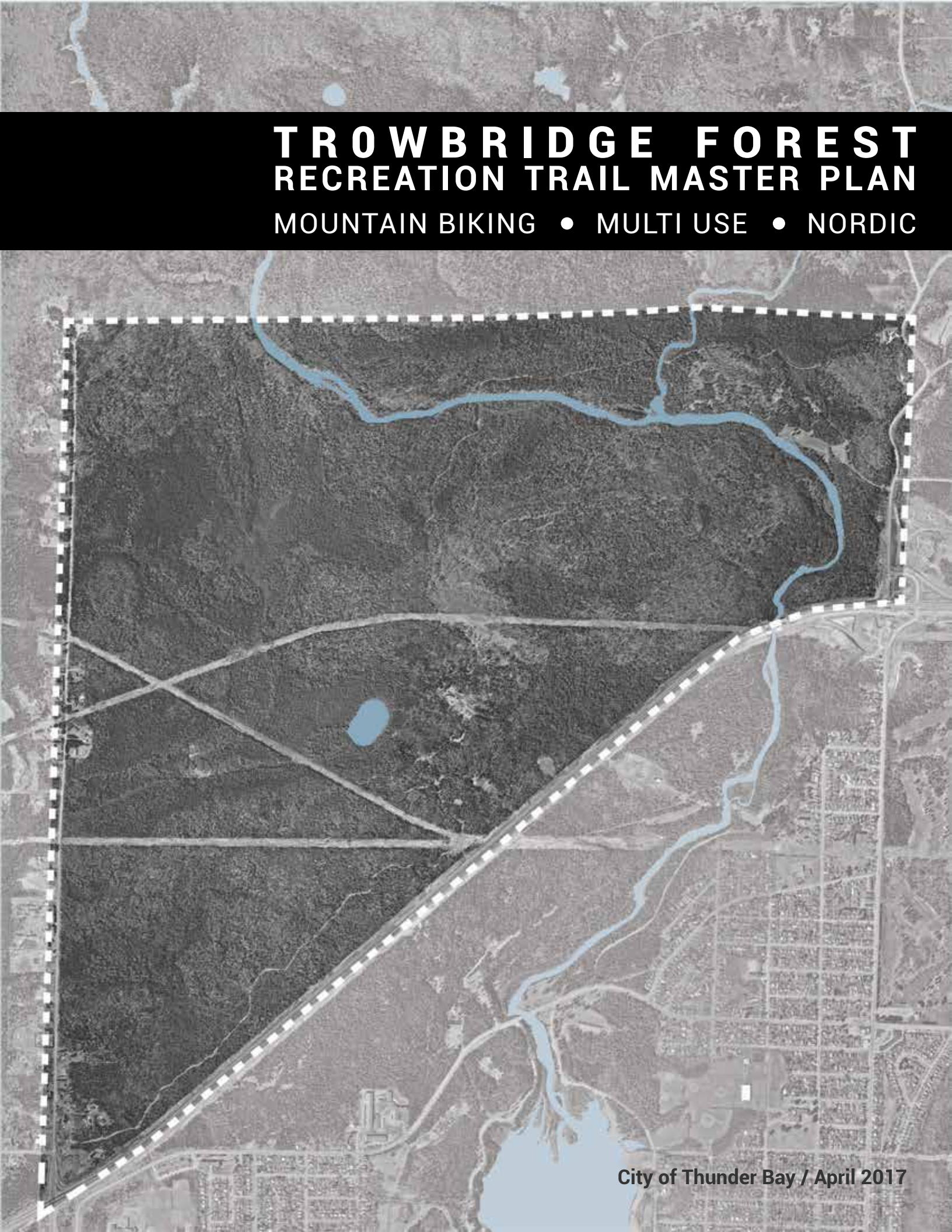
TROWBRIDGE FOREST
RECREATION TRAIL MASTER PLAN

MOUNTAIN BIKING • MULTI USE • NORDIC



City of Thunder Bay / April 2017


CITY OF
Thunder Bay
Superior by Nature


TOURISM
NORTHERN
ONTARIO

Executive Summary

The Trowbridge Forest trail system – which includes Centennial Park, Shuniah Mines, Trowbridge Falls Park and Kinsmen Park – needs a trails master plan that will direct the development of a network of trails that will provide a fun, safe environment for a wide range of trail users of various abilities and skills. This includes but is not limited to hikers, mountain bikers, trail runners, and dog walkers.

Working in partnership with the City of Thunder Bay and Tourism Northern Ontario the Blacksheep Mountain Bike Club has been working toward expanding mountain biking in order to increase recreational opportunities for the residents of the City as well as provide greater opportunities for tourism and opportunities to host large, as well as National level mountain bike events. Ultimately the club is striving to have the trails designated as an International Mountain Biking Association Ride Center. Therefore, a cohesive and dynamic trail system in the Trowbridge Forest is an important stepping stone in achieving this goal.

The trails master planning process was undertaken by thinc design and DJS Trail Consultants from January to March 2017. Keys steps included:

- Site Reconnaissance;
- Stakeholder Meetings;
- Open House;
- Posting of plans on-line for commenting; and,
- Receiving and considering community feedback.

The resulting plan provides a sustainable network of trails that caters to a wide range of users. Key aspects of the proposed network include:

- Improved trail heads and access.
- Closing of redundant, unsafe or unsustainable trails.
- Enhancement of existing trails.
- Introduction of over 20 kilometers of new trails.
- Identifying priority designation of hiking, cross country skiing, mountain biking and fat biking trails.
- Improvements to technical trail features to ensure they follow IMBA guidelines and Whistler Standards for trail design and the construction of technical trail features.
- Improvements to Kinsmen Park.
- Introduction of a bike park with pump track and technical training area.
- Signage and wayfinding strategy.

The plan also provides a strategy for implementation which divides improvements into short, medium and long term. Costs associated with each improvement are provided for budgeting purposes. This includes consideration of the level of volunteer involvement anticipated by providing a low, medium and high price.

The appendix provides supplementary information on the process and planning resources utilized in preparing this plan including:

- Community comments summary;
- Public meeting panels;
- Sample questionnaires;
- Trail Difficulty Rating System;
- Whistler Trail Standards;
- Estimating Time and Cost of Building Trails; and,
- Other recommended trail resources.

image credit: Brent Maranzan

Table of Contents

Introduction

The Blacksheep Mountain Bike Club is a not-for-profit organization based in Thunder Bay that plans local cycling events, helps with the development of riders and maintains the local mountain biking trail system on behalf of the City of Thunder Bay Parks & Open Spaces Section.

Incorporated in 2002, the club has been working toward expanding mountain biking in order to increase recreational opportunities for the residents of the City and to establish mountain biking as a viable tourism draw for the City. The club and the City are working towards formalizing their relationship with the intention of developing additional mountain biking opportunities within the City of Thunder Bay.

The club plans to both improve and expand the trail system within the Trowbridge Forest which would provide greater opportunities for tourism and opportunities to host large, as well as National level mountain bike events.

Tourism Northern Ontario has partnered with the City of Thunder Bay for this study with a vested interest in enhancing the trails for a wide range of users for four season use to encourage tourism to the region.

A high level vision of the club is to have Thunder Bay designated as an IMBA Ride Center (International Mountain Biking Association). A cohesive and dynamic trail system in the Trowbridge Forest is an important stepping stone in this goal.

In addition to mountain biking, the Trowbridge Forest trail system is a popular destination for a range of different user group/activities including:

- hiking;
- trail running;
- dog walking;
- nature appreciation;
- walking;
- snowshoeing;
- nordic skiing; and,
- fat biking.

The trail system needs to be designed to support the wide range of trail users currently using the trails and provide a fun and safe trail network that allows for the integration of all users groups during all seasons.

New trail construction in Trowbridge Forest
Image Credit: Mark Maranzan, Blacksheep Mountain Bike Club

Process

The master planning process lasted for approximately three months from January to March, 2017. Key aspects of the process included site reconnaissance, meetings with various user groups, an open house, and commenting forms for feedback.

Site Reconnaissance

Site review was undertaken with City staff and members of the Blacksheep Mountain Bike Club on January 31, February 1 and March 6, 2017. This work included:

- mapping of trails (GPS).
- assessment of existing alignments.
- assessment of potential new alignments.
- photographic inventory.
- documentation, review and assessment of existing structures (bridges and technical trail features).

Stakeholder Meetings

Meetings were held with various groups to discuss the project in general and specific issues of interest. Consulted groups included:

- Parks North Operations Staff.
- Lakehead Region Conservation Authority.
- Blacksheep Mountain Bike Club.
- Tourism Thunder Bay.

Open House

An open house was held on March 6, 2017 at the Current River Community Centre from 6-9 PM. City staff, the consulting team and a member of the Blacksheep Mountain Bike Club were on hand to discuss the trails concept with the public.

Five panels were presented at the meeting to illustrate the existing site conditions and trail network, as well recommended enhancements to the existing trail network and a proposed bike park and associated park improvements at Kinsmen Park.

Participants were give the opportunity to comment/ draw directly on the panels. Fifty-one people signed in and of those 28 completed written comment forms.

Online

The panels were also posted on-line from March 6 to March 13, 2017. Six responses to the associated on-line questionnaire were provided.

Community Feedback

Response was generally positive with most indicating support for the project. However, there were some criticism of the plan in regards to its focus on mountain biking, length of the on-line commenting period, and the perception that the integration of mountain bikers with other user groups was not considered in the planning of the trail network.

For more details on the community feedback on the draft master plan, please refer to Appendix A.

Comments and concerns received on the draft master plan have been considered and addressed in the preparation of the final master plan.

Top: Site reconnaissance
Middle and Bottom: Public open house on March 6, 2017

image credit: Brent Maranzan

Existing Conditions

Context

The Trowbridge Forest is located in north east Thunder Bay. The area for consideration as part of the trails master plan consists of Centennial Park, Shuniah Mines, Trowbridge Falls Park and Kinsmen Park. It is bounded by the Thunder Bay Expressway to the south, Balsam Street to the west, Copenhagen Road to the east and Cascades Conservation Area to the north. A plan of the master plan area is provided on the following page.

Key interface considerations include trail connections to Centennial Park, Cascades Conservation Area, and the Trowbridge Campground. The Current River flows through the north and east portion of the study area.

Centennial Park

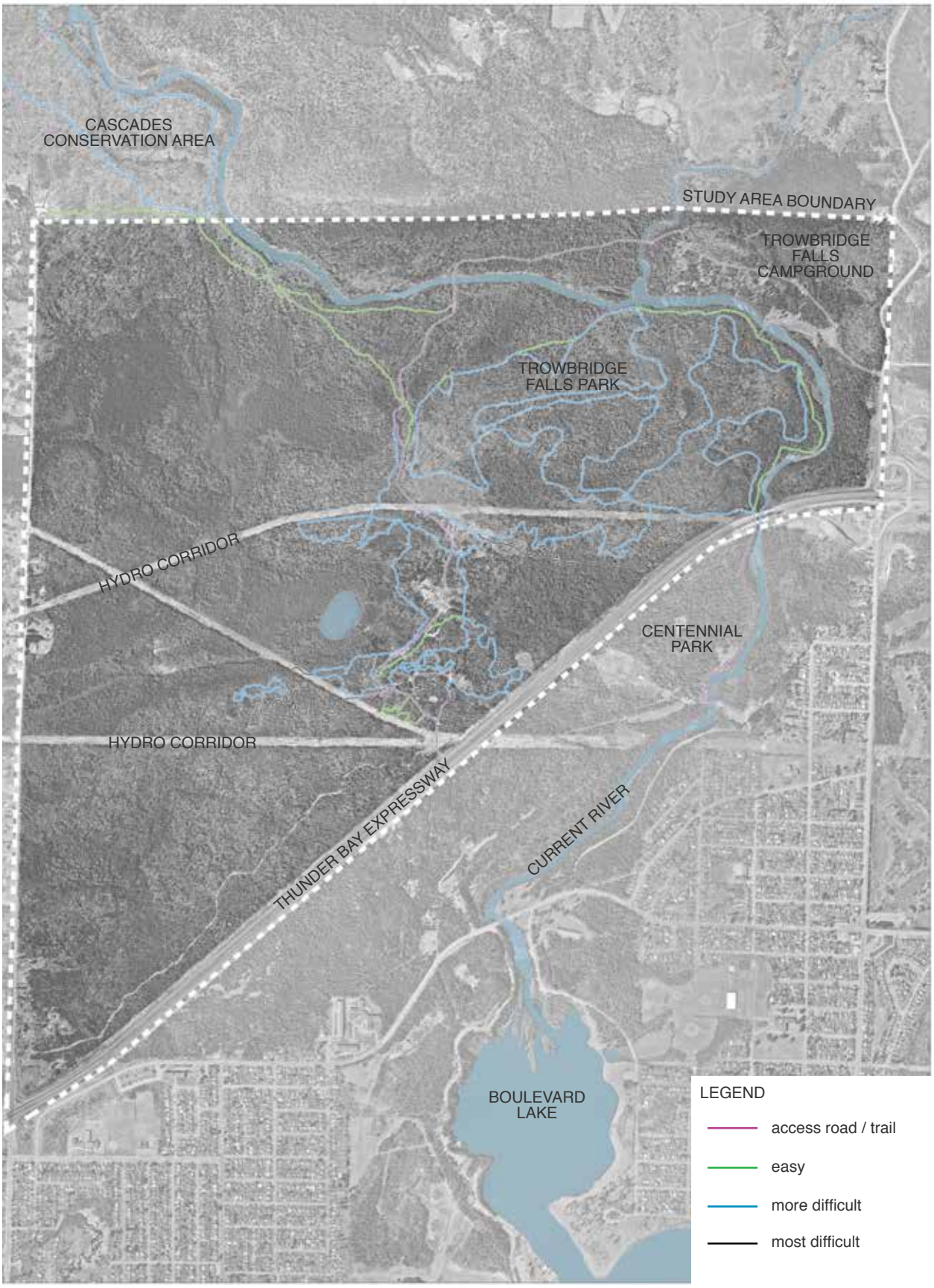
Developed in 1967, the park follows the shore of the Current River. The park was built to represent the history of logging and features many replicas of the equipment and living conditions on logging camps in the early 20th century. The park also features recreational facilities, such as an animal farm, toboggan hill, miniature train (Muskeg Express), parking lot, and chalet.

The park is divided by the Thunder Bay Expressway with the south portion containing the park's programmed park features and the north containing approximately 10 kilometres of multi use trails. Access to the north portion of the park is via a pedestrian underpass. The park's multi use trails north of the expressway (named Yellow, Red and Blue) are considered part of the trails master plan while the trails and amenities south of the expressway are excluded from the master plan. The use of the Yellow, Red and Blue trails is to remain focused on pedestrians (walking/hiking) and cross country skiing in the winter.

Shuniah Mines

South of the east-west hydro corridor that meets the Thunder Bay Expressway where it crosses the Current River, is the area referred to as Shuniah Mines. Named after the silver mine that once occupied the site, the area consists of approximately 15 kilometres of single track trail designed and constructed by the Blacksheep Mountain Bike Club and the City of Thunder Bay.

The trail network includes a variety of single track primarily catering to intermediate and advanced riders. This includes some single track flow trails as well as more technical climbing and decent trails. There are



Map of study area

also technical trail features including skinnies, ladder bridges, drops and a teeter-totter.

Trowbridge Falls Park

Trowbridge Falls Park includes over 600 hectares of boreal forest along the Current River. Within the Park are a campground and Kinsmen Park.

Trowbridge Campground

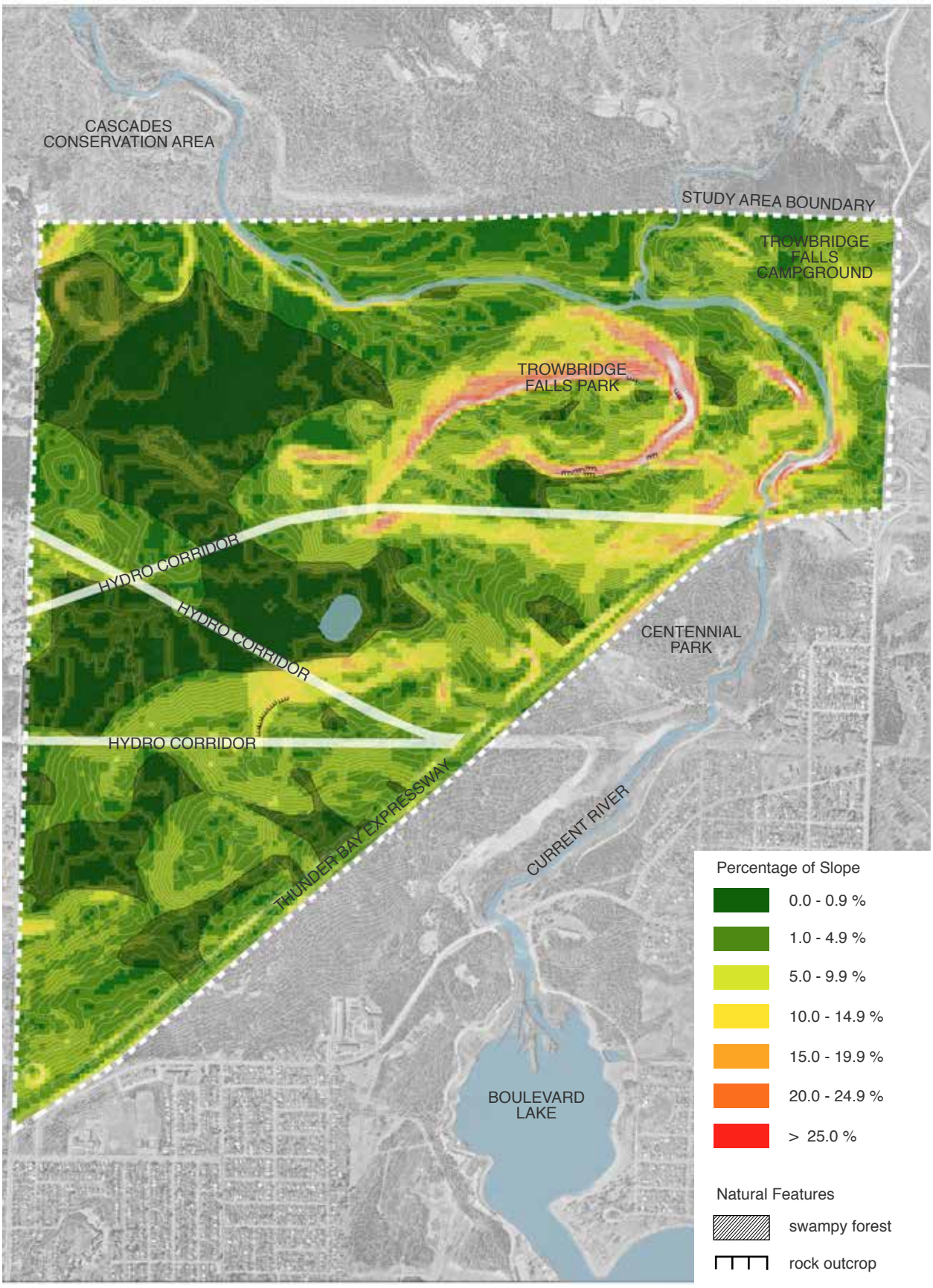
Within the Trowbridge Falls Park is a full-service campground with 64 RV and tent sites. It includes a store, washrooms, showers, laundry facilities, firewood sales, water and electrical services. It is open June to September.

