Grand Bay-Westfield
ACTIVE TRANSPORTATION PLAN

Final Report | February 2017 | Trace Planning & Design

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1.0 Active Transportation in Grand Bay-Westfield

The Town of Grand Bay-Westfield is a quintessentially beautiful New Brunswick riverfront community where lifestyle and nature combine to provide residents with an idyllic residential setting. Sitting approximately 28 kilometres from the regional centre city of Saint John, on the western Saint John River shoreline, Grand Bay-Westfield's 5200 residents have local access to shops and services, schools, churches and recreation assets such as parks, trails and community centres.

The Town of Grand Bay-Westfield commissioned the creation of this active transportation (AT) plan to formalize multi-modal routes within the town, linking to both regional active and passive recreation routes and the City of Saint John. The plan contemplates the creation of both active and passive routes that provide opportunities for residents to walk, run or bike for social, fitness and/or competitive reasons. Most importantly, the plan represents the Town's desire to enhance the notion of livability, resident wellness, and economic development reasons through attractive regional visitation and attracting new residents. When combined with the idyllic setting, promoted AT demonstrates Grand Bay-Westfield's unique combination of place and culture; a place where everyone should live.

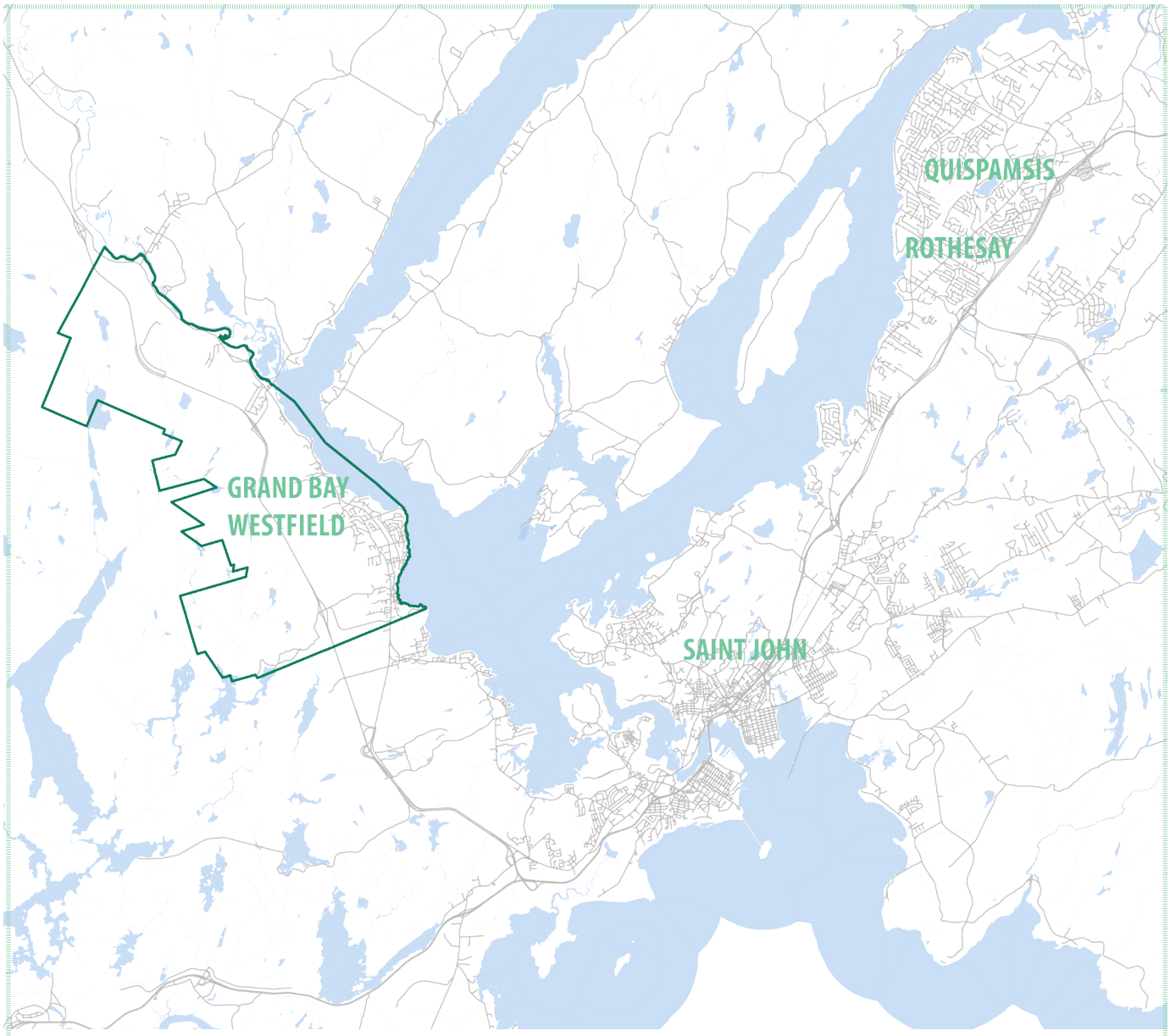


Figure 1.0

1.1 The Contemporary Community and Active Transportation

Active transportation is broadly defined as the human-powered transport of people and/or goods using muscle-based power. Human-powered transport has existed since people could move in the form of walking, running and swimming. Contemporary technology has allowed machines to enhance human-power through the bicycle. Contemporary technology has also allowed the automobile to capitalize and dominate civic public space domain through the almost complete conversion of the street corridor to auto corridor. Since the 1950s, the human use of the street corridor has been restricted to a 1.5 meter concrete or asphalt ribbon on one or both sides of the street. The vehicle dominance of the street was institutionalize through this definitive separation. Active transportation, as a global movement, seeks to dissolve this separation.

