, through economies of scale, the construction cost charged to the Town by a contractor may be lower. The distances for multi-use trails in Town and Regional road rights-of-way have been assigned to the Town because multi-use trails, like sidewalks, are the responsibility of local municipalities in York Region.

The estimated costs to implement grade separated crossings as illustrated in the recommended trails network are not included with the estimated network costs for the following reasons:

- Costs for these vary widely depending on the style and ultimate design of the structure(s);
- The design of, timing for and construction of many of the proposed grade separated crossings would be subject to infrastructure improvements being made by other agencies such as York Region. In these cases the final design would be part of a larger infrastructure improvement project that would be subject to an Environmental Assessment process and subsequent detail design; and
- There may be an opportunities to partner with agencies for these projects. For example it is reasonable to assume that the Town would be able to partner and cost-share with the Region for grade separations of Regional roads, thus an accurate estimated cost to the Town for each can not be developed until each location has been studied in more detail as part of pre-design of those structures.

6.4.1.2 Operations

Operations costs include on-going funding related to implementing the Trails Master Plan, preparing the annual progress report, delivering safety, educational outreach and promotional programs, and performing network and infrastructure maintenance to achieve a state of good repair and to ensure all season use. This also includes staff resources, as well as management and administration.

The incremental cost to maintain trails relatively low. Generally speaking, most municipalities adjust maintenance budgets based on the number of kilometres of each facility and increase maintenance budgets relative to the length of new infrastructure added on an annual basis. Maintenance of mature off-road multi-use trails, particularly in greenways and parks can cost from $4,000 to $6,000 per linear kilometre of trail (3.5 m wide), depending on the level of service standard of a municipality. Annual maintenance can include drainage and storm channel maintenance, sweeping, clearing of debris, trash removal, weed control and vegetation management, mowing of grass along shoulders, minor surface repairs, repairs to trail fixtures (benches, signs) and other general repairs. Costs also can vary depending on whether the trail is in a road boulevard or in a linear greenway or park and whether it is paved or has a granular surface. New asphalt off-road trails also typically have lower maintenance costs in the first 10 years.

An absolute dollar value for maintenance costs was not calculated for trails network as the budget for maintenance will need to grow in an incremental fashion along with the incremental growth of the trails network. As each new network segment is added (either in boulevard or off-road), the impact to the operations budget should be calculated by Town staff so that it can be added into the annual maintenance budget request.

Recommendation 6-10:	That the Town review and update its annual maintenance budget for trails based on the recommended design guidelines in the Trails Master Plan, and increase this budget as additional kilometres of trails are added to the network.

6.4.2 Where Will the Money Come From?

The annual implementation budget for the Trails Master Plan should be identified in an annual report and be based on implementation objectives and opportunities for the coming year. This report would also comment on projects from the previous year. It is expected that the majority of Trails Master Plan capital costs related to proposed in-boulevard right-of-way facilities will be identified and included as component costs within a planned right of way widening, reconstruction, resurfacing, new development, or other Aurora and York Region projects.

To assist in reducing taxpayer costs, the Town of Aurora should pursue outside funding opportunities. Over the last few years funding sources made available for cycling, pedestrian and trail related projects is at or near an all time high, likely due to the enormous popularity of trails today. It is expected that this trend will continue. Outside funding opportunities may include:

- York Region Municipal Partnership Program;
- Federal / Provincial Gas Tax;
- Metrolinx (as per the Regional Transportation Plan and funding recommendation of $20 million per year for municipal active transportation infrastructure in the GTHA);
- Transport Canada's MOST (Moving on Sustainable Transportation) and ecoMobility (TDM) grant programs;
- Federation of Canadian Municipalities Green Municipal Fund;
- Federal / Provincial infrastructure stimulus funding;
- Ontario Ministry of Health Promotion grant programs;
- Ontario Ministry of Environment Community Go Green Fund (CGGF);

- Ontario Ministry of Transportation Demand Management Municipal Grant program;
- Partnership funding with York Region for infrastructure and health promotion related initiatives;
- The Communities in Action Fund available through the Ontario Ministry of Health Promotion for programming and promotional initiatives related to health/active living/active transportation;
- The Canada-Ontario Infrastructure Program;
- Ontario Trillium Foundation that was recently expanded in response to the money collected throughout the Province by casinos;
- Human Resources Development Canada program that enables personnel positions to be made available to various groups and organizations. For example, the Ontario Trails Council has been able to hire two people under this program;
- Corporate Environmental Funds such as Shell and Mountain Equipment Co-op that tend to fund small, labour-intensive projects where materials or logistical support is required;
- Corporate donations which may consist of money or services in-kind, and have been contributed by a number of large and small corporations over the years;
- Potential future funding that might emerge from the Province in rolling out the Ontario Trails Strategy;
- Service Clubs such as the Lions, Rotary and Optimists have assisted with a number of high visibility projects at the community level; and
- Private citizen donations/bequeaths, and this can also include a tax receipt for the donor where appropriate.

6.4.3 Why Should the Town Make the Investment?

There are numerous benefits that emphasize why the Town of Aurora's commitment to implement the Trails Master Plan is so important. Chapter 2 of this report details the various benefits of walking and cycling in terms of recreation, health and fitness benefits; transportation benefits; environmental benefits; and economic benefits. The Town's investment in the Trails Master Plan can be expected to yield benefits in all of these areas.

In addition to these important benefits, the costs of the Trails Master Plan can be justified as part of the cost of providing a more sustainable, balanced and efficient recreation and transportation system in the Town of Aurora. Finally, as the consultations conducted as part of this study confirmed, Town residents want governments to invest in making Aurora more walkable and bikeable. The Town should make the investment in trail implementation because residents are requesting it and it will support Council's efforts to make Aurora one of the most desirable communities in Ontario to live and work.

6.5 MANAGING THE PLAN

6.5.1 Insurance, Liability and Risk Management

Exposures to potential and concerns from private landowners who grant easements or who are located adjacent to in-boulevard right-of-way and multi-use trail facilities are liability concerns for the Trails Master Plan.

Even though multi-use trails are separated from the roadway, they still may legally fall under the definition of a "highway", since bicycles are legally defined as vehicles. This is an important point because it means that cycling facilities are covered under many of the same basic immunities as other highways. It also illustrates the importance of adhering to design and construction guidelines, as this will provide the greatest legal protection. Aside from proper design and operation of multi-use trail facilities, the Town should address potential hazards associated with these facilities including accidents, theft, vandalism, and other problems. This becomes much more acute when these facilities are located along waterways and residential backyard fences.

The following methods of reducing risk are proposed for Aurora to help minimize the liability associated with providing designated multi-use trail facilities:

- Improve the physical environment, increase public awareness of the rights and obligations of pedestrians and cyclists and improve access to educational programs in order to demonstrate that

efforts are being taken to reduce the likelihood of accidents occurring and lawsuits being initiated by injured parties;

- Select, design and designate facilities in compliance with the highest prevailing standards;
- Design concept(s) should comply with all applicable laws and regulations;
- Maintenance operations should conform to acceptable standards. If a hazard cannot be removed, it must be isolated with barriers or notified by clear warning signage;
- Monitor on a regular basis the physical conditions and operations of trail facilities. All reports of hazardous conditions received from pedestrians, cyclists, police or others should be promptly and thoroughly investigated;
- Keep written records of monitoring and maintenance activities;
- Avoid describing or promoting routes or pathways as "safe" or "safer" than alternatives. It is preferable for facility users to assess their capabilities themselves and govern their choices accordingly, which is the prevailing situation; and
- Maintain proper insurance coverage as a safeguard against having to draw payment for damages from the public treasury.

Recommendation 6-11:	That the Town establish and document, in association with the Town's legal advisors, recommended procedures for risk management as it relates to the design, maintenance and operation of trail facilities in the Town of Aurora.

6.5.2 Monitoring Implementation and Performance Measures

Implementation of the Trails Master Plan is expected to begin in 2011. It is proposed that the Town implement the town-wide trail network infrastructure plan on an annual basis in accordance with the proposed phasing and available capital funding, and as authorized by Town Council.

Collecting data to evaluate the different and changing aspects of trail users' behaviour will assist in evaluating the effectiveness and overall contribution of various activities to achieve the stated vision and goals of this Plan. This data collection should begin in 2011 and build upon the various Trails Master Plan initiatives, and may include public attitude surveys. The data will establish a benchmark with which to compare later data as the Trails Master Plan is implemented.