Kinsmen Park

Kinsmen Park is located south of the campground, east of the Current River. It includes a stone dust pathway connecting the parking lot to a pedestrian bridge over the Current River. The park also has a grass lawn area, washrooms and children's playground equipment which has reached the end of its life cycle.

Cascades Conservation Area

The Cascades Conservation Area is located north of the Trowbridge Falls Park, west of the Current River. The main visitor access is from the parking lot at the north end of Balsam Street which is the starting point for the approximately 5.5 km of hiking trails which provide a scenic view of the rapids. Washrooms are available at the entrance. Mountain biking is not permitted in the Conservation Area.



Existing conditions

Terrain

General Areas

The terrain within the project area consists of three distinct zones: flat to low grade wet areas, undulating small hummocks and a single “mesa”.

With respect to developing sustainable trail, the low grade wet areas are generally to be avoided except in circumstances where an efficient connection is required or a “winter only” trail is being proposed. Shuniah Lake is situated within this area type.

The undulating hummocks can provide suitable terrain, particularly where side slopes range between 5% and 15%. With proper construction techniques this allows for a baseline trail alignment grades ranging in steepness from 0% to 7% with steeper grades in very short sections where appropriate.

The “mesa” provides some of the best terrain to be found in the project area with large areas of side slopes ranging between 0% and 30% and some exceeding this to near vertical cliffs. This area has numerous drainages that move water to either the river or the low grade wet areas. Each drainage requires careful consideration as crossing needs to be done at pitch points where the water is more focused and the potentially effected area of the trail is minimized.

In contrast to the good side slopes found on the “mesa”, the relatively flat “top” of the “mesa” is generally unsuitable for trail development due to deep organic soils and large wet, poor draining areas.

The “mesa” also provides some of the best views of the surrounding landscape which are currently not possible from the existing trail network.

Aspect

There are currently trails situated on all aspects. However, developing new trails on south facing aspects is key to minimizing impacts from early season/spring trail users as well as for late season/fall trail users. It also ensures that the season is extended as long as possible maximizing the trail use and enjoyable prior to transitioning to snow sports or vice versa.

In contrast, trails developed on the northern aspects will retain moisture better during the drier summer months. By having both aspects addressed it will provide a trail system which caters to a positive user experience by allowing the user to choose the most appropriate trails to enjoy depending on the conditions at that time.

Image credit: Blacksheep Mountain Bike Club

Vegetation

The project area consists of mixed species typical of boreal forest. Certain species of conifer and deciduous vegetation were identified during the field work as an indicator species for low lying wet areas and, as such, was avoided when found in concentrations. There are areas where the vegetation, primarily young conifers, can be quite dense. These areas would require heavy tree removal and considerable ground work to remove the root mass that would be exposed from trail construction. Other areas where the vegetation is more mature and the spacing between trees is suitable for laying out trail would require minimal tree and root removal.

Rock

There are various instances of exposed rock formations throughout the project area. Visual observation and research indicates that the rock is a combination of sedimentary rock and igneous rock (shale). These formations, as well as various glacial erratics, provide for a richer user experience with dramatic changes in elevation, vistas and opportunities for technical trail features.

Soil

The mineral soil found within the project area is Ground Moraine glacial deposit till found interspersed between exposed sections of bedrock. In general it is sandy with high quantity of stone, boulders and gravels with a small amount of clay content.

This soil type can be used to produce durable trail tread when used in conjunction with suitable trail alignments. The permeability and compaction coefficient of the sand combined with poor to moderate plasticity from the silt and small amounts of clay will compact well. With sufficient moisture retention any trail tread built should handle grades suitable for advanced trails. The amount of shade provided by the forest tree canopy should aid in soil moisture retention during hotter segments of the summer season. Careful attention will be needed when building in areas without shade as during these hot segments the soil will begin to lose its moisture content and cohesion resulting in trail tread degradation. In addition, the site contains areas of muskeg. The trail network needs to be designed to avoid these areas.

Control Points

The information identified above was categorized into positive and negative control points or areas where trail development should be focused or avoided. The following chart identifies each with neutral items falling into both categories depending on the context:

Positive Control Points	Neutral	Negative Control Points
• Side slopes between 5% and 50% in grade • Undulating hummocks • South facing aspects • Rock bluffs • Glacial erratics • Vistas	• Vegetation • Soils	• Side slopes over 50% • Low grade wet areas • Interior top of mesa • North facing aspects • Flood plain along river

Trowbridge Forest control points for trail development

Existing Trails

The existing trail network is a combination of purpose built trails (pathways and ski trails) and an organically grown single track network.

Adjacent to the project area is Cascade Conservation Area which provides additional hiking only trails with views of rapids and waterfalls on the Current River as well as a paved accessible trail.

The trails at Trowbridge Park includes segments of hiking trail and pathway which connect from the Chalet at Centennial Park along the Current River connecting to the Cascade Conservation Area. These trails are used by most trail user types within the trail network despite suffering from water issues during the spring and fall seasons.

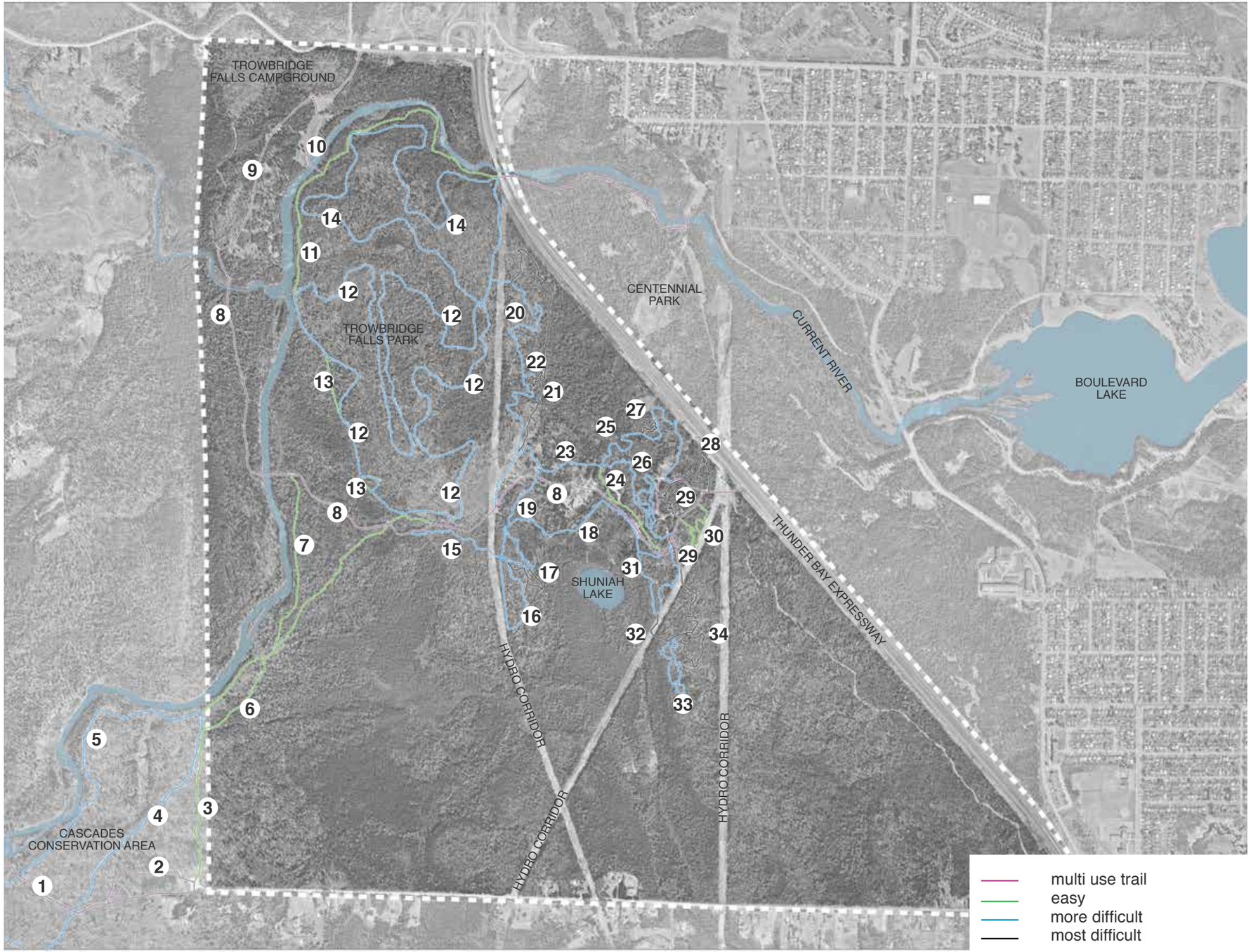
The nordic ski trails found in Trowbridge Falls Park were initially developed in the 1970s as a training/race course. This includes steep ups and downs often with sharp hard corners at one or both ends.

The Shuniah Mines trails are comprised primarily of mountain bike optimized single track trails and abandoned double track from industrial/utility works. The mountain bike trails range from winding cross country trails with technical trail surfacing through to downhill optimized trails with numerous technical trail features such as bridges, rock drops, jumps and bermed corners.

Existing trails in Trowbridge Park




Existing trails in Shuniah Mines
Image credit: Blacksheep Mountain Bike Club



EXISTING TRAILS

CASCADES CONSERVATION AREA

1 yellow trail
2 forest trail
3 blue trail
4 orange trail
5 red trail

TROWBRIDGE FALLS PARK

6 cascades access (1)
7 cascades access (2)
8 adventure trail
9 trowbridge trail
10 trowbridge access
11 yellow trail
12 blue trail
13 blue trail by pass
14 red trail
15 hill top trail

SHUNIAH MINES TRAILS

16 road to hell
17 the green mile
18 the stranger
19 cassandra
20 upper 2k
21 lower 2k
22 2k cut
23 crossover
24 peekaboo
25 dagobah
26 grand chasm
27 inner dagobah
28 snakes and ladders
29 double track
30 bmx
31 doctors
32 the otherside
33 yo mitchell
34 milk and cookies

50 250 750
0 100 500 1000m

Examples of the wide array of signage found within the existing Trowbridge Forest trail network

Existing Signage

A wide range of signage and trail markers are used across the trail network including markers that are old, faded and difficult to read. This results in a number of issues such as:

- Difficult to navigate through the park and know where you are.
- Anecdotal evidence suggests that people who are not familiar with the current trail network often get disoriented and need to ask other users how to get back to Centennial Park, Kinsmen Park or the Cascades Conservation Area.
- Lack of mapping at trail heads which illustrate the entire network.
- Newer signage in Shuniah is an excellent start, but needs to be coordinated with the entire trail network.

To improve the signage and wayfinding more consistency is needed throughout the trail network. This includes additional trail markers, maps of the entire trail network, and information pertaining to emergency contact information, by-laws and information on trail etiquette.

Examples of the wide array of signage found within the existing Trowbridge Forest trail network

Current Access

Currently the trail network is accessed from four main locations:

1. Centennial Park
2. Kinsmen Park
3. Cascades Conservation Area
4. Thunder Bay Expressway

Centennial Park

- Provides access from south via pedestrian underpass under the Thunder Bay Expressway.
- Popular pedestrian route therefore potential for bike/pedestrian conflicts during busy periods.
- During winter provides connection between nordic ski trails at Centennial Park and ski trails in Trowbridge Falls Park.

Kinsmen Park

- Preferred mountain bike access point to minimize conflicts with other trail user groups.
- Easy access to existing multi-use / Adventure trail which connects into Trowbridge Falls Park.
- Nordic ski trail access point.
- Use of existing parking lot.

Cascades Conservation Area

- Mountain biking is not permitted in Cascades Conservation Area.
- Access for pedestrians (walkers and hikers) only.

Thunder Bay Expressway

- Informal access point to Shuniah Mines mountain bike trails.
- Not promoted as an access point due to access restrictions related to the expressway.
- Egress/ingress from controlled access highway is not permitted.
- Access has been informally used in the past to allow for access to trails for construction.

Top: Centennial Park
Middle: Kinsmen Park
Bottom: Thunder Bay Expressway

Archaeology

Trowbridge Forest has a number of archaeology sites scattered throughout. Most of the sites identified are located in the Shuniah Mines area. However, no comprehensive archaeological plan currently exists. The Ministry of Tourism, Culture and Sport should be consulted regarding future trail projects. As a result, the trail network (existing and proposed) may need to be revised to help protect any identified key sites.

image credit: Brent Maranzan

Trails Master Plan

Overview of Proposed Trail Network

The goal of this plan is to create a network of trails that can be safely enjoyed by all user groups. This includes hikers, trail runners, walkers, mountain bikers and cross country skiers. The trails need to be fun, safe and challenging. Key aspects of the proposed network include:

- Improved trail heads and access.
- Closing of redundant, unsafe or unsustainable trails.
- Enhancement of existing trails.
- Introduction of new trails.
- Identifying priority designation of hiking, cross country and fat biking trails.
- Improvements to technical trail features to ensure they follow IMBA guidelines and Whistler Standards for trail design and the construction of technical trail features.
- Improvements to Kinsmen Park.
- Signage and wayfinding strategy.
- Accessibility.

Trailheads and Access

Access to the trail network needs to be more clearly defined with improvements at each of the key points of entry. For mountain biking, the primary point of access is at Kinsmen Park with secondary access from Balsam Street. Hiking and Cross Country Ski access is permitted from Centennial Park and Kinsmen Park. Pedestrian only access is from Cascades Conservation Area with emergency and periodic maintenance access from Thunder Bay Expressway.

Kinsmen Park

- Primary trailhead for mountain biking.
- Nordic access during winter.
- Existing parking and washroom facilities.
- Direct access to trails.
- Location of proposed bike park.

Balsam Street

- Proposed new secondary trailhead.
- Small parking lot for 10 to 15 vehicles.
- Signage.

Centennial Park

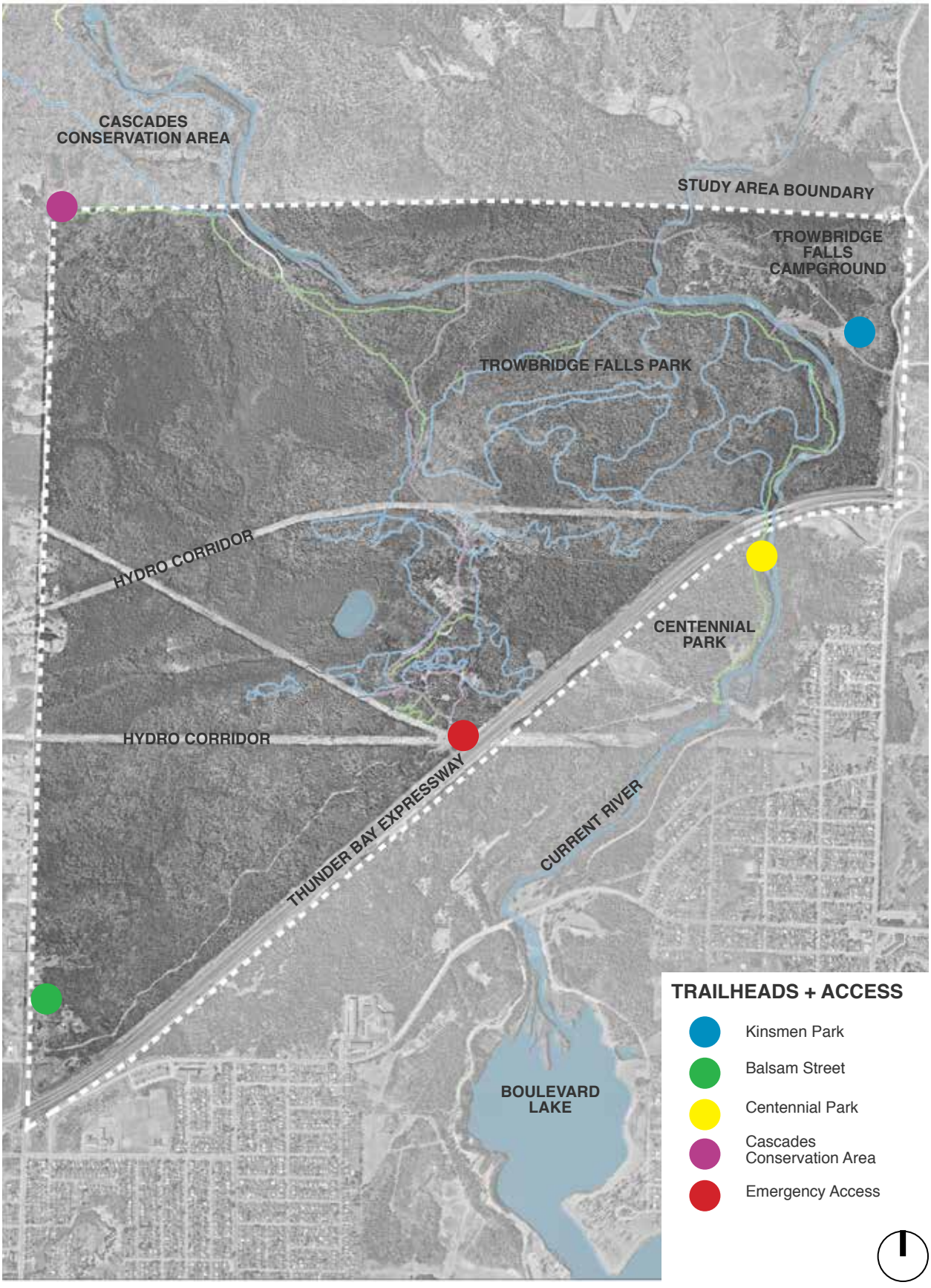
- Hiking and nordic skiing access.
- Signage at park directing mountain bikers to either Kinsmen or Balsam Street access points.

Cascades Conservation Area

- No mountain biking permitted in Conservation are.
- Parking lot at the north end of Balsam to have signage directing mountain bikers to either Kinsmen or Balsam Street access points.

Emergency Access

- Improved gate to prevent access / dissuade users from accessing Trowbridge Forest from this location.
- Location is an important access point for emergency services vehicles.
- Access for maintenance.


