

Fromme Mountain Sustainable Trail Use and Classification Plan

December, 2007



Prepared for:



Contact information

LEES + Associates

509-318 Homer St.
Vancouver, BC
V6B 2V2

T: 604-899-3806

F: 604-899-3805

elees@elac.bc.ca

TABLE OF CONTENTS

INTRODUCTION	5
Project Context.....	6
Consultation Process.....	9
CHAPTER 1: TRAIL CLASSIFICATION PLAN AND MAPS.....	11
Overview	12
Ecological Evaluation	12
Trail Sustainability Assessment	16
Trail Classification Plan	19
Trail Management Areas and Trail Details	20
Management Recommendation Overview and Priority	51
CHAPTER 2: TRAIL GUIDELINES.....	57
Overview	58
Policy Context.....	58
Trail Types.....	60
Trail Management Categories	64
Trail Management Categories	65
Trail Difficulty Levels.....	66
Technical Trail Feature Construction Guidelines.....	73
Management Guidelines	82
Maintenance	84
CHAPTER 3: BEST MANAGEMENT PRACTICES.....	89
Overview	90
Core Concepts	90
Approach	91
Related Documents and References.....	91
Policy and Principles.....	92
Best Management Practices	94
REFERENCES	123
APPENDICES.....	125
APPENDIX A: GLOSSARY.....	126
APPENDIX B: CONSULTATION MATERIALS AND SUMMARIES.....	130
APPENDIX C: TRAIL WORK PERMIT APPLICATION.....	169
APPENDIX D: TREE PRESERVATION BY-LAW.....	171
APPENDIX E: KEY INVASIVE SPECIES OF CONCERN.....	174

DEFINITION OF ACRONYMS USED IN THIS PLAN

ARRG: Alpine Recreation Reference Group

ARSS: Alpine Recreational Strategic Study

BCMC: British Columbia Mountaineering Club

BMP: Best Management Practice

DNV: District of North Vancouver

ESA: Environmentally Sensitive Area

GIS: Geographic Information System

IMBA: International Mountain Bicycling Association

MTB: Mountain Bike

NSMBA: North Shore Mountain Bike Association

ORAC: Outdoor Recreation Advisory Committee

PNEAC: Parks and Natural Environment Advisory Committee

PPE: Personal Protective Equipment

RMZ: Recreation Management Zone

ROW: Right of Way

TTF: Technical Trail Feature

SARA: Species at Risk Act

VCC: Valued Community Component

VEC: Valued Ecosystem Component

XC: Cross Country

INTRODUCTION

Project Context

Project Process and History

The Fromme Mountain Trail Classification Study emerged from the Alpine Recreational Strategic Study recommendations that were approved by DNV Council in 2005. A growing population of outdoor-oriented residents and visitors has increased recreational use of District of North Vancouver mountain areas, specifically related to trail activities. The popularity of mountain biking on the North Shore over the past years has resulted in significant changes to user patterns on the mountain side. Changes in recreational use resulted in challenges relating to parking, public safety, environmental impact, code of conduct, and commercial uses, to name a few. These and other concerns triggered discussion at a municipal, community and regional level on how to most effectively manage these precious lands. In 2003, the District of North Vancouver initiated a study, entitled the Alpine Recreational Strategic Study (ARSS), with the goal to develop a comprehensive strategy for managing mountain recreation. A series of recommendations emerged, one of which was to move forward on a Fromme Mountain Sustainable Trail Classification Study. The intention of this study was to formalize within an eco-based framework an assessment of the existing trails, and work within an adaptive management framework to establish a trail network map, develop Best Management Practices to address environmental concerns, and develop Trail Guidelines to provide direction on trail construction for staff and volunteers. The recommendations from the Fromme Mountain Trail Classification Study will be phased in over the next several years within a management framework. Although developed specifically for the Fromme Mountain Area, Trail Guidelines and Best Management Practices found within this document may also be applied to similar settings on the North Shore.

Physical Situation

The Fromme Mountain Area is a steep, generally south facing, heavily forested mountain-side bordered by residential neighbourhoods below. The Area extends from Capilano River in the west to Lynn Creek in the east. Heavy precipitation feeds minor and more major creeks which intersect the slope at regular intervals. Most areas where the trails are situated have been logged within the last 100 years, producing even-aged stands of second-growth forest, degraded soil, a network of old skid-roads, and interrupted drainage patterns.

Social Circumstances

The Fromme Mountain Area trail network consists of a mix of informal social trails, purpose built trails and relic logging skid roads. The network has developed over the past decades with little formal planning with respect to ecological sensitivity, neighbourhood interface, local and regional connectivity or recreational use. Historically, trail construction and maintenance has been conducted primarily by independent volunteers and organized clubs, with increasing inputs by the DNV in recent years. The result has been informal trail network that provides niche user experience requiring local knowledge for navigation.

Vision Statement

The Vision guiding the ARSS was developed from input provided through public consultations held in March and April 2004. At a general level, it expresses what a range of people agree needs to be protected or retained and what can be accomplished. The recreational study will go on to articulate a strategy, in the form of goals, policies and actions, to achieve this vision.

The vision for the North Shore mountainside is fundamentally one of sustainability – of respecting natural systems and managing uses of the mountain in ways that do not diminish the ability of future generations to enjoy this wonderful endowment. By adopting an approach that protects the mountain’s ecology while providing recreational, social and economic benefits, the North Shore will become a model of sustainable recreational management.

At the heart of achieving this vision is a commitment to balancing environmental protection with recreational activity. This commitment will be shared by all who are responsible for this asset – individuals using the mountain, governments, private land owners, commercial operators and other agencies. Common, sustainable strategies will emphasize awareness, education, safety and stewardship. Management approaches will be shaped by a desire to minimize negative impacts on the environment and residential neighbourhoods, while maximizing opportunities for positive outcomes such as habitat enhancement, tourism, inter-agency and community partnerships, education or other opportunities. The ARSS is an ongoing process that includes classifying the trail network and providing a plan for sustainable trail management through Trail Guidelines, environmental Best Management Practices (BMPs), and an adaptive management approach.

Statement of Principles

The Principles which guide the study for the North Shore mountains were developed in conjunction with the vision statement, with input provided through public consultations held in March and April 2004. The 12 principles outlined below express the range of basic concepts which are key to the development of a successful Alpine Recreational Strategic Study and Plan and the realization of the Vision.

1. Sustainable Planning Framework

The North Shore mountain environment is a unique asset requiring careful management to preserve and sustain it as a legacy for future generations. This requires a framework that supports a harmonious balance between long term social, economic and environmental values, including an eco-based approach to strategy development and implementation. Balancing the biophysical and physical capacity of the mountain to accommodate recreational use is a key consideration.

2. Environment Preservation, Opportunities and Enhancement

A proactive approach is required to ensure that biodiversity and high value habitats and ecosystems are preserved while managing recreational use on the mountain. To this end, this study and subsequent strategies and actions will recognize and respect the importance of protecting sensitive areas, and will develop initiatives to enhance

the ecological values of the system. To stay relevant it will also encourage ongoing research and learning, and apply environmental technologies and practices that will support the community's goal to be a leader in environmental management.

3. Accessibility and Recreation

Natural mountain areas are public spaces to be enjoyed by District and regional residents and visitors, but accessibility to meet recreational needs must be achieved while maintaining the ecological integrity of natural areas through the creation of appropriate supports and regulations. This includes providing infrastructure to support legitimate access and to balance neighbourhood livability with recreational uses, without compromising sustainability.

4. Stewardship and Responsibility

To achieve truly sustainable outcomes over time, responsibility, accountability and stewardship must be fostered at all levels including individual users, community groups, District managers and other agencies. This shared responsibility begins with public and multi-agency involvement in the development of this plan, including policies and standards for managing the social, environmental and economic aspects of the use of the Fromme Mountain area. Policies will include opportunities for stewardship and ongoing involvement in monitoring and implementation of the Fromme Mountain Sustainable Trail Use Plan.

5. Leadership, Partnerships and Innovation

The challenges arising from burgeoning recreational use present an opportunity for the DNV to become a leader in effective, sustainable management of mountain areas. The North Shore's value as a destination must be matched by leadership through innovation, co-operation, partnerships and volunteerism promoted by a comprehensive plan for long term management of the mountain resource.

6. Awareness, Public Education and Advocacy

Awareness, education and advocacy are integral to fostering respect for the natural environment and an appreciation for the health and safety of the public recreating within it. Building respect and awareness of these issues through public education and advocacy will be a key theme of the plan.

7. Public Health, Safety and Risk Management

To enhance the healthy outdoor lifestyles found on the North Shore, users require a challenging, yet safe and maintained outdoor mountain recreational system within a risk management framework including standards and regulations.

8. Adaptive Management

Recognizing the magnitude of the challenge in managing the mountain area in the face of growing and changing trends in recreational activities, it is important to adopt an approach that is innovative, adaptable and responsive to evolving social and environmental expectations. An adaptive management approach will be key to

the sustainable trail use plan and must include a monitoring function to evaluate the effectiveness of initiatives, modify actions as required, and incorporate new approaches and decision-making processes if necessary.

9. Multi-Jurisdictional Relationships with Landowners

The mountainside is not only a local asset, but a regional resource. While the plan will focus on access and use related to District lands, the DNV alone cannot effectively manage this vast area. The active involvement of neighbouring land managers through mutually respectful and productive partnerships and initiatives is essential to realizing stewardship and sustainability goals.

10. Tourism and Economic Considerations

Consistent with the shared vision for a sustainable future, and within the context of an eco-based planning approach, appropriate opportunities for low-impact tourism and other economic activities may be pursued.

11. Monitoring for Future Trends and Opportunities

To remain proactive and adaptive as the plan is implemented, it will be important to continue to anticipate future recreational trends through ongoing communication with recreation lists, residents and other partners.

12. Financial Development

The plan recognizes that limited budgets will require that a variety of initiatives be explored to implement the final plan. The long term success of the plan depends on reliable and sustainable funding strategies within the context of innovative partnerships, priority setting and cost/benefit considerations.

Criteria

Furthermore, four **Criteria** were developed to assist in the evaluation of existing and proposed trails:

1. User Experience
2. Ecological Impact
3. Trail Degradation
4. Management Considerations

Consultation Process

Consultations for this study included two stakeholder workshops, an Alpine Recreation Reference Group (ARRG) meeting, and an Open House. Please refer to *Appendix B* for consultation materials, hand-outs and summaries.



CHAPTER 1: TRAIL CLASSIFICATION PLAN AND MAPS

Overview

An assessment of Fromme Mountain's current trail network required a two-part approach: an ecological evaluation and a trail sustainability assessment. Evaluations and assessments were carried out using existing background reports and studies as well as site visits. Previous consultations with stakeholders and DNV staff helped identify key criteria and areas of focus for the reviewers.

Once completed, the trail sustainability assessment was overlaid with the ecological evaluation to assess where potential trail changes or altered management practices may be required to achieve a balance between environmental protection and recreational activity. Recreational Zones and management principles already approved by Council for the greater Alpine Recreation Area were noted and used to help guide final recommendations for managing and classifying the trail network. The combined assessments were used to craft Trail Guidelines and Best Management Practices, found in Chapters 2 and 3.

Ecological Evaluation

The biophysical attributes of the study area were assessed in an ecological evaluation conducted by Libor Michalak, R.P.Bio. The entire study area was evaluated on the merits of current ecosystem integrity with respect to species and habitat components identified as significant or important by the stakeholders. Through consultations with DNV staff and stakeholders, four key Valued Ecosystem Components (VECs) were identified and used as criteria to assess the study area.

The VECs include:

1. Riparian corridors – this includes all watercourse areas;
2. Species at risk/ red and blue listed species;
3. Old growth forest, and
4. Structural diversity - High, Moderate and Low ratings for species numbers and composition.

It should be noted that structural diversity (which often translates into areas of high biodiversity) is often found in areas of high disturbance, and in areas where there is a transition from one habitat structural stage to another, thus catering to both plant and animal species diversity. Therefore the hydro corridor has been identified as one of the most diverse areas of the mountain. It is highly disturbed and transitioning from forest habitat to open meadow/low shrub habitat through a succession of vegetational stages.

Areas such as the hydro corridor that exemplify this type of successional vegetative growth, or contain wildlife trees, are very important to many species of vegetation as well as vertebrates and invertebrates. Accordingly, these areas have been recorded as significant under the Structural Diversity VEC. Individual VEC areas were assigned ratings of High, Moderate or Low.

Diversity for the Fromme Mountain was then further ranked by canopy structure and its association with riparian areas. For example, the highest species diversity was identified in areas with a riparian canopy and varied vegetation structure diversity.

Identification and ranking of Valued Ecosystem Components was carried out by reviewing previous ecological assessments such as the Diamondhead report¹, conducting site visits, using aerial photography and applying protection recommendations as required under the Federal Fisheries Act.

Results of the evaluation were produced in a map format (*see next page*). It was determined that:

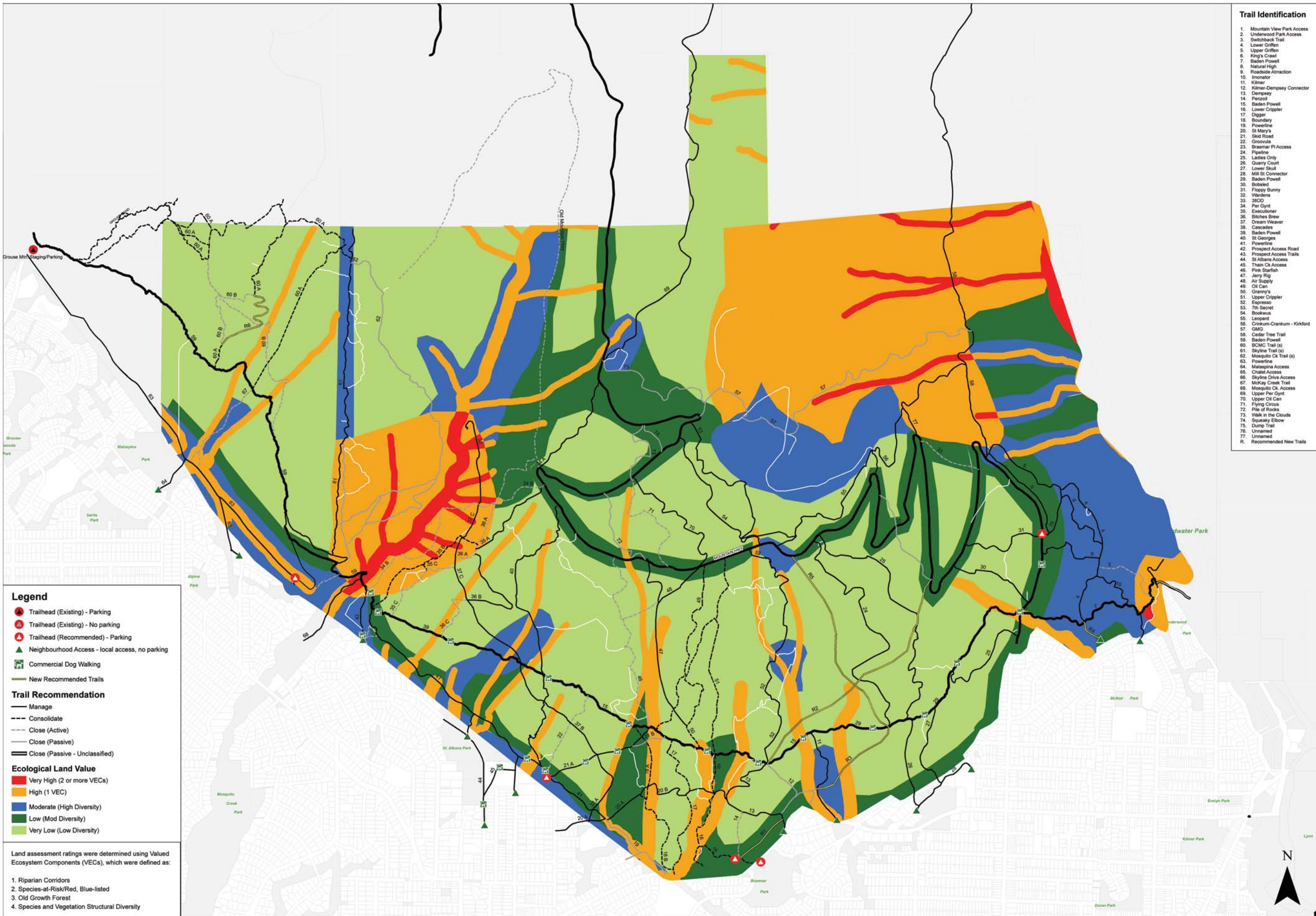
- Many riparian corridors exist in the study area;
- Old growth areas exist in smaller patches, mostly away from existing trails, and
- High structural diversity tends to be located in higher-use areas.

In attempting to rank Low to High value areas on Fromme, overlapping VECs were used. In areas where two or more VECs overlapped, a designation of Very High habitat value was applied. Where there was one VEC only, a High habitat value was assigned. Those labeled Moderate and Low were designated as such based on their diversity.

The results of the Ecological Evaluation were used to guide management decisions with respect to trail upgrades and closures, and most importantly, to inform Best Management Practices.