The data collection will be used to:

- Confirm the overall direction and implementation of the Trails Master Plan;

- Confirm statistics on the number and type of trail users; and
- Verify the route selection process.

Over time, the evaluation system should identify changes in route preference to assist in determining where to implement changes to "hard and soft" trail infrastructure. The results of this assessment may be used to determine the success of implementing various types of trail facilities. However, caution must be used in relying on an immediate response to a given improvement. An extended timeframe should be established to ensure that trail use awareness initiatives are in place to assist in changing travel patterns and habits.

Assessing the impact and costs of the implementation program might be based on information such as:

- Origin/destination counts;
- Screen line counts on a finer scale that are appropriate to trail use patterns;
- Intersection counts to coincide with routes on which improvements are proposed, and also on parallel routes; and
- User counts on major trail systems.

This information should be collected every two years and during the peak trail use season.

Data collected through evaluation/monitoring programs along with information collected through on-going public consultation exercises, such as user surveys and public attitude surveys conducted every five years, will inform and assist in preparing the list of annual priorities and measuring the performance of the Plan.

A component of measuring the implementation of the Plan and its success in meeting objectives is to establish performance measures and targets.

6.5.3 Trail Maintenance

Many jurisdictions have formalized programs to plan and construct trail systems, however the number that have formal programs for trail maintenance is lower. In 2004, telephone interviews were conducted with approximately a dozen southern Ontario municipalities to determine the overall scope of their trail maintenance, to learn about significant issues and priorities and to gain an understanding of basic costs for trail maintenance1. The following are some highlights:

- Very few maintain their trails in winter. Of those that do, none reported maintaining all of their trails in winter. Generally winter maintained trails included only asphalt trails and those that are heavily used, or are main connections serving utilitarian purposes such as connections to schools and main bicycle/pedestrian commuter routes;
- Several reported having defined maintenance standards for trails, based on trail type. Many of those that did not currently have standards reported that they were working towards them;
- Most have a call in/hot line for areas requiring emergency repairs, or areas where garbage containers are heavily used. None of the hot lines were trail specific, most often they were included with a parks or even municipal-wide hotline for parks, roads, infrastructure etc.;
- In most cases, respondents felt that they could do a better job at trail maintenance, but were limited by resources (staff resources/budget and time);
- Most reported conducting an annual safety audit, in most cases this was included as part of their annual safety and security audit for parks, playgrounds and recreation facilities;
- Many noted that proactive or preventative maintenance, especially with regard to trail surface condition, signing, trash and vandalism was a key success factor;
- Most use trail patrols or supervisors conducted a regular (i.e. as often as weekly) review to assess conditions, prioritize maintenance tasks and monitor known problem areas;
- Some use maintenance logbooks to set out a schedule of tasks, priorities, standards to be achieved and method of tracking that the work has been completed. This method of tracking was also noted as useful for being able to predict which locations would require the highest level of maintenance;
- In most cases, parks crews performed trail maintenance as part of their regular park maintenance role. Where extensive maintenance programs were reported, additional seasonal labour was added to the workforce (often summer students). Volunteer “adopt-a-trail” programs were also identified as useful for basic trail cleanup and monitoring;
- Trail maintenance is generally handled under Parks Operations budgets, sometimes tracked as a separate trail maintenance budget, but most often grouped in with other parks maintenance budgets;
- Trail maintenance costs range depending on the type of trail and location. Costs to maintain highly urbanized trails ranged from $4000-$6000/km per year, whereas costs to maintain rural trails (including rail trails) were significantly lower, ranging from less than $100/km year to $350/km per year. Tasks

1 Municipal Trail Maintenance Survey. Telephone interviews conducted by Stantec, 2004

covered as part of these estimates included maintenance of trail drainage, storm channel and culvert maintenance, grading and minor topping up of trail surfaces, minor pothole repair, sweeping and clearing of debris, trash removal, mowing of clear zones, minor surface repairs and repairs to trail fixtures/furnishings;

- Many respondents reported that asphalt surfaces on trails have a life span of approximately 15-20 years, and trails that were installed in 1980's and earlier now require reconstruction, and in the process are generally being widened to meet higher levels of use/demand experienced today. Wider trails are also better for preventing damage to trail edges by municipal service vehicles, as vehicle wheels are less likely to roll over and break trail edges and less likely to create ruts in the soil beside the trail;
- Trails that were properly constructed at initial installation had the fewest maintenance issues. Proper subgrade excavation, adequate base and proper drainage were noted as keys to trail longevity;
- Many reported that erosion is a big challenge and that "trail hardening" with asphalt on sloped trails is the best way to prevent further erosion. Some reported trying other soil binding compounds for trails on slopes and reported only moderate success with these alternative materials;
- Mowing grass along edges of trails is performed on a regular basis. Depending on trail location this may be weekly, biweekly, monthly or infrequently throughout the growing season. The width of the mown swath generally varies from 0.5m to 2.0m depending on the municipality and location. Mowing helps to keep clear zone open and can also help with the invasion of weeds into granular trail surfaces;
- Several have trained their mower operators to be more observant while mowing and to take note of problem areas along the trails;
- Garbage pickup is performed on a regular basis (i.e. 10 day cycle), with receptacles located at the ends of trail segments where they can be easily accessed for service vehicles;
- Tasks performed on a seasonal basis include culvert cleanout and pruning to maintain trail clear zones;

- Grading/grooming the surface of granular trails is generally performed once per year or as required after heavy storm events in areas prone to erosion;
- Tasks performed every 3 to 5 years cycle include refurbishment of signs, cleaning and refurbishment site furnishings;
- Tasks performed on an as-required basis include moving or marking obvious hazards within 24 hours of their identification, inspection/monitoring of trail areas prone to damage following heavy storms, repairs to vandalized items, minor repairs to structural elements such as bridges, trail surfaces, railings, benches, gates and signs; and
- Major renovation or replacement of large items such as bridges, kiosks, gates, parking lots, and asphalt trail surfaces was generally described as a 10-20 year replacement item.

6.5.3.1 Winter Maintenance of Off-Road Trails

As previously noted very few municipalities in Ontario maintain their off-road trails during winter months. For those municipalities that do offer winter maintenance services on trails, only certain routes are maintained and these tend to be primary routes that serve a commuter function to key destinations such as schools and community centres. The following are some general initiatives that are being used in other jurisdictions to identify candidates for winter trail maintenance and to develop priorities among those candidate routes.

a. Trail Function and Location

- The trail's role in the overall transportation network and community connectivity (primary vs. secondary function);
- The trail does not provide an alternate route to a nearby sidewalk or trail that is already being maintained in winter;
- Determine if the trail is integral to the overall network such that it provides a primary route to schools, public facilities such as recreational centres and to other pedestrian generators such as senior's homes, shopping and commercial establishments;
- The trail is not merely a convenient short cut. If the trail is not available for winter use, the length of the detour required should be explored further. Although these should be explored further on a case-by-case individual basis, 500m could be used as a threshold guideline;
- The trail connects dead end streets or cul-de-sacs where alternative routes do not exist;
- Consideration is given to neighbouring land use(s) and how this relates to pedestrian origins, destinations and pedestrian generators; and
- Consideration is given to trails that have historically received winter maintenance, but winter maintenance has not been formally adopted.

b. Trail Design and Condition

- The trail should be constructed to a minimum standard including:
- Adequate surface drainage to prevent ponding of water on the trail surface;

- Minimum width (e.g. no less than 3.0m) and there is adequate access for maintenance equipment;
- The trail has an asphalt surface (this factor may not apply if a snowblower is used instead of a plow); and
- There should be no danger adjacent to the trail, such as a steep drop off that could be a hazard for equipment operators.

6.3.7.2 A Trail Maintenance Plan for Aurora

Based on the information in the previous sections, this section describes a potential trail maintenance program for Aurora. The general objectives of a trail monitoring and maintenance plan are to:

- Provide safe, dependable and affordable levels of service;
- Preserve infrastructure assets;
- Protect the natural environment;
- Enhance the appearance and health of the community;
- Provide a reference framework against which to measure performance;
- Provide the basis of a peer review that is comparable with other municipalities; and
- Provide citizens and Council with a reference for expectations.
- The first step in implementing a maintenance and management program is to determine its scope. Trail plans, maps, inventories, trail logs, traffic count information and condition surveys are all valuable sources of information for developing maintenance management systems.