Although motorization has increased speed and load capacity, many forms of human-powered transport remain popular for reasons of lower cost, leisure, physical exercise and environmentalism. Human-powered transport is sometimes the only type available, especially in underdeveloped or inaccessible regions. Interestingly, human-powered mobility reliance results in generally healthier populations. Thus, active transportation, as a global movement, also promotes resident health and well being.

To expand on this, AT is commonly attributed with improving health which, inversely, reduces provincial healthcare costs. When more people walk and bike, we lower healthcare costs as we reduce the levels of obesity, heart disease, and Type 2 diabetes. To a limited degree, increased cycling and walking reduce the number of automobiles on the street where residents access services or go to work through alternative mobility formats. Nationally in Canada, 98.5% of collisions on regional roads are between gas-powered vehicles. Additionally, communities with people walking and biking within public corridors, have lower crime levels as the result of increased 'eyes on the street' as well as evident and apparent civic pride. Other common benefits include:

Equally important, economic development opportunities are enhanced through both the image and promotion of the AT lifestyle. As previously mentioned, Grand Bay-Westfield is an idyllic setting that offers unequaled lifestyle amenity to those who work within the region, and wish to live in an 'advanced suburban' setting. Embedding AT into this notion clearly demonstrates that health and wellbeing are interwoven with nature and community. Thus, Grand Bay-Westfield becomes the complete residential address through the implementation of active transportation. This AT plan contemplates this and improved resident health as primary reasons for encouraging multi-modal street and trail use.

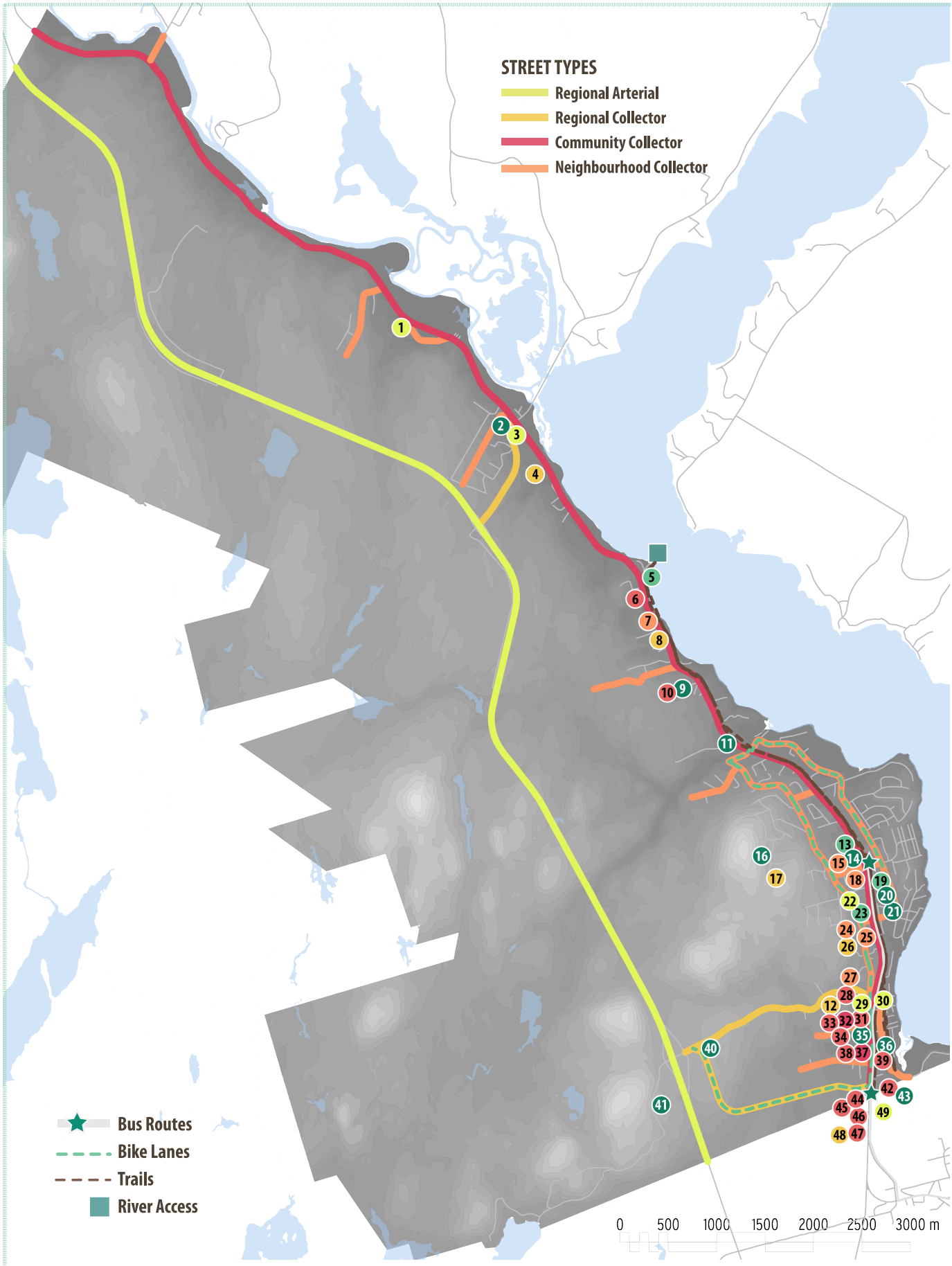
1.2 The Physical Grand Bay-Westfield Context

Grand Bay-Westfield's residents presently enjoy strong local mobility assets such as the Municipal Heritage trail, bordering River Valley Drive as well as semi-rural streets that, through both dimensions and shape, inherently calm traffic. The regional transportation routes, River Valley Drive and the Highway 7 Martinon Bypass provide linkages to adjacent communities; however, multi-modal speed and comfort issues must be addressed to extend street-use from vehicle to multi-modal. All other streets comfortably support active transportation use.