CASCADES CONSERVATION AREA
STUDY AREA BOUNDARY
TROWBRIDGE FALLS CAMPGROUND
TROWBRIDGE FALLS PARK
HYDRO CORRIDOR
CENTENNIAL PARK
HYDRO CORRIDOR
THUNDER BAY EXPRESSWAY
CURRENT RIVER
BOULEVARD LAKE
TRAILHEADS + ACCESS
Kinsmen Park
Balsam Street
Centennial Park
Cascades Conservation Area
Emergency Access

Closed Trails

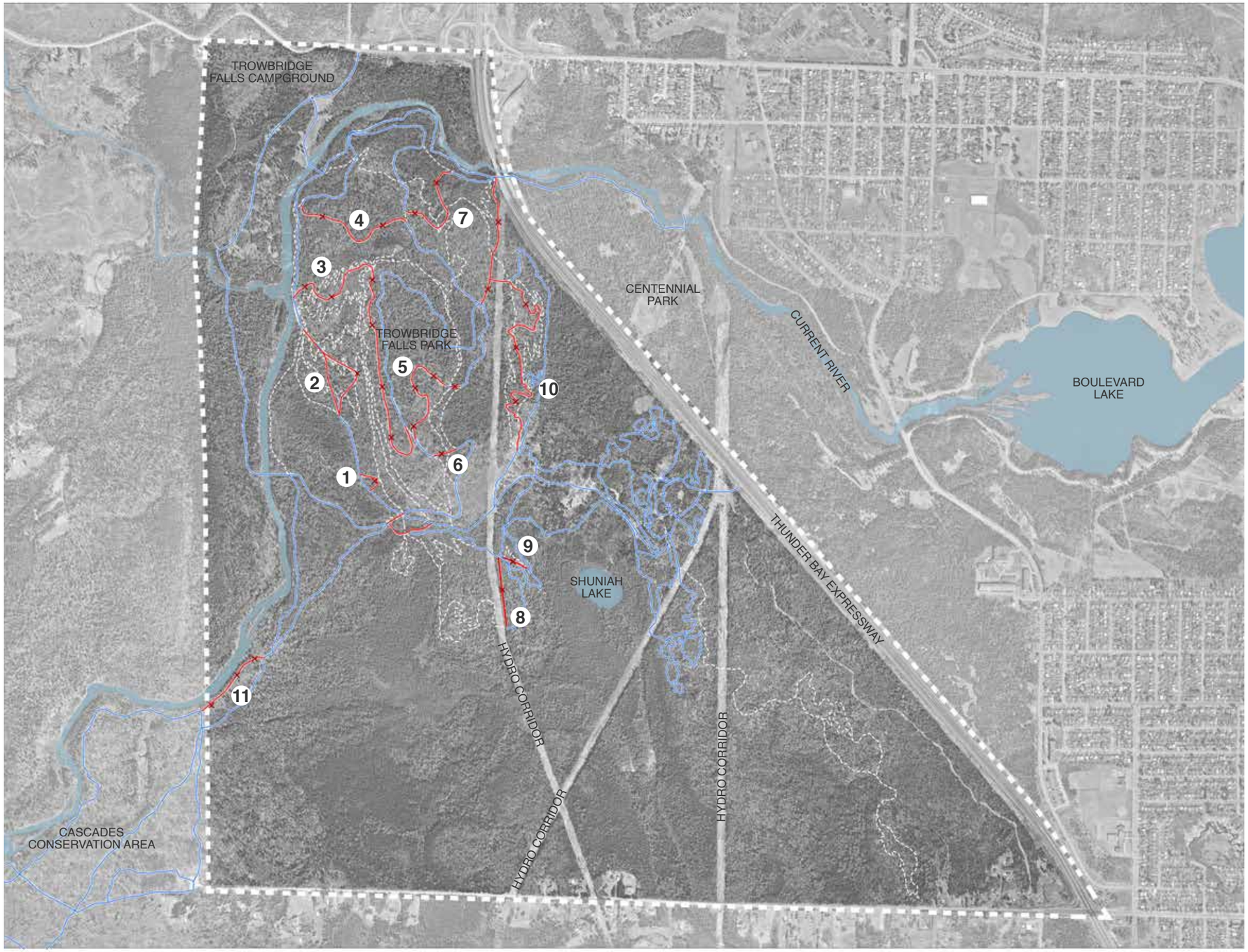
Approximately 6 kilometres of trail are proposed for closure. Closures are recommend primarily to address steep hills / terrain which is contributing to erosion and/or creating unsafe riding or skiing conditions.

Some closures also help to address simplifying the trail network at intersections resulting in an improved user experience.

To be successful, trail closures require a proactive approach to prevent continuous use of the trail. Key aspects of this strategy include:

- Sign the closure at either end;
- Blocking of the trail entrance(s) with fallen trees or logs;
- Placement of logs/dead fall and debris at regular intervals along the trail to prevent use;
- Regular inspection of the closure to ensure trail closure measures remain in place.

#	Trail Name/ Description	Length (m)	Reason for Closure
1	Blue Trail	822	Eliminate steep section of trail.
2	Blue Trail Bypass (east)	239	Rerouted to provide a more consistent and sustainable alignment to the north.
3	Blue Trail	1314	Rerouted to provide a more consistent and sustainable alignment to the north.
4	Red Trail	540	Fall line alignment which goes through the base of a drainage which is seasonally wet.
5	Blue Trail	758	Top of mesa section which is prone to wet sections due to alignment.
6	Blue Trail	105	Steep fall line alignment with erosion and safety issues.
7	Red Trail	630	Redundant trail
8	Road to Hell	281	Redundant trail
9	The Stranger	109	Eliminate steep fall line section.
10	Upper 2k	1086	Eliminate technical steep sections, create easier access route into Shuniah Mines trails. Avoids areas of archaeological significance.
11	Cascades Access 1	386	Limit access to Cascades to a single point to make navigation and control of unauthorized mountain bike entry into Cascades easier.
	total	6,270	



CLOSED TRAILS

blue trail
blue trail bypass (east)
blue trail
red trail
blue trail
blue trail
red trail
road to hell
the green mile
upper 2k
cascades access 1

closed trails
existing trails
proposed trails

50 250 750
0 100 500 1000m

Existing Trails for Enhancement

The following section describes some of the key enhancement to existing trails. For a complete description for all existing trails please refer to the table on the following pages.

Adventure Trail (8)

- Designate as a non-motorized trail.
- Re-establish turnpike raised tread construction throughout; install swales and crown trail tread.
- Consider hardening trail with aggregate (long term) .

Yellow Trail (11)

- Surfaced with aggregate mix and crowned to provide better all seasons trail tread.
- Turnpike construction upgrades with a swale on one or both sides depending on vegetation allowances.
- Extension west to “Adventure Trail” bridge to provide multi-use pathway loop on either side of Current River.

Blue Trail (12)

- Reroute of northern portion lower down the side slope in order to provide a more consistent graded climb without the ups and downs that are generally bypassed by users.
- Designed as a winter trail not generally to be used in spring / summer / fall.
- Reroute of south west portion eliminating requirement for nordic skiers to go up and down but now can traverse along base of side slope.

The Stranger (18)

- Reroute the western end, eliminating the fall line fast section and replacing it with a longer section which uses more of the side slope and adds numerous turns and optimized flow more in character with the rest of the trail.

Upper 2k (20)

- Re-aligned down slope of its existing alignment, removing the steep, fall line sections.
- The realignment avoids areas of archeological significance.

Snakes and Ladders (28)

- Dismantling of many existing technical trail features (see page 46).
- Redevelopment of existing wood based technical trails with more optional lines and more technical trail features including possibilities such as:
  - roller coaster ladder bridge.
  - elevated log rides.
  - log stack up-and-overs.
  - ladder bridges with integrated rock features.

BMX (30)

- Converted from a cross country trail into a trail more suited to its namesake.
- Addition of elevated soil based trail features including rollers, bermed corners and roller doubles.
- Addition of turnpike trail construction techniques and converting mineral soil burrow pits into drainage sumps to manage water.

Existing Trail Recommendations

#	Trail Name	Level of Difficulty	Type	3 Season Use	Winter Use
6	Cascades Access 1	Easy	Singletrack	Multi Use	Multi Use
7	Cascades Access 2	Easy	Singletrack	Multi Use	Multi Use
8	Adventure Trail	Easy	Unpaved Road	Multi Use	Fat Biking
9	Trowbridge Road	Easy	Double Track (access road)	Multi Use	Multi Use
10	Trowbridge Access	Easy	Double Track (access road)	Multi Use	Multi Use
11	Yellow Trail	Easy	Double Track	Multi Use	Cross Country Skiing
12	Blue Trail	Moderate	Double Track	Multi Use	Cross Country Skiing
13	Blue Trail Bypass	Moderate	Singletrack	Multi Use	Cross Country Skiing
14	Red Trail	Moderate	Double Track	Multi Use	Cross Country Skiing
15	Hill Top Trail	Moderate	Singletrack	Mountain Biking	Closed
16	Road to Hell	Moderate	Singletrack	Mountain Biking	Closed
17	The Green Mile	Difficult	Singletrack	Mountain Biking	Closed

Direction	TTFs + Structures	Length (metres)	Recommendations
Bi-directional		1301	
Bi-directional		707	Mountain bike turn around at the north end to address restriction on mountain biking in Cascades Conservation Area.
Bi-directional		3245	Signage and enforcement for no motorized vehicles.
Bi-directional		931	
Bi-directional		336	Realignment of existing pathway to accommodate bike park design. Surface to be asphalt to create paved link between Centennial park and Kinsmen Park.
Bi-directional		2399	Trail surface upgraded to asphalt or granular for improved access between Thunder Bay Expressway underpass (at Centennial Park) and bridge over Current River at Kinsmen Park.
Bi-directional		5500	Reroute of northern portion lower down the side slope in order to provide a more consistent graded climb without the ups and downs that are generally bypassed by users. Reroute of south west portion eliminating requirement for nordic skiers to go up and down but now can traverse along base of side slope. Designed as a winter trail not generally to be used in spring / summer / fall.
Bi-directional		57	Closed
Bi-directional		3234	
Downhill	Berms, step down jumps and rhythm sections	401	
Bi-directional		640	
Bi-directional		307	

Existing Trail Recommendations

#	Trail Name	Level of Difficulty	Type	3 Season Use	Winter Use
18	The Stranger	Moderate	Singletrack	Mountain Biking	Closed
19	Cassandra	Moderate	Singletrack	Mountain Biking	Closed
20	Upper 2k Trail	Moderate	Singletrack	Mountain Biking	Closed
21	Lower 2k Trail	Difficult	Singletrack	Mountain Biking	Closed
22	2k Cut	Moderate	Singletrack	Mountain Biking	Closed
23	Crossover	Moderate	Singletrack	Mountain Biking	Closed
24	Peekaboo	Easy	Singletrack	Mountain Biking	Closed
25	Dagobah	Moderate	Singletrack	Mountain Biking	Closed
26	Grand Chasm	Moderate	Singletrack	Mountain Biking	Closed
27	Inner Dagobah	Difficult	Singletrack	Mountain Biking	Closed
28	Snakes and Ladders	Difficult	Singletrack	Mountain Biking	Closed
29	Double Track (Prologue Loop)	Easy	Access Road	Mountain Biking	Closed
30	BMX	Easy	Singletrack	Mountain Biking	Closed
31	Doctors	Moderate	Singletrack	Mountain Biking	Closed
32	The Otherside	Difficult	Singletrack	Mountain Biking	Closed
33	Yo Mitchell	Difficult	Singletrack	Mountain Biking	Closed
34	Milk & Cookies	Difficult	Singletrack	Mountain Biking	Closed

Direction	TTFs + Structures	Length (metres)	Recommendations
Bi-directional		1198	Reroute the western end, eliminating the fall line fast section and replacing it with a longer section which uses more of the side slope and adds numerous turns and optimized flow more in character with the rest of the trail.
Bi-directional		430	
Bi-directional		1417	Realignment of trail
Bi-directional	Bridge	1190	Maintain as challenging cross country section mid system.
Bi-directional		70	
Bi-directional	Bridge	418	
Bi-directional	Bridge	432	
Bi-directional		952	Maintain as is and re-assess for upgrading once trail plan has been successfully implemented. Consider installing split rail cedar fence at sharp corner adjacent to Expressway.
Downhill	Berm, Bridge, Drop, Jump, Ladder Bridge, Rock Face	1085	Address bridge issue as identified in TTF section.
Bi-directional		265	
Uphill	A-frame, Bridge, Drop, Skinny, Teeter Totter	673	Dismantling of many existing technical trail features.
Bi-directional		400	Close south end to prevent informal crossing of expressway.
Bi-directional		391	Converted from a cross country trail into a trail more suited to its namesake.
Downhill	Roller Coaster	662	
Downhill	Bridge, Rock Face	681	
Downhill		626	Maintain as is and re-assess for upgrading once trail plan has been successfully implemented.
Downhill		382	Maintain as is and re-assess for upgrading once Trail Plan has been successfully implemented.

Proposed Trails

The following section describes the primary improvements to the Trowbridge Forest trail network. This includes:

- Almost 15 kilometres of mountain bike optimized trails; and,
- Five and a half kilometres of multi-use trails.

In total over 20 kilometers of new trail is proposed to achieve the following objectives:

- Better integration between multi-use trails and mountain bike optimized trails to make the system compatible with all trail user groups;
- Improved nordic ski loops;
- Improved network of fat biking trails;
- Improved access to the Shuniah Mines trails;
- Provide a range of single track trail experiences (flow trails, technical trails, climbing, and down hills);
- Provide trails suitable for all skill levels (easy, moderate and difficult);
- Provide a trail network that is sustainable and is sensitively integrated into the Trowbridge Forest landscape; and,
- Fun, safe and challenging for riders making it a premier regional mountain biking destination that will encourage repeat visits.

The following section describes some of the key proposed trails for the Trowbridge Forest. For a complete list of all proposed trails, refer to the plan on the facing page and table on the following pages.

Accessibility

Due to limitations with topography and environmental protection, the proposed trail will not meet all requirements outlined in the Accessibility for Ontarians with Disabilities Act (AODA) for accessible trails. However, information on signage and wayfinding platforms should address AODA requirements by providing detailed information for people of varying abilities to determine for themselves whether or not they will be able to enjoy and use the trails.

Trail building in Trowbridge Forest
Image credit: Blacksheep Mountain Bike Club

Balsam Trail (A)

- New access trail linking proposed Balsam Trail Head to the existing Shuniah Mines Trails.
- Easy multi use trail with optional intermediate mountain bike priority lines (A1, A2 and A3).
- Optional lines may include technical trail features.
- Optional lines to be closed in winter due to wet conditions.

Lower Bluff Trail (F)

- East west connector along bottom of ridge.
- Provides route along iconic Canadian Shield rock face.
- Provides connection to technical downhill flow trails and climbing trails.

Top of Bluff Trail (G)

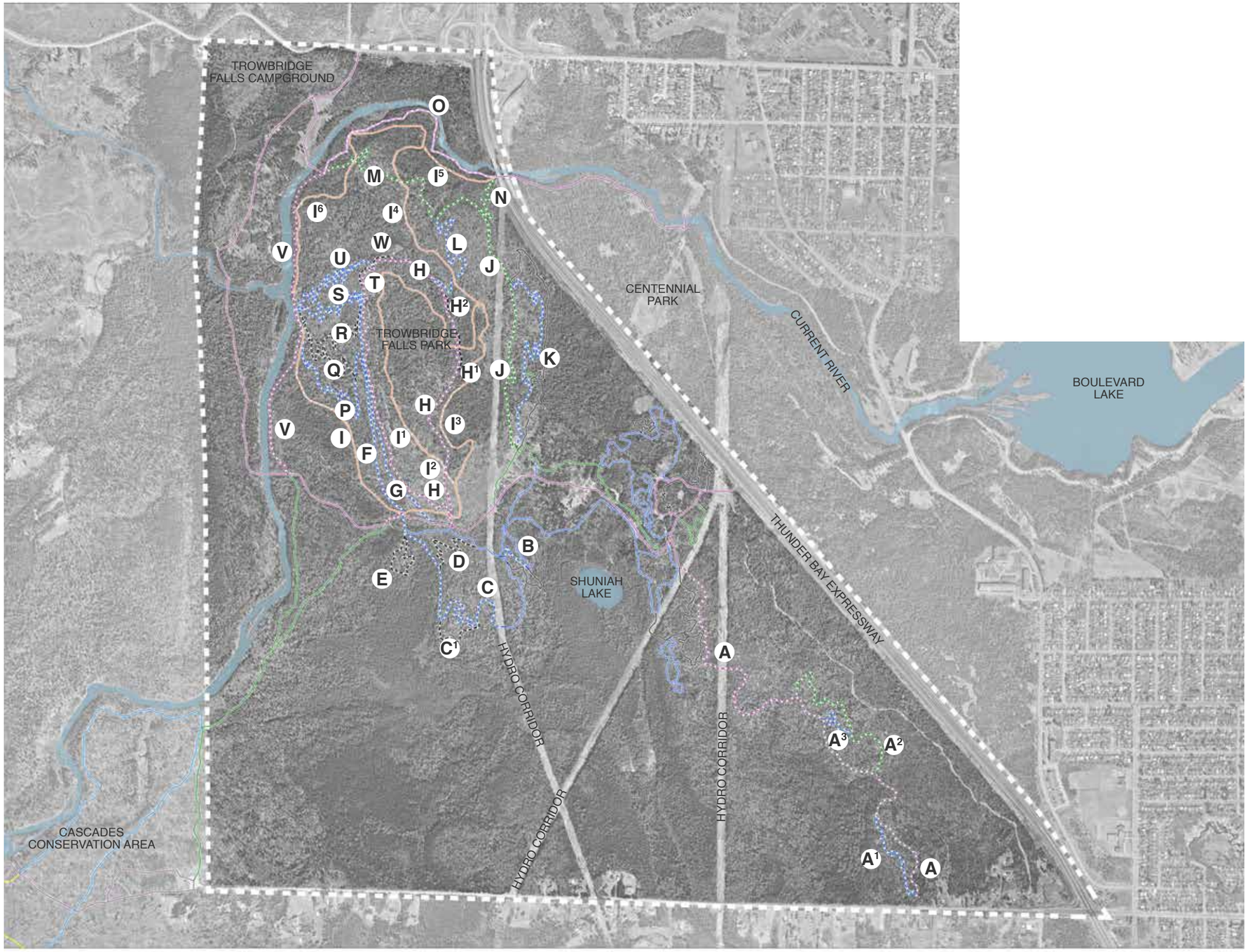
- East west connector along top of ridge.
- Provides route along iconic Canadian Shield rock face .

Top and bottom: Lower bluff trail precedent image, Image credit: Trevor May
Middle: Lower bluff trail precedent image

Lookout Trail (H)

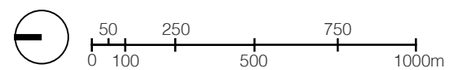
One of the most interesting locations in the Trowbridge Forest is the height of land in Trowbridge Falls Park. Currently no formal trail leads to this location with views of Lake Superior and the Sleeping Giant formation to the east. A multi-use/pedestrian priority trail which encircles the ridge with two “Boulder Bluff” optional advanced mountain bike optimized lines proposed on south section of trail. A boulder field trail (T) is proposed off of the north section.