Table 6-3 outlines typical trail maintenance activities that Aurora should include as part of the development of a trail maintenance program that is tailored to suit the Town's needs. Tasks have been grouped according to the frequency with which they would typically be performed:

- Immediately (within 24 to 48 hours);
- Regularly (weekly/biweekly/monthly);
- Seasonally;
- Annually;
- Every 3 to 5 years; and
- Every 10 to 20 years.

Table 6-3 Maintenance Opportunities for Off-Road Trails

Immediate (within 24 hours of becoming aware of the situation through a "hotline", email, other notification or observation)	▪ As a minimum, mark, barricade and sign the subject area to warn trail users, or close the trail completely until the problem can be corrected. ▪ Remove vegetation and/or windfalls, downed branches etc., where traffic flow on the trail is being impaired or the obstruction is resulting in a sight line issue. Remove hazard trees that have been identified. ▪ Repair or replace items that have been vandalized or stolen/removed. This is especially important for regulatory signs that provide important information about trail hazards such as road crossings, steep grades, and sharp curves. ▪ Removal of trash in overflowing containers or material that has been illegally dumped. ▪ Repair of obstructed drainage systems causing flooding that poses a hazard to trail users or that is resulting in deterioration that poses an immediate safety hazard. ▪ Monitor trail areas and structures that are prone to erosion after severe summer storms and repair as required. ▪ Repairs to structural elements on bridges such as beams, railings, access barriers and signs.

Regularly (weekly / biweekly / monthly)	▪ Trail patrols/inspections should review the trail conditions (as often as weekly in high-use areas), to assess conditions and prioritize maintenance tasks and monitor known problem areas. ▪ Mow grass along edges of trails (in open settings only). Depending on trail location this may be done weekly, biweekly or monthly and the width can vary according to the location (typically 0.5 to 1.0m). This helps to keep the clear zone open and can slow the invasion of weeds into granular trail surfaces. Not all trails will have mown edges. In woodland and wetland areas, pruning and brushing is typically the only vegetation maintenance to be undertaken. ▪ Regular garbage pickup (10 day cycle or more frequent for heavily used areas). ▪ Restock trailhead information kiosks with brochures as needed. ▪ Repair within 30 days or less, partially obstructed drainage systems causing intermittent water backups that do not pose an immediate safety hazard, but that if left unchecked over time will adversely affect the integrity of the trail and/or any other trail infrastructure or the surrounding area.
Seasonally	▪ Patching/minor regarding of trail surfaces and removal of loose rocks from the trail bed. ▪ Culvert cleanout where required. ▪ Top up approaches to bridges. ▪ Planting, landscape rehabilitation, pruning/beautification. ▪ Installation/removal of seasonal signage.

Annually	▪ Conduct an annual safety audit. This task is not necessarily specific to trails and may be included with general annual safety audits for parks, playgrounds and recreation facilities. ▪ Evaluate support facilities/trailside amenities to determine repair and/or replacement needs. ▪ Examine trail surface to determine the need for patching and grading. ▪ Grading/grooming the surface of granular trails, and topping up of wood chip trails. ▪ Pruning/vegetation management for straight sections of trail and areas where branches may be encroaching into the clear zone. This task is more of a preventative maintenance procedure. Cuttings may be chipped on site and placed appropriately or used as mulch for new plantings. Remove branches from the site unless they can be used for habitat (i.e. brush piles in a woodlot setting), or used as part of the rehabilitation of closed trails. Where invasive species are being pruned and/or removed, branches and cuttings should be disposed of in an appropriate manner. ▪ Inspect and secure all loose side rails, bridge supports, decking (ensure any structural repairs meet the original structural design criteria). ▪ Aerate soils in severely compacted areas.
Every 3 to 5 Years	▪ Cleaning and refurbishment of signs, benches and other trailside amenities.
Every 10 to 20 Years	▪ Resurface asphalt trails (assume approximately every 15 years). ▪ Replace or reconstruct granular trails (assume approximately every 15 years, but this may not be necessary if adjustments/repairs are made on an annual basis). ▪ Major renovation or replacement of large items such as bridges, kiosks, gates, parking lots, benches etc.

Note: A trail maintenance log should be used to document maintenance activities. The log should be updated when features are repaired, modified, replaced, removed, or when new features are added. Accurate trail logs also become a useful resource for determining maintenance budgets for individual items and tasks, and in determining total maintenance costs for the entire trail. In addition, they are a useful source of information during the preparation of tender documents for trail contracts, and to show the location of structures and other features that require maintenance.

6.6 NEXT STEPS

There are a number of recommended steps that the Town of Aurora should take in 2010 and 2011 to advance the Trails Master Plan:

- The Town should develop and distribute a Trail Promotional Brochure (map) to the public;

- Following Council's adoption of the Draft Final Report, issue a media release and public notice announcing the completion of the Trails Master Plan and note that the report is available for public review for a 45 day period, following which if there are no major concerns it will be formally adopted by the Town. The draft report should be posted in digital format on the Town's website so that it can be viewed and downloaded by the public, and copies made available at the Town's offices; and
- Provide copies of the Trails Master Plan to all Town Departments, York Region, adjacent municipalities, the Toronto Region Conservation Authority and Lake Simcoe Region Conservation Authority, and the Ontario Ministry of Natural Resources
- Develop a detailed signage and branding strategy for the Town's trails network.

From as early as the mid 1970's the Town of Aurora has embraced the creation of municipal trails network. Over 57km of trails and bike paths are enjoyed by Aurorans today. Residents know and love their trails as is evidenced by their support for improving and expanding the network. This support was confirmed in the results of the recent surveys conducted as part of the development of this Trails Master Plan, as well as the Parks and Recreation Master Plan. The Aurora Trails Master Plan is the next logical step in the continued evolution of trails for Aurora. It consolidates the many years of hard work that have brought the trails to where they are today, and it looks to the future. It is intended to be the guide for the Town to take the next steps towards improving and expanding the trails network, and to promote Aurora's trails as a public health, nature appreciation recreation and transportation asset.

The development of the Aurora Trails Master Plan is based on current needs, issues and priorities along with experiences from other municipalities having similar goals. The Trails Master Plan paves the way for future expansion of the trails network. It is inevitable that needs, issues and priorities will change; therefore the TMP will need to evolve and be periodically reviewed to be an effective planning tool, so that Aurora's trails can be enjoyed by residents and visitors for generations to come.

CHAPTER 7
SELECTED REFERENCES

Accessibility News. Trails for All Ontarians Collaborative (TAOC), 2006. Web. Spring 2010. <http://www.accessibilitynews.ca/cwdo/resources/resources.php?resources=72>.

American Association of State Highway and Transportation Officials. *Guide for the Planning, Design and Operation of Pedestrian Facilities*. Rep. American Association of State Highway and Transportation Officials, 2004. Print.

British Columbia, Canada. British Columbia Cycling Coalition Cycling Advocates. Finance and Government Services Committee. *Certainty in an Uncertain World: The Case for Accelerated Investment in Cycling in Challenging Economic Times*. By British Columbia Cycling Coalition. British Columbia, 2007. Web. Spring 2010. http://www.bccc.bc.ca/Documents/BCCC_Budget_Submission_2008.pdf>.

Canada. Go for Green. *National Active Transportation Roundtable*. 2003. Print

Canadian Social Research Links. *Social Development Canada*. Web. Spring 2010. <http://www.canadiansocialresearch.net/index.htm>.

City of Ottawa. Department of Planning and Growth Management. *Greenspace Master Plan - Strategies for Ottawa's Urban Greenspaces*. City of Ottawa, 2006. Print.

Crowe, Timothy D. "Crime Prevention Through Environmental Design." *CPTED Ontario Home Page*. CPTED Ontario, 2002. Web. 30 Sept. 2010. <http://www.cptedontario.ca/>.

Donaldson. G.A., in Design and Safety of Pedestrian Facilities: A Recommended Practice of the Institute of Transportation Engineers, March 1998

Federation of Canadian Municipalities. Centre for Sustainable Community Development. *Communities in Motion: Bringing Active Transportation to Life*. Ottawa: Federation of Canadian Municipalities. Print.

Frank, L, Kavage S. & Litman, T. (2006). Promoting public health through smart growth: Guiding healthier communities through transportation and land use policies and practices. *Smart Growth BC.* 1-43.

Go for Green, and Environics. Rep. 1998. Print.

Government of Canada. "Transport, Infrastructure and Communities Portfolio."*Welcome Page | Page D'accueil*. 29 Sept. 2010. Web. 04 Oct. 2010. <http://www.tc.gc.ca/eng/menu.htm>.