Residents consulted during plan development articulated the notion that a Grand Bay-Westfield AT network links four key internal and two external destinations. Internally, key destinations include the Grand Bay Plaza, the Centrum, the River Valley Community Centre and Brundage Point (park and ferry). Externally, key external linkages include the Trans-Canada Trail (extending to Saint John), the road network in Nerepis, Keatings Corner and Morrisdale, as well as the regional transit network (with modification).

Figure 1.2b illustrates the key internal locations while figure 1.2a provides typical sections for existing street and trail corridors. Probably the most significant aspect of the present Grand Bay-Westfield network is the fact that streets retain a rural character (narrow corridors and ditches). The Town of Grand Bay-Westfield is removing ditches through the installation of structural drainage; however, regional collector streets or new streets receive contemporary street design (street, sidewalk, and bike lane). Existing residential streets will retain present character and image.

Figure 1.2a


STREET TYPES
Regional Arterial
Regional Collector
Community Collector
Neighbourhood Collector
Bus Routes
Bike Lanes
Trails
River Access
0 500 1000 1500 2000 2500 3000 m

Points of Interest:

SCHOOLS & PRE-SCHOOLS

7 Westfield Elementary School
15 River Valley Middle School
18 River Valley Pre-School & After School Program
24 Tiny Treasures Learning Centre & After School Program
25 Grand Bay Primary School
27 Inglewood School

CHURCHES

4 St. Augustine's Parish
8 Two Rivers United
12 Anglican Church of the Resurrection
17 River Valley Wesleyan
26 Grand Bay Baptist
48 St. Matthew's Parish

GAS & CONVENIENCE STORES

6 Westfield Country Store & Restaurant
32 Circle K
37 Scholten's Grand Bay Shell

RESTAURANTS, GROCERY & PHARMACIES

6 Westfield Country Store & Restaurant
10 Grassroots Grill
28 The Medicine Shoppe
31 Subway
33 Aromas Food Court
34 Apple Patch
38 Glen's Village Square Bake Shop
39 Jodi's Pizzeria & Bakery
42 Guardian Grugs
44 Pizza Delight
45 Sobeys
46 Tim Horton's
47 Wok Taste

PARKS & RECREATION

2 MacLean Park
5 Brundage Point
9 Westfield Golf & Country Club
11 Unity Park
14 Tailwhip Park
16 Ridgeway Park
20 Lions Field & Splash Pad
21 Tennis Court
35 B-hive Bowling
36 Southwood Park
40 James Ready Park
41 "Little Paw Big Paw" Dog Park
43 Blueberry Hill Nature Preserve

COMMUNITY FACILITIES

5 Brundage Point River Centre
13 River Valley Community Centre (arena)
19 Lions Building
23 Community Centrum/Municipal Offices

OTHER

1 RCMP Station
3 Fire Department
22 Fire Department
29 Post Office
30 Cenotaph
49 Scotia Bank

Figure 1.2b

2.0 An Active Transportation Vision for Grand Bay-Westfield

This AT plan is developed from the results of community consultation processes with youth, general residents and senior populations. All suggest the AT is not simply a network of streets and trails that connect important civic destinations, and connects Grand Bay-Westfield to regional destinations (Saint John, shopping malls, places of work). Instead, AT in Grand Bay-Westfield is all about connecting resident front doors to in-community destinations that combine social and economic activity with daily activity routes. This is a very interesting and unique notion that certainly makes AT in Grand Bay-Westfield all about in-community gathering and activity. Inversely, AT in Grand Bay-Westfield becomes a regional activity destination through the route promotion and the social/shopping network gateways. Again, this is both interesting and unique.

Thus, the vision for active transportation in Grand Bay-Westfield is the creation of destination multi-modal activity routes that provide varied social experiences, physical activity levels, accessed from within the heart of the community. These routes can be accessed from resident front doors by bicycle, on foot, or by auto. Although the routes are formalized with combined street, sidewalk and bike lane infrastructure, the access routes retain their semi-rural character to sustain Grand bay-Westfield's unique regional image and identity.

The following sections describe route criteria and the destination routes as developed through resident consultation.

2.1 Youth Mobility and Comfort Criteria

Students are significant present and future users of a multi-modal system within Grand Bay-Westfield. For youth, connectivity to important community destinations along safe and comfortable corridors is paramount. The corridors must work for all ages, and provide opportunities to meet and greet friends and residents along the corridor; therefore, important community routes must adopt a park-like feel and be open to all mobility modes.

Youth consulted during AT plan development are less concerned with destinations and more interested in the journey. Parents, teachers, municipal staff and town council can concern themselves with the parks, churches, rinks, etc. that are linked with an AT network; youth want to see safe routes. For the most part, streets located at residents' front doors are fine as is. Streets that connect neighbourhood streets to River Valley Drive require conventional sidewalks and/or signage that informs drivers about the multi-modal nature of the street.