Top: Proposed lookout at site’s highpoint
Bottom: View from proposed lookout



PROPOSED TRAILS

A	Balsam Trail
	Balsam Option Line #1
	Balsam Option Line #2
	Balsam Option Line #3
B	The Stranger
C	Cross Country Connector
	Technical Cross Country Trail
D	Downhill Flow Trail (west)
E	Technical Trail Cross Country Loop
F	Lower Bluff Trail
G	Top of Bluff Trail
H	Lookout Trail
	Boulder/Bluff Optional Line #1
	Boulder/Bluff Optional Line #2
I	Nordic Loop
	Nordic Loop
	Nordic Loop
	Nordic Loop
	Nordic Loop
	Nordic Loop
	Nordic Loop
J	Easy 2k
K	Upper 2k
L	East-West Connector
M	Shuniah Mines Access
N	Short Connector
O	Centennial Park Link Trail
P	Downhill Flow Trail- Moderate
Q	Downhill Technical Flow Trail
R	Downhill Flow Trail- Difficult
S	Flow Trail
T	Boulder Field Trail (Technical)
U	Climbing Trail
V	Current River Hiking Trail
W	Lookout



New Green Trail North of Upper 2k (M + N)

- Easy single track trail connection between bridge at Kinsmen Park and re-aligned Upper 2K to provide a beginner access route into Shuniah Mines trails from the east
- East leg links to underpass connection to Centennial Park.

Top: Pedestrian walkway under Thunder Bay Expressway
Bottom: Bridge over Current River linking Kinsmen Park to Trowbridge Falls Park

Proposed Trails

#	Trail Name/ Description	Level of Difficulty	Type	3 Season Use	Winter Use
A	Balsam Trail	Easy	Single Track	Multi Use	Multi Use + Fat Biking
A1	Balsam Option Line #1	Moderate	Single Track	Mountain Biking	Fat Biking
A2	Balsam Option Line #2	Easy	Single Track	Mountain Biking	Fat Biking
A3	Balsam Option Line #3	Moderate	Single Track	Mountain Biking	Fat Biking
B	The Stranger	Moderate	Single Track	Mountain Biking	Fat Biking
C	Cross Country Connector	Moderate	Single Track	Mountain Biking	Fat Biking
C1	Technical Cross Country Trail	Difficult	Single Track	Mountain Biking	Closed
D	Downhill Flow Trail (west)	Difficult	Single Track	Mountain Biking	Closed
E	Technical Cross Country Loop	Difficult	Single Track	Mountain Biking	Closed
F	Lower Bluff Trail	Moderate	Single Track	Mountain Biking	Fat Biking
G	Top of Bluff Trail	Moderate	Single Track	Mountain Biking	Fat Biking
H	Lookout Trail	Moderate	Single Track	Multi Use	Multi Use + Fat Biking
H1	Boulder/Bluff Optional Line #1	Difficult	Single Track	Mountain Biking	Closed
H2	Boulder/Bluff Optional Line #2	Difficult	Single Track	Mountain Biking	Closed
I	Nordic Loop	Easy	Double Track	Multi Use	Cross Country
I1	Nordic Loop	Easy	Double Track	Multi Use	Cross Country
I2	Nordic Loop	Easy	Double Track	Multi Use	Cross Country
I3	Nordic Loop	Easy	Double Track	Multi Use	Cross Country
I4	Nordic Loop	Easy	Double Track	Multi Use	Cross Country
I5	Nordic Loop	Easy	Double Track	Multi Use	Cross Country
I6	Nordic Loop	Easy	Double Track	Multi Use	Cross Country
J	Easy 2K	Easy	Single Track	Mountain Biking	Fat Biking
K	Upper 2k	Moderate	Single Track	Mountain Biking	Closed
L	East-West Connector	Moderate	Single Track	Mountain Biking	Fat Biking

Direction	TTFs + Structures	Length (metres)	Notes
Bi-directional	None	2191	Connection between Balsam trail head and Adventure Trail in Shuniah Mines
Bi-directional		475	Optional mountain bike priority line branching off of main multi use trail
Bi-directional		824	Optional mountain bike priority line branching off of main multi use trail
Bi-directional		268	Optional mountain bike priority line branching off of main multi use trail
Bi-directional		188	new sustainable alignment for west leg of existing trail
Bi-directional		1141	Connector between Road to Hell and the Adventure Trail
Bi-directional		277	Optional line off of the Cross Country Connector
Downhill		489	Downhill connector between Hill Top
Bi-directional		436	Loop at east end of Cross Country Connector
Bi-directional		868	Trail follows bottom of ridge
Bi-directional		651	Trail follows top of ridge
Bi-directional		2530	Trail circles ridge with lookout at east side
Bi-directional		162	
Bi-directional		93	
Single Direction		297	
Single Direction		55	
Single Direction		104	
Single Direction		294	
Single Direction		60	
Bi-directional		154	
Single Direction		24	
Bi-directional		778	
Bi-directional		1246	
Bi-directional		656	Connection between lookout trail and Shuniah Mines Access

Proposed Trails

#	Trail Name/ Description	Level of Difficulty	Type	3 Season Use	Winter Use
M	Shuniah Mines Access	Easy	Single Track	Mountain Biking	Fat Biking
N	Short Connector	Easy	Single Track	Mountain Biking	Fat Biking
O	Centennial Park Link Trail	Easy	Single Track	Multi Use	Multi Use
P	Downhill Flow Trail- Moderate	Moderate		Mountain Biking	Closed
Q	Downhill Technical Flow Trail	Difficult	Single Track	Mountain Biking	Closed
R	Downhill Flow Trail- Difficult	Difficult	Single Track	Mountain Biking	Closed
S	Flow Trail	Moderate		Mountain BIking	Closed
T	Boulder Field Trail (Technical)	Difficult	Single Track	Mountain Biking	Closed
U	Climbing Trail	Moderate	Single Track	Mountain Biking	Closed
V	Current River Hiking Trail	Easy	Single Track	Multi Use	Multi Use
W	Lookout	Easy	Double Track	Multi Use	Multi Use

Direction	TTFs + Structures	Length (metres)	Notes
Bi-directional		1340	Connector between bridge at Kinsmen Park and Upper 2k
		311	
Bi-directional		977	Asphalt Trail
Downhill		991	
Downhill		738	
Downhill		783	
		817	
Bi-directional		221	
Uphill		988	
Bi-directional		1266	Extension of Cascade Access #2 to the east
Bi-directional		57	
	total:	**20227**	

Gravity Trails (P, S)

Flow or gravity trails create a roller coaster experience, with minimal pedaling and braking required. Gravity trails typically have banked turns, rolling terrain, various types of jumps, and consistent and predictable surfaces. Abrupt corners and unforeseen obstacles are minimized to preserve flow of the ride.

Two Intermediate to advanced flow trails along the northern side slope of the mesa are proposed. These trails will:

- Be gravity assisted with rollers, jumps and bermed corners to aid the rider in maintaining momentum.
- Include features for speed management including gentle, strategic grade reversals where the mild, short uphill allows the rider to reduce their speed prior to a corner, feature or straight section without applying the brakes. This will reduce the impacts to the trail tread from braking forces and improve the rider experience.
- Include rollers, table top jumps, roller doubles, rollable step up jumps and bermed corners.
- Provide opportunities for optional hip jumps or “hidden lines” to increase the longevity and interest of the trail for by providing further progression.
- Limit jumps to a height of 0.7 metres.
- Have jump transitions / landings 1.5x wider than the take-offs to accommodate for rider error and/or advanced riding styles.

Advanced flow trails are to include:

- All of the features identified in the intermediate trail as well as rollable step down jumps and drops.
- Jumps with no maximum height.
- Jump transitions / landings 1.5x wider than the take-offs to accommodate for rider error and/or advanced riding styles
- Drops up to 1 metre in height with a minimum 3 metre long transition / landing.
- No gap jumps.

Top and middle: Mountain bike flow trail
Bottom: Mountain bike flow trail, Image Credit: Brian Finestone

Downhill Trails (Q, R)

Two intermediate to advanced technical downhill trails are proposed along the northern side slope of the mesa. Each of these trails will be gravity assisted with rollers, jumps and bermed corners as well as numerous rock features, technical trail surfacing (exposed roots, etc.) and (potentially) wooden technical trail features. Speed management is to be a combination of strategic grade reversals, rock armoured section with anchors and gateways and technical trail features.

Climbing Trail (U)

A designated climbing trail is proposed north of the lookout. It is designed with an average grade of 6% or less to allow for an "easier" climb which does not exhaust the rider by the time they have reached the top. This trail is also designed for ski training, as a replacement of Martii's hill which is proposed for closure.

Top: Mountain bike flow trail
Bottom: Mountain bike climbing trail, Image Credit: NSMBA

Hiking Trail (V)

- Proposed hiking trail to extend along the south side of the Current River.
- Connects the "yellow" multi use trail to Cascades Access 2 to form a continuous river walk hiking trail from the Thunder Bay Expressway underpass to the Cascades Conservation Area (approximately 4 km).
- Armoured raised turnpike construction with heavy rip rap base capped with mineral soil excavated from swales on either side of trail tread to allow for movement of water draining from "mesa" to river.

Nordic Ski Trails

The nordic ski trails have been consolidated to reduce maintenance and develop a more accessible ski trail system which caters to recreational nordic skiers instead of racers. This includes reducing the number of “fall line” alignments which are unsustainable for summer use due to erosion and prove too challenging for general demographic of nordic skiers using this trail system.

Some optional sections of steeper trail have been maintained so users can choose to take a more advanced loop as opposed to being forced to complete a loop.

The revised alignment provides approximately 6 kms of nordic trail which is suitable for 1 - 2.5 hours of skiing depending on route taken and skier’s skill / fitness level.


CASCADES
CONSERVATION AREA
STUDY AREA BOUNDARY
TROWBRIDGE
FALLS
CAMPGROUND
TROWBRIDGE
FALLS PARK
HYDRO CORRIDOR
HYDRO CORRIDOR
HYDRO CORRIDOR
CENTENNIAL
PARK
THUNDER BAY EXPRESSWAY
CURRENT RIVER
BOULEVARD
LAKE
NORDIC TRAILS
existing cross country ski
proposed cross country ski

Fat Bike Trails

Fat biking in the project area is a relatively newly managed activity. It is similarly so across North America and, as such, the information provided below are “best practices-to-date” which may be improved upon in the short term as the sport develops.

It is the recommendation of this report that, should the fat bike trails be groomed, they be designated as fat bike and snowshoe ONLY during the winter months. Doing so will reduce damage to grooming caused by walkers and dogs during warmer days during the winter. The one possible exception to this designation is the “lookout trail” (H) as the vista will undoubtedly be a desirable destination for all users during the winter.

It should be noted that fat bike trails generally take longer to be open for summer use due to the compaction of the snow during use or grooming.

The fat bike trails map route identified in this report is a “recommended” network based on low grade trails which are more suited to the low gearing and tread patterns currently available to fat bikes. Temporary signage and “wands” indicating the fat bike routes is an effectively way to identify what is open to fat bikes and snowshoes and what is not. It also allows for easy modification / adaptability of the fat bike designated trails should various factors necessitate a change. For example: By closing or reducing the number of fat bike trails in the spring during low snow months one can reduce further compaction of the snow and allow the snow on the trail to melt sooner.

Fat Biking at Silverstar Mountain, British Columbia


CASCADES
CONSERVATION AREA
STUDY AREA BOUNDARY
TROWBRIDGE
FALLS
CAMPGROUND
TROWBRIDGE
FALLS PARK
HYDRO CORRIDOR
HYDRO CORRIDOR
HYDRO CORRIDOR
CENTENNIAL
PARK
THUNDER BAY EXPRESSWAY
CURRENT RIVER
BOULEVARD
LAKE
FAT BIKE TRAILS
existing fat bike trails
proposed fat bike trails

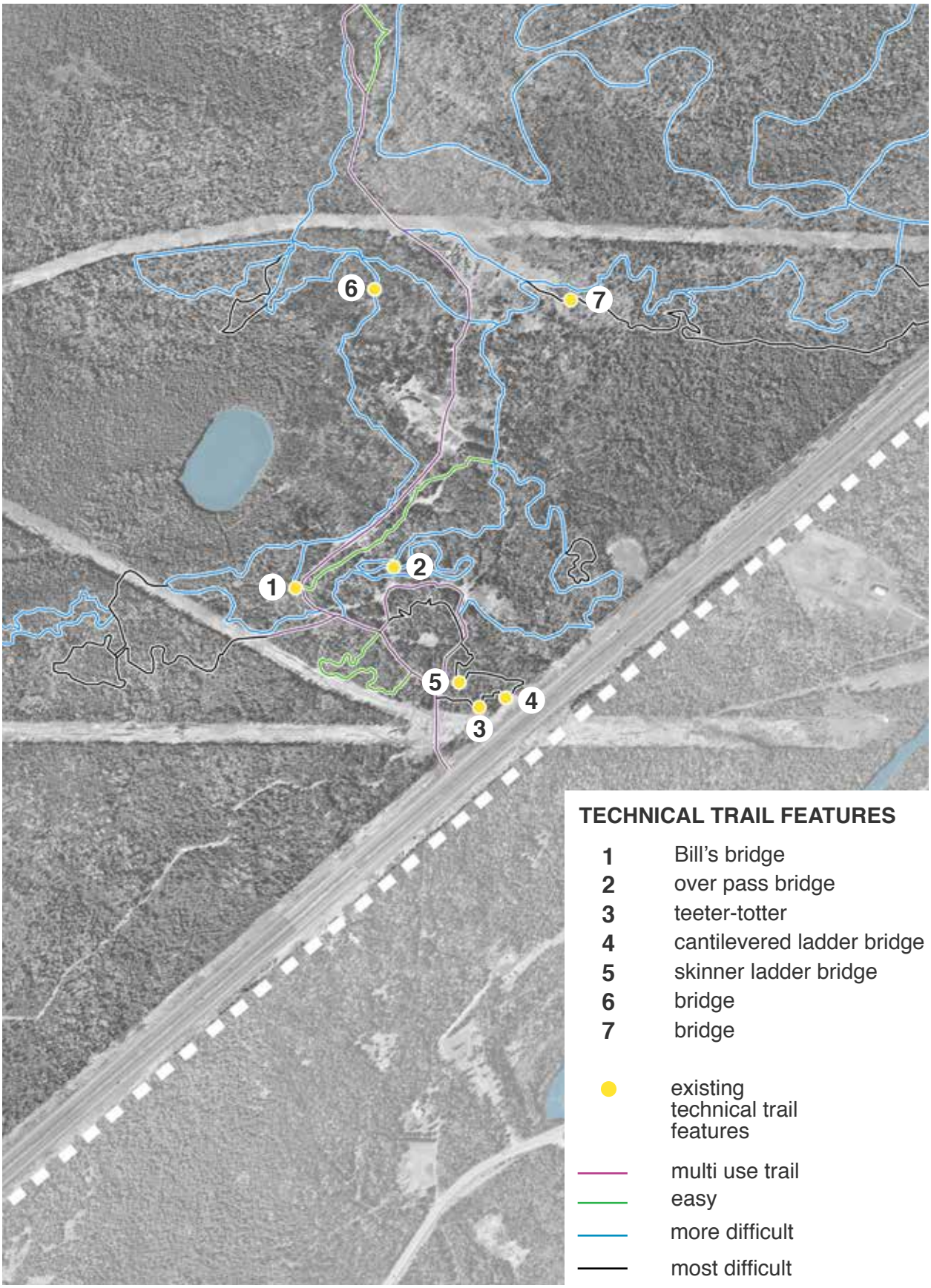
Technical Trail Features

Technical trail features (TTF) are an essential ingredient in a fun, sustainable mountain bike trail network. It is strongly recommended that wooden technical trail features be limited to a few specific trails or to areas where no other solution will work in order to reduce the maintenance / duty of care associated with these elements.

When a TTF is suitable for construction, the Whistler Trail Standards "TTF Construction Standards" are to be used as the guiding document.

Snakes & Ladders – Snaking Skinny
image credit: trailforks.ca

Snakes & Ladders – Up and Over Skinney
image credit: trailforks.ca



TECHNICAL TRAIL FEATURES

1	Bill's bridge
2	over pass bridge
3	teeter-totter
4	cantilevered ladder bridge
5	skinner ladder bridge
6	bridge
7	bridge

existing technical trail features

multi use trail

easy

more difficult

most difficult

TTF CONSTRUCTION STANDARDS

Trails with constructed Technical Trail Features (TTF) must exceed a minimum standard to protect the trail user.

SAFETY

TTFs must exceed the minimum strength and stability standard. Also, the finish must be such that if a rider were to fall, the structure or other protrusions would not increase the degree of the injury.

STRENGTH AND STABILITY

Each span of the TTF must be capable of withstanding a centered vertical load of 225 kg (495 lb, 2 times heaviest rider/bike and gear). Every single rung should be capable of holding a rider/bike and gear's weight.

TTF DESIGN PHILOSOPHY

- Gateways:
  -By placing a narrow section or difficult turn early while the TTF is still close to the ground (known as a gateway), inexperienced riders may dismount prior to the TTF getting too high above the ground where the rider is more likely to be injured should a fall occur. For example, place a 10 cm wide gateway 40 cm off the ground as a gateway to a 30 cm wide section 1.2 m off the ground.
- Make the highest difficulty section visible from the entry:
  -By placing the difficult section in view, the rider can make an informed decision before they may get into trouble with a TTF that may be beyond their ability.
  -Avoid wide, easy entrances leading to high, narrow exposed features

TTF HEIGHT AND WIDTH

As outlined in the Technical Trail Difficulty section, maximum height and minimum width are dependent on the TTFs difficulty. As the height above the ground increases, the consequence of injury in the case of a fall increases.

Height is measured vertically to the lowest point within 1.0 m adjacent to TTF (figure 2). Tread width is the amount of flat tread (figure 3).

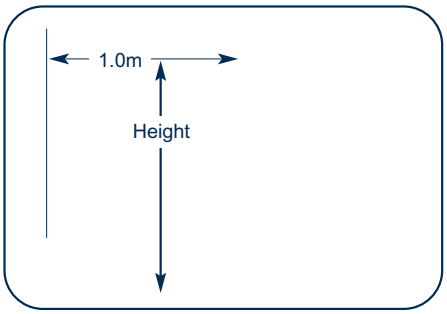


FIGURE 2 MEASUREMENT OF TTF HEIGHT

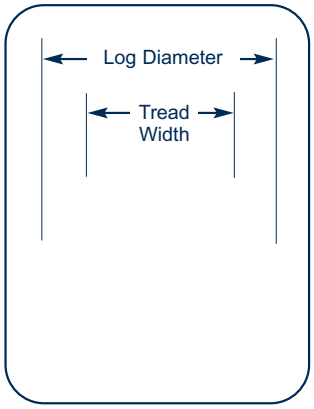


FIGURE 3
TREAD WIDTH
MEASUREMENT

CONSTRUCTION PRACTICES

Cross bracing of vertical members is required (figure 4). Also, TTFs should not be mounted to living trees for the following reasons:

- The tree will continue to grow, compromising the integrity of the TTF.
- The tree may sway due to wind, weakening the TTF.
- Nailing to live trees is harmful to the tree.