Heart and Stroke Foundation of Canada (2006) Tipping the Scales of Progress. Heart Disease and Stroke in Canada 2006. Retrieved from www.heartandstroke.ca

IBI Group. "Strategies for Sustainable Transportation Planning: A Review of Practices and Options." Editorial. Transport Canada: Transportation Planning Summer 2005. Print.

Institute for Social Research, York University (on behalf of Go for Green and the Public Health Agency of Canada), 2004. *National Survey on Active Transportation*.

Institute of Transportation Engineers. *Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities*. Publication. Institute of Transportation Engineers, 2006. Print.

Katzmarzyk P.T. and C. Mason. Prevalence of class I, II and III obesity in Canada. *Canadian Medical Association Journal* 2006;174:156-157. [PMID: 16415457]

Lalani, Nazir, and ITE Pedestrian and Bicycle Task Force. *Alternative Treatments for At-Grade Pedestrian Crossings*. Rep. Institute of Transportation Engineers, 2001. Print.

Lawrence Frank, et al, Obesity Relationships with Community Design, Physical Activity, and Time Spent in Cars.

Metrolinx. *The Big Move*. Rep. Metrolinx - Government of Ontario, 2008. Print

Ministry of Health Promotion. *Ontario Trails Strategy*. Rep. Queen's Printer for Ontario, 2005. Print.

Ministry of Health Promotion and Sport. *Ministry of Health Promotion and Sport*. 31 Mar. 2010. Web. 04 Oct. 2010. <http://www.mhp.gov.on.ca/en/>.

Ministry of Transportation. *Ontario Highway Traffic Act*. Rep. 1990. Print.

MMM Group Limited, Go for Green, Decima Research, and Regional Municipality of York. *York Region Pedestrian & Cycling Master Plan Study: Towards a More Sustainable Region*. Rep. York Region: Regional Municipality of Work, 2008. Print.

Nabti, Jumana, Matthew Ridgway, and ITE Pedestrian and Bicycle Council. *Innovative Bicycle Treatments: An Informational Report*. Rep. United States of America: Institute of Transportation Engineers, 2002. Print.

Planning and Conservation Land Statute Law Amendment Act (2006) (enacted). Print.

Price Waterhouse Coopers, The Ontario Trillium Foundation, and Trans Canada Trail Sentier Transcanadien Ontario. *Economic Impact Analysis Trans Canada Trail in Ontario*. Tech. Toronto: Price Waterhouse Coopers, 2004. Print.

Province of Ontario. Ministry of Community and Social Services. *Accessibility for Ontarians with Disabilities Act*. By Ministry of Community and Social Services. 2005. Web. Spring 2010. <http://www.mcss.gov.on.ca/en/mcss/programs/accessibility/OntarioAccessibilityLaws/2005/index.aspx>.

Province of Ontario. Ministry of Municipal Affairs and Housing. *Greenbelt Plan*. 2005. Print.

Province of Ontario. Ministry of Public Infrastructure Renewal. *Places to Grow Growth Plan for the Greater Golden Horseshoe*. 2006. Print.

Province of Ontario. *Municipal Act*. 2001. Print.

Provincial Policy Statement, 2005. Ministry of Municipal Affairs and Housing, Jan. 2005. Web. Jan.-Feb. 2010. <http://www.mah.gov.on.ca/Page1485.aspx>.

Region of Hamilton-Wentworth Transportation, Operations & Environment Division. *Shifting Gears: A New Cycling Plan for Hamilton-Wentworth*. Rep. Hamilton-Wentworth, December 1999. Print

Regional Municipality of York. Planning and Development Services. *York Region Sustainability Strategy*. Markham: Regional Municipality of York, 2007. Print.

Regional Municipality of York. *York Region Sustainability Strategy: Towards a Sustainable Region*. Rep. Regional Municipality of York, 2007. Print.

Regional Municipality of York. *Vision 2026 Towards a Sustainable Region*. Rep. Regional Municipality of York, 2009. Print.

Stephen Farber, University of Pittsburgh and Pennsylvania Economy League, Inc., *An Economic Impacts study for the Allegheny Trail Alliance*, January 1999, i-ii.

The Regional Municipality of York. *Vision 2026*. 2001. Print.

The Regional Municipality of York. *York Region Official Plan*. 2008. Print.

The Regional Municipality of York. *York Region Sustainability Strategy*. 2007. Print.

The Regional Municipality of York. *York Region Transportation Master Plan*. By MMM Group Limited. 2009. Print.

The Regional Municipality of York. *Pedestrian and Cycling Master Plan*. By MMM Group Limited, Go For Green, and Decima. 2008. Print.

Town of Aurora. Leisure Services Department. *Parks and Recreation Master Plan*. Town of Aurora, Jan. 2010. Web. May 2010. <http://www.town.aurora.on.ca/aurora/index.aspx?ArticleID=3287&lang=en-CA>.

Town of Aurora. Leisure Services Department. *2008 Business Plan and Budget*. 2008. Print.

Town of Aurora. Leisure Services Department. *Parks and Recreation Master Plan*. Town of Aurora, Jan. 2010. Web. May 2010. http://www.town.aurora.on.ca/aurora/index.aspx?ArticleID=3287&lang=en-CA.

Town of Aurora Leisure Services Department. *Town of Aurora 2008 Business Plan and Budget*. Rep. Town of Aurora, 2008. Print.

Town of Aurora. "Official Plan." *Official Town of Aurora Website*. Aug. 2010. Web. 04 Oct. 2010. <http://www.town.aurora.on.ca/aurora/index.aspx?ArticleID=2390&lang=en-CA>.

Town of Aurora. Planning Department. *Official Plan Consolidation*. 2009. Print.

Town of Aurora. Town of Aurora Accessibility Advisory Committee. *Accessibility Plan*. 2008. Print.

Town of Aurora. *Town of Aurora Official Plan*. Rep. Aurora, Ontario: Town of Aurora, 2010. Print.

Town of Aurora, and Trails Sub-Committee. *Town of Aurora Official Plan Amendment #2*. Rep. Town of Aurora, 2010. Print.

Town of Aurora Trails Sub-Committee. Trails Sub-Committee Report for a Trails Master Plan and Core Document / Trail Policy Directions. Rep. Town of Aurora, 2009. Print.

Traffic Engineering Council Committee TENC-5A-5, *Design and Safety of Pedestrian Facilities: A Recommended Practice of the Institute of Transportation Engineers*, Institute of Transportation Engineers, Washington, D.C., March 1998.

Transportation Association of Canada. *Bikeway Traffic Control Guidelines for Canada*. Rep. Ottawa, Canada: Transportation Association of Canada, 1998. Print.

United States Department of Transportation - Federal Highway Administration. "Environment - HEP - FHWA." *Federal Highway Administration: Home*. Administration. Web. 30 Sept. 2010. <http://www.fhwa.dot.gov/environment/>.

World Health Organization, Peggy Edwards, and Agis Tsouros. *Promoting Physical Activity and Active Living in Urban Environments: The Role of Local Governments*. Tech. Copenhagen: World Health Organization, 2006. Print.

Zegeers, Charles V., and Traffic Engineering Council. *Design and Safety of Pedestrian Facilities*. Rep. Washington, D.C.: Institute of Transportation Engineers, 1998. Print.

Photo Credit: Flicker.com

APPENDIX A

MAP LEGEND

LEGEND SYMBOL	LEGEND TITLE	DESCRIPTION
GRADE SEPARATED TRAIL CROSSINGS		
Existing Proposed		
	Primary Crossing	Typically found on the major spine of the trail system and intended to be mid-block grade separated crossings by way of a trail under a road bridge or through a large concrete box structure (i.e. tunnel) under a road. However, they could include a pedestrian/trail bridge over the road. Where design constraints and/or the cost to grade separate a trail at a road crossing is deemed not feasible, an at-grade crossing may be considered.
	Secondary Crossing	These include mid-block (not at an intersection) trail road crossings on local neighbourhood trail routes (i.e. not normally the primary trail spine) that may take various forms depending on the location, type of road/number of lanes and daily traffic volumes. These would therefore require a warrant assessment completed at the time of implementation. Crossing types could include the following: ➢ a grade separated crossing, ➢ a pedestrian signal, ➢ a formal crossover and signal, or ➢ an uncontrolled crossing (no pedestrian crossing markings on the pavement) with advanced advisory signs to inform motorists of a trail crossing ahead. At uncontrolled crossings, trail users must wait for a suitable gap in traffic before crossing.
	Culverts	Culverts are typically steel or concrete round or box structures used below roadways to accommodate water courses, utilities and animal and trail crossings. In order to accommodate a trail crossing through a culvert, the vertical elevation of the road base would need to be high enough to allow for a culvert which is able to accommodate a trail and necessary head room to pass below.
	Major Railway Grade Separation	A major railway grade separation is typically located on the major spine of the trail system and is comprised of a large concrete box structure to allow the trail to pass under the rail corridor. However, depending on the location, the crossing could also take the form of a pedestrian bridge.
AT-GRADE TRAIL CROSSINGS		
Existing Proposed		
	Crossing	At-grade trail crossings of roadways may take various forms depending on the location, type of road/number of lanes and daily traffic volumes, and would therefore require a warrant assessment completed at the time of implementation. Crossing types could include the following: ➢ routing the trail to cross at an existing controlled intersection (i.e. traffic signal or stop signs) or at mid-block locations: ➢ through a pedestrian signal, ➢ a formal pedestrian crossover and signal, or