River Valley Drive requires significant attention. Youth believe that this street acts more like a highway than a town street. This should not be the case for a street that every town resident uses on a daily basis to access daily-needed destinations. Therefore, youth propose re-development criteria that, if implemented, will convert the street to a multi-use street corridor. A series of classroom exercises that speak to street speed, planting, multi-use trail size and human setback from the street resulted in the dimensions articulated on the proposed street sections.

2.2 The Passive Recreation Community

Daily use of a multi-modal network in Grand Bay-Westfield involves planned walking and cycling routes that, in almost all cases, involves River Valley Drive. Safe and comfortable walking on this route is critical to sustaining Grand Bay-Westfield's passive quality of life. Views of the river, as well as meeting and greeting friends, occurs on River Valley Drive's sidewalk. Those using the route for daily walking are concerned about vehicle speed and the close proximity between car and pedestrian. In fact, creating a secondary comfortable separation and ideal walking/cycling surface is considered essential for improved lifestyle and economic development.

Another important component of a passive network is point of entry, or gateways. These are existing places where walkers can park vehicles, walk, return to have coffee or access another service, or simply jump in their car and go home. These include parks, churches, shopping areas or civic buildings (such as the municipal offices or arena). The following describes the passive routes and associated gateway points while figure 2.0 illustrates locations.

An improved River Valley Drive corridor combines with adjacent and parallel streets to create varied length walking loops. Residents desire a walk between 45 minutes and 2 hours. The following routes, developed through consultation, meet this desire.

a. The Daily Eight. This eight kilometre figure eight loop (primarily inclusive of River Valley, Woolostook and Inglewood Drives) can be accessed from several gateways; however, the arena site is described as best. Walkers can complete the entire double-loop or break the figure eight into any desired component (2, 4 or 6 kilometre walks). All of the town's important daily services are located on this loop as well as most recreation addresses. The Grand Bay Plaza is located within one kilometre of the loop and provides a gateway for longer walks and follow up coffee.

Improvements required to bring these street corridors up to 'lifestyle standard' include signage, promotion and the completion of sidewalks on one side of Inglewood Drive as well as the placement of a River Valley-side multi-modal trail (built to youth specifications). River Valley Drive forms part of other complimentary AT routes, such as the Power 8 and the Unity Corridors.