See the Ecological Land Assessment map on the following page.

¹ Diamond Head Consulting Ltd. (2004) "District of North Vancouver Fromme Mountain Area Ecosystem Analysis". Available at <http://www.district.north-van.bc.ca/article.asp?c=988>.



Legend

- Trailhead (Existing) - Parking
- Trailhead (Existing) - No parking
- Trailhead (Recommended) - Parking
- ▲ Neighbourhood Access - local access, no parking
- 🐕 Commercial Dog Walking
- New Recommended Trails

Trail Recommendation

- Manage
- - - Consolidate
- - - Close (Active)
- - - Close (Passive)
- Close (Passive - Unclassified)

Ecological Land Value

- Very High (2 or more VECs)
- High (1 VEC)
- Moderate (High Diversity)
- Low (Mod Diversity)
- Very Low (Low Diversity)

Land assessment ratings were determined using Valued Ecosystem Components (VECs), which were defined as:

1. Riparian Corridors
2. Species-at-Risk/Red, Blue-listed
3. Old Growth Forest
4. Species and Vegetation Structural Diversity

0 250 500 Meters

1:5,000

Original data received by the DNV were either unprojected or projected using NAD83 and UTM 12N. The projection information has not been modified from the original. For further details please contact the Cartographer.

Map was created in consultation with the District of North Vancouver
Printed September 26th, 2007

- Trail Identification**
1. Mountain View Park Access
 2. Underwood Park Access
 3. Switchback Trail
 4. Lower Griffin
 5. Upper Griffin
 6. King's Crawl
 7. Baden Powell
 8. Natural High
 9. Roadside Attraction
 10. Inonator
 11. Kilmer
 12. Kilmer-Dempsey Connector
 13. Dempsey
 14. Penzill
 15. Baden Powell
 16. Lower Crippler
 17. Digger
 18. Boundary
 19. Powerline
 20. St Mary's
 21. Skid Road
 22. Groovils
 23. Braemar PI Access
 24. Pipeline
 25. Ladies Only
 26. Quarry Court
 27. Lower Skull
 28. Mill St Connector
 29. Baden Powell
 30. Bobbed
 31. Flappy Butty
 32. Wardens
 33. 380D
 34. Per Gynt
 35. Executioner
 36. Bitches Bw
 37. Dream Weaver
 38. Cascades
 39. Baden Powell
 40. St Georges
 41. Powerline
 42. Prospect Access Road
 43. Prospect Access Trails
 44. St Albans Access
 45. Thin Ck Access
 46. Pink Starfish
 47. Jerry Rig
 48. Air Supply
 49. Oil Can
 50. Granny's
 51. Upper Crippler
 52. Espresso
 53. 7th Secret
 54. Bookius
 55. Leopard
 56. Crinkum-Crankum - Kirkford
 57. GAG
 58. Cedar Tree Trail
 59. Baden Powell
 60. SCMC Trail (s)
 61. Skyline Trail (s)
 62. Mosquito Ck Trail (s)
 63. Powerline
 64. Malaspina Access
 65. Chalet Access
 66. Skyline Drive Access
 67. McKay Creek Trail
 68. Mosquito Ck Access
 69. Upper Per Gynt
 70. Upper Oil Can
 71. Flying Circus
 72. Pit of Rocks
 73. Walk in the Clouds
 74. Squeaky Elbow
 75. Dump Trail
 76. Unnamed
 77. Unnamed
 - R. Recommended New Trails

Ecological Land Assessment

LEES + Associates Landscape Architects

KEYSTONE ENVIRONMENTAL

DISTRICT OF NORTH VANCOUVER naturally beautiful

Trail Sustainability Assessment

The Trail Sustainability Assessment was developed and applied using core concepts of sustainable trails as outlined in *Natural Surface Trails by Design*, Parker 2004. The core concepts consider user experience, physical science, and management (risk, monitoring and maintenance). In addition, biophysical impacts were captured. The Trail Classification Plan was developed from a combination of the:

- Trail Sustainability Assessment;
- Ecological Evaluation;
- Stage 1: Alpine Recreation Strategic Study (ARSS) results;
- Stakeholder Consultation including ARRG and PNEAC review;
- Public Consultation through an Open House, and
- DNV Staff Consultation.

The Trail Sustainability Assessment was conducted by Stuart Spooner with technical assistance provided by Dave Diplock, P.Eng. A trail sustainability field evaluation form was developed and completed for each trail segment (*see next page*).

Fromme Mountain Trail Classification Project
Guide to Evaluation Form

1	Trail Section Number	From Annotated Map
2	Date	Obvious
3	Trail Name	Additional Data Required
4	Assessor	Bear Environmental
5	Trail Type	Single-track / Skid Road
6	Apparent Frequency of Use	Regular / Occasional / Rare
7	Trail Use Suitability	Multi-use / Hiking Only / MTB priority
8	Trail Difficulty	Beg/Int/Ad/Exp (North Shore)
9	Length	Estimated from Map
10	Elevation	Top and Bottom
11	Type of TTFs	
12	Number of TTFs	
13	Condition of TTFs	
14	Incorporation of Landscape	From <i>Parker 2004</i>
15	Harmony	From <i>Parker 2004</i>
16	Playfulness	From <i>Parker 2004</i>
17	Efficiency	From <i>Parker 2004</i>
18	Safety	From <i>Parker 2004</i>
19	Tread Degradation	Description of Actual Condition
20	Tread Watersheds	Assessment of Overall Sustainability of Design
21	Adjacent Impacts	Sedimentation and User Impacts
22	Proximity to Riparian Areas	
23	Impacts to Riparian Areas	
24	Accessibility for Maintenance	Distance and effort
25	Volunteer Stewardship	What and How much is being done
26	Summary	Overview and specific issues
27	Recommendations	Priority Actions and Possibilities

Trail segments are considered individual management areas and consist of either entire trails, a portion of a trail, or a network of related trails, as shown. The study area was divided into seven management areas for the sake of communicating the results:

1. Mountain View Park Area;
2. Braemar Area;
3. Eastern Fromme Area;
4. Western Fromme Area;
5. Central Fromme Area;
6. Seventh Secret Area, and
7. West of Mosquito Creek Area.

The results of the assessment are detailed later in this chapter under heading *Trail Management Areas and Trail Details*. The assessment provides a preliminary inventory of the existing formal trail networks, and makes recommendations specific to individual trails and to particular management areas within the study area. Fromme Mountain consists of both formal and informal trail networks which warrant distinction. This study was confined to what we have assessed as the de facto formal trail network. This includes the more intensively used or historically significant trails.

Informal Trails

The study area contains a vast informal network of historic skid-roads and less used trails. The informal trails have unsustainable alignments, are in poor condition, have little aesthetic or functional value, and receive little to no use. This report recommends that informal trails be considered closed with no action required, as it is currently beyond the capacity of the DNV to physically deactivate (disguise and rehabilitate) the informal trail network. If the formal trail network is effectively signed and developed, the informal trail network will eventually become invisible to most trail users.

Formal Trails

The trail network on Fromme was not designed. It evolved organically as a network of social trails and historic skid roads, and has not been systematically managed. As a consequence, almost all existing trails have significant sections where the alignment is fundamentally unsustainable. In general, tread segments are too steep and long, resulting in ongoing deterioration under the combined impacts of water erosion and trail use. The trails only remain functional through very limited use, or intensive volunteer maintenance.

Trail Classification Plan

Each trail segment inventoried is provided with current classification information, including:

- intensity of use
- trail type
- trail user mode
- level of maintenance
- condition
- harmony²
- management recommendation

Management recommendations have been consolidated into a final map that re-classifies trails, creating an integrated network that balances diverse use and level of difficulty, while ensuring all trails can be maintained sustainably. (*See page 55 for the Recommended Trail Network*).

Management recommendations for existing trails fall under four general headings:

1. **Manage** – maintain the trail to an acceptable standard. A detailed assessment and management plan is required for each trail, after which significant sections of the trail will need to be upgraded or re-routed on a priority basis to achieve more sustainable alignments.
2. **Consolidate** – where trails exist in parallel, it can make sense to identify the best parts of each (with regard to intensity, condition, harmony, etc.), then link these sections together with new trail. This means deactivating other sections, and concentrating resources on creating one more desirable trail.
3. **Close: Active Decommissioning** –when trails scheduled for closure are of high use and/or have significant surface water flow, active decommissioning may be required. This option will need to be justified (closing trails will be unpopular) by the poor sustainability of the trail, and the focusing of resources on more appropriate trails. Protocols for active trail deactivation are provided in the *Habitat Restoration* BMP. The goal in decommissioning trails is to slow surface run-off and make the old trail indistinguishable from the surrounding area.
4. **Close: Passive Decommissioning** – where trails have very low usage and do not have significant ongoing erosion due to surface water drainage, a lower level of resources is required to close the trail. Protocols for passive

² **Harmony** is the feeling of overall appropriateness of a given trail. It includes characteristics such as integration with site, support of movement, rhythm and flow, and use of natural materials. For further understanding of trail design that incorporates **harmony** see Parker 2004 pp 28-31.

trail deactivation are provided in the *Habitat Restoration* BMP. Trails scheduled for passive decommissioning are expected to readily return to a natural condition over time once use is discontinued.

Trail Management Areas and Trail Details

The study area was divided into seven management areas for the sake of communicating the results:

1. Mountain View Park Area;
2. Braemar Area;
3. Eastern Fromme Area;
4. Western Fromme Area;
5. Central Fromme Area;
6. Seventh Secret Area, and
7. West of Mosquito Creek Area.

Each trail segment assessed was provided with a classification summary and individual management recommendations. General recommendations for each management area are also provided. These trail management recommendations have been consolidated into a map format (*see page 54 for Trail Management Recommendations map*). Note that both the Recommended Trail Network map and the Trail Management Recommendations map were produced in GIS. Information provided in the following text of this document was captured as trail data in the GIS files.

Mountain View Park Area

Mountain View Park Area contains mountain biking trails that descend from Mountain Highway, through Mountain View Park and onto McNair Avenue. This area has multi-use, mountain bike (MTB) and walking trails and represents the easiest (lowest level of difficulty) trails within the study area. This area can be accessed from the Underwood Park subdivision, and stairs (for walkers only) can be used to descend to the Lynn Headwaters. The Baden Powell trail is an important walking trail within the Mountain View Park Area.

Mountain View Park Trails:

1. Mountain View Park Access

- Short access trail to the Baden Powell trail.
- Gravel road.
- High level of use.
- Multi-use trail.

-
- Good condition.
 - Rated beginner (because it does not connect to trails of the same rating it cannot function as beginner level trail).
 - Moderate harmony (presence of non-natural materials, i.e. gravel and fencing).

RECOMMENDATION: Manage. Sign for dogs-on-leash in Mountain View Park Area. Compliance will require monitoring in the areas. Recommend upgrading fence around wetland (or other measures) if voluntary compliance is ineffective. Follow BMPs for Riparian Areas.

2. Underwood Park Access

- Short access trail to the Baden Powell.
- Single-track.
- Rated intermediate.
- Moderate level of use.
- Hiking only trail (stairs preclude mountain bike use).
- Very poor condition (eroded and overgrown).
- Low level of volunteer stewardship.
- Low harmony (rough tread, uncomfortably close to fence-line).

RECOMMENDATION: Manage. Re-route on sustainable alignment. Sign for dogs-on-leash in Mountain View Park Area.

3. Switchback Trail / “Lower Griffen”

- MTB descent (multiple TTFs).
- Single-track.
- High level of use.
- Multi-use trail (youth/beginner MTB trail for study area).
- Rated intermediate.
- High level of volunteer stewardship (rock armouring and TTF maintenance).
- Good condition.
- Groundwater seepage issues on switchbacks and adjacent to ephemeral creek.
- Low harmony (switchbacks, crosses flat boggy area).

RECOMMENDATION: Close – active decommissioning (pending upgrade of Lower Griffen as a primary alternative route).

4. Lower Griffen

- MTB XC/descent (some TTFs).
- Single-track.
- High level of use.
- Multi-use trail (Youth/beginner MTB trail for study area).
- Rated intermediate.
- Moderate level of volunteer stewardship (rock armouring).
- Poor condition (erosion and worn TTFs).
- Sustainable alignment.
- Bridges required for creek crossing(s).
- Moderate harmony.

RECOMMENDATION: Manage and upgrade. Sign for dogs-on-leash in Mountain View Park Area.

5. Upper Griffen

- MTB descent (some TTFs).
- Single-track.
- High level of use.
- Multi-use trail. (Youth/beginner MTB trail for study area)
- Rated intermediate.
- Moderate level of volunteer stewardship (some rock armouring and TTFs).
- Poor condition at top (erosion).
- Low harmony.

RECOMMENDATION: Manage and upgrade.

6. King of Shore

- MTB XC/descent (some TTFs).
- Single-track.
- Moderate level of use.
- MTB trail (does receive considerable hiking use).
- Rated intermediate.
- Low level of volunteer stewardship.
- Very poor condition (erosion and worn TTFs).

-
- Low harmony.

RECOMMENDATION: Manage as beginner multi-use trail.

7. Baden Powell (Mountain Highway – Lynn Headwaters)

- Major destination and connecting trail.
- Single-track.
- High level of use.
- Multi-use trail (stairs make unsuitable for MTB use).
- Rated intermediate.
- Moderate level of volunteer stewardship (rock armouring).
- Poor condition (erosion).
- Invasive species (Holly).
- Moderate harmony.

RECOMMENDATION: Manage. Re-route on sustainable alignment. Sign for dogs-on-leash in Mountain View Park Area.

8. Natural High

- MTB descent (multiple TTFs).
- Single-track.
- High level of use.
- MTB trail (does receive considerable hiking use).
- Rated advanced (with optional expert lines).
- Exceptionally high level of volunteer stewardship (extensive rock armoring and maintenance of TTFs).
- Good condition.
- High harmony.

RECOMMENDATION: Manage.

9. Roadside Attraction

- MTB XC.
- Single-track.
- High level of use.
- Multi-use trail.

-
- Rated intermediate.
 - Low level of volunteer stewardship.
 - Fair condition.
 - Low harmony (straight, featureless).
 - Within Infrastructure Zone.

RECOMMENDATION: Manage.

10. Imonator

- MTB descent (multiple TTFs).
- Single-track.
- Low level of use.
- MTB trail.
- Rated advanced.
- Low level of volunteer stewardship (appears to be abandoned).
- Very poor condition (worn TTFs).
- Moderate harmony (interesting land features).

RECOMMENDATION: Manage and upgrade as an extension of Natural High. Sign for dogs-on-leash in Mountain View Park Area.

Braemar Area

The Braemar Area contains intermediate to expert MTB trails. Braemar also has many popular trails for walking. Within this area multiple access routes can be used to reach the Baden Powell trail. This area has unregulated and convenient parking. The existing topography provides natural access/egress points to the trail network.

Braemar Trails:

11. Kilmer

- Steep fall-line access route to the Baden Powell trail.
- Single-track.
- Moderate level of use.
- Multi-use trail.
- Rated intermediate.
- Low level of volunteer stewardship.

-
- Very poor condition (erosion).
 - Very low harmony.
 - Sections within riparian zone.

RECOMMENDATION: Manage and upgrade. Re-route on sustainable alignments.

12. Kilmer – Dempsey Connector

- Links Kilmer to Dempsey
- Single-track (partially on old skid-road).
- Moderate level of use.
- Multi-use trail.
- Rated intermediate.
- Low level of volunteer stewardship.
- Fair condition (erosion).
- Low harmony (follows fence-line).
- Within riparian zone.

RECOMMENDATION: Close – passive decommissioning.

13. Dempsey

- Access route to the Baden Powell trail, and a MTB descent.
- Single-track.
- High level of use.
- Multi-use trail
- Rated intermediate.
- Moderate level of volunteer stewardship (rock armouring).
- Fair condition (erosion).
- Good harmony.

RECOMMENDATION: Manage and upgrade as part of new climbing route. Change to beginner trail use designation.

14. Penzoil

- Access route to the Baden Powell trail.
- Single-track.

-
- Low level of use.
 - Multi-use trail.
 - Rated intermediate.
 - Low level of volunteer stewardship.
 - Fair condition (new with erosion).
 - Moderate harmony.

RECOMMENDATION: Close – Active decommissioning.

15. Baden Powell (St Georges – Kilmer)

- Major destination and connecting trail.
- Single-track.
- High level of use.
- Multi-use trail.
- Rated intermediate.
- High level of volunteer stewardship (rock armouring, bridges).
- Fair condition (erosion, worn bridges).
- Good harmony.

RECOMMENDATION: Manage. Sign as commercial dog walking route. Apply BMPs for Riparian Areas.

16. Lower Crippler

- MTB descent.
- Single-track.
- High level of use.
- MTB trail (does receive some hiking use).
- Rated advanced (with optional expert lines).
- High level of volunteer stewardship (extensive rock armouring and multiple TTFs).
- Poor condition (erosion and worn TTFs).
- Significant impact to riparian area.
- Low harmony.

RECOMMENDATION: Consolidate with Digger and Boundary into one advanced MTB route. Apply BMPs to riparian areas.

17. Digger

- MTB descent.
- Single-track.
- Moderate level of use.
- MTB trail.
- Rated advanced.
- Moderate level of volunteer stewardship (rock armouring and multiple TTFs).
- Very poor condition (erosion and worn TTFs).
- Low harmony.