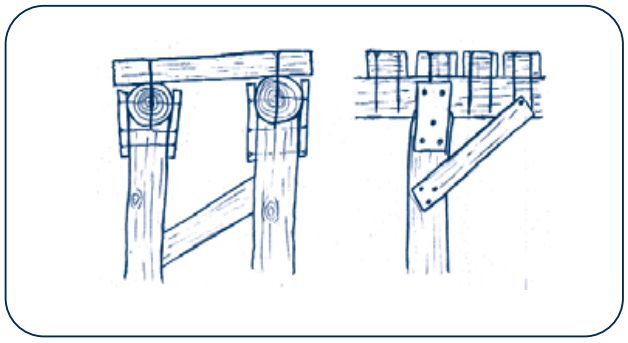


FIGURE 4 BRIDGE STRINGER SUPPORT AND CROSS BRACING

CONNECTED MEMBERS

The methods for joining members in order of preference is: nuts and bolts, lag bolts, wood screws or ardox nails. Ensure two-thirds of nail or screw's length penetrates the stringer. Loading on a member should be done in such a way as not to rely exclusively on the shear strength of the joining method.

BRIDGE RUNG SPACING

Deck rungs must be placed tightly so that children will not catch their feet between rungs, arms will not fit between rungs and all users including dogs will use bridges as opposed to walking adjacent to the bridge, compromising the sensitive area the bridge was intended to protect. An appropriate spacing between rungs is 3 cm to promote drainage of water and mud. Overhang rungs past stringers by less than 5 cm (2 in) (figure 5).

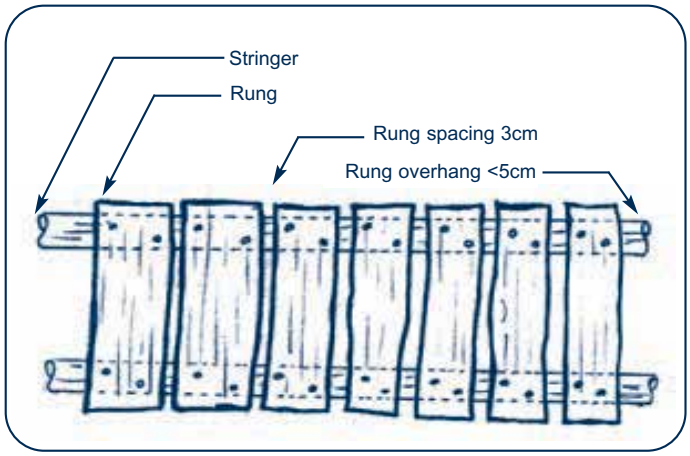


FIGURE 5 BRIDGE RUNG SPACING, RUNG OVERHANG

BRIDGE SURFACING

It is recommended that wood surfaces with a slope exceeding 10°, with the exception of split wood having a rough surface finish, have an applied anti-slip surface. One recommended material is expanded diamond lath. Chicken wire and rolled roofing material, although popular, are not durable and roofing material traps moisture promoting premature rotting.

Note: TTFs must be reinforced to withstand the additional loading of anti-slip surfaces against the direction of the braking forces.

WOOD PREPARATION

Bark must be stripped off and wood in contact with the earth should be isolated to minimize rotting. For natural rot resistant wood, use cedar.

#	Description	Assessment	Recommendation
1	**Bill's Bridge** ▫ Round stringers ~6" diameter with rough sawn dimensioned decking ▫ Snowpack limited ability to fully assess	▫ Choice of materials is good ▫ Unclear as to whether stringers are elevated off ground at each end ▫ Decking has 10cm of overhang from hinge point (nail) but 5cm of overhang from edge of stringer	▫ Ensure that stringers are not in direct contact with ground by installing sleepers and building soil / rock ramps on each end. ▫ Monitor decking for leveraging or added wear.
2	**Over Pass Bridge** ▫ Telephone pole stringers with a tapering diameter (~20cm - 40cm) ▫ Log retainer with tree stump and live tree as vertical supports ▫ Exact width to height ratio is unknown due to snowpack	▫ Bridge deck is twisted ▫ Log retainer uses old stump and ▫ Decking has 10cm of overhang from hinge point (nail) but 5cm of overhang from edge of stringer	▫ Rebuild bridge using existing stringers and decking with maximum 2% cross slope on bridge ▫ Add proper cribbed deadman footings on both sides and backfill with rip-rap rock and mineral soil
3	**Teeter-Totter** ▫ ~2.5m long with deck boards spaced 15cm apart ▫ Dimensioned lumber used for construction ▫ Galvanized hardware for pivot point	▫ Ladder bridge does not meet Whistler Trail Standards for deck spacing ▫ Noticeable lateral movement when loaded	▫ Remove
4	**Cantilevered Ladder Bridge** ▫ Uses dimensional lumber ▫ Hardware all galvanized ▫ Bolts into boulder using expansion anchors ▫ Snowpack limited ability to fully assess	▫ A few support beams use poor quality lumber with knots and cracking	▫ Replace poor quality lumber pieces ▫ Monitor

#	Description	Assessment	Recommendation
5	**Skinny Ladder Bridge** ▫ 30cm wide ladder bridge with log support at centre point ▫ Snowpack limited ability to fully assess	▫ Visual inspection indicates signs of degradation	▫ Remove / Rebuild
6	**Bridge** ▫ 10cm x 10cm square stringers with dimensional lumber decking ▫ 5cm overhang and 3cm spacing on decking ▫ Snowpack limited ability to fully assess	▫ Choice of materials is good ▫ Unclear as to whether stringers are elevated off ground at each end	▫ Ensure that stringers are not in direct contact with ground by installing sleepers and building soil / rock ramps on each end.
7	**Bridge** ▫ 10cm x 10cm square stringers with dimensional lumber decking ▫ 5cm overhang and 3cm spacing on decking ▫ snowpack limited ability to fully assess	▫ Choice of materials is good ▫ Unclear as to whether stringers are elevated off ground at each end	▫ Ensure that stringers are not in direct contact with ground by installing sleepers and building soil / rock ramps on each end

#4 Snakes & Ladders – Cantilevered Ladder Bridge
image credit: trailforks.com

#1 The Stranger – Bill's Bridge
image credit: trailforks.com

#3 Teeter Totter

#2 Overpass Bridge

Kinsmen Park Improvements

A series of improvements are proposed for Kinsmen Park to make it a whole family recreation destination including improvements to the playground, picnic facilities, and as a new launching point for mountain biking in the Trowbridge Forest. Key features include:

- Bike park;
- Asphalt or compacted granular loop/trail around the perimeter of the park;
- Picnic/shade structure;
- Children's playground; and;
- Skills learning trail.

Other necessary park improvements include bike racks, benches, picnic tables, and additional litter receptacles.

These proposed improvements will integrate well with some of Kinsmen Park's existing features including:

- Parking lot;
- Washrooms;
- Water service (for bike park maintenance);
- Open lawn;
- Direct access to the Trowbridge Forest from the Adventure Trail and Trans Canada Trail bridge; and,
- Trowbridge campground.

Kinsmen Park existing features:
Top: Bridge over Current River
Middle: Existing washrooms
Bottom: Playground and field

Asphalt Loop

Around the perimeter of the site is an asphalt loop which connects the various areas. This loop will:

- Provide a hard surface access to all proposed park elements.
- Allow for easier maintenance.
- Minimize impact during wet conditions.
- Be 3 metres wide to facilitate multi-use two way traffic.
- 1.5 metres wide pathway along south west stretch to encourage primarily pedestrian traffic between the playground and bridge.

Children's Playground

New playground equipment is required at Kinsmen Park to replace the existing structures that have significantly deteriorated. The proposed playground area is approximately 700 square metres and would provide play opportunities for a range of ages and abilities.

Swings, slides, ropes, climbing elements, the integration of natural materials and natural play elements would replace the play value of the existing equipment and fit well within the Trowbridge setting.

Examples of playground equipment for Kingsmen Park. Image credit (bottom two): Earthscape.ca

Bike Park

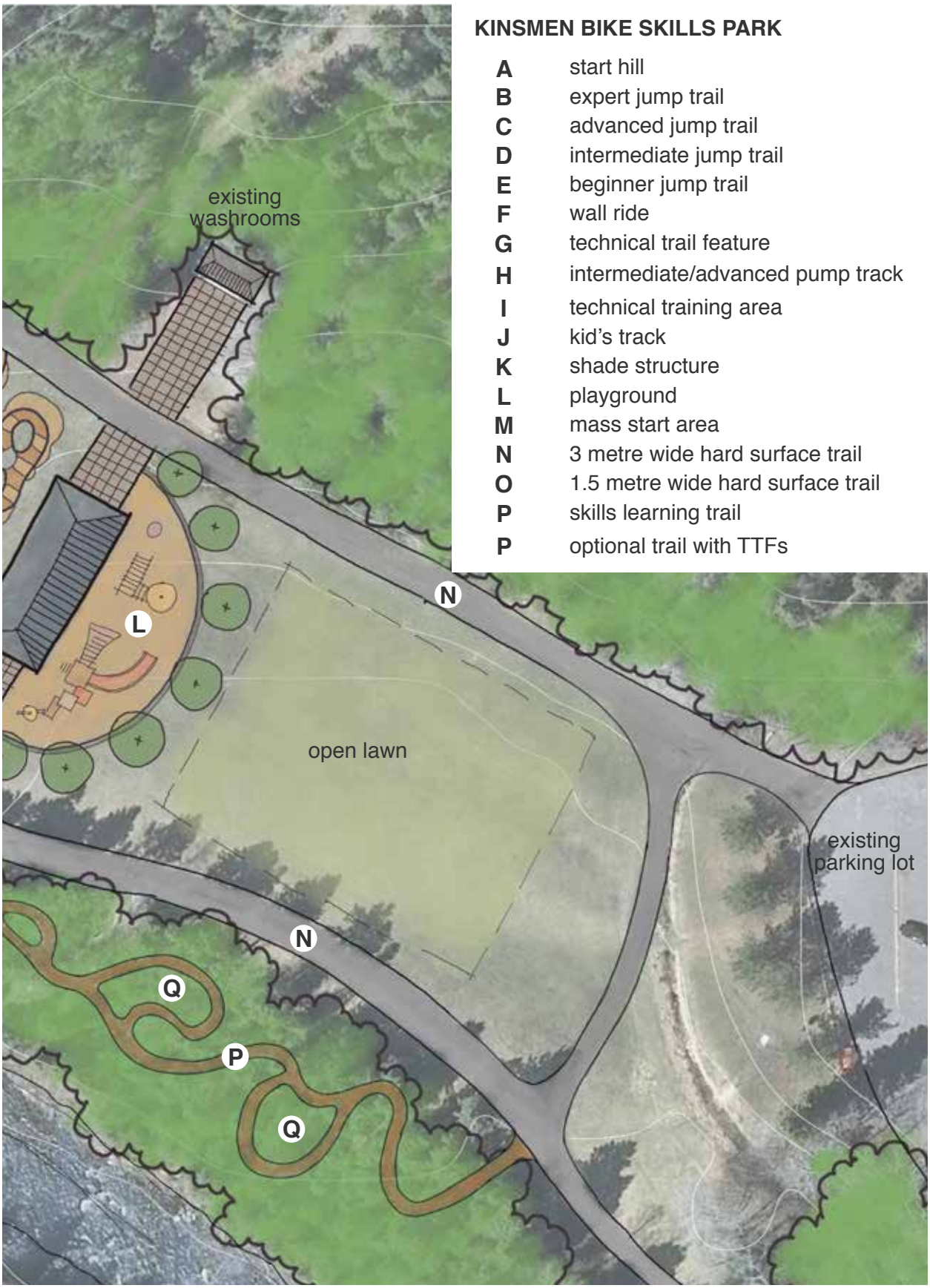
A bike park would make an exciting and fun addition to Kinsmen Park and would compliment the existing and proposed network of mountain bike trails. Key considerations in the design of the bike park include:

- Existing park grades are well suited for a bike park.
- High point at north west corner – which slopes down to the south east – makes an excellent start hill.
- Four jump trails are proposed which cater to different skills levels: Expert, advanced, intermediate and beginner.
- Technical trail features incorporated into each jump trail provide riding options and create interest and additional challenge for riders.
- Intermediate/advanced pump track is proposed for the east end of the park.
- Run bike friendly kid's pump track is proposed for the north east corner to provide a safe learning environment for children.
- Technical training area at south end with structures for practicing in a controlled environment.

Top and middle: Technical Training Area
Bottom: Kid's Track
image credit: Ontario Bike Park Construction

Top: Dirt jumps at Chicopee
Middle: Dirt jumps at Georgina Bike Park
Bottom: Technical trail feature


A
B
C
D
E
F
G
H
I
J
K
M
N
P
Q
existing bridge
current river



KINSMEN BIKE SKILLS PARK

A	start hill
B	expert jump trail
C	advanced jump trail
D	intermediate jump trail
E	beginner jump trail
F	wall ride
G	technical trail feature
H	intermediate/advanced pump track
I	technical training area
J	kid's track
K	shade structure
L	playground
M	mass start area
N	3 metre wide hard surface trail
O	1.5 metre wide hard surface trail
P	skills learning trail
P	optional trail with TTFs

Top left: Jump trail - Expert, image credit: Flow Concept Design
Top right: Advanced expert - flat wall ride
Middle left: Jumps- Intermediate
Middle right: Jump trail - Expert, image credit: David Clock
Bottom left: Advanced - jumps
Bottom right: Pump track, image credit: Pete Stutz

Shade Structure

A large central shade structure is proposed on axis with existing washrooms to create a central destination in the park in close proximity to the playground and bike skills park. The structure will provide weather protection for park users to picnic, and watch their children in the playground, pump track and bike skills park. It should also be sized to accommodate larger events and to provide weather protection for participants and vendors.

Skills Learning Trail

A 200 to 250 metre kids bike trail through the adjacent forest provides a fun and exciting trail for young kids. This natural surface trail would be run bike friendly and provide an opportunity for young children to become comfortable with trail riding in a safe and controlled environment before venturing out onto the main trails.

Example shade structure (top and middle)
Kid's Skills learning trail (bottom)

Signage + Wayfinding

An overall strategy for trail signage at Trowbridge is required to help enhance the trail user's experience. This includes:

- trailhead panel;
- trail maps;
- trail information;
- trail markers;
- interpretive panels; and,
- road and highway directional signs.

Some key considerations in the design of the signs include:

- Use of vandal and fade resistance materials;
- Easy replacement to accommodate changes to the overall trail network as new trails are constructed;
- Accessibility for Ontarians with Disabilities Act (AODA) compliance (i.e. serif vs. non serif and contrast level as well as information on the trail itself);
- Graffiti resistance;
- Integration of text and graphics in a bold, clear arrangement;
- Text written in short, simple sentence at a grade 3 reading level;
- Consistency in text, graphics and layout across the entire system.

A study of the City's overall wayfinding strategy is anticipated. The trail signage strategy for Trowbridge should tie into this study.

The following provides an overview of the recommended sign types along with general sign guidelines.

Top: Trail head at Crothers Woods, Toronto, Image credit: City of Toronto
Bottom: Trail mapping at Shuniah Mines

Trailhead Panels

At the trailheads / entrances to the trail network, information regarding trail safety and user etiquette is required to help enhance the trail user's experience. Key features of these information signs should include:

- Trail context and larger trail network map;
- Trail route map;
- Location information in case the user needs emergency assistance (GPS Coordinates);
- Information regarding trail difficulty and distances to key destinations;
- Permitted trail uses;
- Information on applicable bylaws;
- Information regarding trail safety;
- Trail etiquette;
- AODA information to alert users that not all trails are suitable for all users;
- "In Case of Emergency Call 9-1-1"; and,
- Contact information to report trail management and maintenance concerns.

Trail Maps

A simplified version of the trailhead signage is required at key locations along the trail network. Clear and accurate maps will improve user experience and improve safety. At a minimum trail maps should include the following:

- Trail context and larger trail network map;
- Trail route map; and,
- Information regarding trail difficulty and distances to key destinations.

Trail Information

Trail information signs should be provided at key trail intersections and decision nodes to help direct users. Space permitting they may also provide information regarding permitted uses.

Signs indicating closed trails, private property, restoration efforts for example should also be clearly indicated along the trail route. The facing page provides a number of examples.

These signs will typically be fabricated of aluminum with vinyl.

Trail Markers

Directional/wayfinding signage is needed throughout the trail network to identify entrances, demarcate the trail to help keep users on trail, and to provide information regarding routes, destinations and distances to key locations. Signage should be standardized throughout the trail network and build upon the systems employed elsewhere in the City to provide consistency across the network.

Where the Trowbridge Forest trails connect to adjacent trail network, such as Centennial Park and Cascades Conservation Area, the markers should be coordinated to avoid confusion.

Interpretative Panels

Interpretive / educational panels located throughout the trail network will enhance the trail user experience and educate visitors about the special features found along the trail. Possible interpretive themes which could be addressed include:

- Wildlife Habitat;
- Forest ecology and restoration;
- Invasive species;
- Cultural History; and,
- Natural History.

These signs will typically be constructed from high pressure laminate.

Location Identification Signs

Signs indicating you are entering or leaving a specific area are required. These should be provided at the various boundaries of the different park spaces to help orient trail users. This includes signs that identify when a user is crossing into/out of:

- Cascades Conservation Area;
- Centennial Park;
- Kinsmen Park;
- Trowbridge Park; and,
- Shuniah Mines.

Road and Highway Directional Signs

Signs should be strategically located to direct drivers to the two Trowbridge Forest Trails trailheads at Kinsman Park and at Balsam Street. This includes signage on the Thunder Bay expressway. These signs will not only be an important component of the trail signage and wayfinding strategy, but will also contribute to the marketing and promotion of the trail network. These signs should follow the City's wayfinding strategy.

image credit: Brent Maranzan

Operations + Maintenance

Trail Etiquette

Understanding proper trail etiquette will enhance the experience of all users. For Trowbridge Forest trails, an important consideration is for all users to understand how they should conduct themselves on the trail and when to yield (give right of way) to other users.

Sharing the Trail

Generally accepted trail etiquette dictates that mountain bikers are to yield to pedestrians, and that downhill users yield to those traveling uphill. This protocol should be followed for all multi use trails. However, on trails optimized for mountain biking, hikers should yield to mountain bikers and this should be clearly signed. Mountain bikers should also politely let other trail users they are coming, either using a bell or voice greeting.

Trail etiquette signage should also outline trail rules for the winter months when the nordic skiing and fat biking is taking place. Signage should emphasize that hikers should not walk on groomed ski or fat bike trails.