		➢ an uncontrolled crossing (no pedestrian crossing markings on the pavement) with advanced advisory signs to inform motorists of a trail crossing ahead. At uncontrolled crossings, trail users must wait for a suitable gap in traffic before crossing.
	Secondary Railway Crossing	Secondary railway crossings are typically a formal at-grade crossing of a rail corridor along a trail route. However, it also could also take the form of a grade separated crossing if a design feasibility assessment concludes one is feasible and appropriate for the location.
OTHER TRAIL NETWORK INFORMATION		
	Lookout	A lookout is an area along a trail that may include a bench and garbage receptacle and provides the trail user with the opportunity to view or overlook a valley, natural feature or area of interest. Lookouts could also provide interpretive signage and other amenities as may be appropriate to the specific lookout.
	Trail Connection to Adjacent Municipality	A trail connection to an adjacent municipality symbol represents a location where the Town's existing or proposed trail system might connect with an existing or possible future trail link in an adjacent municipality.
	General Area where there is desire to have trail link developed in the long term	There are several locations in the Town where the Town's Trails sub-committee would like to achieve a trail link. We have identified these proposed links. However, the exact location, alignment or form of link can not be confirmed at this time until redevelopment occurs in the future.
	Local Road	A local road is road under the jurisdiction of the Town of Aurora
	Regional Road	A Regional Road is typically a collector or arterial road under the jurisdiction of the Region of York.
	Highway	A highway is multi-lane high speed roadway typical under the jurisdiction of the Province of Ontario.
	Public Transport Hub	A public transport hub is a facility that supports various travel/mobility modes (e.g. motorists, cyclists, pedestrians) interconnect or transfer to public transit (e.g. bus, train). The Aurora GO Station is a public transport hub that includes a major public parking facility.
	School	This symbol identifies the location of an existing school in the Town of Aurora
	Car Parks (Existing and Proposed)	This symbol identifies the location of existing and proposed public parking in the Town.
	Railway	This symbol identifies the location and alignment of an existing railway corridor in the Town of Aurora
	2C Secondary Plan Area	This symbol identifies a location in Aurora where planning for a major new development is underway. The Area 2c lands are located east and west of Leslie Street between Wellingston Street in the south to St. Johns Sideroad to the north.

Photo Credit: Flicker.com

APPENDIX B

NETWORK HEIRARCHY FIGURES

B-1: DRAFT ULTIMATE TRAIL ROUTE NETWORK AND ROUTE HIERARCHY - AURORA WEST LEGEND

NETWORK HIERARCHY

- Town-Wide Spine Trails (In-Road Right of Way)
- Town-Wide Spine Trails (Off-Road)
- E-W / N-S Spine Trail
- Local Neighbourhood Trails
- Special Use Trails
- Preferred Municipal Trail on Land Currently Under Private or other Public Ownership (e.g Ontario Land Trust)

NOKIIDAA / OAK RIDGES TRAIL ALIGNMENTS

- Nokiidaa Trail existing alignment
- Nokiidaa Trail preferred alignment
- Oak Ridges Moraine Trail existing alignment
- Oak Ridges Moraine Trail preferred alignment

GRADE SEPARATED TRAIL CROSSINGS

EXISTING	PROPOSED	
		Primary Crossing
		Secondary Crossing
		Underpasses
		Major Railway Grade Separation

AT-GRADE TRAIL CROSSINGS

EXISTING	PROPOSED	
		Crossing
		Secondary Railway Crossing

OTHER TRAIL NETWORK INFORMATION

- Lookout
- Trail Connection to Adjacent Municipality
- General Area where there is desire to have trail link developed in the long term.

TOWN INFORMATION

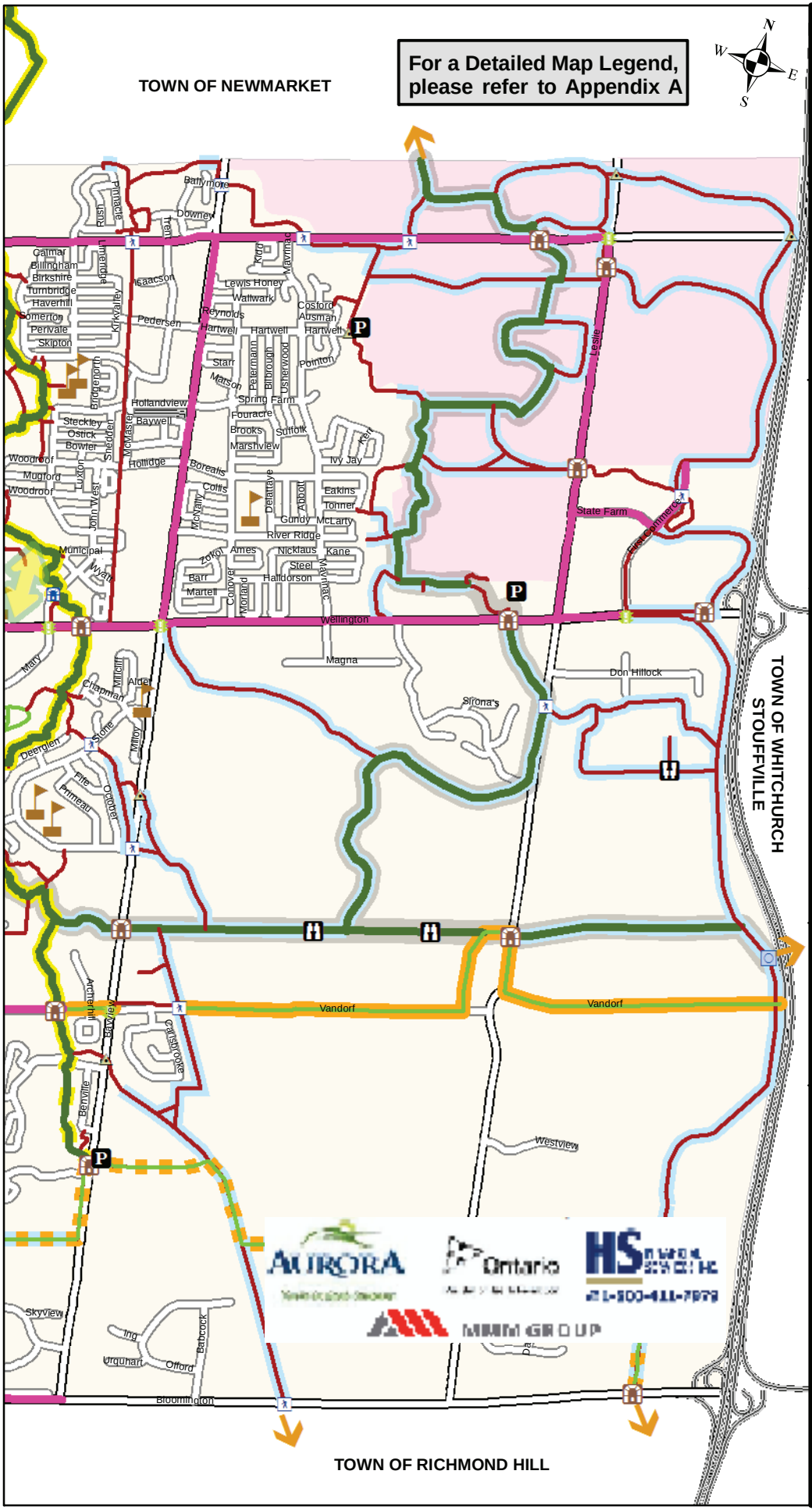
- Local Road
- Regional Road
- Public Transport Hub
- School
- Car Parks (Existing and Proposed)
- Railway