RECOMMENDATION: Consolidate with Lower Crippler and Boundary into one advanced MTB route. Apply BMPs to riparian areas.

18. Boundary

- MTB descent.
- Single-track.
- High level of use.
- MTB trail (does receive considerable hiking use).
- Rated expert.
- High level of volunteer stewardship (extensive rock armouring and multiple TTFs).
- Fair condition (erosion).
- Significant impact to riparian area.
- Moderate harmony (incorporates natural features).

RECOMMENDATION: Consolidate with Digger and Lower Crippler into one advanced MTB route. Apply BMPs to riparian areas.

19. Powerline (St Mary's Ave to Braemar Ave)

- Rough route.
- Single-track.
- Multi-use trail.
- Low level of use.
- Rated advanced.
- Low level of volunteer stewardship.

-
- Very poor condition (erosion, overgrown).
 - Very low harmony.

RECOMMENDATION: Close – passive decommissioning.

20. St Mary's

- Access route to the Baden Powell trail, and MTB descent.
- Single-track (partially on an old skid-road).
- High level of use.
- Multi-use trail.
- Rated intermediate.
- Low level of volunteer stewardship (tread construction).
- Fair condition (erosion, worn bridges).
- Moderate harmony.

RECOMMENDATION: Manage and upgrade. Apply BMPs to riparian areas.

21. Skid Road

- Good access route to the Baden Powell trail.
- Skid-road.
- Moderate level of use.
- Multi-use trail.
- Rated intermediate.
- Low level of volunteer stewardship.
- Poor condition (erosion).
- Low harmony.

RECOMMENDATION: Manage and upgrade. Re-route upper section onto a sustainable alignment and close the skidder continuation entering the riparian zone below Lester Barth Bridge. Sign as commercial dog walking route.

22. Groovula

- MTB descent (multiple TTFs).
- Single-track.
- Low level of use.
- Very braided.

-
- Rated extreme.
 - High level of volunteer stewardship (TTF maintenance).
 - Fair condition (erosion, worn TTFs).
 - Moderate harmony.

RECOMMENDATION: Close - passive decommission. “Watch and see” approach is particularly important as an expert-level user group maintains this trail. Re-visit this recommendation with DNV with regard to policy on expert MTB trails.

23. Braemar Place Access

- Access to Powerline.
- Gravel road.
- Low level of use.
- Multi-use trail.
- Rated beginner.
- Volunteer stewardship not required.
- Good condition.
- High quality (paved with lighting) access route built by developer, but it leads to nowhere.
- Low harmony (artificial).

RECOMMENDATION: Close - passive decommission (leave as unofficial access point serving adjacent cul-de-sac).

Additional Recommendations

- Develop a dedicated staging area on a large flat bench in the forest just inside the lower pull-out on the uphill side of Braemar Road within the Infrastructure Zone. Alternatively, it may be more economical to provide angle parking on the east side of Braemar between Princess and Dempsey. A proposed staging area within Braemar Park may be in addition or as an alternative to the proposed parking within the Infrastructure Zone.
- Upgrade trail connectivity from staging area to provide multi-modal climbing route.
- Strengthen trail connection from the proposed trailhead and parking.
- Develop an intermediate contour trail linking Dempsey Trail to the proposed Braemar staging area.
- Link proposed Braemar staging area to Dreamweaver trail via St. Mary’s.

-
- Completely re-route Kilmer on a more sustainable alignment, linking to the intersection of Pipeline and Baden Powell trails.
 - Re-route and upgrade St Mary's and Dempsey to an MTB climbable standard.

Eastern Fromme Area

The Eastern Fromme Area contains intermediate to expert MTB trails and some walking trails. There are multiple access routes to the Baden Powell trail.

Eastern Fromme Trails:

24. Pipeline

- MTB descent.
- Single-track.
- High level of use.
- MTB trail.
- Rated intermediate.
- High level of volunteer stewardship (rock armouring and multiple TTFs).
- Good condition.
- Moderate harmony.

RECOMMENDATION: Manage.

25. Ladies Only

- MTB descent.
- Single-track.
- High level of use.
- MTB trail.
- Rated advanced.
- High level of volunteer stewardship (rock armouring and multiple TTFs).
- Good condition.
- High harmony.

RECOMMENDATION: Manage. Apply BMPs to riparian areas.

26. Quarry Court

- Steep fall-line access route to the Baden Powell trail.
- Single-track.
- Moderate level of use.
- Multi-use trail.
- Rated advanced.
- Low level of volunteer stewardship.
- Very poor condition (erosion).
- Very low harmony.

RECOMMENDATION: Manage. Re-route to a sustainable alignment and connect to a new community access node at Dempsey Road west of Mountain Highway. Sign as hiking only.

27. Lower Skull

- MTB descent.
- Single-track.
- Low level of use.
- MTB trail.
- Rated expert.
- Low level of volunteer stewardship.
- Fair condition (erosion).
- Moderate harmony.

RECOMMENDATION: Manage. Re-route to connect to a new community access node at Dempsey Road, west of Mountain Highway. Sign as MTB primary.

28. Mill St Connector

- Links Mill St. to Quarry Court.
- Single-track (partially on old skid-road).
- Moderate level of use.
- Multi-use trail.
- Rated intermediate.
- Low level of volunteer stewardship (tread construction).
- Fair condition (erosion, worn bridges).

-
- Moderate harmony.

RECOMMENDATION: Manage. Sign as hiking only once Skull extension is completed.

29. Baden Powell (Kilmer to Mountain Hwy)

- Major destination and connecting trail.
- Single-track.
- High level of use.
- Multi-use trail (stairs make unsuitable for MTB).
- Rated intermediate (multiple advanced sections).
- High level of volunteer stewardship (rock armouring).
- Fair condition (erosion, worn bridges).
- Moderate harmony.

RECOMMENDATION: Manage. Sign as commercial dog walking route 9AM – 4PM weekdays only. Apply BMPs to riparian areas.

30. Bobsled

- MTB descent (multiple TTFs).
- Single-track.
- Moderate level of use.
- Multi-use trail.
- Rated intermediate with advanced options.
- Moderate level of volunteer stewardship (TTF maintenance).
- Very poor condition (erosion and worn TTFs, fall-line orientation).
- Low harmony.

RECOMMENDATION: Manage.

31. Floppy Bunny

- MTB descent (some TTFs).
- Single-track.
- Low level of use.
- Multi-use trail.
- Rated intermediate with advanced options.

-
- Low level of volunteer stewardship.
 - Fair condition (erosion and worn TTFs).
 - Low harmony.

RECOMMENDATION: Manage.

32. Wardens

- Short-cut from 2nd to 5th switchback
- Skid-road
- Low level of use.
- Multi-use trail.
- Rated intermediate.
- Low level of volunteer stewardship.
- Poor condition (erosion).
- Low harmony.

RECOMMENDATION: Close - passive decommission.

33. 38DD

- MTB descent (multiple TTFs).
- Single-track.
- Low level of use (could be abandoned).
- MTB trail.
- Rated expert.
- Low level of volunteer stewardship (may be abandoned?).
- Very poor condition (erosion and worn TTFs).
- Low harmony.

RECOMMENDATION: Close - active decommission.

Additional Recommendations

- Re-route Baden Powell (Lower Ladies – Mountain Highway) on a more sustainable alignment.
- Develop an intermediate contour trail, climbable on a mountain bike, linking the intersection of Dempsey and Baden Powell to the 2nd

Switchback on Mountain Highway. Upgrade steep access to Mill St. Connector from Mill St.

- Establish commercial dog walking drop off at intersection of Mountain Highway fire road and Baden Powell due to conflict with traffic at current drop off at water tower.
- Potential to develop future additional beginner mountain bike trails in triangle between 1st, 2nd and 3rd switchbacks on Mountain Highway fire road. Area is currently highly fragmented by fire road resulting in low ecological value. Adjacent road provides excellent access for monitoring, maintenance and emergency response. Area has excellent connectivity with easier trails below towards Mountain Highway staging area and proposed staging area and access road from Braemer Read. This recommendation is made in anticipation of future demand.

Western Fromme Area

The Western Fromme Area has advanced to expert MTB trails and destination hiking trails. This area also contains access routes to the Baden Powell trail.

Western Fromme Trails:

34A. Upper Per Gynt

- Single-track.
- Low level of use.
- Hiking only trail.
- Rated advanced.
- Low level of volunteer stewardship.
- Poor condition (erosion).
- Borders preservation zone.
- Situated on private property (Grouse Mountain).
- Low harmony.

RECOMMENDATION: Manage.

34B. Lower Per Gynt

- Steep fall-line access trail to the upper mountain.
- Single-track.
- Low level of use.
- Hiking only trail.
- Rated advanced (steep and rough).

-
- Low level of volunteer stewardship.
 - Very poor condition (erosion).
 - Within preservation zone.
 - Low harmony.

RECOMMENDATION: Close – active decommissioning. New hiking only option has been established outside of the Preservation Zone to the east.

35A. Upper Executioner

- MTB descent (some TTFs).
- Single-track.
- Low level of use.
- Lots of recent windthrow.
- MTB trail.
- Rated expert.
- Low level of volunteer stewardship.
- Poor condition (erosion and worn TTFs).
- Partially situated on private property (Grouse Mountain).
- Low harmony.

RECOMMENDATION: Manage and upgrade. Re-route onto sustainable alignment for multi-use.

35B+C. Lower Executioner (multiple routes)

- MTB descent (some TTFs). Braided into multiple routes.
- Single-track (with linking skid-roads).
- Low level of use.
- Multi-use trail.
- Rated expert.
- Low level of volunteer stewardship.
- Very poor condition (erosion and worn TTFs).
- Partially situated on private property (Grouse Mountain).
- Very low harmony.

RECOMMENDATION: Consolidate into one sustainable hiking only route. Actively decommission 35C.

36A. Upper Bitches Brew

- MTB descent (multiple TTFs).
- Single-track and skid road.
- Very low level of use.
- MTB trail.
- Rated expert.
- Low level of volunteer stewardship.
- Very poor condition (erosion and worn TTFs).
- Partially situated on private property (Grouse Mountain).
- Moderate harmony.

RECOMMENDATION: Close – active decommissioning.

36B. Middle Bitches Brew

- MTB descent (multiple TTFs).
- Single-track.
- Moderate level of use.
- MTB trail.
- Rated expert.
- Moderate level of volunteer stewardship.
- Good condition.
- Well designed and built.
- Partially situated on private property (Grouse Mountain).
- Moderate harmony.

RECOMMENDATION: Consolidate into one mountain bike primary route linking Upper Executioner and Dreamweaver route. Provide alternate routes to TTFs.

36C. Lower Bitches Brew

- MTB descent (multiple TTFs).
- Single-track.
- Low level of use.
- MTB trail.
- Rated expert.
- Moderate level of volunteer stewardship.

-
- Fair condition (erosion and worn TTFs).
 - Broken major bridge is a safety hazard.
 - Within riparian zone.
 - Partially situated on private property (Grouse Mountain).
 - Moderate harmony.

RECOMMENDATION: Close – active decommissioning.

37A. Lower Dreamweaver

- Single-track.
- High level of use.
- Multi-use trail.
- Rated intermediate.
- High level of volunteer stewardship (tread maintenance).
- Good condition.
- Multiple bridges with high exposure.
- High harmony.
- Well designed contour trail with appropriate trail watersheds.

RECOMMENDATION: Manage. Upgrade creek crossings.

37B+C. Upper Dreamweaver

- Destination trail (links to Cascades trail).
- Single-track.
- High level of use.
- Hiking trail.
- Rated intermediate.
- High level of volunteer stewardship (tread maintenance).
- Good condition.
- Multiple bridges with high exposure.
- High harmony.
- Well designed contour trail with appropriate trail watersheds.

RECOMMENDATION: Manage. Sign as hiking only as it turns into 37C above the intersection with Bitches Brew. Upgrade creek crossings.

38. Cascades

- Destination trail.
- Single-track.
- Moderate level of use.
- Hiking only trail.
- Rated advanced (rough with high exposure).
- Moderate level of volunteer stewardship (bridges, clearing windfall).
- Fair condition (erosion).
- Multiple bridges with high exposure.
- Within Preservation Zone.
- High harmony.

RECOMMENDATION: Manage. Maintain as old growth and cascade destination option for Mosquito Creek Preservation Zone. Apply BMPs.

39. Baden Powell (Mosquito Creek – St Georges)

- Major destination and connecting trail.
- Single-track.
- High level of use.
- Multi-use trail (stairs make unsuitable for MTB).
- Rated intermediate (multiple advanced sections).
- Moderate level of volunteer stewardship (rock armouring).
- Poor condition (erosion, worn bridges).
- Low harmony.

RECOMMENDATION: Manage. Sign as commercial dog walking route. Re-route sections to sustainable multi-use alignment. Apply BMPs to riparian zones.

40. St Georges

- Major destination and connecting trail.
- Single-track.
- Moderate level of use.
- Hiking trail (local custom).
- Rated intermediate.
- Low level of volunteer stewardship.

-
- Invasive species (Holly).
 - Poor condition (erosion).
 - Partially situated on private property (Grouse Mountain and others).
 - Low harmony.

RECOMMENDATION: Manage. Requires re-routing or stairs due to erosion/poor alignment.

41. Powerline (St Mary's Ave. – Mosquito Creek)

- Low elevation connecting road.
- Gravel road (BC Hydro service road).
- Moderate level of use.
- Multi-use trail.
- Rated beginner.
- Volunteer stewardship not required.
- Good condition.
- Low harmony.

RECOMMENDATION: Manage. Sign as commercial dog walking route, re-open and upgrade parking area on Powerline ROW.

42. Prospect Access Road

- Access road to the Powerline road and the Baden Powell trail.
- Gravel road.
- High level of use.
- Multi-use trail.
- Rated beginner.
- Volunteer stewardship not required.
- Good condition.
- Moderate harmony.

RECOMMENDATION: Manage. Sign as commercial dog walking route. Recognize Community Access Node.

43. Prospect Access Trails

- Steep fall-line access trails/shortcut to the Powerline road.
- Single-track.
- Moderate level of use.
- Multi-use trail.
- Rated advanced.
- Low level of volunteer stewardship.
- Very poor condition (erosion, fall-line orientation).
- Very low harmony.

RECOMMENDATION: Close – active decommissioning.

44. St Albans Access

- Access to the Powerline road.
- Single-track.
- Moderate level of use.
- Multi-use trail.
- Rated intermediate.
- Low level of volunteer stewardship.
- Poor condition (erosion).
- Low harmony.

RECOMMENDATION: Manage.

45. Thain Creek Access

- Access to the Powerline road.
- Single-track.
- Moderate level of use.
- Multi-use trail.
- Rated intermediate.
- Low level of volunteer stewardship.
- Poor condition (erosion).
- Low harmony.

RECOMMENDATION: Manage.

Additional Recommendations

- Develop a sustainable, beginner-level alternative linking Prospect Access Road to the Powerline.
- Establish official Trail Head Access parking below Powerline at the top of St. Mary's Road. Re-open and upgrade former parking area.
- Recommend for future consideration a Trailhead Access with parking. Current road access is favourable, though there are challenges with connectivity across Mosquito Creek. Further focused investigation is required.
- Re-route and upgrade Baden Powell on a sustainable alignment.
- Reduce trail density for ecological gains and healthy forest understory. Higher species diversity and mature tree stands make for good overall structural diversity on west side of Mountain View Park Recreation Area.
- Reduce trail density and lower intensity of recreational use.
- Consider creating Limited Mountain Recreation Zone from Mosquito Creek Preservation Zone to Hastings Creek main stream above the Baden Powell.
- Connectivity across Mosquito Creek to be upgraded. Options include: upgrading existing bridge, building a new bridge and enhancing trails in the area.
- In consultation with private land owners, develop strategies that will develop options to address the concerns of private land owners, where existing public recreational access and trails are constructed over/onto private property. Options that may be explored include:
 - Relocating trails from private lands to public-owned lands or other suitable and agreed upon lands, where feasible and upon request of the private landowner.
 - Obtaining licenses to occupy for trails that cross through private land, with agreement and support of the landowner.
 - Drafting covenants and/or memorandum of understanding between the public agencies and private owners with agreement and support of the landowner.

Central Fromme Area

The Central Fromme Area is characterized by advanced to expert MTB trails. There is limited use by walkers.

Central Fromme Trails:

46. Pink Starfish

- MTB descent (multiple TTFs).

-
- Single-track.
 - High level of use.
 - MTB trail.
 - Rated expert.
 - Moderate level of volunteer stewardship (rock armouring and TTF maintenance).
 - Very poor condition (erosion, worn TTFs, fall-line orientation).
 - Partially situated on private property (Grouse Mountain).
 - Low harmony.

RECOMMENDATION: Close – active decommissioning.

47. Jerry Rig

- MTB descent (multiple TTFs).
- Single-track.
- Low level of use.
- MTB trail.
- Rated extreme.
- High level of volunteer stewardship (TTF maintenance).
- Fair condition (erosion, worn TTFs).
- Partially situated on private property (Grouse Mountain).
- Moderate harmony.