Some other key points that should be conveyed on signage at trail heads should include but is not limited to:

1. Don't ride on closed trails.
2. Don't ride on muddy trails.
3. Be sensitive to the trail and its surroundings by riding softly and never skidding.
4. Do not litter and never scare animals.
5. Stay on the trail: Do not intentionally ride off trail.
6. Ride slowly on crowded trails.
7. Slow down when approaching other trail users and respectfully make others aware you are approaching.
8. Share the trail with other trail users.
9. Mountain bikers should yield to hikers.
10. Don't do unauthorized trail work. Report any necessary improvements to the City of Thunder Bay (contact information to be provided).

For more detailed description on trail etiquette refer to the International Mountain Bike Association Rules of the Trail to the right.

IMBA RULES OF THE TRAIL

The International Mountain Biking Association has developed the following "Rules of the Trail" to promote responsible and courteous conduct on shared-use trails.

Ride Open Trails: Respect trail and road closures. Ask the appropriate land manager for clarification if you are uncertain about the status of a trail. Do not trespass on private land. Obtain permits or other authorization as required. Be aware that bicycles are not permitted in areas protected as state or federal Wilderness.

Leave No Trace: Be sensitive to the dirt beneath you and the environment around you. Wet and muddy trails are more vulnerable to damage than dry ones. When the trail is soft, consider other riding options. This also means staying on existing trails and not creating new ones. Don't cut switchbacks. Don't ride around standing water which results in widening the trail. Be sure to pack out at least as much as you pack in. Consider improving the trail experience for those that follow by picking up and removing any litter.

Control Your Bicycle: Inattention for even a moment could put yourself and others at risk. Obey all bicycle speed regulations and recommendations, and ride within your limits. Social conflicts on trails often result when riders are going too fast.

Yield Appropriately: Do your utmost to let your fellow trail users know you're coming — a friendly greeting or bell ring are good methods. Try to anticipate other trail users as you ride around corners. Mountain bikers should yield to other non-motorized trail users, unless the trail is clearly signed for bike-only travel. Bicyclists traveling downhill should yield to all users headed uphill, unless the trail is clearly signed for one-way or downhill-only traffic. In general, strive to make each pass a safe, controlled and courteous one.

Never Scare Animals: Animals such as horses are easily startled by an unannounced approach, a sudden movement or a loud noise. Give animals enough room and time to adjust to you. When passing horses, dismount from your bike, walk around them on the downhill side of the trail, use special care and follow directions from the horseback riders (ask if uncertain). Running cattle and disturbing wildlife are serious offenses.

Plan Ahead: Know your equipment, your ability and the area in which you are riding and prepare accordingly. Strive to be self-sufficient: keep your equipment in good repair and carry necessary supplies for changes in weather or other conditions.

Source: https://www.imba.com/about/rules-trail

Operations

New Trails

Trails in the Trowbridge Forest should be constructed to meet the International Mountain Bicycling Association (IMBA) Guidelines as well as Whistler Trail Standards. Whistler Trail Standards are particularly beneficial in the review and evaluation of existing technical trail features and any proposed technical trail features. For further information on Whistler Trail Standards, please refer to Appendix C.

IMBA Ride Centre Designation

"The Ride Center™ designation represents IMBA's Model Trail recognition for large-scale mountain bike facilities that offer something for every rider."

Trowbridge Forest, when combined with the other mountain bike trail offerings in Thunder Bay, could qualify for Bronze level Ride Center status.

"The evaluation criteria is comprised of key aspects that make an amazing mountain bike destination and include, but not limited to;

- Trail Experiences
- Services
- Community Involvement
- Tourism, Promotion, and Marketing
- Evaluation and Measurement
- Above and Beyond"

A revised application process will be available in May of 2017 via https://www.imba.com/model-trails/ride-centers.

Mountain Bike Trails

Blacksheep are in the process of creating a memorandum of understanding with the City to maintain designated trails. This will be an important aspect of ensuring the trails properly operate each season.

Fat Bike Trail Network

There are numerous ways with which to groom the designated fat bike trails within the project area:

- Manually using snowshoes.
- Snowmobile with pull behind "weight".
- Track sled such as "Best Tracksled", "Sled Dog" or equivalent.

Each of these methods has benefits and drawbacks but each has been proven to be effective. Should funds be available it is recommended that one of the two motorized grooming tools be acquired:

- Snowmobile and attachment method could leverage existing snowmobile and crew that grooms ski trail.
- Track sled provides the most consistent grooming but would require additional funding, upkeep and storage facilities

Image of track sled for fat bike grooming.

Cross Country Ski Trails

Existing grooming equipment is not adequate to create safe conditions during low snow/ freeze thaw conditions. Investing in a pull behind renovator for low snow would be advantageous for both skiing and walking on main trail.

Emergency Access

The following points are to be designated as emergency access points:

1. Kinsmen Park
2. Adventure Trail
3. Hydro Corridor(s)
4. Emergency Access off Expressway
5. Balsam Street

Information regarding how to access these locations along with an Emergency Action Plan should be developed with local First Responders. GPS coordinates and accurate maps will be invaluable to the First Responders as will encouraging them to use the Trowbridge Forest for one or two scenarios per year to help familiarize their members with the area in a mock “crisis” event.

Trail Maintenance

Staff and volunteers should be trained to conduct regular trail inspections and undertake repairs as required. This includes the removal of fallen trees, clearing brush, fixing damaged or missing wayfinding signage, inspections of technical trail features and structures and repairs and alterations to the trail tread to eliminate trip hazards or the pooling of water.

Inspections should occur seasonally, particularly in the early spring after the spring thaw to get the trail ready for the season. Follow-up inspections should take place monthly.

To assist with the inspection process, a standardized checklist should be used record observations and keep a record of conditions and repair work completed.

A trail tip hot line and email should also be provided at trail heads so the public can report any issues on the trails such as garbage clean up, vandalism or hazardous trail conditions.

image credit: Brent Maranzan

Phasing + Implementation

Implementing this plan should be viewed as a multi-stage initiative over many years. It will need to be a partnership between the City and community.

The implementation sequence is organized into three stages: short, medium and long term. A brief description of the projects in each stage is provided.

The complete list of projects, organized by stage with estimated costs is provided in the subsequent pages.

Phasing

Short

The following trail improvements should be undertaken as part of the first phase of implementation. These are projects that will:

- Improve trail safety;
- Improve access;
- Enhance user experience; and,
- Create immediate benefit for the greatest number of trail users.

Key short term initiatives include:

- Improve/repair or remove existing technical trail features;
- Improved signage at trail heads;
- Improved signage on existing multi use trails;
- Balsam trail head and multi-use trail connection;
- Development of the beginner access route into Shuniah Mines;
- Asphalt loop and playground improvements at Kinsmen Park; and,
- Signage and wayfinding improvements across the trail network.

Medium

Medium term improvements are those that will improve the trail user experience by improving the flow and connectivity of existing trails and provide new riding opportunities. This includes new trails which will benefit all trail users and will improve the interface between mountain bikers and hikers. This includes reconfiguration of the nordic ski trails that and introducing additional fat biking opportunities. Specific medium term trail initiatives include:

- Closing and realignment of sections of blue and red trail to improve nordic ski loops;
- Creation of new lower and top of bluff trails with access to the lookout for views to the east;
- Creation of new mountain bike optimized flow trails including one technical flow trail;
- Creation of a new hiking trail along the Current River;
- Creation of new mountain bike optimized downhill flow trails; and,
- Creation of a new climbing trail to replace Martii's hill.

Long Term

Long term trail improvements are those that are nice to have, but are not critical to the function and operation of a safe and sustainable trail network. Key long term initiatives include:

- Mountain bike optional line trails;
- Closing of redundant trails; and,
- New technical cross country trails.

The implementation sequence of the plan can be adjusted and refined over time as new priorities emerge and the capacity of the city and club to expand the trail network is better understood. Projects identified here as long term may garner interest over time and may be fast tracked. While other projects may be determined to be less of a priority and therefore delayed.

A key consideration in implementing the plan is to ensure new trails are opened and signed before closing existing trails. Trail closures must also be actively monitored and restoration re instituted as required to ensure closed trails remain closed.

Cost Estimate

The following cost estimate is provided as an order of magnitude costing to implement the trails master plan. Budget numbers are provided as low, medium and high to illustrate the range of costs anticipated for trail building depending on the level of volunteer and professional contractors. A description of each figure is provided below. More detailed costing numbers/ unit rates are also provided in Appendix D.

Low Estimate

This figure represents an estimation of the costs involved in developing the specific trail section using a volunteer / user group based approach. Methods include some machine time in conjunction with a large amount of manual construction. Costs associated with this figure include estimates for one or two individuals for paid part time work (ie. corridor clearing, machine operation), costs of materials, cost of machine rental / fuel, cost of facilitating extensive and coordinated volunteer build days, infrastructure (signage) and other items as required. This also includes a coefficient for volunteer hour values.

Moderate Estimate

This figure represents an estimate of the costs involved in developing the specific trail section using a hybrid model which leverages the speed and efficiencies of professional trail building with the additional strength and reduced cost of a volunteer work force. Machine operation and complex feature construction is typical lead by the professional trail builder while trail tread finishing is completed by volunteers. Costs associated with this figure include estimates for one or two professional trail builders (machine operation, feature construction, etc.), costs of materials, cost of machine rental / fuel, cost of facilitating coordinated volunteer days, infrastructure (signage) and other items as required. This is often the most effective method of producing quality trail within a relatively short window at a decent price as it minimizes mobilization (should the builder not be local) and labour costs, leverages the local user group, fosters a sense of ownership and aids in developing mountain bike culture in the area.

High Estimate

This figure represents an estimate of the costs involved in developing the specific trail section using solely professional trail builders. All tasks associated with the construction of the build are completed by the trails contractor. This method, while often the most expensive, yields the most amount of trail in the shortest amount of time, thereby alleviating issues with volunteer management / capacity, inconsistency construction methods, etc. Should funding be available, it can prove beneficial to hire multiple trail contractors to work on separate trails within the same network simultaneously. This both expedites the development as well as allows for the nuances of different builders to be represented in the system, thereby providing different “flavours” or “styles” with the system.

So long as those involved in the construction of the trail are qualified, managed well and provided good weather then each of these different estimate can be mixed and matched per situation without risk of a lesser final product.

Short Term

#	Map Ref #	Description	Length (m)	Unit	Low	Medium	High
SIGNAGE + ACCESS							
1		Improved signage and wayfinding on trail		Allowance	$ 7,500.00	$ 15,000.00	$ 22,500.00
2		Improved signage at trailheads		Allowance	$ 3,750.00	$ 7,500.00	$ 12,000.00
3		Improve/Remove/Repair existing TTFs		Allowance	$ 1,500.00	$ 5,000.00	$ 10,000.00
4		Balsam Street Trail Head		Allowance	$ 30,000.00	$ 45,000.00	$ 67,500.00
5		Improve gate at Thunder Bay Expressway		Allowance	$ 3,000.00	$ 6,000.00	$ 9,000.00
6		Cascades Turn Around		Allowance	$ 5,000.00	$ 10,000.00	$ 15,000.00
					$ 50,750.00	**$ 88,500.00**	**$ 136,000.00**
CLOSED TRAILS							
8	9	The Stranger	109	lin. m	$ 218.00	$ 1,090.00	$ 1,635.00
9	10	Upper 2k	1086	lin. m	$ 2,172.00	$ 10,860.00	$ 16,290.00
			1195	lin. m	**$ 2,390.00**	**$ 11,950.00**	**$ 17,925.00**
PROPOSED TRAILS							
10	A	Balsam Trail	2191	lin. m	$ 21,910.00	$ 54,775.00	$ 109,550.00
11	B	The Stranger	188	lin. m	$ 1,880.00	$ 4,700.00	$ 9,400.00
12	M	Shuniah Mines Access	1340	lin. m	$ 13,400.00	$ 33,500.00	$ 67,000.00
13	N	Short Connector	311	lin. m	$ 3,110.00	$ 7,775.00	$ 15,550.00
14	J	Upper 2K	778	lin. m	$ 7,780.00	$ 19,450.00	$ 38,900.00
15	K	Middle 2k	1246	lin. m	$ 12,460.00	$ 31,150.00	$ 62,300.00
16	O	Centennial Park Link Trail	977	lin. m	$ 63,505.00	$ 63,505.00	$ 63,505.00
			7031		**$124,045.00**	**$ 214,855.00**	**$ 366,205.00**
KINSMEN PARK							
17		Asphalt Loop Trail	550	lin m.	$ 35,750.00	$ 35,750.00	$ 35,750.00
18		Playground (including curb and surfacing)		Allowance	$200,000.00	$ 200,000.00	$ 200,000.00
					$235,750.00	**$ 235,750.00**	**$ 235,750.00**
				Total Short Term	**$412,935.00**	**$ 551,055.00**	**$ 755,880.00**

Medium Term

#	Map Ref #	Description	Length (m)	Unit	Low	Medium	High
SIGNAGE + ACCESS							
		Signage and wayfinding for trail improvements		Allowance	$ 7,500.00	$ 15,000.00	$ 22,500.00
CLOSED TRAILS							
19	1	Blue Trail	822	lin. m	$ 1,644.00	$ 8,220.00	$ 12,330.00
20	2	Blue Trail bypass (east)	239	lin. m	$ 478.00	$ 2,390.00	$ 3,585.00
21	3	Blue Trail	1314	lin. m	$ 2,628.00	$ 13,140.00	$ 19,710.00
22	4	Red Trail	540	lin. m	$ 1,080.00	$ 5,400.00	$ 8,100.00
23	5	Blue Trail	758	lin. m	$ 1,516.00	$ 7,580.00	$ 11,370.00
24	6	Blue Trail	105	lin. m	$ 210.00	$ 1,050.00	$ 1,575.00
25	7	Red Trail	630	lin. m	$ 1,260.00	$ 6,300.00	$ 9,450.00
			4408		**$ 8,816.00**	**$ 44,080.00**	**$ 66,120.00**
PROPOSED TRAILS							
26	F	Lower Bluff Trail	868	lin. m	$ 1,736.00	$ 13,020.00	$ 13,020.00
27	G	Top of Bluff Trail	651	lin. m	$ 6,510.00	$ 16,275.00	$ 32,550.00
28	H	Lookout Trail	2530	lin. m	$ 25,300.00	$ 63,250.00	$ 126,500.00
29	I	Nordic Loop	297	lin. m	$ 2,970.00	$ 7,425.00	$ 14,850.00
30	I1	Nordic Loop	55	lin. m	$ 550.00	$ 1,375.00	$ 2,750.00
31	I2	Nordic Loop	104	lin. m	$ 1,040.00	$ 2,600.00	$ 5,200.00
32	I3	Nordic Loop	294	lin. m	$ 2,940.00	$ 7,350.00	$ 14,700.00
33	I4	Nordic Loop	60	lin. m	$ 600.00	$ 1,500.00	$ 3,000.00
34	I5	Nordic Loop	154	lin. m	$ 1,540.00	$ 3,850.00	$ 7,700.00
35	I6	Nordic Loop	24	lin. m	$ 240.00	$ 600.00	$ 1,200.00
36	L	East-West Connector	656	lin. m	$ 6,560.00	$ 16,400.00	$ 32,800.00
37	P	Flow Trail	991	lin. m	$ 9,910.00	$ 24,775.00	$ 49,550.00
38	Q	Downhill Technical Flow Trail	738	lin. m	$ 7,380.00	$ 18,450.00	$ 36,900.00
39	R	Downhill Flow Trail	783	lin. m	$ 7,830.00	$ 19,575.00	$ 39,150.00
40	S	Flow Trail	817	lin. m	$ 8,170.00	$ 20,425.00	$ 40,850.00
41	U	Climbing Trail	988	lin. m	$ 9,880.00	$ 24,700.00	$ 49,400.00
42	V	Current River Hiking Trail	1266	lin. m	$ 12,660.00	$ 31,650.00	$ 63,300.00
43	W	Lookout Trail	57	lin. m	$ 570.00	$ 1,425.00	$ 2,850.00
			11333		**$106,386.00**	**$ 274,645.00**	**$ 536,270.00**
KINSMEN PARK							
44		Concrete Paving	640	m2	$ 64,000.00	$ 64,000.00	$ 64,000.00
45		Shade Structure		Allowance	$100,000.00	$ 100,000.00	$ 100,000.00
					$164,000.00	**$ 164,000.00**	**$ 164,000.00**
			Total Medium Term		**$279,202.00**	**$ 482,725.00**	**$ 766,390.00**

Long Term

#	Map Ref #	Description	Length (m)	Unit	Low	Medium	High
SIGNAGE + ACCESS							
46		Signage and wayfinding for trail improvements		Allowance	$ 7,500.00	$ 15,000.00	$ 22,500.00
CLOSED TRAILS							
47	8	Road to Hell	281	lin. m	$ 562.00	$ 2,810.00	$ 4,215.00
48	11	Cascades Access 1	386	lin. m	$ 772.00	$ 3,860.00	$ 5,790.00
		Total	**667**		**$ 1,334.00**	**$ 6,670.00**	**$ 10,005.00**
PROPOSED TRAILS							
49	A1	Balsam Optional Line #1	475	lin. m	$ 4,750.00	$ 11,875.00	$ 23,750.00
50	A2	Balsam Optional Line #2	824	lin. m	$ 8,240.00	$ 20,600.00	$ 41,200.00
51	A3	Balsam Optional Line #3	268	lin. m	$ 2,680.00	$ 6,700.00	$ 13,400.00
52	C	Cross Country Connector	1141	lin. m	$ 11,410.00	$ 28,525.00	$ 57,050.00
53	C1	Technical Cross Country Trail	227	lin. m	$ 2,270.00	$ 5,675.00	$ 11,350.00
54	D	Downhill Flow Trail (west)	489	lin. m	$ 4,890.00	$ 12,225.00	$ 24,450.00
55	E	Technical Cross Country Loop	436	lin. m	$ 4,360.00	$ 10,900.00	$ 21,800.00
56	H1	Boulder/Bluff Optional Line #1	162	lin. m	$ 1,620.00	$ 4,050.00	$ 8,100.00
57	H2	Boulder/Bluff Optional Line #2	93	lin. m	$ 930.00	$ 2,325.00	$ 4,650.00
58	T	Boulder Field Trail (Technical)	221	lin. m	$ 2,210.00	$ 5,525.00	$ 11,050.00
		Total	**5670**		**$ 43,360.00**	**$ 108,400.00**	**$ 216,800.00**
59		Bike Skills Park (incl. pump track + skills area)		Allowance	$150,000.00	$ 200,000.00	$ 300,000.00
60		Kid's Bike Loop		Allowance	$ 10,000.00	$ 25,000.00	$ 50,000.00
					$160,000.00	**$ 225,000.00**	**$ 350,000.00**
				Total Long Term	**$212,194.00**	**$ 355,070.00**	**$ 599,305.00**

image credit: Brent Maranzan

Appendix A: Community Engagement

Comments Summary

Response was generally positive with most indicating support for the project. The following provides a summary of the comments received organized under the four questions.