For a Detailed Map Legend, please refer to Appendix A

TOWN OF NEWMARKET

TOWNSHIP OF KING

TOWN OF RICHMOND HILL



B-2: DRAFT ULTIMATE TRAIL ROUTE NETWORK AND ROUTE HIERARCHY - AURORA EAST

LEGEND

NETWORK HIERARCHY

- Town-Wide Spine Trails (In-Road Right of Way)
- Town-Wide Spine Trails (Off-Road)
- E-W / N-S Spine Trail
- Local Neighbourhood Trails
- Special Use Trails
- Preferred Municipal Trail on Land Currently Under Private or other Public Ownership (e.g Ontario Land Trust)

NOKIIDAA / OAK RIDGES TRAIL ALIGNMENTS

- Nokiidaa Trail existing alignment
- Nokiidaa Trail preferred alignment
- Oak Ridges Moraine Trail existing alignment
- Oak Ridges Moraine Trail preferred alignment

GRADE SEPARATED TRAIL CROSSINGS

EXISTING PROPOSED

- Primary Crossing
- Secondary Crossing
- Culverts
- Major Railway Grade Separation

AT-GRADE TRAIL CROSSINGS

EXISTING PROPOSED

- Crossing
- Secondary Railway Crossing

OTHER TRAIL NETWORK INFORMATION

- Lookout
- Trail Connection to Adjacent Municipality
- General Area where there is desire to have trail link developed in the long term.

TOWN INFORMATION

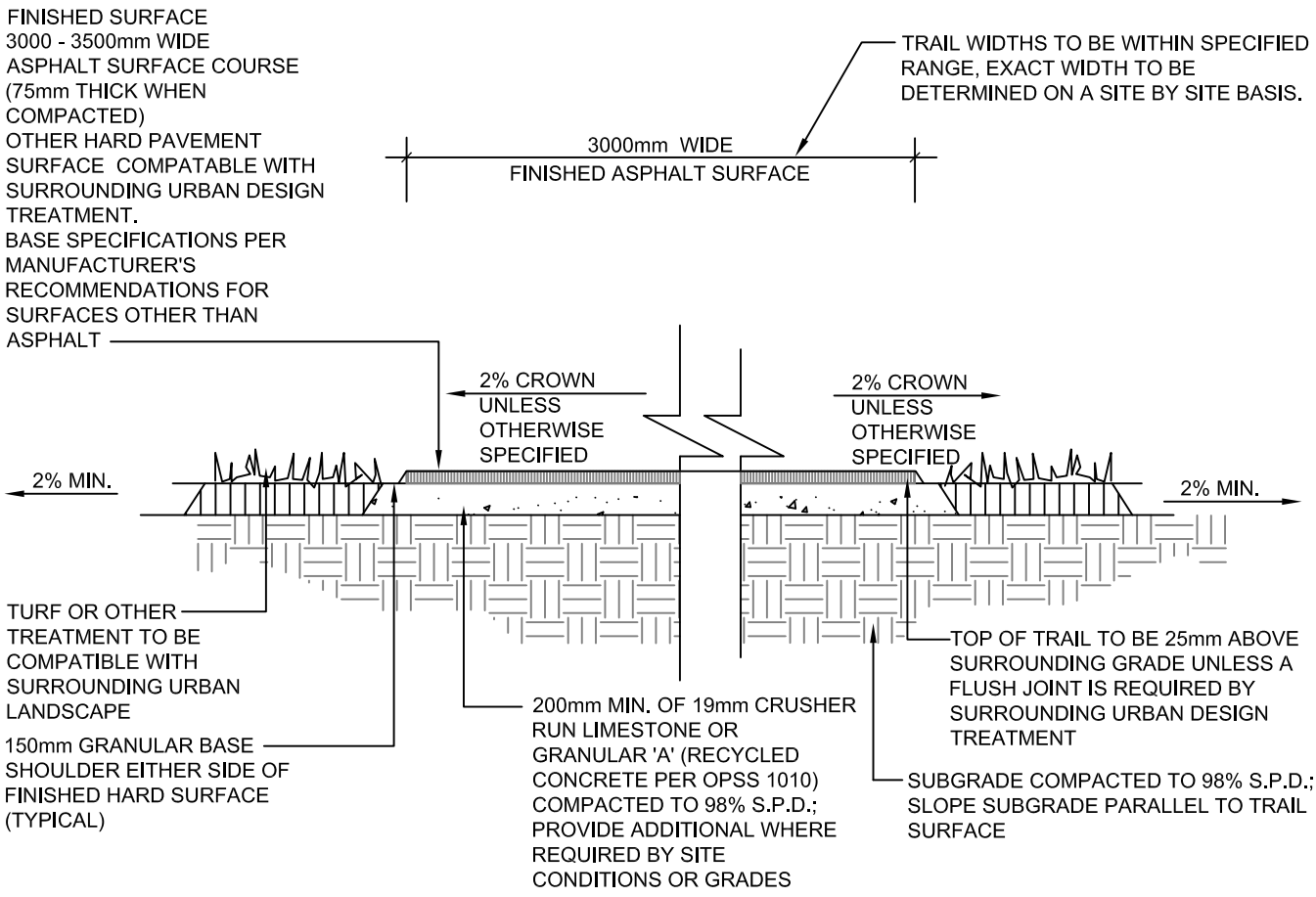
- Local Road
- Regional Road
- Highway
- Public Transport Hub
- School
- Car Parks (Existing and Proposed)
- Railway
- 2C Secondary Plan Area (Trail alignments to be finalized as part of the review and approval process for the 2C lands)