RECOMMENDATION: Manage. Requires policy decision on risk management as this trail represents the upper end of user exposure to extreme TTFs; however it caters to niche users.

48. Air Supply

- MTB descent (multiple TTFs).
- Skid-road.
- Moderate level of use.
- MTB trail.
- Rated extreme – good location given proximity to fire road.
- High level of volunteer stewardship (TTF maintenance).
- Good condition (gap jumps well maintained, ladder bridges worn).
- Moderate harmony.

-
- Partially situated on private property (Grouse Mountain).

RECOMMENDATION: Manage. Requires policy decision on risk management as this trail represents the upper end of user exposure to extreme TTFs; however it caters to niche users.

49. Oil Can

- MTB descent (some TTFs).
- Single-track.
- High level of use.
- MTB trail.
- Rated advanced.
- High level of volunteer stewardship (rock armouring).
- Fair condition (erosion).
- Partially situated on private property (Grouse Mountain).
- Moderate harmony.

RECOMMENDATION: Consolidate with Granny's and Upper Crippler to create two (2) advanced MTB primary trails of greater length and enjoyment, on a sustainable, low maintenance alignment.

50. Granny's

- MTB descent (some TTFs).
- Single-track.
- Moderate level of use.
- MTB trail.
- Rated advanced.
- Low level of volunteer stewardship.
- Very poor condition (erosion, worn TTFs).
- Partially situated on private property (Grouse Mountain).
- Low harmony.

RECOMMENDATION: Consolidate with Oil Can and Upper Crippler to create two (2) advanced MTB primary trails of greater length and enjoyment, on a sustainable low maintenance alignment.

51. Upper Crippler

- MTB descent (multiple TTFs).
- Single-track.

-
- Low level of use.
 - MTB trail.
 - Rated expert.
 - Moderate level of volunteer stewardship (rock armouring).
 - Poor condition (erosion).
 - Partially situated on private property (Grouse Mountain).
 - Moderate harmony.

RECOMMENDATION: Consolidate with Oil Can and Granny's to create two (2) advanced MTB primary trails of greater length and enjoyment, on a sustainable low maintenance alignment.

52. Espresso

- MTB descent (multiple TTFs).
- Single-track.
- High level of use.
- MTB trail.
- Rated advanced.
- High level of volunteer stewardship (rock armouring, TTF maintenance).
- Fair condition (erosion, worn TTFs).
- Moderate harmony.
- Partially situated on private property (Grouse Mountain).

RECOMMENDATION: Manage.

Additional Recommendations

- Consolidate the best parts of Oil Can, Granny's and Upper Crippler into two high quality sustainable routes.
- Formalize land access agreement and management protocols with Grouse Mountain with respect to trail heads.
- Focus trail use/development on Central and Eastern Fromme.
- Potential for future intermediate XC Mountain biking loop(s) to be developed using informal trails above the Baden Powell between Pipeline and Crippler. This would be an excellent compliment to XC type trails below (Baden Powell, St. Mary's, Dempsey) and provide connectivity to the proposed Braemar staging area. This recommendation is made in anticipation of future demand.

Seventh Secret Area

The Seventh Secret Area contains intermediate to Expert MTB trails.

Seventh Secret Zone Trails:

53. Seventh Secret

- MTB descent (multiple TTFs).
- Single-track.
- High level of use.
- MTB trail.
- Rated advanced.
- High level of volunteer stewardship (rock armouring, TTF maintenance).
- Good condition.
- High harmony.
- Partially situated on private property (Grouse Mountain).
- Hosts annual trail maintenance fundraiser race.

RECOMMENDATION: Manage.

54. Bookwus

- MTB descent (some TTFs).
- Single-track.
- Low level of use.
- MTB trail.
- Rated Expert.
- Low level of volunteer stewardship.
- Poor condition (erosion and worn TTFs).
- Low harmony.
- Partially situated on private property (Grouse Mountain).

RECOMMENDATION: Manage.

55. Leopard

- MTB descent (some TTFs).
- Single-track.
- High level of use.
- MTB trail (some hiking use).

-
- Rated intermediate.
 - High level of volunteer stewardship (rock armouring, TTF maintenance).
 - Good condition (contour trail).
 - High harmony.
 - Hosts annual trail maintenance fundraiser race.

RECOMMENDATION: Manage.

56. Crinkum-Crankum / Kirkford

- MTB descent.
- Single-track.
- High level of use.
- MTB trail.
- Rated intermediate.
- High level of volunteer stewardship (rock armouring).
- Good condition.
- High harmony.
- Within GVRD Lynn Headwaters Park below 3rd Switchback.
- Closed below 3rd switchback due to wash-out on Cedar tree trail.

RECOMMENDATION: Manage.

57. GMG

- MTB descent (Some TTFs).
- Single-track.
- Low level of use.
- MTB trail.
- Rated expert.
- Low level of volunteer stewardship.
- Very poor condition (erosion, worn TTFs, fall-line orientation).
- Very steep (>50% grades).
- Low harmony.
- Partially situated on private property (GVRD).

RECOMMENDATION: Close – passive decommissioning.

58. Cedar Tree Trail

- Destination hiking trail, return trail from GMG and Kirkford trails.
- Single-track and skid-road.
- Low level of use.
- Multi-use trail.
- Rated Intermediate.
- Low level of volunteer stewardship.
- Poor condition (erosion).
- Moderate harmony.
- Major wash-out has closed trail.

RECOMMENDATION: Manage. Apply BMPs to riparian zones. Formalize hiking loop with Lynn Headwaters trail in GVRD.

Additional Recommendations

- Formalize land access agreement and management protocols with Grouse Mountain and Lynn Headwaters Park (GVRD).
- North of the trails, in the Multi-Purpose Recreation Zone, the ecological assessment identified high ecological values (sensitivity) in this area. Change to a Preservation Zone using the ecological assessment and as a guide to on-the-ground site analysis required to set new zone boundaries.

West of Mosquito Creek Area

West of Mosquito Creek Area is characterized by remote hiking trails. This is a Limited Mountain Recreation Zone.

West of Mosquito Creek Trails:

59. Baden Powell

- Major destination and connecting trail.
- Single-track and skid road.
- Moderate level of use.
- Multi-use trail (very limited MTB use).
- Rated intermediate.
- Low level of volunteer stewardship.
- Poor condition (erosion).

-
- Low harmony.
 - Crosses significant section of private land (Grouse Mountain).
 - Significant wash-outs on creek crossings.

RECOMMENDATION: Manage. Apply BMPs to riparian zones and steep slopes.

60. Northwest of Skyline Trail(s)

- Steep access trails to upper mountain.
- Single-track.
- Low level of use.
- Hiking only trails.
- Rated advanced (steep and rough).
- Low level of volunteer stewardship.
- Very poor condition (erosion).
- Low harmony.
- Private land-owner(s) wants to limit access.

RECOMMENDATION: Consolidate into one hiking only route providing connectivity between Grouse Mountain Resort and Baden Powell from Mosquito Creek. Include one off-shoot trail to bottom of Cut. Key challenges include steep slope and private land parcels. Engage BCMC and other stewards/stakeholders in decision-making process.

61. Skyline Trail(s)

- Steep access trail to upper mountain.
- Single-track.
- Low level of use.
- Hiking only trails.
- Rated advanced (steep and rough).
- Low level of volunteer stewardship.
- Very poor condition (erosion).
- Very low harmony.
- Partially situated on private land (Grouse Mountain).

RECOMMENDATION: Consolidate into one hiking only route.

62. Mosquito Creek Trail(s)

- Steep (braided) access trails to upper mountain.
- Single-track.
- Low level of use.
- Hiking only trail.
- Rated advanced (steep and rough).
- Low level of volunteer stewardship.
- Poor condition (erosion).
- Moderate harmony.
- Within preservation zone.

RECOMMENDATION: Close - passive decommissioning.

63. Powerline

- Low elevation connecting road.
- Road.
- Moderate level of use.
- Multi-use trail.
- Rated beginner.
- Volunteer stewardship not required.
- Good condition.
- Low harmony.

RECOMMENDATION: Manage.

64. Malaspina Access

- Access to Powerline.
- Single-track.
- Moderate level of use.
- Multi-use trail.
- Rated intermediate.
- Low level of volunteer stewardship.
- Poor condition (erosion).
- Low harmony.

RECOMMENDATION: Manage (Community Access Node).

65. Chalet Access

- Access to Powerline.
- Gravel Road.
- Moderate level of use.
- Multi-use trail.
- Rated Beginner.
- Volunteer stewardship not required.
- Good condition.
- Low harmony.

RECOMMENDATION: Manage (Community Access Node).

66. Skyline Drive Access

- Low elevation connecting road.
- Road.
- Moderate level of use.
- Multi-use trail.
- Rated beginner.
- Volunteer stewardship not required.
- Good condition.
- High harmony.

RECOMMENDATION: Manage. Recommended as a future Staging Area. Further investigation is required given connectivity challenges across Mosquito Creek and into Mosquito Creek Park, as well as private landowner issues.

67. McKay Creek Trail

- Steep access trails to Baden Powell trail and the BCMC Trail(s).
- Single-track.
- Low level of use.
- Hiking only trails.
- Rated advanced (steep and rough).
- Low level of volunteer stewardship.
- Very poor condition (erosion).
- Low harmony.

-
- Historical debris torrent.
 - Riparian zone impacts.

RECOMMENDATION: Close – active decommissioning.

68. Mosquito Creek Access

- Access to the Baden Powell trail.
- Single-track.
- Low level of use.
- Hiking only trail.
- Rated advanced.
- Low level of volunteer stewardship.
- Poor condition (erosion).
- Low harmony.

RECOMMENDATION: Manage (see recommendation for trail 66, Skyline Drive Access).

Additional Recommendations

- Formalize land access agreement and management protocols with Grouse Mountain, and smaller private land-owners.
- Engage BCMC and other stewards/stakeholders for route finding.
- Further investigation into connectivity and potential staging area at top of Skyline Drive.
- Expand the Preservation Zone halfway up, and on the east side of skyline trail due to ecological sensitivity of the area and existence of braided trails in the area.

Management Recommendation Overview and Priority

In addition to the specific trail level recommendations, overarching management recommendations and priorities are provided. Timelines are resource dependant and are based on anticipated available resources.

Priority 1 (Years 1 and 2)

1. Finalize the Trail Classification Plan – a number of areas need routing consultations including equestrian users.
2. A dedicated staging and parking area is urgently required. Its location will greatly affect subsequent trail management and development. The obvious location (from the perspective of geography, trail users and vehicle management) is on a large, flat bench in the forest, north and the east pull-out on the north side of East Braemar Road. Following the construction of the staging area, the development of new trails to allow uphill access for cyclists will facilitate utilization of the trail network from this location. This will distribute trail use and mitigate vehicle and staging impacts within the adjacent neighbourhoods.
3. An additional parking area should be established at the top of St. Mary's beneath the Powerline trail.
4. Formalize and provide signage for the trail network, including signage for the Community Access Nodes.
5. Provide training. DNV staff and NSMBA volunteers should be trained in the principles and practice of sustainable trail design prior to implementation of trail level recommendations and BMPs.
6. Focus trail maintenance on riparian areas. Locations where trails cross creeks and infringe on riparian zones are of major concern from the perspective of both user safety and environmental impact. These locations present a fast, achievable opportunity for significant improvement. An inventory and assessment of all significant trail crossings of creeks should be completed and a priority plan developed and resourced to install safe, low impact bridges at each location.
7. Trail management framework including funding strategy should be developed and formalized. The strategy should include a full time trail crew to carry out Classification Plan recommendations as well as organization and enhancement of volunteer efforts.
8. Develop sustainability targets, including metrics to track progress. Ecological, social and economic metrics are required. Examples include:
 - Creek crossing upgrades
 - Meters of trail re-routed/upgraded from riparian zones
 - Number of habitat enhancement projects completed
 - Trail maintenance hours performed
 - Outside funding dollars acquired

-
- User satisfaction
 - Neighbourhood satisfaction
 - Continued biodiversity monitoring and evaluation
9. Formalize trail access agreements with Grouse Mountain Resort and GVRD.
 10. Conduct trail closures – begin with signage and passive decommissioning protocol for trails slated for both active and passive decommission. Conduct active decommissioning protocols as required, dependant on available maintenance resources.
 11. Develop an Ecological Enhancement Plan in conjunction with a forest management plan.

Priority 2 (Years 3 and 4)

12. Apply BMPs to ongoing trail maintenance and recommended trail re-routes and upgrades.
13. Formalize trail access agreements with individual private land owners.
14. Consolidate trails recommended for consolidation.

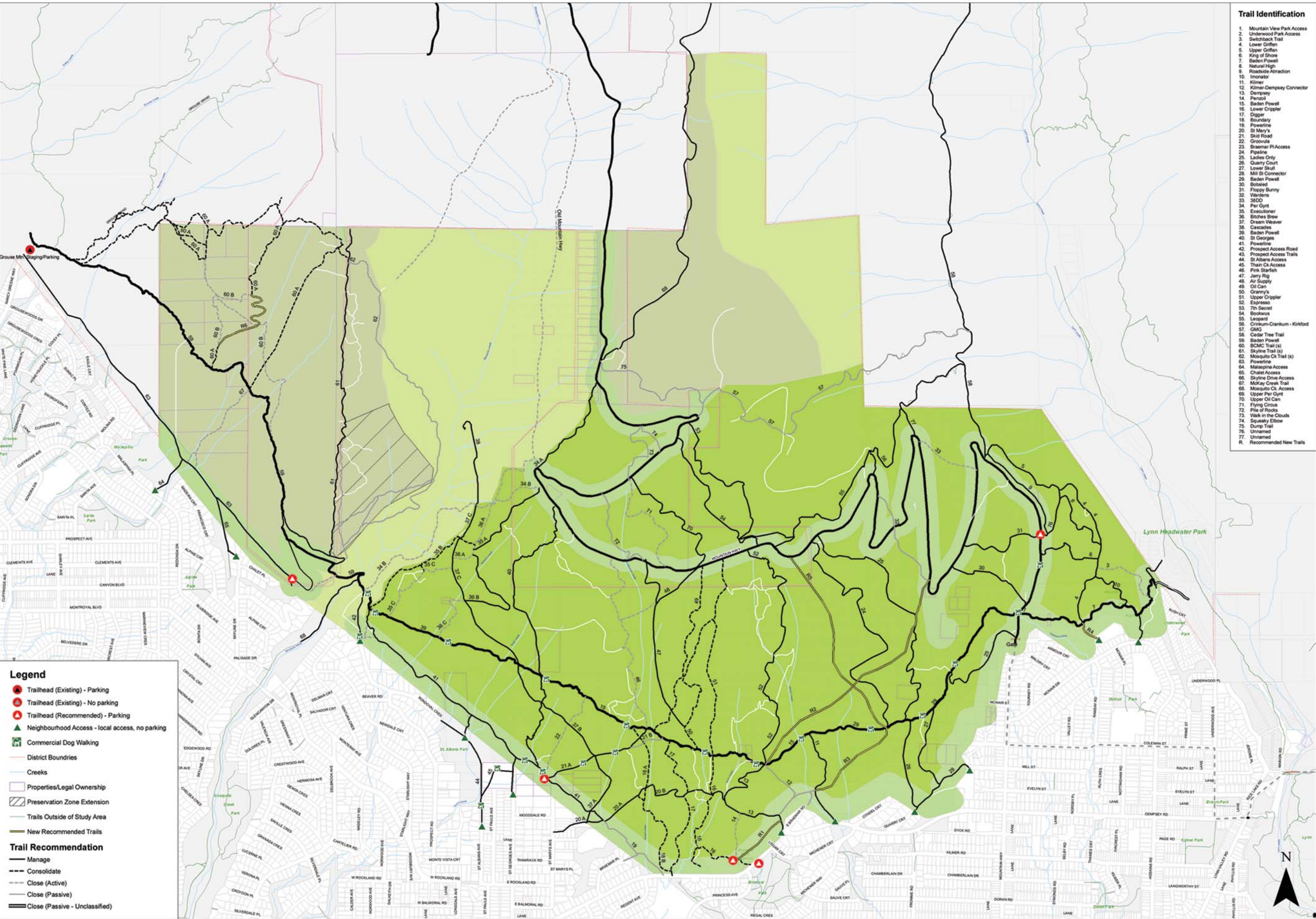
Priority 3 (Years 5+)

15. Measure and assess progress based on user needs and established sustainability indicators. Adapt management practices appropriately.
16. Consider trail upgrades pending user needs. This includes:
 - a) Potential expansion of beginner MTB trails between 1st, 2nd and 3rd switchbacks.
 - b) Potential for intermediate XC Mountain biking loop(s) using informal trails above the Baden Powell between Pipeline and Crippler.

The following two maps – *Recommendations for Trail Network Management* and *Recommended Trail Network* – provide a graphic summary of information that has been expressed in text form in Chapter 1.