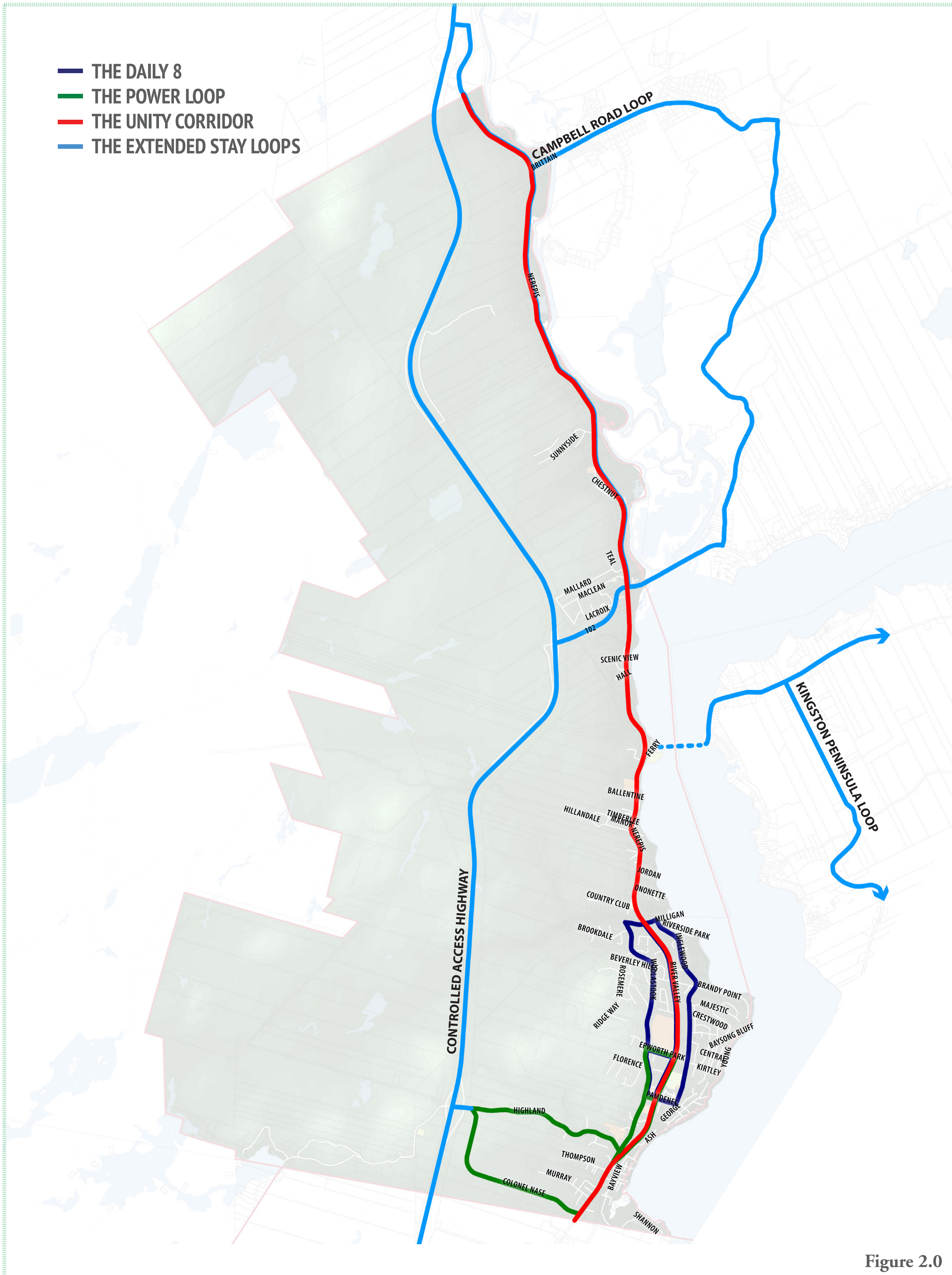

THE DAILY 8
THE POWER LOOP
THE UNITY CORRIDOR
THE EXTENDED STAY LOOPS
CAMPBELL ROAD LOOP
BRITTAIN
NEREPIS
SUNNYSIDE
CHESTNUT
TEAL
MALLARD
MACLEAN
LACROIX
102
SCENIC VIEW
HALL
FERRY
KINGSTON PENINSULA LOOP
BALLENTINE
HILLANDALE
TIMBERLEE
MANOR
NEREPIS
JORDAN
ONONETTE
COUNTRY CLUB
MILLIGAN
RIVERSIDE PARK
BROOKDALE
INGLEWOOD
BEVERLEY HILL
ROSEMERE
WOOLASTOOK
RIVER VALLEY
BRANDY POINT
MAJESTIC
CRESTWOOD
RIDGE WAY
BAYSONG BLUFF
CENTRAL
YOUNG
KIRTLEY
EPWORTH PARK
FLORENCE
CAMDEN
GEORGE
CONTROLLED ACCESS HIGHWAY
HIGHLAND
ASH
THOMPSON
MURRAY
BAYVIEW
COLONEL NASE
SHANNON

Figure 2.0

b. The Power Loop. This loop provides undulating terrain for the advanced walker and recreational cyclist. Primary gateway points are the **Centrum** or **Tailwhip Park Plaza**. From each of these points, walkers/cyclists access Colonel Nase Boulevard, Highland Road, River Valley and Woolostook Drives. The total length of the loop is 8.32 kilometres; however, shorter loops are possible if desired.

Improvements required to bring this loop up to 'lifestyle standard' include signage, promotion and the creation of a future sidewalk on Highland Road (a difficult and long-term project).

c. The Unity Corridor. This is the heart of the Grand Bay-Westfield's AT network and will be the primary lifestyle amenity infrastructure used to promote future residential and commercial growth in Grand Bay-Westfield. The corridor is part of all other routes/loops and is fully multi-modal. Corridor components include two vehicle lanes, two bike lanes (in progress), grass setback sidewalk with tree planting and lighting. The existing road-side Municipal Heritage Trail presently extends along 14.5 kilometres of the corridor. Residents typically use this trail to the Golf Course for off season trail use by snowshoe and cross country skiing.

This is obviously a challenging and expensive proposal. Both Nerepis Road and River Valley Drive evolved into a provincial route highway. The Unity Corridor proposal creates a multi-use corridor from the Grand Bay Plaza to Route 102 (8.4 kilometres). Most of Grand Bay-Westfield's cultural and recreational assets exist along this stretch of road and all neighbourhoods collector routes extend to the corridor.

To extend the same level of sidewalk and bike lane capacity along the corridor extending up-river from the Route 102 intersection for an additional 6.8 kilometres is a long-term objective; shared-route signage may be posted in the interim. Thus, the total unity corridor is 15.2 kilometres.

Grand Bay-Westfield must position itself for regional expansion as opportunity is created. The Unity Corridor supports the notion that Grand Bay-Westfield is a lifestyle-based community where wellness, environment and social health have supporting infrastructure. The Unity Corridor is the heart of this infrastructure.

2.3 The Active Recreation Community

As previously mentioned, Grand Bay-Westfield will become a regional lifestyle destination through promotion and infrastructure. The passive network components are largely created to serve local residents. The active network serves both local residents and visitors seeking a visually captivating and challenging running and biking route. Thus, AT in Grand Bay-Westfield becomes a regional destination for athletes such as triathletes and cyclists who drive into town, park and access the network. Food services extend visits for social and nutrition reasons.

Extended Stay Loops begin in Grand Bay-Westfield, on the Unity Corridor, and extend up river. Return options are possible on the Unity Corridor. The Unity Corridor also provides opportunity to cross the river, by Ferry, at the Brundage Point River Centre for Campbell Road, for the Kingston Peninsula or on Route 102 (leading to Keatings and Lynch Corner, before returning to the Unity Corridor via the bridge on Brittain Road).

The infrastructure requirement for this loop is 1.5 meter-wide bike lane and signage on the Unity Corridor, and promotional and TAC signage elsewhere. Bike lanes and signage are required for the Unity Corridor section from the Grand Bay Plaza to Route 102. All other portions of the Extended Stay Loop are outside of the municipality and follow Department of Transportation Signage.

3.0 The Grand Bay-Westfield Active Transportation Toolbox

As previously mentioned, Grand Bay-Westfield's identity is the result of a natural and cultural interface that is unique to the town; therefore, any AT interventions should respect this identity. Also, any intervention must be flexible to allow the creation of AT infrastructure relative to the unique setting of various streets and trails. Steep ditches, road-side banks and sharp corners will not allow typical infrastructure to be placed in all places. Grand Bay-Westfield staff must have the ability to draw upon a toolbox of applications that allow for desired corridor use; irrespective of setting. For example, not all sections of the Unity Corridor lies within a corridor that is wide enough to support sidewalk, bike lane and vehicle lanes. Town staff may then consider the creation of a multi-use asphalt lane to support both bikes and pedestrians. This flexibility will allow the plan to proceed through implementation within the context of Grand Bay-Westfield.