Question 1: Which of the proposed enhancements do you like the most:

- total of 55 comments received;
- 23 comments related to support for more new trails;
- 15 comments in support of an enhanced trail head at Balsam Street;
- 13 comments in support of a bike park, technical trail features, and pump tracks for kids and adults; and,
- 4 comments in favour of more beginner trails and easier access for beginners into the Shunaih Mines trails.

Question 2: Are there any trail and/or amenity enhancements that are missing?

- Most popular recommendation was to provide a bike wash station. Some combined this request with a bike repair and/or bike rental facility.
- A couple of comments focused on improved signage and education of users on trail etiquette.
- Some of common requests included additional trail connections between the Trowbridge Forest site, centennial park and the campground, introducing more technical trail features, and user amenities like drinking fountains and picnicking facilities.

Question 3: Are they any modifications you would like to see to the proposed trail improvements?

- Most popular responses pertained to the existing ski trail network and not closing ski trails. In particular Martii's Hill which is a popular hill for summer nordic ski training.
- Other comments suggested making the plan more inclusive to other trail users, making the trail system more family friendly, and paving connecting trails.

Question 4: Other Comments

This last question was proposed to try and capture any other comments not addressed in the previous three questions. The most common comments pertained to:

- Not closing existing trails;
- The potential for user conflicts on trails between different trail user groups; and,
- Including more mountain bike and multi-use trails.

Plan Criticism

While the majority of comments received during the open house were very positive, the on-line comments did result in a few responses that were not in favour of the project. The main point of criticism was that the plan was too focused on one user group and excluded other users from continued enjoyment of the existing trails.

Proper separation of users was also raised with concern for conflict between mountain bikers and "non mechanized activity". Concerns about the environmental impacts of mountain biking was also raised.

Public Meeting Panels

Five panels were used to illustrate the draft master plan:

Panel #1: Existing Physical Conditions

Panel #2: Existing Trail Network

Panel #3: Proposed Trail Network and Enhancements

Panel #4: Detailed View of Proposed Trail Network and Enhancements

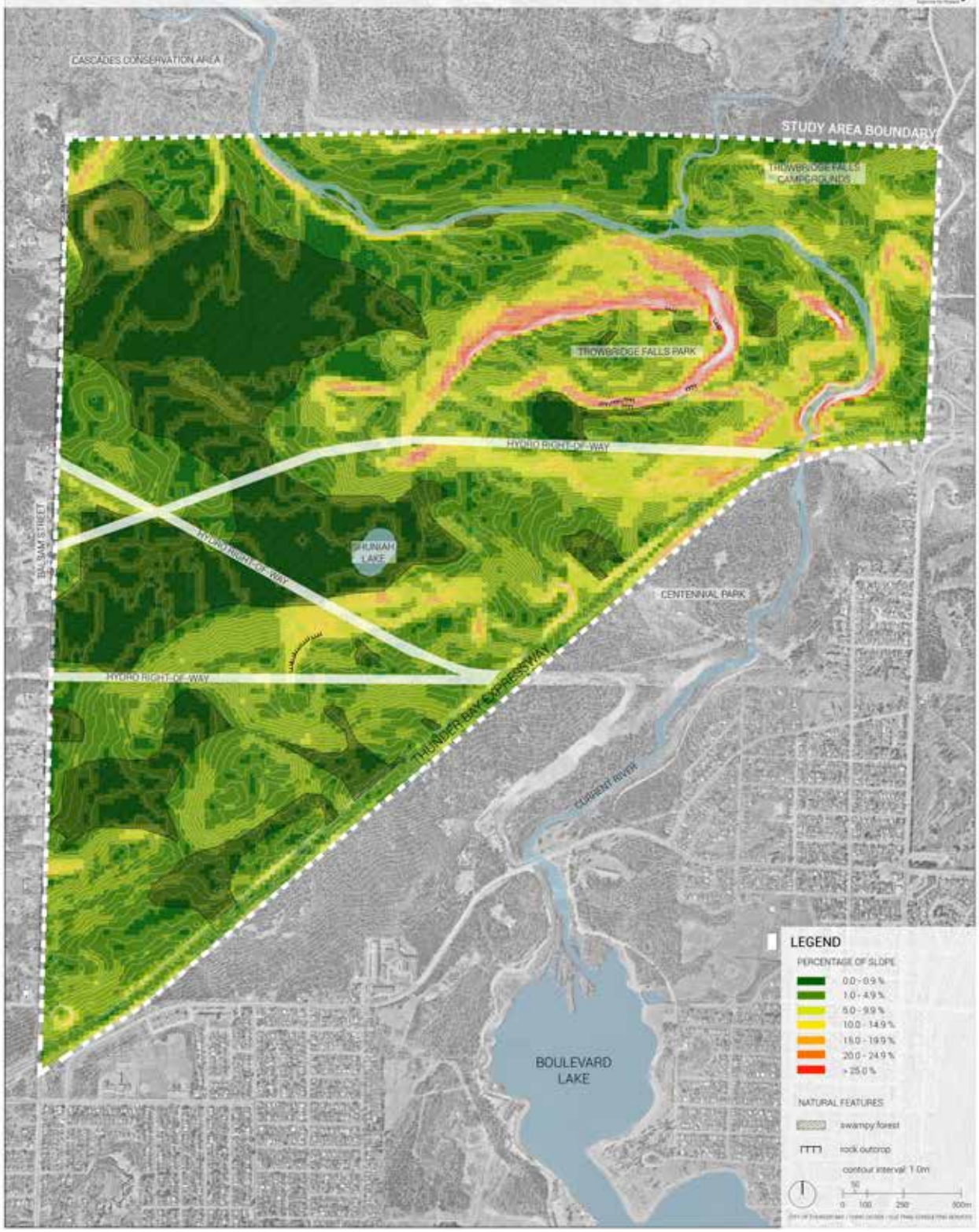
Panel #5: Bike Park Concept

Copies of these panels were also placed on tables with markers giving participants the opportunity to draw directly on the plans to make their own recommendations.

Many of the comments reflected the comments provided in the written comments. While others identified trail connections outside of the study area, or in locations deemed to be too wet. However, where possible, the proposed master plan has incorporate other comments.

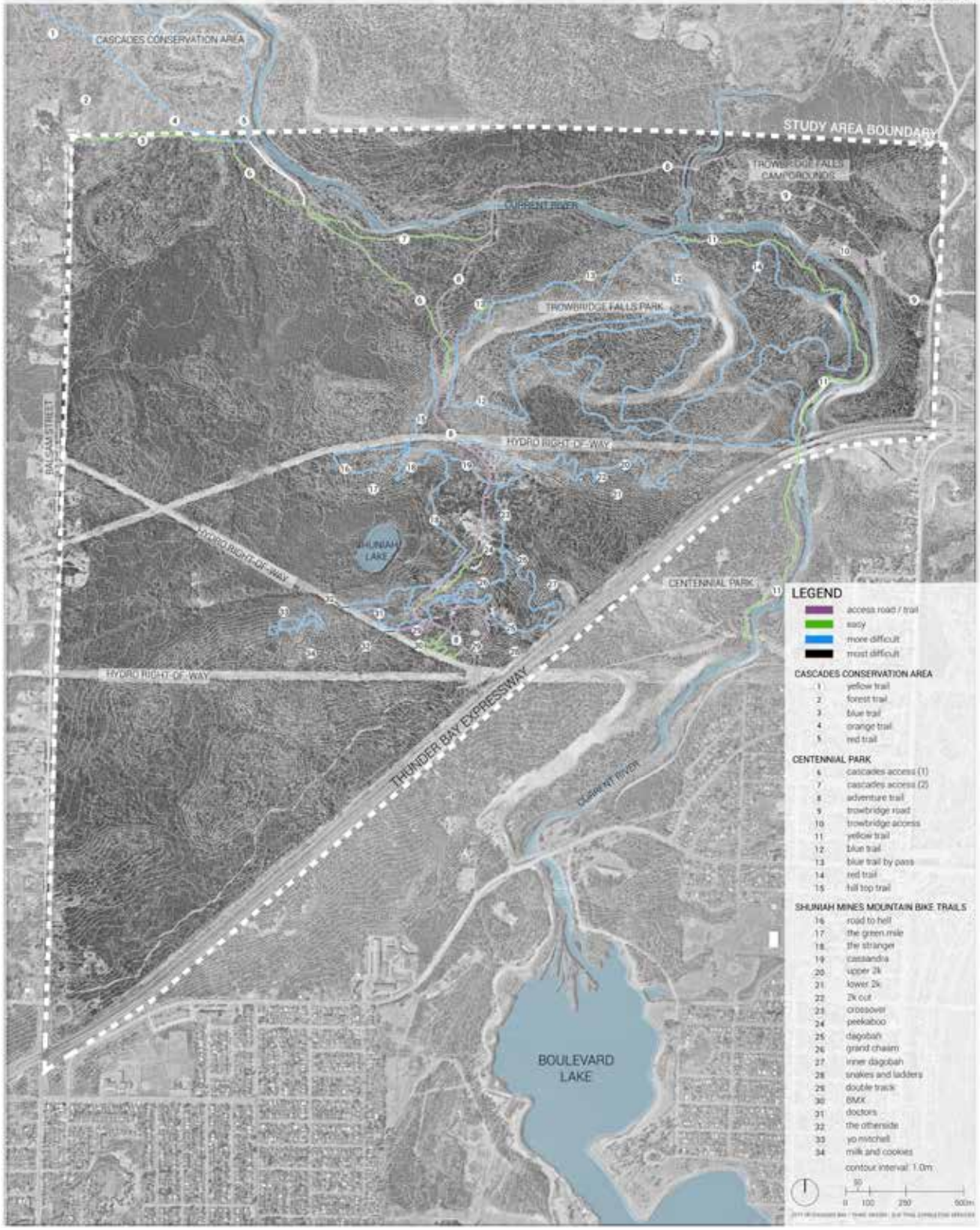
EXISTING PHYSICAL CONDITIONS

TROWBRIDGE FOREST MOUNTAIN BIKE TRAIL SYSTEM MASTER PLAN



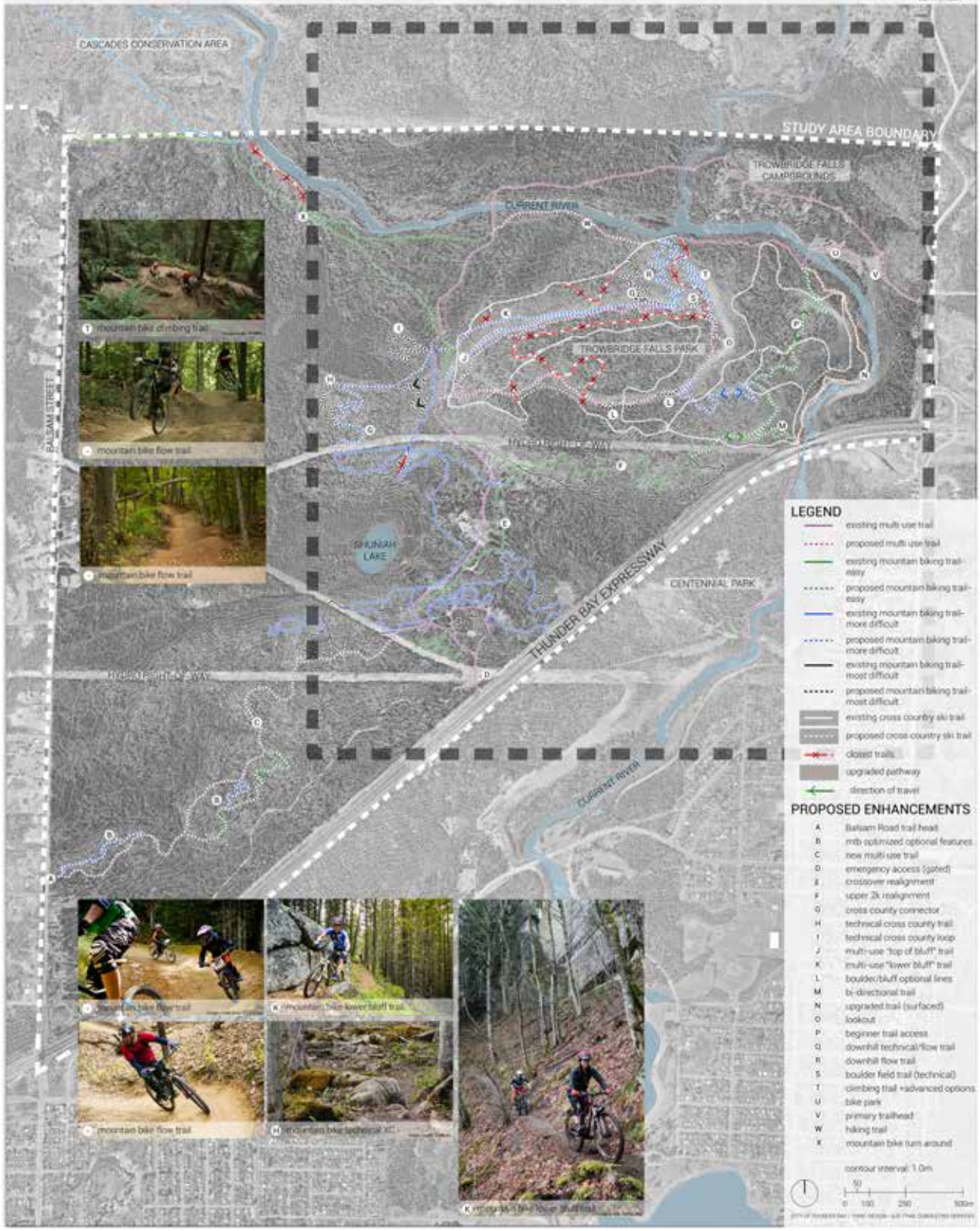
EXISTING TRAIL NETWORK

TROWBRIDGE FOREST MOUNTAIN BIKE TRAIL SYSTEM MASTER PLAN



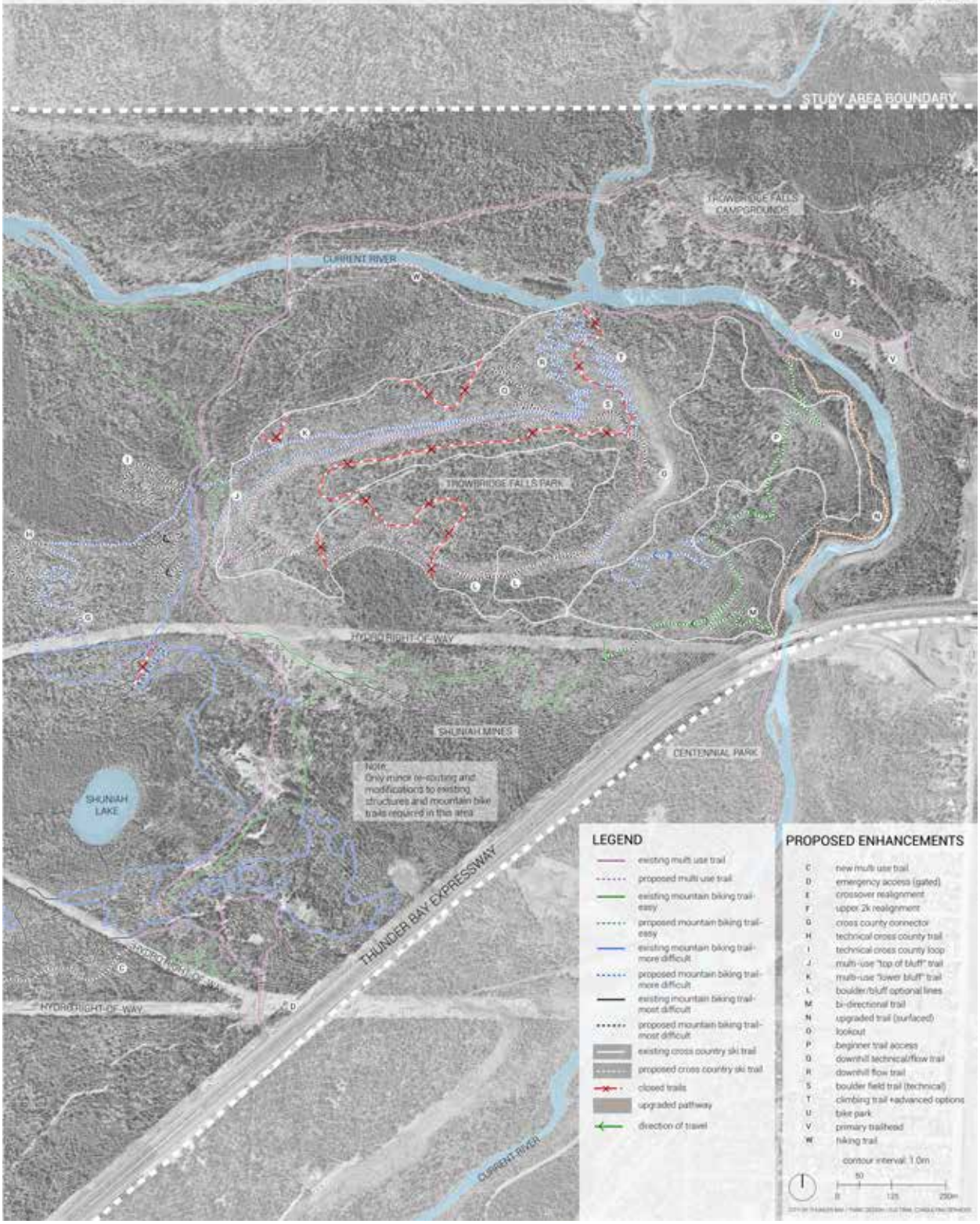
PROPOSED TRAIL NETWORK + ENHANCEMENTS

TROWBRIDGE FOREST MOUNTAIN BIKE TRAIL SYSTEM MASTER PLAN



DETAILED VIEW OF PROPOSED TRAIL NETWORK+ ENHANCEMENTS

TROWBRIDGE FOREST MOUNTAIN BIKE TRAIL SYSTEM MASTER PLAN



BIKE PARK CONCEPT

TROWBRIDGE FOREST MOUNTAIN BIKE TRAIL SYSTEM MASTER PLAN


view north west


view south east of existing playground


existing washroom building


view of existing bridge over current river


view south east

EXISTING CONDITIONS


C advanced jump trail


D intermediate jump trail


F flat wall ride


G technical trail features


I technical training area


technical training area


J kids' track


K shade structure


playground


L playground

D expert jump trail

LEGEND

A	start hill
B	expert jump trail
C	advanced jump trail
D	intermediate jump trail
E	beginner jump trail
F	wall ride
G	technical trail feature
H	intermediate/advanced pump track
I	technical training area
J	Kids' track
K	shade structure
L	playground
M	mass start area
N	3 metre wide asphalt path
O	1.5 metre wide asphalt path

0 15 30m

Questionnaires

Questionnaires were made available to everyone who attended the March 6th open house. An on-line version was also available from March 6th to March 13th. In total 34 questionnaires were completed answering the following four questions:

1. Which of the proposed enhancement do you like the most?
2. Are there any trail and/or amenity enhancements that are missing?
3. Are they any modifications you would like to see to the proposed trail improvements?
4. Other Comments?