Trail Identification

1. Mountain View Park Access
2. Underwood Park Access
3. Switchback Trail
4. Lower Giffen
5. Upper Giffen
6. King of Shore
7. Baden Powell
8. Natural High
9. Roadside Attraction
10. Inonator
11. Kilmer
12. Kilmer-Dempsey Connector
13. Dempsey
14. Penzill
15. Baden Powell
16. Lower Crippler
17. Digger
18. Boundary
19. Poweline
20. St Mary's
21. Skid Road
22. Groovle
23. Braemar Pl Access
24. Pipeline
25. Ladies Only
26. Quarry Court
27. Lower Skull
28. Mill St Connector
29. Baden Powell
30. Bobbed
31. Floppy Bunny
32. Wardens
33. 3800
34. Per Gyt
35. Executioner
36. Bishes Brier
37. Dream Weaver
38. Cascades
39. Baden Powell
40. St Georges
41. Poweline
42. Prospect Access Road
43. Prospect Access Trails
44. St Albans Access
45. Train Ck Access
46. Park Starfish
47. Jerry Rig
48. Air Supply
49. Oil Can
50. Granny's
51. Upper Crippler
52. Espresso
53. 7th Secret
54. Bonnus
55. Leopard
56. Crinkum-Crankum - Kirkford
57. CMC
58. Cedar Tree Trail
59. Baden Powell
60. SCMC Trail (s)
61. Skyline Trail (s)
62. Mosaquito Ck Trail (s)
63. Poweline
64. Malaspina Access
65. Chail Access
66. Skyline Drive Access
67. McKay Creek Trail
68. Mosaquito Ck Access
69. Upper Per Gyt
70. Upper Oil Can
71. Flying Circus
72. Pile of Rocks
73. Walk in the Clouds
74. Squeaky Elbow
75. Dump Trail
76. Unnamed
77. Unnamed
- R. Recommended New Trails

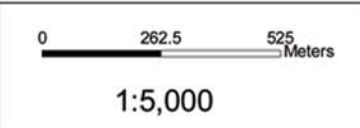


Legend

- Trailhead (Existing) - Parking
- Trailhead (Existing) - No parking
- Trailhead (Recommended) - Parking
- ▲ Neighbourhood Access - local access, no parking
- ▲ Commercial Dog Walking
- District Boundaries
- Creeks
- Properties/Legal Ownership
- Preservation Zone Extension
- Trails Outside of Study Area
- New Recommended Trails

Trail Recommendation

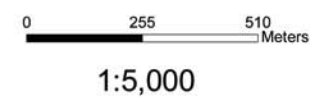
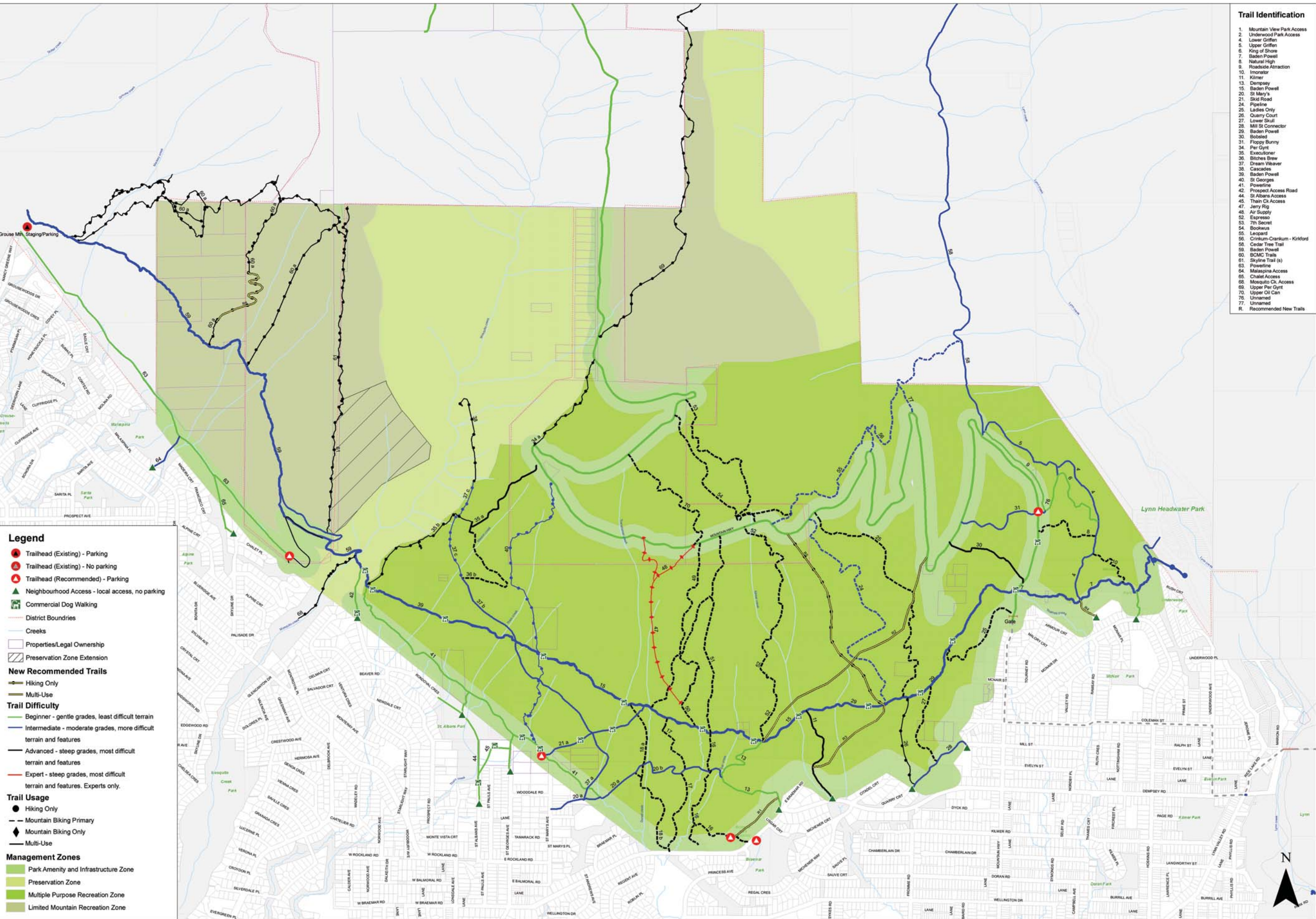
- Manage
- Consolidate
- Close (Active)
- Close (Passive)
- Close (Passive - Unclassified)



Original data received by the DNV were either unprojected or projected using NAD83 and UTM 10N. The projection information has not been modified from the original. For further details please contact the Cartographer.

Map was created in consultation with the District of North Vancouver
 Printed October 16th, 2007

Recommendations for Trail Network Management



Original data received by the DNV were either unprojected or projected using NAD83 and UTM 10N. The projection information has not been modified from the original. For further details please contact the Cartographer.
Map was created in consultation with the District of North Vancouver
Printed October 16th, 2007

Recommended Trail Network

CHAPTER 2: TRAIL GUIDELINES

Overview

The trails of the District of North Vancouver (DNV) have been recognized as a community resource providing recreational opportunities for a wide variety of residents and visitors. In order to sustain this resource and maintain the user's experience while minimizing ecological and community impacts, the DNV has developed these Trail Guidelines in support of an overall trail management framework. The Trail Guidelines were developed with stakeholder involvement within the Alpine Recreation Strategic Study (ARSS) process. Trail Guidelines provide detailed information on trail types and levels of difficulty, construction recommendations for technical trail features, and general recommendations on how and who to involve in trail management and maintenance. A signage and overall community use strategy for the trail network is recommended and outlined in this section.

Objectives of the Guidelines

The DNV has been given the mandate by Council to take responsibility for the management of the Fromme Mountain Area trail network. These Trail Guidelines provide a guidance framework for DNV staff, interest groups, and individuals on ways to address recreational trail management issues, enhancing the management and protection of lands governed by the DNV. Implementation of the Sustainable Trail Use Plan will be adaptive, requiring continuing cooperation and participation from the public.

Policy Context

The genesis of the DNV Trail Guidelines was through the Alpine Recreation Strategic Study (ARSS), an ongoing process that engages the DNV community in the sustainable recreational management of forested mountain regions within the district.

Recreation Management Zones

Stage 1 of the ARSS process included an ecological analysis of the Fromme Mountain Area. This analysis included assembling and analyzing available biogeographic information and databases using GIS technology, followed by site reconnaissance and assessment by biologists. The results were used to develop Recreation Management Zones (RMZs). The RMZs were revisited and refined during Stage 2 of the ARSS process when further biological assessment and sustainability planning was conducted.

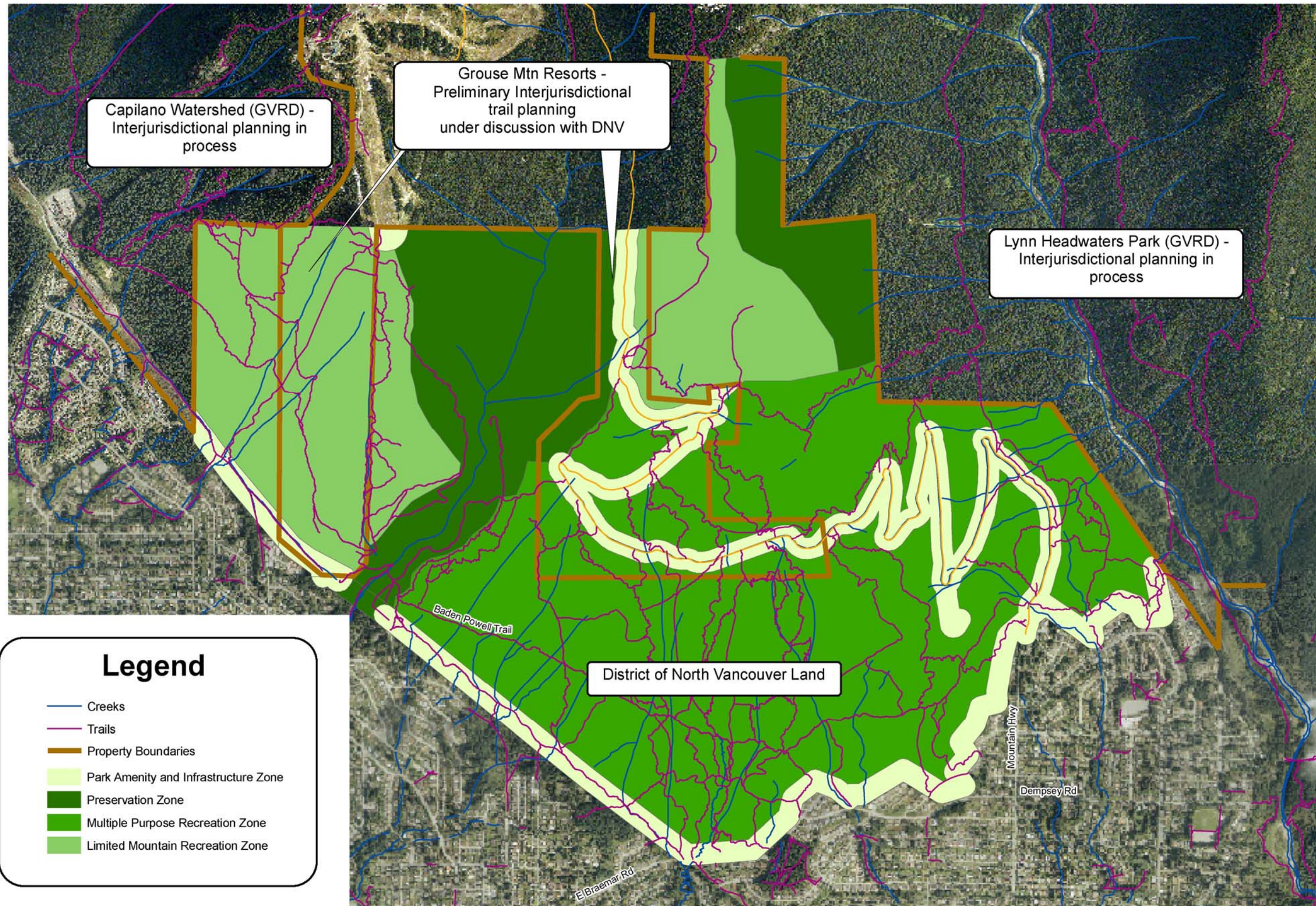
The RMZs guide the present and future recreational uses of the area to ensure ecological and community values are protected. There are four RMZs:

1. Park Amenity and Infrastructure Zone
2. Multiple Purpose Recreation Zone
3. Limited Mountain Recreation Zone
4. Preservation Zone

RMZ locations are illustrated on the map on the following page.



District of North Vancouver Western Region/Fromme Mountain Area Recreation Management Zones



Trail Types

All recreational trails used for self-propelled activities (including walking, hiking and mountain biking) fit within the following Trail Types. Trail Types describe the actual physical trail characteristics without crossing over into Trail Technical Difficulty, which quantifies the user experience.

Trail Type distinctions can be helpful when planning with site managers and trail stewards the range of accessible trails that should be included in various parts of the Fromme Mountain trail network. Details of physical trail characteristics are included to ensure there is a shared knowledge and understanding amongst those responsible for trail design, construction and management.

Type 1

- Surfaced or un-surfaced double-track trail.
- Surfaced with compacted gravel, or located on existing roadbeds.
- Embedded trail obstacles removed.
- 2 to 3 m tread width.
- Cleared corridor width of 5.0 m.
- Cleared height of 2.4 m.
- Machine built.
- Examples: Powerline, Mountain View Park Access.



Type 1 Trail – Old Buck, Mount Seymour



Type 1 Trail – Mountain View Park Access, Fromme Mountain.

Type 2

- Unsurfaced, single-track trail.
- 50-70 cm tread width on native soil.
- Cleared trail corridor width of 1.3 m.
- Cleared height of 2.4 m.
- Machine or hand built.
- Examples: Baden Powell, Dempsey, St Mary's.



Type 2 Trail – Roadside Attraction, Fromme Mountain.

Type 3

- Unsurfaced, single-track trail.
- 30-50 cm width tread on native soil, sometimes rough terrain.
- Cleared trail corridor of 1.0 m.
- Cleared height of 2.4 m.
- Examples: Seventh Secret, Leopard.



Type 3 Trail – Seventh Secret Trail, Fromme Mountain.

Type 4

- Lightly used wilderness trail.
- 30-50 cm tread maximum, sections of very rough terrain.
- Cleared height of 2.4 m.
- Examples: BCMC Trail, Per Gynt.



Type 4 Trail

Trail Management Categories

The following categories classify trails based on the type(s) of users the trails are being managed for. Trails will fall into one of the three following categories, based on both the physical suitability of the trail, the history of use, and target recreational experience:

Multi-Use

To be used by walkers and mountain bikers. Mountain bikers should give way to walkers.

Trail design provides a primary routing for pedestrian use. Unnecessary technical trail features should not be added to multi-use trails.

Hiking Only

Use by mountain bikers is not permitted. Trail design is exclusively for pedestrian use.

Mountain Biking Primary

Walkers are allowed, however they should expect and give-way to mountain bikers. Trail design is for primarily mountain biking use.

The following two designations may also apply in specific limited locations:

Commercial Dog Walking

Select trails shall be designated for commercial dog walking use. Hiking and mountain biking may or may not be permitted.

Equestrian

Only certain trails shall be designated for equestrian use. Hiking and mountain biking may or may not be permitted.

Trail Difficulty Levels

The following levels identify and quantify the characteristics that compose trail difficulty as applicable to mountain biking, although they will also provide useful – albeit less critical – guidance to other trail users. It is important to emphasize that these are guidelines to assist in the management of trails, not absolute limits. Some flexibility with regard to the history and expectations of local trail users and trail conditions is to be expected.

Level 1

NAME: Beginner

SYMBOL: Green Circle

GENERAL

- Gentle climbs and easily avoidable obstacles such as rocks, roots and pot-holes.

DETAILED

- Maximum grade: 15%.
- Maximum sustained climbing grade: 8%.
- Curve radius: 2.4m.
- Usually associated with Trail Types 1 or 2.



Level 1 Beginner Trail – Roadside Attraction, Fromme Mountain.

EXPECTED TECHNICAL TRAIL FEATURES

General

- Small roots and logs to cross.
- Embedded rocks to avoid.
- Wide bridges.

Detailed

- Embedded trail obstacles: up to 10cm high.
- Logs and roots perpendicular to direction of travel ($\pm 15^\circ$).
- Bridges minimum 90cm wide, handrail required if the height of the bridge exceeds 1m (3').
- No drops.
- No jumps.

Level 2

NAME: Intermediate

SYMBOL: Blue Square

GENERAL

- Challenging riding with steep slopes and/or obstacles, possibly on a narrow trail with poor traction.
- Requires riding experience and some fitness.



DETAILED

- Maximum climbing grade: 25%.
- Maximum sustained climbing grade: 10%.
- Maximum descent grade on non-rock surface: 35%.
- Minimum curve radius: 1.8m.
- Usually associated with Trail Types 2 or 3.

Level 2 Intermediate Trail – St. Mary’s Trail, Fromme Mountain

EXPECTED TECHNICAL TRAIL FEATURES

General

- 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 20cm high.
- Elevated bridges: less than 100cm (~3.3') high above surface.
- Minimum width of flat decking equal to 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 60cm (~2') high above the surface, with the width of flat decking one-half the height above surface at pivot point.
 - Rock or ramp descents not to exceed 45%.
 - Drop-offs not exceeding 30cm (~1') high with exit cleared of all obstacles.
 - No jumps with consequences for lack of speed, such as gap jumps.
 - Table tops maximum height 100cm (3.3').
 - Jumps maximum height 45cm (18").
 - Locate more difficult (up to Level 3) technical trail features to the side of the main trail as a signed optional route for more advanced riders consciously seeking a more challenging line.