The following sections describe AT plan components and physical tools required for implementation

3.1 Activity Gateways

The AT plan is built on the notion that four destination-based routes are accessed by both residents and visitors within Grand Bay-Westfield (at three locations). All routes have gateway options based on the desired meeting or social experiences. The following describes the gateways.

a. **The Grand Bay Plaza.** This gateway provides access to all four experiential routes for those wishing to visit Tim Hortons prior to, or following activity. Also, the plaza hosts other shopping experiences for both pre-and-post activity visitation.
b. **Tailwhip Park Plaza.** This gateway is a central gateway for all routes; however, this is the best launching point for the in-community walks/runs or bikes by local residents (the Daily 8, the Power Loop and the Unity Corridor).
c. Brundage Point. This location is ideal for use of the Unity Corridor or the Extended Loops. As a launching point, this location is best suited for regional visitation for cycling activity.

To support all gateways, Grand Bay-Westfield should develop small AT kiosks that provides route information to visitors, and becomes a meeting point for visitor to assemble at (see figure 3.1).

Figure 3.1

3.2 Route Tools

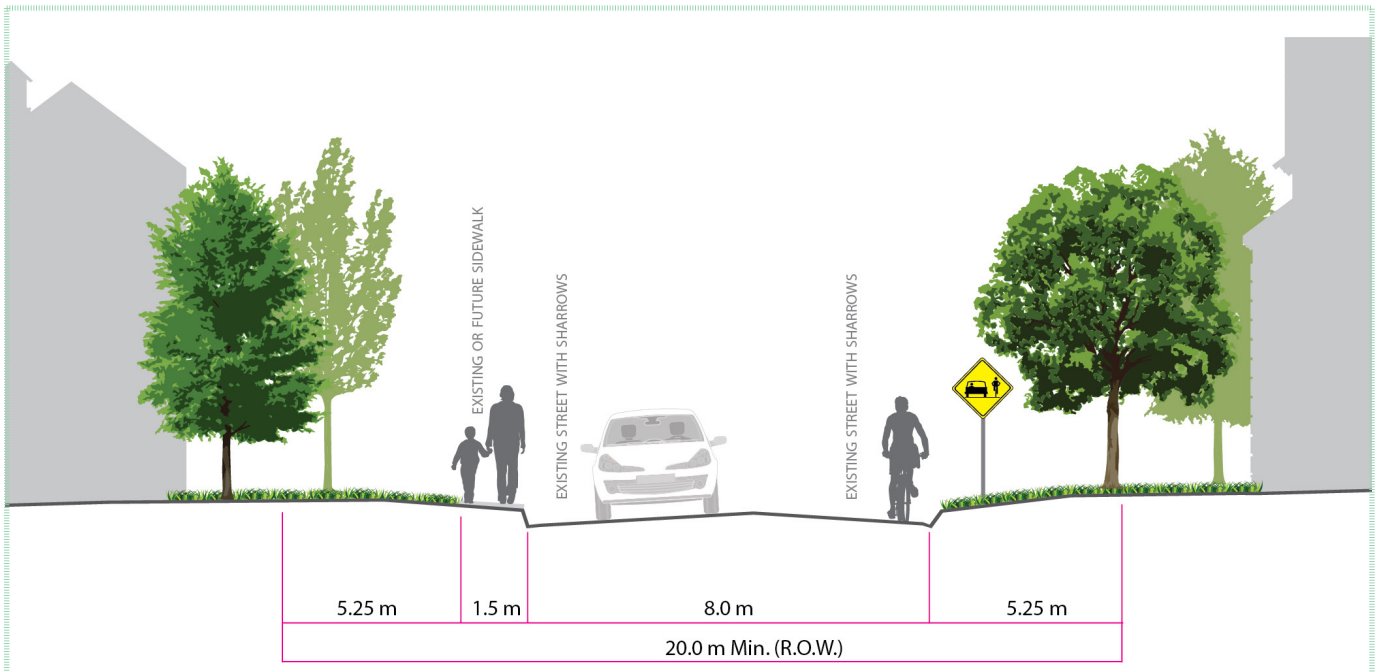
Grand Bay-Westfield has three physical street application tools at its disposal that can be adapted to its streets for the purpose of creating the AT network. The following describes these tools while figure 3.2 provides typical sections.

a. The Sidewalk. Grand Bay-Westfield presently hosts sidewalks on many of its streets, and plans to expand sidewalk construction on re-developed and new streets. The sidewalk is a 1.5 meter wide concrete surface that is placed immediately adjacent to the street for maintenance purposes.

b. The Bike Lane. This is a 1.5 meter-wide asphalt street edge that lies between vehicle lanes and the curb or edge of asphalt. The vehicle-bike lanes are separated by solid white painted line.

c. The Asphalt Trail. This road-side trail is proposed for the Unity Corridor only for the purpose of creating comfortable and safe youth passage for daily school and activity use. The trail should be a maximum of 3.0 meters and minimum of 2.5 meters in width (to allow for safe stroller passage).