Aurora
Ontario
HS Financial Services Inc. 1-800-411-7979
MMM Group

Photo Credit: Flicker.com

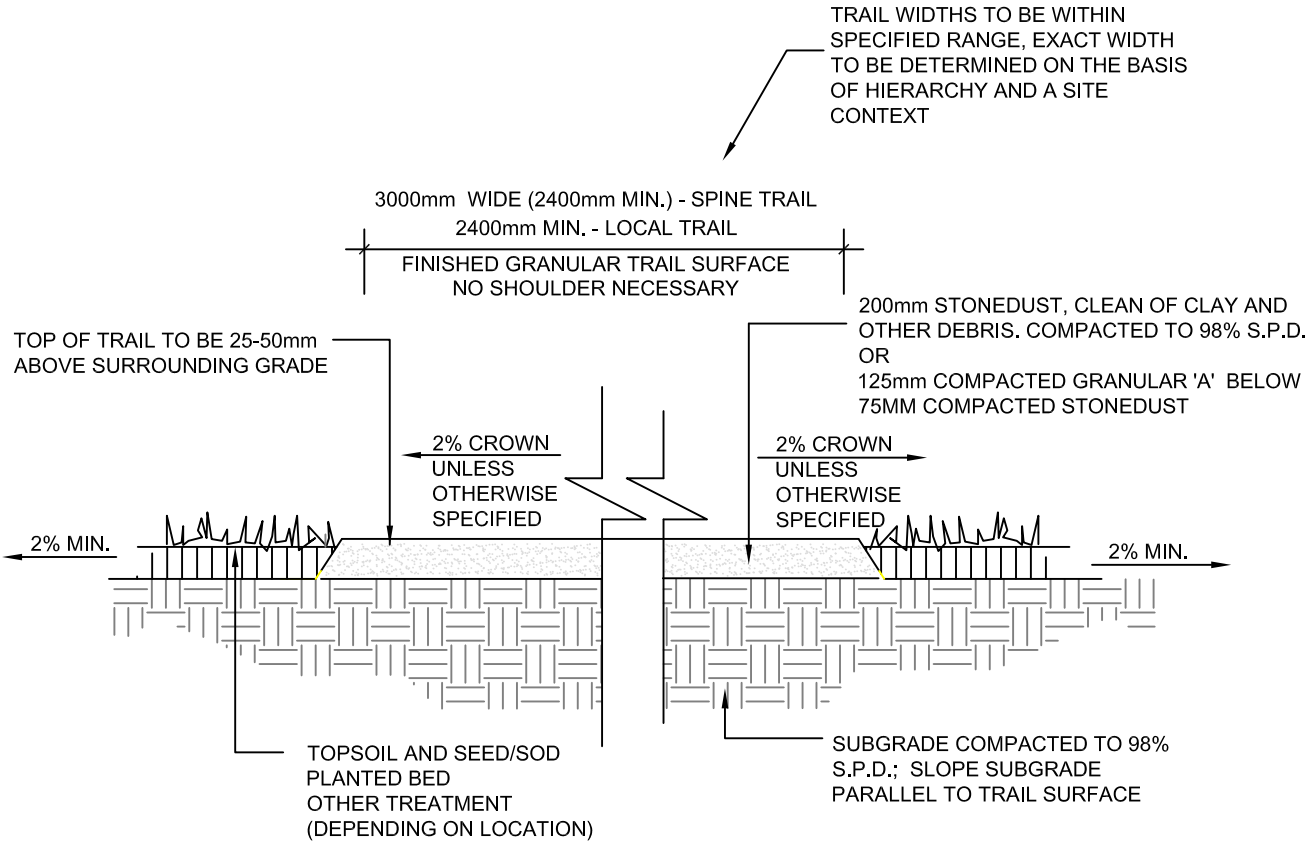
APPENDIX C

TRAIL CONSTRUCTION DETAILS



TOWN OF AURORA - TYPICAL TRAIL DESIGN DETAIL

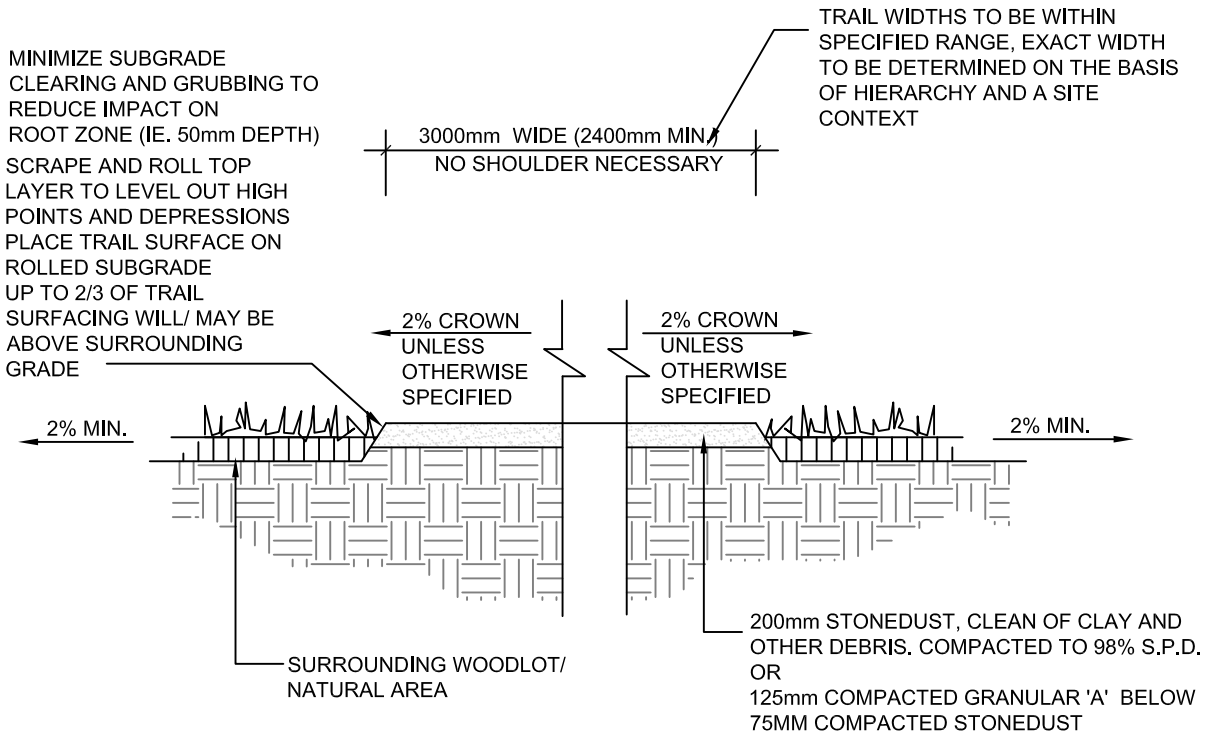
HARD SURFACE SPINE TRAIL N.T.S.



TOWN OF AURORA - TYPICAL TRAIL DESIGN DETAIL

GRANULAR SURFACE TRAIL

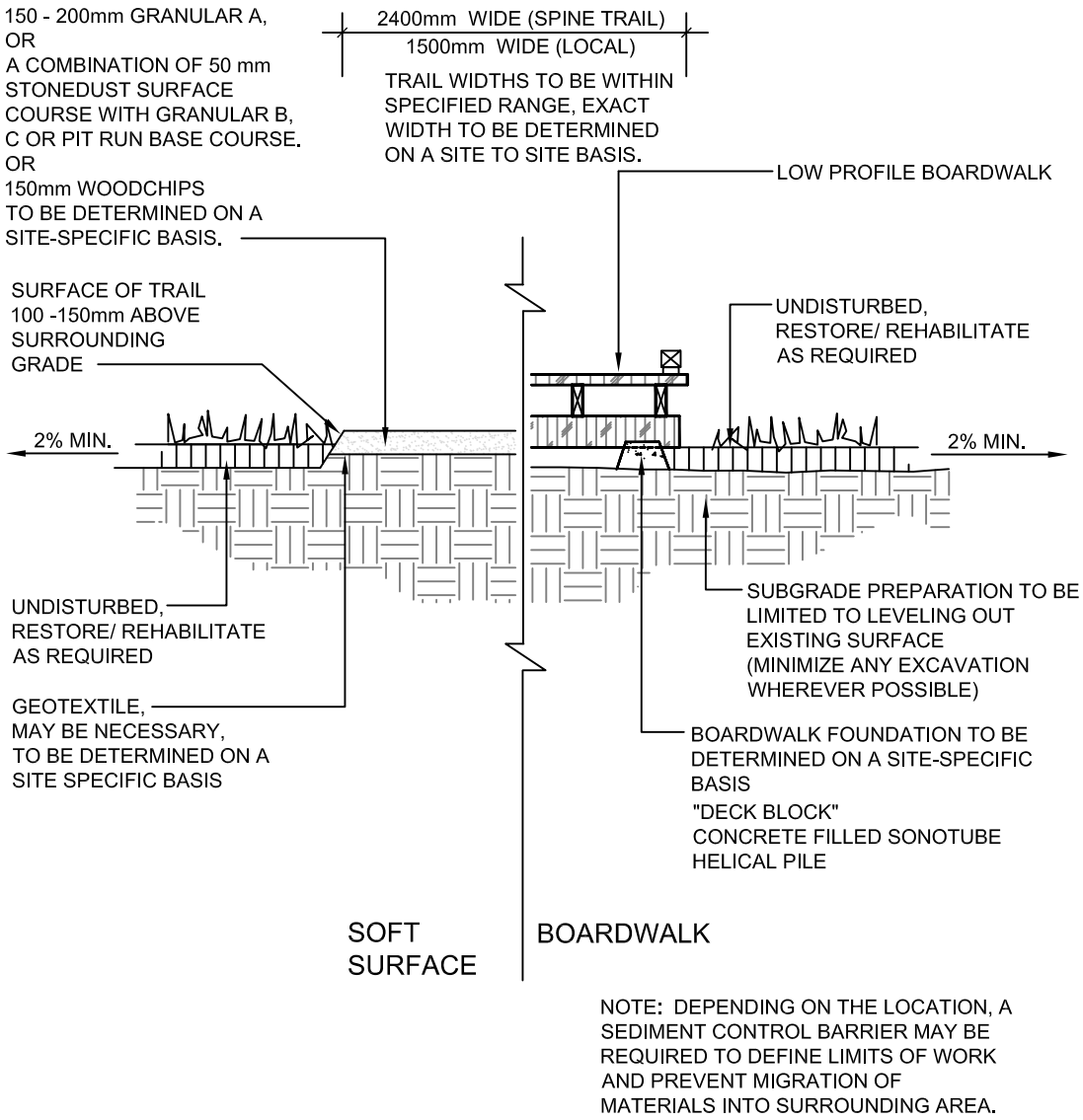
N.T.S.



TOWN OF AURORA - TYPICAL TRAIL DESIGN DETAIL

WOODLOT SPINE TRAIL

N.T.S.