*Level 2 Intermediate Trail – Leopard Trail,
Fromme Mountain*

Level 3

NAME: Advanced

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.
- Requires advanced riding experience and fitness.



Level 3 Advanced Trail – Lower Ladies, Fromme Mountain

DETAILED

- Maximum climbing grade: 30%.
- Maximum sustained climbing grade: 15%.
- Usually associated with Trail Types 2 or 3.

EXPECTED TECHNICAL TRAIL FEATURES

General

- Elevated bridges and teeter-totters.
- Connected bridges.
- Mandatory air.
- Larger jumps.
- Steep descents with sharp transitions.

Detailed

- Elevated bridges: less than 2m (6') high above surface.
- Minimum width of flat decking equal to one-quarter of the height above surface, with no minimum deck width for bridges less than 45cm (18") high.
- Mandatory air less than 60cm (2') vertical.
- Rock or ramp descents not to exceed 120%.
- Locate more difficult (up to Level 4) technical trail features to the side of the main trail as a signed optional route for more advanced riders consciously seeking a more challenging line.



Level 3 Advanced Trail - Seventh Secret, Fromme Mountain

Level 4

NAME: Expert

SYMBOL: Double Black Diamond

GENERAL

- The most difficult sanctioned trails in the network.
- Expert trials and jumping skills essential to clear many challenging obstacles. High risk level.
- Only expert level mountain bikers will enjoy these trails.
- Not recommended for hiking use.



Level 4 Expert Trail – Jerry Rig, Fromme Mountain.

DETAILED

- Maximum climbing grade: 30%.
- Maximum sustained climbing grade: 15%.
- Usually associated with Trail Types 2 or 3.

EXPECTED TECHNICAL TRAIL FEATURES

General

- Elevated bridges and teeter-totters with maximum deck height.
- Connected bridges.
- Mandatory air.
- Larger jumps.
- Steep descents with sharp transitions.

Detailed

Trail features will not exceed 3 m (10') in height. Trails designated expert will require discussion, approval and permitting from the District of North Vancouver. Signage advising users of the trail rating as well as risk management information would be expected. Hiking may not be permitted on expert mountain bike trails for safety reasons.



Level 4 Expert Trail – Air Supply, Fromme Mountain.

Technical Trail Feature Construction Guidelines

The DNV is concerned with the safety, durability, design, height and surface finish of Technical Trail Features (TTFs). The design and integration of the TTF to the specific site is fundamental in determining how safe and enjoyable it is to ride. However such factors are the responsibility of a skilled and experienced trail builder and are beyond the scope of these guidelines. TTFs should be discussed and reviewed with DNV staff to determine suitability. TTFs by definition have an inherent risk; it is the purpose of these TTF Construction Guidelines to minimize the potential for unintentional hazards.

Safety

Design Philosophy

The following design philosophies are used to reduce the likelihood of a rider's exposure to a TTF's inherent risk in situations that exceed the skill level of the rider.

Gateways:

- The objective of a Gateway (aka Filter) is to make riders fall early before being exposed to a higher consequence situation. This is achieved by placing a narrow section or difficult turn early while the TTF is still close to the ground (known as a gateway). Inexperienced riders will dismount prior to being exposed to a higher risk element beyond their skill level.



Skinny log acts as a Gateway to the more difficult line option, Natural High, Fromme Mountain.

Intuitive Design:

- The maximum skill level required for a TTF should be intuitive and visible from the entry. Situate the most difficult section in view so the rider can

make an informed decision before they may experience difficulty with a TTF that exceeds their skill level.

Difficulty Level Signage:

- Where the skill level required to successfully complete a TTF exceeds that required for the trail itself, a less difficult alternative TTF or a ride-around should be provided as the primary route.



Sign identifies optional line difficulty level exceeds trail difficulty level, CBC, Mount Seymour.

Fall Hazard:

The structure should be built and finished to minimize potential injury to a falling rider colliding with the structure or supports.

Strength and Stability

The TTF must be capable of supporting the greatest anticipated force and weight, and should be tested using dynamic body weight(s) for the capacity to resist vertical and lateral loading under dynamic conditions.

Fall Zone Guidelines

- The Fall Zone is the area adjacent to a TTF into which a rider might conceivably fall if they are unsuccessful in negotiating the feature.
- Falls should be anticipated, and any objects that endanger a falling rider (sharp objects, large rocks, stumps etc.) should be removed to a minimum of 1.5 m in any direction. Vegetation that poses no danger to the rider

need not be removed. Planting of durable native species within Fall Zones is encouraged.

- Management of risks associated with Fall Zones should be relative to the trail difficulty level, with a focus on intermediate and advanced trails.

TTF Construction Practices

The following guidelines are provided to increase the stability and durability of wooden TTF structures while maintaining the traditional TTF style that is synonymous with the North Shore. TTFs should be designed and built by or with the assistance of individuals experienced in conventional carpentry techniques.

Design Philosophy

Maximizing the size of wood used and minimizing the number of fasteners often achieves a more durable structure requiring less maintenance. This is particularly the case for areas of high impact and breaking.



Large pieces of wood and minimal fasteners increase the longevity of structures.

Sighting

- The approach to the TTF should be on dry ground to limit the mud and moisture transported onto the structure. Potholes are symptomatic at the transitions of a TTF due to the increased forces realized there; construction of adequate transitions (preferably from rock) onto and off of the TTF will prolong the life of the structure and increase riding enjoyment.



Armoured approach to this TTF increases longevity of the structure, Natural High, Fromme Mountain.

- Structural elements of the TTF should not contact the ground directly. Use separate pieces as a foundation.



Bridge stringers elevated above ground to reduce potential for rot, Natural High, Fromme Mountain.

- TTFs should not be mounted to living trees for the following reasons:
 1. The tree will continue to grow, compromising the integrity of the TTF.
 2. The tree may sway due to wind, weakening the TTF.
 3. Most attachment methods are harmful to the tree.
 4. Fasteners within the tree represent a future hazard for tree falling.

Wood Dimensions

These specifications are not engineered or to building code, rather they constitute common overbuild practice.

Dimensional Lumber Construction:

- Stringers: 2”x 6” or 4” x 4” cedar for bridge spans up to 3m³.
- Decking: 2”x 4” cedar.
- Cross-bracing: 2”x 4” cedar.
- Ramps: 2”x 6”, 2”x 10” or 2”x 12” cedar for spans up to 1.5m
- Ramps: 4”x 6”, 4”x 10” or 4”x 12” cedar for spans up to 3.0m



A free-standing TTF constructed of dimensional cedar lumber, CBC, Mount Seymour.

Native Wood Construction:⁴

- Stringers: 20cm diameter intact (peel off the bark) cedar logs for spans up to 3m.
- Decking: 9cm by 5cm split cedar.
- Cross Bracing: 9cm x 5cm split cedar.
- Ramps: 5cm thick cedar for spans up to 1.5m
- Ramps: 9cm thick cedar for spans up to 3.0m
- Native cedar strings and other structural elements should be squared at point of contact with other timbers and decking.

³ For bridge spans exceeding 3m seek consultation with DNV Engineering Department.

⁴ Note that the strength and rigidity of native cedar varies with orientation of the grain.



Native wood construction, Natural High, Fromme Mountain.

Wood Sourcing

- Untreated cedar contains natural preservatives and so is the best choice for durable technical trail features. Concentration of this natural preservative increases with the age of the tree.
- Wood sourced from the forest or rough-cut lumber has higher aesthetic value than commercial lumber.
- Rough-cut dimensional cedar transported to the site should be used for TTF construction where practical.
- Dimensional wood is strongly recommended for all structural components of TTFs.
- Split cedar is strongly recommended for all decking of TTFs for traction and aesthetic purposes.
- Authorized individuals may selectively harvest living cedar trees for use on-site, subject to the land manager's forest management policies (*see Best Management Practices, Chapter 3*).
- Use of treated wood is discouraged and prohibited where in contact with streams or wetlands.

Bridge Rung Spacing

Spacing of approximately 2cm between rungs promotes drainage of water and mud and will ensure that humans and dogs will not catch their feet between rungs. Rungs should not overhang stringers by more than 5cm (2in) to ensure that they do not cantilever off when weight is applied to the outside.



Two inch bridge rung spacing prevents foot and paws from falling through while allowing dirt to shed from the structure, Natural High, Fromme Mountain.

Fasteners

- The usual method of joining pieces of wood together is galvanized ardox (spiral) spikes and nails. Deck screws may also be used as they have the advantage of ease of future maintenance.
- Ensure two-thirds of the nail or screw length penetrates the stringer. (5" nail require for 2"x4" decking)
- Galvanized nuts and bolts or lag bolts or are recommended over screws and nails for joining main structural supports.
- The strength of the TTF should not rely on the shear strength of the fasteners. Use cross and diagonal bracing.



Recommended fasteners: (left to right) galvanized lag bolt, galvanized lag screw, ardox spike, ardox nail, deck screw.

Log Rides

Logs from native tree species may be incorporated in TTFs. Logs may be of any native tree species, however, most native wood can be expected to have a reduced lifespan compared to cedar. Furthermore, stability and durability is relative to the log thickness and state of decay.

Minimum log diameter is 20cm. The riding surface of the log may be squared or not depending on the targeted skill level. Logs should be stabilized with supports to eliminate unwanted movement.



Log ride, CBC, Mount Seymour.

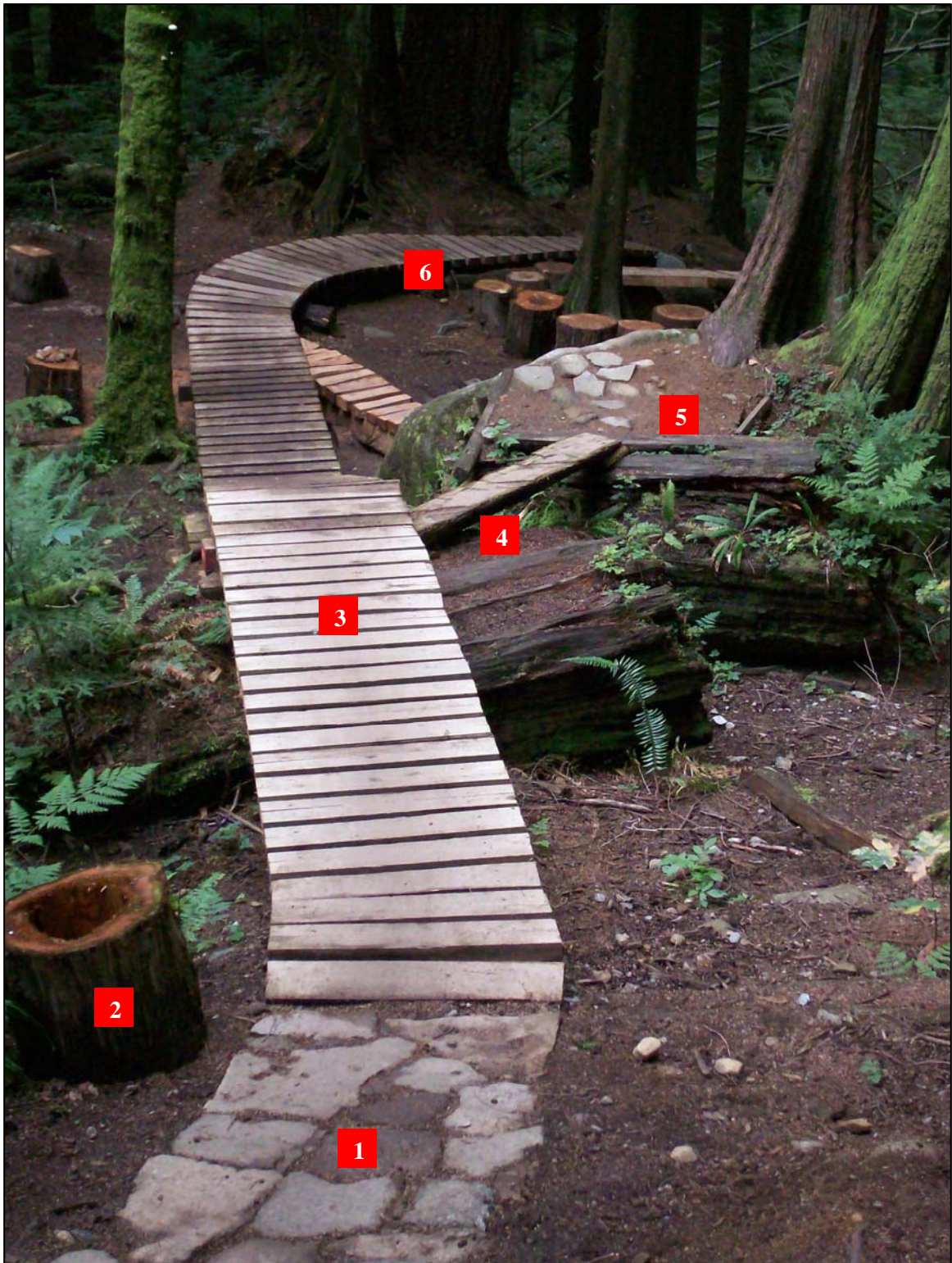
Anti-slip Surfacing

The use of split or rough cut dimensional lumber as decking will provide sufficient traction in most situations. Where angles exceed 10°, application of an anti-slip surface is recommended. Various anti-slip surfaces have been experimented over the years with varying results. The recommended anti-slip surface material is rubber conveyer track given its effective traction, durability, ease of application. Furthermore rubber conveyer track does not present a fall hazard. The following alternative traction applications are not recommended:

- Perpendicular saw cuts (traps mud, promotes decay)
- Steel lath or mesh (fall hazard, poor durability)
- Asphalt shingle roofing (poor durability, toxins)



Conveyor belt traction material, CBC, Mount Seymour.



1. Rock armouring approach to boardwalk keeps boardwalk free of mud.
2. Log round acts to anchor trail and guide user.
3. Solid over built construction with dimensional rough cut cedar salvaged from old telephone poles.
4. Optional technical mountain bike line with "Gateway" entrance.
5. Rock armouring protects tree roots.
6. Boardwalk protects tree roots of mature tree.

Management Guidelines

Management Framework

<<Org chart and financial plan to be developed at a later stage of the ARSS process>>

Monitoring

Trail monitoring is an integral part of managing trails. In general, high volume trails will receive a greater level of monitoring. Trails with man-made TTFs also require more frequent inspection.

The evaluation procedure detailed in the book *Natural Surface Trails by Design, Parker 2004 p 64* is used for evaluating trail maintenance requirements. Records of trail monitoring events are to be maintained by the DNV Parks group.

If resource damage caused by recreational use is evident, the root cause should be determined and measures taken. The BMPs for *New Trail Construction* and *Trail Maintenance (see Chapter 3)* should be applied as appropriate. Inform users of the problem and suggest measures they can take to help correct the situation.

Monitoring Frequency

Trails are to be classified as high or low priority based on level of use and TTFs present. Generally, trails with a high level of use will receive a high priority. Trails will also be considered high priority where dictated by the number and condition of TTFs.

HIGH PRIORITY TRAILS will be inspected twice a year (April and September).

LOW PRIORITY TRAILS will be inspected in the spring of each year or prior to the start of the peak trail use season.

Monitoring Frequency	
Trail Name	Priority
Mountain View Park Access	Low
Underwood Park Access	Low
Lower Griffen	High
Upper Griffen	High
King of Shore	High
Baden Powell (Mountain Highway – Lynn Headwaters)	High
Natural High	High
Roadside Attraction	Low
Imonator	High
Kilmer	Low
Dempsey	High
Baden Powell (St Georges – Kilmer)	High
Lower Crippler	High

Digger	High
Boundary	High
St Mary's	Low
Skid Road	Low
Pipeline	High
Ladies Only	High
Quarry Court	Low
Lower Skull	Low
Mill St Connector	Low
Baden Powell (Kilmer to Mountain Hwy)	High
Bobsled	Low
Floppy Bunny	Low
Upper Per Gynt	Low
Upper Executioner	Low
Lower Executioner (multiple routes)	Low
Middle Bitches Brew	Low
Lower Dreamweaver	Low
Upper Dreamweaver	Low
Cascades	Low
Baden Powell (Mosquito Creek – St Georges)	High
St Georges	Low
Powerline (St Mary's Ave. – Mosquito Ck.)	Low
Prospect Access Road	Low
St Albans Access	Low
Thain Creek Access	Low
Jerry Rig	High
Air Supply	High
Oil Can	High
Granny's	High
Upper Crippler	High
Espresso	High
Seventh Secret	High
Bookwus	High
Leopard	High
Crinkum-Crankum / Kirkford	High
Cedar Tree Trail	Low
Baden Powell (West of Mosquito Creek)	Low
Northwest of Skyline Trail(s)	Low
Skyline Trail(s)	Low
Powerline	Low
Malaspina Access	Low
Chalet Access	Low
Skyline Drive Access	Low
Mosquito Creek Access	Low

Sustainability Assessment

Every five years, the entire trail network shall receive a comprehensive assessment focused on predetermined sustainability metrics.