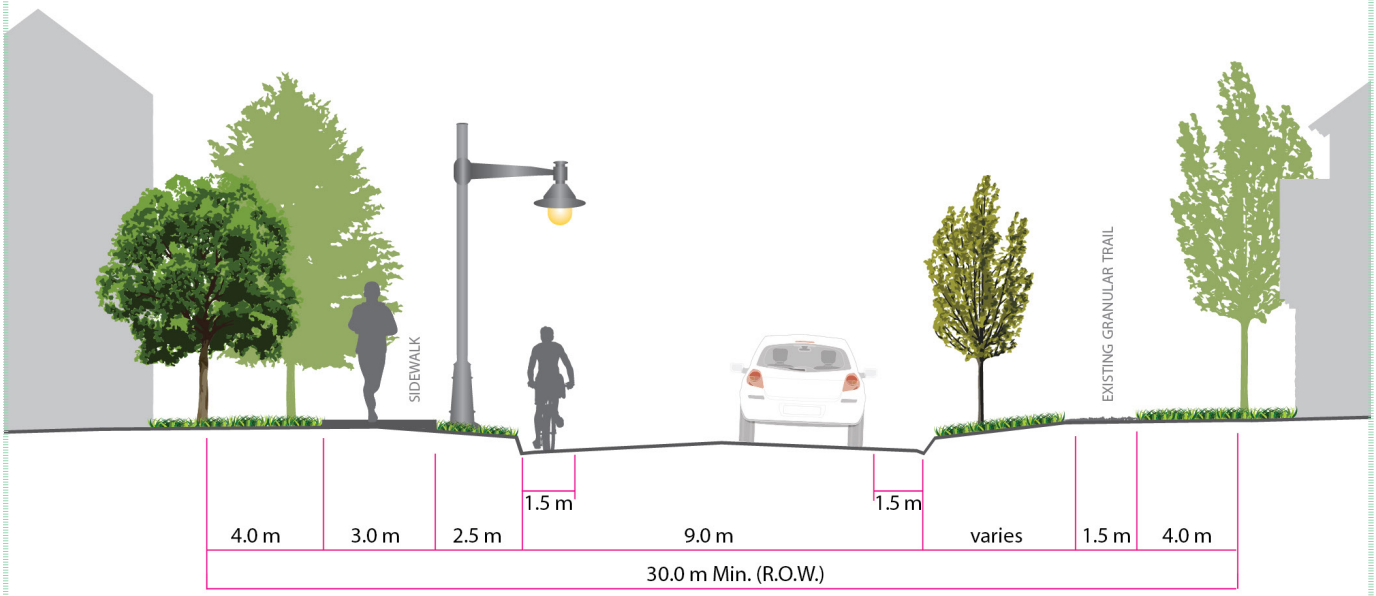
d. The Granular Trail. The granular trail plays a significant role in the early stages of AT growth in Grand Bay-Westfield, and it may be used as substitute for another tool, or used in newly developed areas.



The Daily 8

Inglewood Dr. & Woolastook Dr.

Figure 3.2



Unity Corridor
River Valley Drive/Nerepis Road

Figure 3.2

3.3 Activity Support

Supporting or promoting AT activity within Grand Bay-Westfield should occur in a manner that limits visual impact on the Town's unique natural setting. Whereas many municipal AT plans are founded on the notion the community be blanketed with an extensive AT signage program, Grand Bay-Westfield uniqueness requires an equally distinctive approach. Thus, signage presented in this AT Plan is proposed for limited promotion and slope difficulty purposes only (see figure 3.3; AT Promotional/Slope Signage), highlighted at the three activity gateways. This will, only slightly, extend the present TAC-based signage program Grand Bay-Westfield presently install on routes where biking is encouraged.

In addition to this, the town can capitalize on contemporary digital technologies to promote AT within Grand Bay-Westfield. Thus, rather than rely on signage that only works within the town, a website can reach everybody's hands, workplace and home. The website will host information on the AT routes, the gateways, as well as provide linkage to an App such as Strava (where a users can create both social and competitive communities of users).

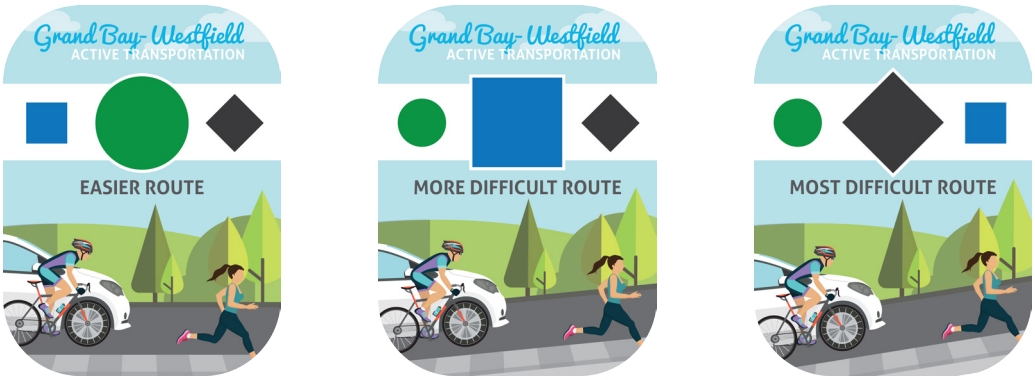


Figure 3.3

3.4 Public Transit

Public transit delivery in suburban areas that intend to link residents to regional centres is a difficult task. In areas like Grand Bay-Westfield, rural/semi-rural landscapes divides the community from primary destinations. In these cases, transit delivery authorities are challenged to deliver a level of service that inserts public transit into daily life. Three challenges commonly face authorities.

Challenge One: Access. In North America, residents will consider using public transit if located within 400 meters from their front door. This also creates more transit visibility within the community. Systems that are based on driving to a destination to access transit require programs and facilities that work on both end of the transit line (reduced urban core parking, on transit WiFi, quality buses, etc.). This system also requires significant origin population to financially sustain the system. Light rail transit has worked in similar contexts; with municipal support, however, cost is an issue in low-population areas.