A copy of the form is provided on the following pages.

Trowbridge Mountain Bike Trails Master Plan

Public Open House March 6, 2017

Name:

email:

Please provide your input on the draft trails master plan concept:

1. Which of the proposed enhancement do you like the most?

2. Are there any trail and/or amenity enhancements that are missing?

3. Are they any modifications you would like to see to the proposed trail improvements?

4. Other Comments?

Please hand-in completed questionnaires at the end of the meeting or by March 13, 2017 to Email: mtocher@thincdesign.ca or fax: 866-496-0239

Appendix B: Trail Difficulty Rating System

IMBA Trail Difficulty Rating System					
	 EASIEST WHITE CIRCLE	 EASY GREEN CIRCLE	 MORE DIFFICULT BLUE SQUARE	 VERY DIFFICULT BLACK DIAMOND	 EXTREMELY DIFFICULT DBL. BLACK DIAMOND
TRAIL WIDTH	72” (1,800 mm) or more	36” (900 mm) or more	24” (600 mm) or more	12” (300 mm) or more	6” (150 mm) or more
TREAD SURFACE	Hardened or surfaced	Firm and stablee	Mostly stable with some variability	Widely variable	Widely variable and unpredictable
AVERAGE TRAIL GRADE	Less than 5%	5% or less	10% or less	15% or less	20% or more
MAXIMUM TRAIL GRADE	Max 10%	Max 15%	Max 15% or greater	Max 15% or greater	Max 15% or greater
NATURAL OBSTACLES AND TECHNICAL TRAIL FEATURE (TTF)	None	Unavoidable obstacles 2” (50 mm) tall or less Avoidable obstacles may be present Unavoidable bridges 36” (900 mm) or wider	Unavoidable obstacles 8” (200 mm) tall or less Avoidable obstacles may be present Unavoidable bridges 24” (600 mm) or wider TTF’s 24” (600 mm) high or less, width of deck s greater than 1/2 the height	Unavoidable obstacles 15” (380 mm) tall or less Avoidable obstacles may be present May include loose rock Unavoidable bridges 24” (600 mm) or wider TTF’s 48” (1,200 mm) high or less, width of deck is greater than 1/2 the height Short sections may exceed criteria	Unavoidable obstacles 15” (380 mm) tall or less Avoidable obstacles may be present May include loose rock Unavoidable bridges 24” (600 mm) or wider TTF’s 48” (1,200 mm) high or less, width of deck is unpredictable Many sections may exceed criteria

Appendix C: Whistler Trail Standards – Trail Difficulty

NAME: Easiest **SYMBOL:** White circle

GENERAL
• Fairly flat, wide and paved. Suitable for all users.[9]

DETAILED
• Maximum grade: 10%
• Preferred average grade: no more than 5%
• Maintain a minimum 2.5 m curve radius
• Usually associated with Trail Type I

EXPECTED TECHNICAL TRAIL FEATURES
TTFs are not appropriate for this trail level.

NAME: Easy **SYMBOL:** Green circle

GENERAL
• Gentle climbs and easily avoidable obstacles such as rocks, roots and pot-holes.[10]

DETAILED
• Maximum grade: 15%
• Maximum sustained climbing grade: 8%
• Curve radius: 2.4 m minimum
• Usually associated with Trail Type II or III

EXPECTED TECHNICAL TRAIL FEATURES
GENERAL
• Small roots & logs to cross
• Embedded rocks to avoid
• Wide bridges

DETAILED
• Embedded trail obstacles: up to 10 cm.
• Logs and roots perpendicular to direction of travel (±15°)
• Bridge minimum 90 cm wide, handrail required if height of bridge above surface exceeds 60 cm
• Rock face descents not to exceed 25%
• No drops
• No jumps

NAME: More Difficult **SYMBOL:** Blue Square

GENERAL
•Challenging riding with steep slopes and/or obstacles, possibly on a narrow trail with poor traction. Requires riding experience. [11]

DETAILED
• Maximum climbing grade: 25%
• Maximum sustained climbing grade: 10%
• Maximum descent grade on non-rock surface: 35%
• Curve radius: 1.8 m minimum
• Usually associated with Trail Type III or IV

EXPECTED TECHNICAL TRAIL FEATURES
GENERAL
• TTF width to height ratio of 1:2
• Small bridges (flat, wide, low and rollable from section to section)
• Small rollable drops
• Small teeter-totters
• Small jumps
• Medium sized logs

DETAILED
• Embedded trail obstacles: up to 20 cm high
• Elevated bridges: less than 1.8 m (6') high above surface
  -Minimum width of flat decking is one-half the height above surface
  -For connected sections, the bisecting angle between each connected section must be large enough to allow the bicycle to complete transition without requiring any wheel lifting techniques
• Teeter-totter: maximum pivot height, less than 60 cm (2') high above the surface
  -Minimum width of flat decking is one-half the height above surface at pivot point
• Rock or ramp descents not to exceed 45%
• Drop-offs not exceeding 30 cm high with exit cleared of all obstacles
• Jumps
  -No jumps with consequences for lack of speed (for example, coffin jumps or gap jumps)
  -Table top jumps maximum height 60 cm (2')
  -Jumps maximum height 45 cm (18")

[9] Paul Kennett; Classic New Zealand Mountain Bike Rides; 1996
[10] Paul Kennett
[11] Paul Kennett

NAME: Most Difficult **SYMBOL:** Black Diamond

GENERAL

- A mixture of long steep climbs, loose trail surfaces, numerous difficult obstacles to avoid or jump over, drop-offs and sharp corners. Some sections are definitely easier to walk. [12]

DETAILED

- Maximum climbing grade: 30%
- Maximum sustained climbing grade: 15%
- Usually associated with Trail Type III, IV or V

EXPECTED TECHNICAL TRAIL FEATURES

GENERAL

- TTF width to height ratio of 1:4
- Elevated bridges and teeter-totters with maximum deck height
- Connected bridges
- Mandatory air
- Larger jumps
- Steep descents with sharp transitions

DETAILED

- Elevated bridges: less than 3 m (10')[13] high above surface
  -Minimum width of flat decking is one-quarter the height above surface
- Teeter-totter: maximum pivot height less than 1.8 m (6') above surface
  -Minimum width of flat decking is one-quarter the height above surface at pivot point
- Mandatory air less than 1.0 m (3.3') vertical
- Rock or ramp descents not to exceed 120%
- Jumps
  -Table tops, no maximum height
  -No gap jumps or rhythm sections

NAME: Expert Unlimited **SYMBOL:** Double Black Diamond

GENERAL

- Exceptional bike control skills and balance essential to clear many challenging obstacles. High-risk level. Only a handful of riders will enjoy these rides.
- The RMOW recognizes Expert Unlimited as a difficulty level but due to the small size of the user group, the RMOW will not pursue ownership of these trails, however there may be some of these elements on a trail provided there is a clearly defined alternate route around.

DETAILED

- Similar to Most Difficult
- Usually associated with Trail Type III or IV

EXPECTED TECHNICAL TRAIL FEATURES

GENERAL

- Risk exceeds Most Difficult due to height, widths and exposure
- Fall zones may not meet fall zone standards
- The consequences of errors may be severe and rescue may be difficult

DETAILED

- Exceeding Most Difficult

[12] Paul Kennett

[13] WCB requires "...that a fall protection system is used when work is being done at a place (a) from which a fall of 3m (10ft) or more may occur, or (b) where a fall from a lesser height involves an unusual risk of injury." Occupational Health & Safety Regulation Book 2, section 11.2, page 11-2

Appendix D: Estimating Time and Cost of Building Trails

The following factors contribute to trail building time and cost.

Type of Trail

The trail style and the mix of anticipated trail users plays a fundamental role in trail building time and cost. The primary access trail in a trail system may need extensive construction work to achieve the necessary wide and smooth tread. On the other hand, a 1.0 metre wide, single track trail could be built with fewer resources.

Type of Terrain

Time and effort increase drastically as soil gets harder, roots and rocks increase, vegetation gets thicker, and the grade gets steeper.

Location of Trail

The proximity of the work site to vehicles, materials, tools, and trail workers will affect both cost and time.

Hand or Mechanized Tools

Mechanized tools can reduce construction time and cost. A three-person crew using a mini dozer can build 150 metres to 200 metres or more of finished trail per day. A three-person crew using only hand tools, by contrast, may only build 150 metres on a good day. The average labourer building a trail by hand earns $15 to $45 per hour, whereas the average trail builder using mechanized tools earns $30 to $100 (the higher rate reflects the skill involved in operating the machinery as well as machinery maintenance and transportation costs). Initially, it may appear that hand labourers are a comparative bargain. In most cases, however, machine-built trails are actually less expensive to construct, since mechanized tools significantly cut labour hours and the overall cost of the project.

Professional or Volunteer Labour

On average, one experienced pro using conventional hand tools can build 3 metres of bench cut trail per hour, or 25 metres per day. In steep, rocky, or heavily forested conditions, that average can drop to as little as 0.5 metres per hour or 4 metres of finished trail in a single day. If you use volunteers, construction costs are much lower, but the work takes much, much more time.

Costs for Trails & Structures

Construction time and costs are also determined by the number of labour intensive features on your trail. Switchbacks and bridges, for instance, will quickly raise the price of your project. Every switchback adds between $500 and $4,000, or 200 to 500 hours of volunteer time, and large-scale bridges can cost as much as $50,000 or more.

Here are some estimates gathered after polling several professional contractors early in 2011. If you are using all volunteer time, you can use these estimates to put a dollar value on the work or log the number of hours per volunteer and multiply by the current average hourly rate in Ontario.

Trail Construction by Machine

Easy conditions:

- $10.00 per metre/$10,000 per kilometre
- Typical conditions:
- $15.00 per metre / $15,000 per kilometre
- Hard conditions:
- $40.00 per metre / $40,000 per kilometre

Trail Construction by Hand

Easy conditions:

- $10.00 per metre/$10,000 per kilometre

Typical conditions:

- $20.00 per metre / $20,000 per kilometre

Hard conditions:

- $50.00 per metre / $50,000 per kilometre

Trail Features

Switchback Construction:

- $500 to $4,000 per switchback

Wooden Bridge:

- $30 to $45 per square foot of decking

Metal Bridge:

- $50 and up per square foot of decking

Rock Work:

- $200 per square metre

Trailhead Facilities

Restrooms:

- $15,000 to $50,000 apiece

Gravel Parking Lot:

- $15,000 to $35,000

Trailhead Kiosk:

- $2,000 to $5,000

Trail Markers:

- $5 to $35 apiece

Individual Labour Rates

Skill labourer:

- $50 to $65 per hour

Labourer:

- $25 to $45 per hour

Appendix E: Recommended Resources

Conflicts on Multiple-Use Trails. Roger Moore. U.S. Federal Highway Administration, 1994. (www.fs.fed.us/cdt/carrying_capacity/conflicts_trails_synthesis_1994.pdf)

This resource offers a comprehensive review of the research literature related to recreation conflict, and has served as an invaluable resource for trail managers, volunteers, and advocates for more than a decade.

Ministry of Forests, Lands and Natural Resource Operations, Recreation Sites and Trails Operations Policy Manual. British Columbia, 2001

(http://www.sitesandtrailsbc.ca/documents/manual/chapter10.pdf)

Chapter 10 of the document presents the position of the Ministry of Forests, Lands and Natural Resource Operations' on recreation trails that are managed for the public, just like recreation sites. In the province of British Columbia there are many players involved with recreation trails. The chapter focuses on recreation trail management. It sets out the management procedures for this very visible and capital-intensive component of the recreation program.

Note: formally named as British Columbia Ministry of Forests - Recreation Manual (Chapter 10: Recreation Trail Management)

Fromme Mountain Sustainable Trail Use and Classification Plan. District of North Vancouver, 2008 (http://www.dnv.org/article.asp?c=988)

This document is a good example of system-wide trail master plan. It was created through a 5-year process, and formalizes a shared-vision for the trails on Fromme Mountain. The document includes assessment of each system trail to provide an overall vision, best practices for environmental sustainability, and provides trail guidelines for future trail projects.

Lightly on the Land: The Student Conservation Association Trail-Building and Maintenance Manual. Robert Birkby, SCA, 2005 (www.imba.com)

Lightly on the Land focuses on crew leadership and the nuts and bolts of trail construction and maintenance. It contains detailed instructions on many technical skills such as building with rock, felling and buckling, building with timber, bridge construction, transplanting, and environmental restoration. Explains tools, tool repair, knots, and rigging. Instead of photos, it uses hundreds of fine illustrations to depict specialized techniques such as surveying, rigging, stonework, chainsaw skills, timber joinery, and bridge building.

Managing Mountain Biking: IMBA's Guide to Providing Great Riding. IMBA, 2007

(www.imba.com)

Managing Mountain Biking offers a collection of best practices for planning, designing, and managing successful trail networks and bike parks. More than 50 experts—including land managers, recreation ecologists, professional trail builders, and experienced advocates—contributed to Managing Mountain Biking, creating a complete reference. Managing Mountain Biking details overcoming user conflict, minimizing environmental impact, managing risk, and providing technically challenging riding. While IMBA's 2004 book, Trail Solutions covers trail construction, Managing Mountain Biking focuses on solving mountain biking issues through innovative trail design, effective partnerships, and visitor management strategies.

Mountain Biking: A Review of the Ecological Effects. Prepared by Michael Quinn and Greg Chernoff, February 2010.

(ftp://goliath.rockies.ca/public/greg/Ecol_Effects_MTB/EcoEffects_MTB_2010_Miistakis_FINAL_bilingual_summary.pdf)

In order to inform an activity assessment of mountain biking within Canada's national protected heritage places, Parks Canada commissioned the following literature review on the ecological effects of mountain biking. The purpose of this review was to summarize the nature of the ecological perturbations or effects arising from the disturbance of recreational mountain biking. Extensive searches and cross-references were conducted using the most relevant on-line databases available through the University of Calgary library. Searches of the World Wide Web via leading search engines and focused reviews of known mountain biking and trail associations were also conducted. The intent of the initial search was to identify as many papers, reports and theses as possible that addressed topics related to mountain biking. Source materials were then filtered to identify those references that addressed ecological effects of the activity. The research described in this report is concurrent with a complementary effort to understand the demographics, culture, and social effects of mountain biking as a recreational activity.

Natural Surface Trails by Design: Physical and

Human Design Essentials of Sustainable, Enjoyable Trails. Troy Scott Parker, 2007 (www.imba.com)

This groundbreaking book explores trail design from a theoretical perspective, covering the physical and human forces and relationships that govern trails—how we perceive nature, how trails make us feel, how trail use changes trails, and how soils, trail materials, water, drainage, and erosion behave.

Recreational Trail Study for British Columbia: Phase 1 – Background Report. Ministry of Tourism, Culture and the Arts, Ministry of Environment, and Province of British Columbia, 2007

(www.tsa.gov.bc.ca/sites_trails/docs/Provincial_Trails_Strategy/Trail_Strategy_Appendix1_May23.pdf)

The first phase of this multi-phased project is the creation of this background report. This document is a great reference for information on Canadian laws and rules related to trails, best trail management practices from across North America, and discussion on the overall benefits of trails. It also includes a comprehensive survey, and the results, to help create a vision for the provincial trail planning, potential funding sources, and a province-wide trail inventory.

Region 5 Mountain Bike Management Strategy: Situational Assessment and Implementation Toolbox. Garrett Villanueva. U.S. Forest Service, 2007.

(http://www.fs.fed.us/r5/mountainbikes/)

This management strategy and situational assessment characterizes existing mountain bike trail conditions and provides methods for management. This document is written specifically for Region 5 in California, but its format, as a toolbox provides trail management advice that can be applied in any trail system. It is also a good example of a system-wide master plan.

Sea to Sky Corridor Recreation Trail Strategy. British Columbia, Ministry of Tourism,

Culture and the Arts, 2007

(http://www.tsa.gov.bc.ca/sites_trails/Initiatives/SeatoSky-Strategy/sea_to_sky_strategy.htm)

The Ministry of Tourism, Culture and the Arts (MTCA) developed this comprehensive strategy to provide guidance on the management of this regional trail system. The strategy provides a framework for legal authorization and establishment of the vast majority of previously unauthorized trails on Crown land, recommends a process and organizational structure for ensuring a Corridor-wide coordinated approach to management of the extensive trail network, identifies opportunities and actions required to ensure a sustainable and economically beneficial network, and outlines and recommends trail construction, maintenance and sign standards and guidelines. This document is a useful example of a regional trail master plan.

Trail Construction and Maintenance Notebook. Woody Hesselbarth, Brian Vachowski,and Mary Ann Davies. U.S. Forest Service, 2007

(www.fhwa.dot.gov/environment/rectrails/trailpub.htm)

This pocket-sized notebook is oriented to the needs of a trailworker. It pulls together basic trail construction and maintenance information in an easy-to-understand format. It includes a lot of the information detailed in Trail Solutions, plus a few additional strategies for trails in wet areas. It is concise with lots of illustrations – a perfect book to keep in a backpack out on the trail.

Trail Planning, Design, and Development Guidelines. Minnesota Department of Natural

Resources, Trails and Waterways Division, 2007

(www.comm.media.state.mn.us/bookstore)

This comprehensive guide to shared-use paved trails, natural surface trails, winter use trails and bikeways is an excellent reference, well organized with tabs and an easy to follow lay-out. The book features dozens of useful reference illustrations and pictures for each specific topic (i.e. 6 pictures of different types of water caused erosion). Some information is Minnesota specific, but most is relevant to all climates and situations.

Trail Solutions: IMBA's Guide to Building Sweet Singletrack. IMBA, 2004.

(www.imba.com)

This comprehensive trail building resource combines cutting-edge trail building techniques with proven fundamentals in an easy-to-read format. The book is divided into eight sections that follow the trail building process from beginning to end. Readers are guided through the essential steps of trail planning, design, tool selection, construction, and maintenance. Additionally, Trail Solutions provides detailed advice on banked turns, rock armouring, mechanized tools, freeriding, downhilling, risk management, and other pioneering techniques. Trail Solutions is an essential tool for land managers and volunteer trailbuilders aspiring to raise their shared-

use trail systems to the next level.

Wetland Trail Design and Construction. U.S. Forest Service, 2007.

(www.fhwa.dot.gov/environment/fspubs.)

This manual describes common techniques for building a wetland trail. Starting with identifying the type of wetlands, this manual outlines how to build a dozen different types of wetland crossing structures (with and without foundations), what tools and materials to use, and instruction on maintaining drainage to minimize environmental impacts. This book is written for wetland trails, the techniques described can also be used for correcting other poorly drained low areas in existing trails.