<<Sustainability metrics to be determined at a later stage of the ARSS process>>

Trail Assessor

Trails may be monitored by DNV staff or DNV-approved trail stewards who have received trail assessment training.

Trail User Monitoring

Trail user input, although informal, represents the most effective up to date monitoring of trail conditions. User input regarding trail hazards and degradation requiring maintenance should be encourage through message boards at trailhead kiosks and internet sites.

Maintenance

Trail maintenance is an integral part of managing trails. In general, high volume trails will receive a greater level of maintenance and an expedited response to trail deterioration. In addition to regularly scheduled maintenance, maintenance triggered by monitoring observations includes:

- Unsafe conditions
- Significant soil displacement
- TTF deterioration
- Trail braiding
- Trail widening
- Adverse (or potential for) impacts to VECs

<<Trail Monitoring response times and responsibilities to be determined with Management Framework>>

Trail maintenance priorities and strategies are developed on a trail-by-trail basis in conjunction with the individual or organization contracted to conduct maintenance on the trail. DNV staff may perform trail maintenance on an as-needed basis.

Stewardship groups may schedule regular trail maintenance or habitat restoration projects upon approval from DNV staff.

All trail maintenance activities shall be conducted in accordance with the Best Management Practices (*see Chapter 3*).

Trail Closure and Deactivation

Trail closure and deactivation may be predicated by one of a combination of the following circumstances:

- Unauthorized trail
- Environmental concerns (seasonal closures)
- Sustainability concerns
- User safety concerns
- Neighbourhood impact concerns

To maximize compliance, closure and deactivation of trails will occur following consultation with user groups and as part of a broader strategy to reallocate resources on more appropriate trails.

Trail closure and deactivation protocols are provided in the Best Management Practices (*see Chapter 3*).

Signage

A simple and consistent model for signs is required to help trail users navigate the system and inform them of appropriate uses. A three-level hierarchy is applied:

Trail Network Sign Kiosk – located at each major trail access point⁵

Trail Information

- Trail network map indicating permitted recreation modes and difficulty rating
- Detailed descriptions of trail difficulty level
- Detailed descriptions of on-the-trail signage

User code of conduct

- Trail etiquette
- Mountain biking etiquette
- Dog walking etiquette
- Riparian area etiquette
- Parking and neighbourhood interface etiquette
- Private land etiquette

⁵ Minor access points may warrant a lesser version of a kiosk depending on level and type of use.

Safety

- Search and rescue recommendations (trip protocol and equipment)
- Recommended mountain biking protective equipment
- Emergency contact information
- Cell-phone coverage disclaimer
- Trail condition variability disclaimer

Bulletin Board

- Trail condition reports
- Message board

Contact Information

- DNV contact info
- User/interest group contact info

Trailhead Sign – located at each trailhead and exit

- Trail name
- Permitted recreation modes
- Trail length, elevation gain/loss, average time to hike, average time to ride
- Topographic profile
- Trail difficulty level
- Description of TTFs if warranted

On-the-trail Signs – site-specific as required

- Changes in permitted recreation mode
- Search and Rescue GPS Station markers
- Trail intersections
- Hazard identification (e.g. cliffs)
- Difficulty level markers for TTFs exceeding the trail difficulty level.
- Site-specific signage for environmental sensitive areas or interpretive areas.

Communication

Maintain an up-to-date network of effective channels to communicate with recreational users and allow for active user input.

- Trailhead kiosks
- Trail maps
- Online trail resources and message boards:
 - www.TrailPeak.com
 - www.NSMB.com
- DNV Organizations:
 - North Vancouver Recreation Commission
 - Outdoor Recreation Advisory Committee (ORAC)
 - Alpine Recreation Resource Group (ARRG)
 - Parks and Natural Environment Advisory Committee (PNEAC)
 - North Shore Search and Rescue
- User groups
 - North Shore Mountain Bike Association (NSMBA)
 - British Columbia Mountaineering Club (BCMC)
- North Shore outdoor retailers
 - Bike shops
 - Tuning shops
 - Mountain Equipment Co-op (MEC)
- Commercial Users
 - Tour operators
 - Event organizers
 - Youth groups
 - Professional dog walkers

CHAPTER 3: BEST MANAGEMENT PRACTICES

Overview

Trail construction and maintenance has the greatest potential for adverse environmental impact on the forested mountainous areas of the DNV, even more so than recreational use. These Best Management Practices (BMPs) provide a broad strategy of construction and maintenance methods to minimize the environmental impact of recreational trails and maximize overall trail sustainability. The BMPs are not mandatory. Rather, they are applied wherever and whenever possible to enhance ongoing trail construction and maintenance activities. The intended users of the BMPs are DNV staff and volunteers who will be working in the field. Although applicable to many trail networks, these BMPs are tailored specifically to the climate, physical geography, and ecology of the North Vancouver Alpine Area and the trails located therein. These BMPs are to be used in conjunction with the DNV Trail Guidelines and DNV Trail Classification Plan in the overall management of the DNV Alpine Area recreational trail network.

Core Concepts

These BMPs are grounded in the fundamental principles of human centered sustainable trail design, which are explored in detail in the book *Natural Surface Trails by Design* by Scott Parker, 2004. It is recommended that *Parker 2004* be read as a companion document to the following BMPs. Parker presents eleven **core concepts** grouped in five categories that define most of the human and physical forces that influence, and are foundational to, natural surface trails like those located in the DNV Alpine Areas.

Human Perception

- Natural Shapes
- Anchors

Human Feelings

- Safety
- Efficiency
- Playfulness
- Harmony

Physical Forces

- Compaction
- Displacement
- Erosion

Tread Material

- Tread Texture

Tread Watershed

- Tread Watershed

Approach

A full understanding of these core concepts, and experience in their application, will enable a “diagnosis and cure” approach. Adverse impacts can be seen as a symptom of a breakdown in the core concepts of a sustainable trail. The decision to both abandon the current alignment and re-route a trail (often the better long-term option) or to maintain the current alignment is informed by considering the effectiveness of conventional maintenance solutions, the resources available and the relative priority of a particular impact. Similarly, adherence to the core concepts and these BMPs maximizes the sustainability of new trails constructed.

For each BMP, the core concepts are introduced with reference to *Parker 2004* and other resources designed to increase the understanding of how to apply core concepts in the field. The greater the understanding of the core concepts, the more effective the application of the BMPs. It is highly recommended that the reference documents below be reviewed by persons conducting trail maintenance and construction activities. Furthermore, field training in the application of the core concepts and BMPs will further the likelihood of success in transforming the DNV recreational trails into a sustainable trail network. Field training should be mandatory for all staff and key volunteers who regularly work on the trail network.

See Appendix A for a Glossary of Terms.

Related Documents and References

Parker, Troy Scott. (2004). *Natural Surface Trails by Design: Physical and Human Design Essentials of Sustainable, Enjoyable Trails.* Natureshape, Boulder.

Parker 2004 provides a solid foundation on the design theory of natural surface trails like those found within the DNV Alpine areas. Eleven core concepts affecting trail sustainability are presented. The core concepts cover natural physical forces, human perception and habits, and the interrelationship between these factors. In-depth review of this key resource will provide a solid foundation for persons undertaking trail construction and maintenance. In conjunction with training, this book is considered the most significant resource for realizing sustainable trails in the DNV Alpine areas.

International Mountain Bike Association. (2004). *Trail Solutions: IMBA's Guide to Building Sweet Singletrack*. IMBA.

IMBA 2004 provides a resource for practical design solutions for trails and trail networks. IMBA is a handbook for overall trail construction and management and presents valuable proven techniques and practices. Presented in eight parts, the book covers land use partnerships, trail planning, sustainable trail design components, construction maintenance and tools of the trade.

Resort Municipality of Whistler. (2003). *Whistler Trail Standards: Environmental and Technical Trail Features*. Resort Municipality of Whistler, Whistler.

Whistler Trail Standards 2003 is the first trail standard policy document developed specifically to address multi-use trails that include significant mountain bike content. The Standards provide a land use compatibility matrix for an array of trail types and modal uses. Mountain bike trail difficulty levels are defined and mountain bike-specific structure standards are provided. Additional guidelines for environmental protection, safety, signage and management are included. North Vancouver trails were researched in the development of this document.

Policy and Principles

Vision, Principles and Criteria

During the Alpine Recreational Strategic Study (ARSS), the DNV in conjunction with stakeholder and professional consultation defined and adopted a **Vision** for the Alpine Area. Twelve **Principles** were developed to express a range of basic concepts key to achieving the **Vision**. Furthermore, four **Criteria** were developed to assist in the evaluation of existing and proposed trails.

The Vision, Principles and Criteria are defined in the *Introduction* and have been incorporated in these BMPs. All persons conducting trail construction and maintenance should be familiar with the Vision, Principles and Criteria.

Environmental Guidelines

The Vision and Principles developed by the ARSS process strive for a balance between recreational opportunity and ecological stewardship. Any recreational intrusion into the natural environment has some impact; however, these impacts can be managed and minimized. Trail construction and maintenance within the forested mountainous (Alpine) areas of the DNV has the potential for adverse impacts on the environment, even more so than recreational trail use. The Best Management Practices provide a broad strategy of methods to minimize the environmental impact of recreational trails and maximize overall trail sustainability.

Trail Guidelines and BMPs have been written to guide and compliment each other. The Trail Guidelines provide the overarching framework, while the BMPS articulate the framework through on-the-ground actions.

Recreation Management Zone Framework

Recreation management zones have been established to provide an overarching policy guiding the location and appropriateness of recreation based activities and amenities within the Alpine Areas of the DNV. However, the core concepts of what constitutes a sustainable trail apply everywhere regardless of management zone. Details of the recreation management zones are provided in the DNV Trail Guidelines (*see Chapter 2*). All persons conducting trail construction and maintenance should be familiar with the recreation management zones and their application.

Valued Ecosystem Components

Valued Ecosystem Components (VECs) have been identified for the forested mountainous areas of the DNV. Descriptions of the VECs are included in the DNV Trail Guidelines (*see Chapter 2*) and the Glossary of Terms (*see Appendix A*). All persons conducting trail construction and maintenance should be familiar with the VECs.

- Riparian areas/watercourses
- Species at risk/ Red and blue listed
- Old growth forest ecosystems
- Species and vegetation structural diversity

Authorization to Work on Trails

DNV Parks provides authorization for volunteer trail maintenance and construction via a permit system. Volunteers can apply for a trail maintenance permit with the permit application included in *Appendix C*. Trail permits are administrated by:

Trail and Habitat Coordinator District of North Vancouver Parks 604-990-3806
--

Permitted volunteer trail builders should be engaged in assessing trails and developing detailed management plans for each trail. Individual trail management plans should include discussion of specific environmental sensitivities at the trail level (riparian areas, use of native materials including coarse woody debris, etc).

Best Management Practices

The following Best Management Practices offer summary descriptions of core concepts and provide mitigation recommendations. Reference to those sections of *Parker 2004* that are directly relevant to concepts under discussion are provided for staff and volunteers needing more information. Each BMP can be easily reproduced and distributed to trail stewards as they encounter particular trail conditions that need to be planned and managed for. The BMP section concludes with a list of tools that staff and volunteers would typically use in the management of a complete and diverse trail network. The Best Management Practices include:

- Off Trail Impacts
- Surface Water Flow
- Tread Wear
- Vegetation
- Environmentally Sensitive Areas
- Wildlife
- Habitat Restoration
- Use of Native Materials
- Technical Trail Features
- Trail Maintenance Ecological Sensitivity Preparation
- New Trail Construction
- Tools

Best Management Practice: Off Trail Impacts

There are two types of off-trail impacts. One is erosion resulting in soil deposition outside the trail corridor. The second is impacts caused by users leaving the trail.

Erosion resulting in significant displacement of trail tread material will lead to sedimentation adjacent to the trail.

Significant off-trail erosion can also result from extreme concentrations of diverted surface water flow which create artificial water courses.

Off-trail impacts are best understood through the core concept of soil displacement.



Figure 1: Ride around options on challenging TTFs can mitigate off trail impacts.

*For a further understanding of the core concept of **soil displacement** see Parker 2004 pp 37-41.*

Off-trail impacts caused by users leaving the trail demand an assessment of underlying issues causing this behavior. There is always a reason that a user leaves the established trail. A variety of design flaws can exacerbate the problem:

- Trails with poor alignment result in poor flow for users and encourage users to leave the trail.
- Switchbacks that do not have a comfortable turning radius and have no physical barrier (such as a large rock) at the inside of the turn will be short-cut.
- Technical Trail Features (TTFs) that are too challenging and have no alternate route will be ridden around.
- When the trail becomes badly eroded, the undisturbed ground to the side is more appealing to users.
- Certain interesting features (such as a rock slab or view point) visible from the trail will attract users off the trail.
- Other trails and trail segments visible from the trail will invite short-cutting.

For a further understanding of the core concepts for trail design that incorporate **human feelings** see Parker 2004 pp 23 to 33.

Designing for prevention and mitigation of off-trail impacts caused by dogs presents a significant challenge as the core concepts surrounding human feelings are not

applicable to dogs. Furthermore, the tendencies of dogs using the trail vary greatly with the breed and individual behavior of the dog. Short of complete fencing, dogs cannot be confined to the trail, and in large numbers can result in significant off-trail impacts. Therefore, in lieu of trail construction and maintenance BMPs, policy regarding dog use (restrictions, on-leash, and off-leash) is the only practical measure.

Mitigation

- Sustainable trail design will minimize trail tread displacement and eliminate high concentrations of diverted water flow. Design flaws to focus on include reducing tread wear and water flow on the trail.
- Sustainable and harmonious design, which incorporates interesting features and good flow, combined with regular maintenance will ensure that staying on the trail is more appealing than leaving it.
- Avoid placing trails and trail segments within view of each other as this encourages short-cutting. Maintain a minimum 30 m buffer between trails where feasible and incorporate natural physical barriers (rocks, vegetation, logs, etc) where trails converge or intersect.
- Physical barriers (logs, rocks, plantings) may also be used strategically throughout the trail to corral users on the trail; however, care must be taken to ensure that barriers do not prevent the natural sheet flow of surface water from exiting the trail.
- Situate more difficult feature TTFs (where spectators congregate and users will make multiple attempts) in appropriate locations, such as on flat skid roads or other areas with low VEC value.
- Switchbacks should have a sufficient turning radius to accommodate all trail users and incorporate a physical barrier to short-cutting.
- TTFs shall not be situated in environmentally sensitive areas, such as riparian areas, wetlands, old growth tree stands, etc.
- Challenging TTFs shall have a ride-around option. These include all expert TTFs and TTFs with a difficulty rating higher than that of the overall trail difficulty rating (*see Figure 1*).
- Dogs can be managed through policies such as enforcing on-leash requirements and prohibitions. Bridges over wetlands and streams should be “dog-friendly”. Fencing of significant environmentally sensitive areas may be required.

Best Management Practice: Surface Water Flow

Surface water flow is the primary erosion force for the trails in the DNV Alpine Area due to the high annual precipitation and relatively steep terrain. Trails intercept and channel natural surface water flow, contributing to the displacement of trail tread material. The incising of the trail tread can also intercept natural subsurface preferential flow, resulting in groundwater seeps on the trail. Incorporation of relatively impermeable surfaces (rock armouring, glacial till, bedrock outcropping, and compacted surfaces such as roads) results in an increased volume of surface water on the trail.

Understanding the core concept of tread watershed and the twelve factors that contribute to prediction and performance of tread watershed are critical to mitigating the impacts of surface water flow. The twelve tread watershed factors are:

1. Tread watershed size
2. Watershed slope
3. Runoff potential
4. Splash erosion
5. Tread width
6. Weather, climate, and microclimate
7. Water sources
8. Tread texture
9. Trail use (compaction and displacement)
10. Tread grade
11. Tread length
12. Dip sustainability



Figure 2: Incorporating bridges near surface drainage areas can mitigate the effects of diverted surface water flow.

*For a further understanding of the core concept of **tread watershed** and the twelve factors that contribute to prediction and performance of tread watershed see Parker 2004 pp 51 to 62.*

Mitigation

- Sustainable trail design will mitigate the effects of diverted surface water flow. This includes minimizing tread watersheds, minimizing tread lengths (particularly in flat and fall line orientations), incorporating boardwalks and bridges where near surface water tables and drainage features are anticipated (*see Figure 2*), and orienting trails beneath a thick canopy to protect from direct rain impact.

Proper Drainage Crossing

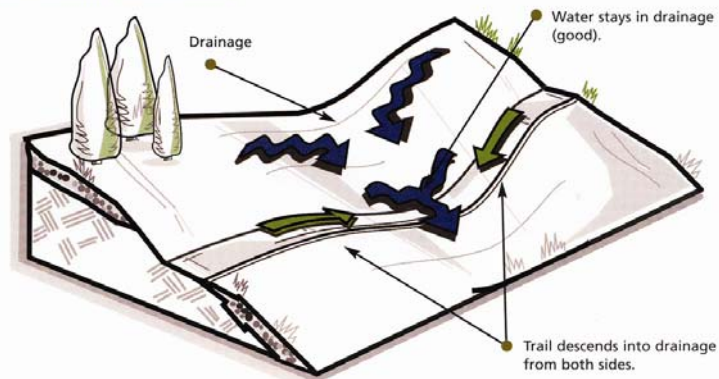


Figure 3: Proper drainage crossing.