Challenge Two: Atmospheric Environment. Although accurately understanding the 'emissions argument' requires very local research, the combined results of several studies provide benchmarks that can be used for general evaluation. Figure 3.4 illustrates general emission outputs for person trip from Grand Bay-Westfield to Downtown Saint John (25 kilometres) for varied transportation modes. The emissions are evaluated based on grams of CO2 emitted as the result of transporting one person to Downtown Saint John by the various vehicle modes.

The figure demonstrates that, unless a public transit bus is full, a four person car-pool is more efficient. A three-person car pool has a similar emission effect as a half-full bus; however, the bus is more efficient at lower numbers of use than the automobile (single passenger/car); however, the financial cost would be significantly more.

Challenge Three: Automobile Evolution. The automobile industry is actively moving personal transportation away from carbon burning to electric. This trend will continue as the world moves toward the UN desired goal of zero emissions within 35 years. Thus, public transit must become a more interesting and effective mode of mobility to attract users in the future. This evolution should be planned for now. For example, as vehciles used for public transporation (as well as municpal and resident vehicles) evolve to include hybrid and electric vehicles, the Town will need to consider incorporating charging infrstructure.

Proposal: Grand Bay-Westfield must regionally reposition the notion of transit. Investment into public transit should be moved to developing a phased approach to moving residents from individual cars, to pooled cars, then to a re-worked transit system that allows resident access in relatively close proximity to home. The implementation section of this report describes this program and planning can begin immediately.

4.0 Implementation

The Grand Bay-Westfield Active Transportation Plan requires minimal investment to launch. Much of the physical infrastructure required to modify routes to specification will occur as street renovation occurs. At that time, the town can proceed with the appropriate toolbox application. It is important to note that Grand Bay-Westfield is a beautiful community that, with the exception of youth safety along the Unity Corridor, functions for AT. Toolbox application will support safety and comfort as network use expands.

4.1 Implementation Steps

This section charts a simple five-step plan that moves AT into the daily life of Grand Bay-Westfield residents. It is important to note that, although the steps are presented in linear format, the implementation process will be iterative.

Step One - Achieve a Mandate to Implement. Grand Bay-Westfield staff should achieve a mandate to proceed with the implementation of this plan with Town Council, the Province of New Brunswick and the Government of Canada. These administrative bodies will be involved with the funding and placement of AT infrastructure and programs. This commences with Council's approval of the implementation plan prior to meeting with the MLA and MP to provide background information and to propose where partnerships will be requested.

Also, Council's acceptance will allow Town Staff to begin developing street modification plans within the context of the AT toolbox.

Step Two - Place the Kiosks. The first physical project of this plan is the placement of the kiosks at the three previously mention gateway positions. To do this, the Town should issue an RFP for the design and construction of the kiosks relative to information provided in chapter three. The Town should work with developers of the Sobeys Grand Bay Plaza for Kiosk development along River Valley Drive right-of-way and parking lot/design.

Step Three - Launch the Website Presence. This AT plan includes the creation and provision of a website presence on the Town's website designed to encourage designated route visitation and use. The site also encourages community social and competitive network use. The town should provide the website to a skilled designer to refine and release the site for final web publication.

Step Four - Design and Install the Signage. This plan includes a very limited signage program that focuses on the activity gateways. The kiosk at Tailwhip Park should be utilized to introduce AT Routes and Signage. As well, AT Route Signage can be introduced at Brundage Point. In addition to this, the Town will utilize TAC-based shared route signage to encourage shared vehicles and cycle use of the designated routes extending sharrow symbols on the pavement where dedicated bike lands have not yet been adopted. Shared use is assumed on all other town streets where permitted by Department of Transportation.

Step Five - Develop Programs with the School District. The previous steps set a physical platform for future use of the AT network. This step involves working with youth to encourage a new generation of users to safely 'hit the streets'. The Town should allocate a staff person to work closely with the school district to develop cycling, walking school bus and other programs that encourages multi-modal street use.

4.2 Budget Estimates

The proposed budget, figure 4.2 on the following page, estimates costs for work that will be developed in association with street modifications. It is important to note that these modifications will occur as streets are renovated or upgraded relative to Grand Bay-Westfield's budgetary or spatial abilities. The street sections proposed in this report are desired outcomes; however, town engineering staff will need to determine how streets are built relative to constraints. The street sections propose a desired street type based on user need. Grand Bay-Westfield may not meet desired sections; however, ensuring users have a place within the designated streets corridors is critical.

The budget proposed programmatic and communication tools that meet the needs of the AT plan. Grand Bay-Westfield can assign full time or student staff to complete projects over the next three years.

Grand Bay-Westfield Active Transportation Plan Budget Estimates

Trace Planning & Design Studio
September 2016

Project Budget Estimates				
Task	amount	unit	cost	extension
Phase One - Communications				
TAC signage on designated Routes	1	lumpsum	$15,000	$15,000
Detailed Communications Strategy	1	lumpsum	$15,000	$15,000
Website Design	1	lumpsum	$6,500	$6,500
				$36,500
Phase Two - Route Gateway and Designation				
Active Transportation Signage	1	lumpsum	$10,000	$10,000
Deliver Communications Strategy	1	lumpsum	$12,000	$12,000
Gateway Kiosks	3	lumpsum	$16,500	$49,500
				$71,500
projects subtotal				$108,000
contingencies (11%)				$11,880
design & contract management (11%)				$13,187
total (plus applicable taxes)				$133,067

Figure 4.2

trace

NATURAL ENVIRONMENTS | BUILT ENVIRONMENTS