TOWN OF AURORA - TYPICAL TRAIL DESIGN DETAIL

WETLAND TRAILS

N.T.S

Photo Credit: Flickr.com

APPENDIX D

UNIT COSTING

ITEM	UNIT	UNIT PRICE	COMMENTS/ASSUMPTIONS
1.0 GENERAL			
1.1 Construct new Town-wide Spine trail within road right-of-way	per metre	$250[2]	Hard surface trail (asphalt) within road right of way-typically along Regional roads, normal site conditions
1.2 Construct new Town-wide Spine trail outside of road right-of-way	per metre	$140	Soft surface trail, 3.0m wide, granular surface, normal site conditions
1.3 Upgrade existing Local Neighbourhood trail to Town-wide Spine Trail outside of road right of way	per metre	$50	Soft surface trail, 3.0m wide, granular surface (assumes existing trail alignment is generally suitable. Work includes widening, realigning, topping up of existing trail), normal site conditions
1.4 Construct new Local Neighbourhood trail	per metre	$100	Soft surface trail, 2.4m wide, granular surface, normal site conditions
1.5 Construct new Single Track Hiking Trail	per metre	$25	Soft surface trail, 1.0 to 1.5m wide, natural or woodchip surface, normal site conditions
1.6 Construct concrete sidewalk	per metre	$75	1.5m wide concrete sidewalk, one side of street only. Price for sidewalk only under normal site conditions, does not include utility pole relocations, retaining walls, excessive grading beside sidewalk etc.). Recent local tender prices equate to $60-90/linear metre.
2.0 STRUCTURES AND CROSSINGS			
2.1 Construct new Boardwalk (pedestrian light duty)	per metre	$250	Low profile structure on floating foundation and decking (1.5m width), no railings
2.2 Construct new Boardwalk (pedestrian light duty)	per metre	$600	Structure on footings, 2.4m wide with railings
2.3 Construct new Boardwalk (heavy duty)	per metre	$1,200	Structure on footings, 3.0m wide with railings, designed to hold light service vehicle
2.4 Self weathering steel truss bridge	per metre	$1,800	1.8m wide
2.5 Self weathering steel truss bridge	per metre	$2,800	3.5m wide
2.6 Construct pedestrian overpass of major arterial/highway	each	$750,000-2,000,000	Requirements and design vary widely, use price as general guideline only
2.7 Metal stairs with hand railing and gutter to roll bicycle	per vertical metre	$3,000	1.8m wide, galvanized steel
2.8 Trail / Road transition	each	$2,500	Typically includes 3 bollards, warning signs, curb cuts an minimal restoration (3.0m trail)
2.9 Trail / Road transition at existing signalized intersection	each	$3,000	(At intersection with pedestrian crosswalk) typically includes 6 bollards, warning signs and minimal restoration
2.10 At grade mid-block crossing	each	$5,000	Typically includes pavement markings, 6 bollards, warning signs, curb cuts and minimal restoration (median refuge island extra)
2.11 At grade railway crossing	each	$100,000	Flashing lights, motion sensing switch (C.N. estimate)
2.12 At grade railway crossing with gate	each	$250,000	Flashing lights, motion sensing switch and automatic gate (C.N. estimate)
2.13 Below grade railway crossing	each	$500,000-750,000	3.0m wide, unlit culvert style approx 10 m long for single elevated railway track
2.14 Multi use subway under 4 lane road	each	$1,200,000	Guideline price for basic 3.3 m wide, lit
2.15 Construct Median Refuge	each	$20,000	Average price for basic refuge with curbs, no pedestrian signals
2.16 Construct Pedestrian activated traffic signal (IPS)	each	$80,000	Varies depending on number of signal heads required
3.0 BARRIERS AND ACCESS CONTROL			
3.1 Lockable gate (2 per road crossing)	each	$5,000	Heavy duty gates, price for one side of road (2 required per road crossing)
3.2 Metal offset gates	each	$1,200	"P"-style park gate
3.3 Removable Bollard	each	$400	
3.4 Berming/boulders at road crossing	each	$600	Price for one side of road (2 required per road crossing)
3.5 Granular parking lot at staging area (15 car capacity-gravel)	each	$15,000	
3.6 Page wire fencing	per metre	$20	
3.7 Chain link fencing	per metre	$70	Range from $35 to $80 per metre depending on height, gauge and site location
4.0 SIGNAGE			
4.1 Regulatory and caution Signage (off-road trail) on new post	each	$150	Trailside sign, 300mm x 300mm c/w metal post
4.2 Signboards for interpretive sign	each	$800	Does not include graphic design
4.3 Trailhead kiosk	each	$3,000	Does not include design and supply of signboards
4.4 Signboards for trailhead kiosk sign	each	$2,000	Typical production cost, does not include graphic design
4.5 Trail directional sign	each	$150	Bollard / post / w 100mm x100mm marker
4.6 Trail marker sign	each	$75	Bollard / post / w 100mm x100mm marker
5.0 OTHER			
5.1 Major rough grading (for multi-use pathway)	cubic metre	$25	
5.2 Clearing and Grubbing	square metre	$2	
5.3 Bicycle rack	each	$200	Post and ring style stand
5.4 Bicycle rack	each	$750	Holds 6 bicycles, price varies depending on manufacturer
5.5 Bicycle locker	each	$2,500	Price varies depending on manufacturer
5.6 Bench	each	$1,000	Price for a typical park style bench
5.7 Garbage container	each	$700	Price for a typical park or streetscape style unit
5.8 Culvert Railings	per metre	$100	Basic wood post and rail style railing
5.9 Small diameter culverts	per metre	$75-160	Price range applies to 400mm to 600mm diameter PVC or CSP culverts for drainage below trail

NOTES:
1. Unit Prices reflect 2010 dollars, based on projects in southern Ontario. They do not include the cost of property acquisition, utility relocations, or major roadside drainage works unless noted.
2. Underlined unit prices were used to estimate network costs for the Implementation Plan. Other unit prices are provided for reference.

AURORA
You're in Good Company

Town of Aurora

Trails Master Plan

Appendix D

Unit Cost Schedule

March 2011

				TRAILS NETWORK IMPLEMENTATION AND COST								
				Phase 1 (0-15 Years)		Phase 2 (16-25 Years)		Phase 3 (26-50+ Years)		Total - All Phases		
Facility Type	Comment	Unit Cost / km	Distance - Existing (km)	Distance (km)	Cost	Distance (km)	Cost	Distance (km)	Cost	Distance (km)	Distance (inc. Existing) (km)	Cost
New Town Wide Spine In Boulevard Right of Way Bike Path	Hard Surface 3.0m wide asphalt	$ 250,000	9.2	14.0	$ 3,500,000	-	$ -	-	$ -	14.0	23.2	**$ 3,500,000**
New Town Wide Spine Off Road Trail	Soft Surface Multi-Use 3.0m wide granular	$ 140,000	0.0	6.8	$ 952,000	1.7	$ 238,000	6.1	$ 854,000	14.6	14.6	**$ 2,044,000**
Upgrade Existing Local Neighbourhood Trail to Town Wide Spine Off Road Trail	Upgrade to Soft Surface Multi-Use 3.0m wide granular	$ 50,000	0.0	-	$ -	-	$ -	-	$ -	-	-	**$ -**
New Local Neighbourhood Trail [4]	2.4m granular-soft surface multi-use	$ 100,000	22.3	42.2	$ 4,220,000	3.5	$ 352,700	18.0	$ 1,800,000	63.7	86.1	**$ 6,372,700**
New Single Track Hiking Trail	1.5, wide natural earth surface or woodchip surface	$ 25,000	7.2	-	$ -	-	$ -	-	$ -	0.0	7.2	**$ -**
Oak Ridges Moraine Trail	Soft Surface Multi-Use 2.4m wide granular	$ 100,000	11.7	7.6	$ 760,000	-	$ -	3.5	$ 350,000	11.1	22.8	**$ 1,110,000**
Nokiidaa Trail	Soft Surface Multi-Use 3.0m wide granular	$ 140,000	6.7	1.2	$ 168,000	-	$ -	-	$ -	1.2	7.9	**$ 168,000**
				Phase 1 Cost	**$ 9,600,000**	Phase 2 Cost	**$ 590,700**	Phase 3 Cost	**$ 3,004,000**	Total Cost - All Phases		**$ 13,194,700**

Table D-2 - Trail and Network Implementation and Cost

NOTES:

1 - Aurora Trails Branding Strategy - $45 000. To be completed in 2011

2 - Active Transportation component of a future study to update the Transportation Master Plan for the Town of Aurora - $50 000. Proposed to be completed by 2012.

3 - Annual funding towards the Promotion of Trails within the Town of Aurora - $20 000 / year. As the Trails Master Plan is reviewed every 5 years, the annual funding for Promotion should be revisited as well.

4 - .43 km of existing Local Neigbourhood Trails are hard surface.