Source: IMBA 2004 p 178

- The essential design element required to manage surface water flow is ensuring that trails are aligned perpendicular to any significant surface or subsurface water flow, and that wherever such intersections occur, it is at the low point (dip) of a trail watershed (IMBA 2004 p 178, *see Figure 3*).
- The most effective design solution to eliminate surface water from the trail tread on DNV trails is the grade reversal dip (IMBA 2004 p 67).
- Various other water crossing techniques (IMBA 2004 pp 179-182), and drainage solutions (IMBA 2004 pp 201-206) can be effective in specific situations, however, given the high levels of both precipitation and trail use in the Fromme area, these will not substitute for effective design. Re-routing or bridging are often the best options.
- Culverts are not recommended as they are prone to clogging, high maintenance and inevitable failure. Should culverts be used, the minimum recommended width is 30 cm (12 inches) and their locations should be recorded for future monitoring and maintenance.

Best Management Practice: Tread Wear

The physical wear of the actual trail tread is a function of the following core concepts:

- The type and volume of trail use and the resulting compaction and displacement.
- The physical characteristics of the trail tread material, its capacity for drainage, resistance to compaction and displacement under wet and dry conditions.
- The alignment of the trail relative to the topography, its steepness and the length of trail watershed segments.
- How well the trail watershed segments resist the erosive impact of both water flow and trail users.
- How well the design of the trail anticipates and incorporates trail user behavior and minimizes skidding.



Figure 4: Successful rock armouring techniques include favouring angular stone where available over rounded stones.

See Parker 2004 for a further understanding of the following core concepts:

- | | |
|---|----------|
| • <i>Compaction and displacement</i> | pp 35-41 |
| • <i>Tread texture</i> | pp 45-50 |
| • <i>Tread watershed</i> | pp 51-62 |
| • <i>Efficiency</i> | pp 25-27 |

Mitigation

The favored local solution to advanced tread wear is to reconstruct the tread with imported rock and soil. This labor and material intensive process is called rock armouring, and is essentially paving the trail. This may be seen as undesirable by some users, hikers and cyclists. However, sustainable trail design (*Parker 2004*) will minimize the need for rock armouring. Any trail segment considered for rock armouring to mitigate extensive tread wear should also be considered for re-routing as the long term sustainable solution prior to the investment of significant resources.

- Where the design of the trail is essentially unsustainable, the ongoing maintenance requirement will be significant and endless, as water flow will undermine even the most well-constructed rock armouring. Rock armouring does not adequately mitigate erosion caused by surface water. The requirement for a constant supply of soil that is continually displaced adjacent to the trail is unsustainable and unacceptable. Rerouting of the trail is favoured under these circumstances.

- There are local trail builders who have considerable experience and skill in rock armouring techniques, specific to local circumstances. Their expertise should be recognized and if possible disseminated amongst staff and volunteers.
- Imported rock is preferred; however, this is only feasible for sections of trail with nearby vehicle access. Prior to sourcing on-site rock for trail armouring, one should consider potential adverse impacts on the environment as described in the *Wildlife BMP* and the *Use of Native Materials BMP*.

Successful rock armouring techniques:

- Compact and stabilize soils beneath the rock armouring to prevent rocks from shifting over time.
- Use larger stones with inherent stability due to their mass where possible.
- Favour angular stone (weathered bedrock), where available, over rounded stones (glacial origin) (*see Figure 4*).
- Use the largest stones as keystones to stabilize adjacent stones, particularly on steeper orientations. Alternatively, use wooden sleepers.
- Sleepers or keystones should be placed frequently. If the armouring fails, this will minimize the loss of armoured tread.
- Always construct rock-armouring from the bottom up.
- Use smaller rocks and mineral soil to chink the void spaces in the rock armouring.
- Counter-sink rock armouring below the adjacent grade to encourage users to travel over the armoured tread.
- Diligence in applying the above design strategies is relative to the steepness of the tread being armoured.

*For further information on quality **rock armouring** refer to IMBA 2004 pp 162-173.*

- Augment the trail tread with suitable soil. Native mineral soils may be used, however are not ideal given the lack of fine particles (silt and clay)⁶. Prior to sourcing on-site soil, one should consider the potential adverse impact on the environment as described in the *Use of Native Materials BMP*.

⁶ Experimenting with mixing native mineral soils with approximately 10% native organic soils may improve tread quality by increasing soil cohesion due to improved moisture retention in summer months and increased elasticity. Although, too much organic soil will result in an overly muddy tread in the winter and decreased cohesion due to soil swelling. Consider sponsoring a University practicum to develop the best native soil mixture for tread performance.

-
- The ideal soil for tread construction is loam (equal fractions of well graded sand, silt and clay). Soils should be compacted to improve tread wear. Where feasible, compaction can be achieved using a hand tamper, a roller or a vibrating packer.
 - Route trails on bedrock where possible. Ensure the bedrock surface is not oriented such that groundwater flows along it and into the trail tread below. Also see BMPs for Amphibians and Reptiles under the *Wildlife* BMP.
 - Trail design that avoids long steep sections, provides sight-lines to grade reversals, and successfully anticipates trail user behavior will minimize the erosive action of hard breaking by mountain bikes, and utilize the compacting force of trail users to stabilize the tread.

Best Management Practice: Vegetation

The loss of soil through tread wear can destabilize a tree making it more susceptible to windfall. The physical impact of trail users (boots and tires) on exposed roots can make the tree more susceptible to a variety of diseases. Trail users leaving the trail can have a significant impact on the surrounding under-story vegetation.

Trail users may also inadvertently transport exotic and invasive species throughout the trail network.



Figure 5: Access to old growth.

Mitigation

- Keep trail users on the trail and minimize soil displacement, compaction in root zones, and vegetation trampling (see the *Off-trail Impacts* BMP).
- Locate (or re-locate) trails away from all old growth trees at a distance of 1.5x the drip line to trunk distance. Where old growth trees present an unavoidable attraction, use boardwalks/steps to provide intimate access for trail users without adverse impact to the root network.
- Locate the trail away from the drip line of mature trees. Where this is not possible, as is often the case in the DNV, favour trails on the uphill side of trees, close to the trunk, to minimize impact to the more delicate feeder root system. Preventive rock armouring or boardwalks should be used where future adverse impacts are anticipated.
- Use rock armouring techniques to protect large roots exposed on the trail tread. Bridges and boardwalks may also be incorporated.
- Prune exposed secondary roots using a saw or equivalent – do not break by hand, ax or shovel etc.
- Ensure that pruning practices cause no further damage (infection) to the tree by cutting only outside the branch collar (see Figure 6).

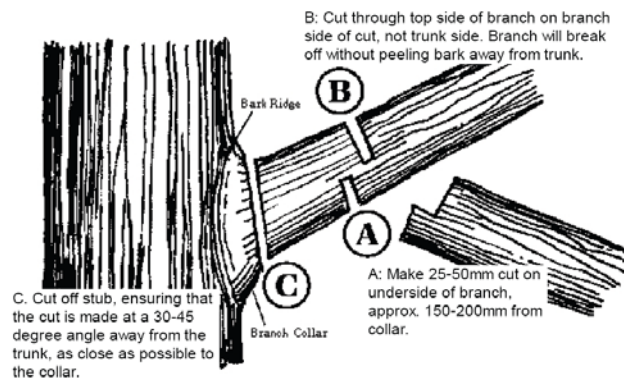


Figure 6: Pruning technique for tree branches

-
- Invasive plant species removal should be incorporated into trail maintenance under the guidance of the DNV Trail and Habitat Coordinator to ensure proper disposal and reduce the risk for further colonization. (See Appendix E for a list of key species of concern). Care should be given to prevent cross-contamination via workers boots, clothing, and equipment.



Figure 7: Invasive species removal should be incorporated into trail maintenance. Japanese Knotweed shown.

- Do not attach TTFs to live trees (see Figure 8). TTFs must be constructed to be stable and free-standing.



Figure 8: TTFs must not be attached to live trees.

-
- Contact the DNV Arborist and/or Trail and Habitat Co-coordinator for approval/permits and further advice.

District Arborist
District of North Vancouver Parks
604-990-3809

Trail and Habitat Coordinator
District of North Vancouver Parks
604-990-3806

Best Management Practice: Environmentally Sensitive Areas

Environmentally Sensitive Areas (ESAs) include wetlands, streams, riparian areas, and areas of significant ecological value such as rock outcroppings or other physical features providing micro-habitats. ESAs warrant special consideration with respect to managing recreational trails.

Mitigation

Riparian Areas

- Construction of trails and disturbance of the soil are considered “developments” falling under BC Riparian Assessment Regulation. They require an Assessment Report be completed by a Qualified Environmental Professional prior to development.
- A Riparian Area should be established according to the assessment methodology of the BC Riparian Area Regulation. A simple assessment of the riparian area was conducted in developing these BMPs, establishing a default riparian area of 30m adjacent to the top of bank for both permanent and non-permanent streams.
- Riparian Areas should be avoided through the re-routing of trails where feasible; however total avoidance is impossible given the perpendicular orientation of streams to the contour.
- Trail segments within riparian areas should receive priority for maintenance and monitoring.
- Trail maintenance within Riparian Areas should be conducted with adherence to these BMPs.
- Keep trail users on the trail and minimize soil displacement (see BMP *Off-trail Impacts*).
- Trail footprint (tread length and width) should be minimized. This can be achieved by re-routing where and when feasible and approaching stream crossings at right angles.
- TTFs should not be located in riparian areas.
- Sourcing of natural materials (soil, rock, live and dead wood) for trail construction and maintenance is not permitted in riparian areas.

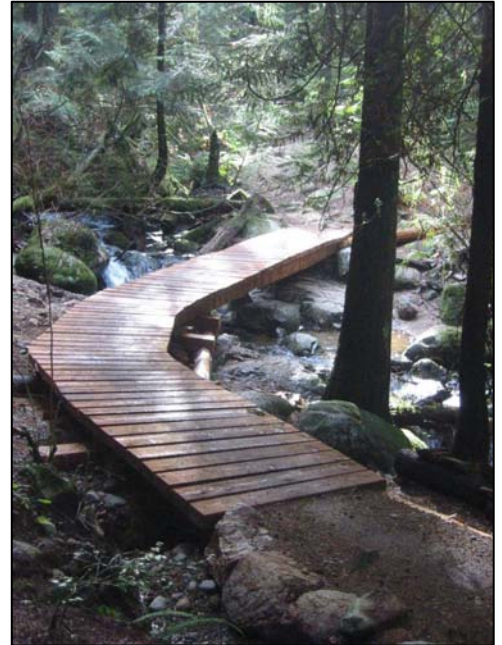


Figure 9: Riparian area stream crossing.

Wetlands

- Wetlands are considered “streams” under the BC Riparian Assessment Regulation and subject to the Riparian Area BMPs above (except when the wetland does not support fish or drain into a watercourse that supports fish).
- Vernal pools can be considered wetlands and thus the wetland BMPs apply. Vernal pools should be identified during trail and construction activities and considered for further assessment and site-specific consideration of protection, and/or enhancement.
- Wetlands are inappropriate locations for trails, and should be avoided through the re-routing of trails where feasible. Otherwise, boardwalks wide enough to be used safely by all users (relative to the type of trail and trail users) are required.
- Consideration should be given to groundwater recharge zones up-gradient of wetlands that may occur beyond riparian areas, as they may provide hydraulic connectivity critical to the wetland.
- TTFs should not be located in wetlands.
- Dogs should be on leash or prohibited from trails crossing wetlands.
- Chemically treated timber (CCA or creosote) should not be used within wetlands to avoid leaching of toxic chemicals (BC Parks policy).



Figure 10: Trails should avoid wetlands whenever possible.

Stream Crossings

- Bridges are considered as “developments” therefore falling under BC Riparian Assessment Regulation and requiring an Assessment Report be completed by a Qualified Environmental Professional prior to development.
- All stream crossings require bridges to keep users out of streams and off the adjacent stream banks.
- Locate bridges to minimize disturbance, on straight sections of stream, and where the banks are stable.
- Bridges should be oriented perpendicular to the stream and span from top of bank to top of bank where possible.
- Bridges need be high enough above the stream channel to prevent debris from becoming trapped by the bridge.

-
- Bridges should be of low technical difficulty and “dog-friendly” to encourage use and discourage incursion into the stream and riparian area.
 - Bridges on trails with mountain bike use should not include sharp turns or steps.
 - Trails that approach a stream should be low angled and as short as possible to minimize sediment run-off into the stream. This can be achieved by having the trail gain elevation as it approaches the stream on both sides, or by incorporation of a grade reversal dip prior to the stream. Furthermore, trail approaches to bridges should be the focus of maintenance and designed to eliminate mud and water that may be transported by users. Rock armouring and boardwalks can be an effective means (see *Tread Wear BMP*).
 - Chemically treated timber (CCA or creosote) should not be used within streams to avoid leaching of toxic chemicals (BC Parks policy).
 - Culverts are not generally recommended due to the in-stream disturbance required and additional monitoring and maintenance to prevent clogging.
 - Follow construction guidelines included in the Trail Guidelines (*Chapter 2*).

Other Environmentally Sensitive Areas

- In the spirit of the DNV’s adaptive management approach for the forested mountainous areas of the DNV and the trail network within, ESAs and VECs may change over time. New and relevant ecological information should be reviewed and incorporated as it becomes available.
- Critical habitat for provincial red-listed species and federal SARA listed species may be inappropriate locations for trails, and should be reviewed and managed on a species-by-species basis.
- Trails maintained within areas of old growth trees require a high priority for maintenance and monitoring. Locate (or re-locate) trails away from all old growth trees at a distance of 1.5x the drip line-to-trunk distance. Where old growth trees present an unavoidable attraction, use boardwalks to provide intimate access for trail users without adverse impact to the root network; otherwise re-route trails so the old growth tree attractant is not visible (see *Figure 5*).
- Areas set aside for VEC conservation may be inappropriate locations for trails, and should be reviewed and managed on a VEC-by-VEC basis.

Best Management Practice: Wildlife

Trail maintenance, construction and recreational use have the potential for adverse impacts on wildlife and their habitat.

Birds

Bird diversity and species numbers are positively correlated with primary and secondary vegetative growth in the Alpine Area, especially adjacent to the mature forested areas that exemplify a three-dimensional forest canopy. The Alpine is basically composed of two structural forest types: Open Areas and Core Forested Areas.



Figure 11: Unless they represent a safety hazard, removal of wildlife trees is not permitted.

Open Areas

Bird species such as the Pine Siskin, Song Sparrow, Swainson's Thrush, Dark-eyed Junco, and the Black-capped Chickadee are examples of very common species of birds likely to be associated with edges of trails and fragmented areas in the network. These species are often associated with forest fragmentation or primary vegetative succession adjacent to forested blocks. Fragmented landscapes, as exemplified by the powerline corridor and areas adjacent to the residential areas add to bird species diversity.

Core Forested Areas

Some species present on Fromme Mountain are especially adapted to breeding in the interior forest areas and do not survive in or prefer edge conditions. These species are commonly associated with forest ground and tree canopy feeding. To these core forest nesting birds, fragmentation and canopy breaks with clearings may be detrimental to breeding. The Alpine Area has a very good composition of core forest areas and is linked to open fragmented corridors that essentially provide greater bird diversity.

Mitigation

- Support, monitor and encourage any bird inventory projects for the mountain.
- Trails within forest edge habitat and riparian areas should receive the highest level of sustainability due diligence. When and where possible

accentuate these areas with indigenous berry bushes to provide more food resources.

- Retain and enhance coarse woody debris and brush pilings on forest floors for core forest nesters in conjunction with trail maintenance activities.
- Construction or maintenance around any identified active raptor nest is not permitted from March through late July.
- Removal of wildlife trees is not permitted unless they represent a safety hazard (*see Figure 11*). A wildlife tree is a tree that is either dead or dying and contains one or more holes or cavities that could be used by wildlife for a variety of purposes including nesting, and raising young, denning, roosting, resting, feeding, catching food, escaping predators, and hibernating (T.R.E.E.S., 1994).

Amphibians and Reptiles

The most significant habitat for local herpetifauna (amphibians and reptiles) occurs along riparian areas. This includes watercourses and areas around the wetlands as well as rock outcrop areas and rock faces. Reptile assessments of outcrop habitats are encouraged to increase the environmental baseline for this type of microhabitat.

Mitigation

- Trails should avoid rock outcropping where possible. There is a balance to be achieved here as outcroppings do provide very sustainable trail treads and are attractive features to users.
- Cobbles and boulders in outcropping microhabitats should be avoided where possible. There is a balance to be achieved here as cobbles and boulders are a valuable trail building resource.
- Apply BMPs for wetlands and riparian areas.
- During maintenance of trails, limit forest harvest or salvage in order to minimise habitat destruction off the trail systems. Where possible, place slash onto off trail areas in canopy breaks of riparian areas or other open canopy locations to create better escape habitat during the active herpetifaunal season.

Small Mammals

The most significant habitat for local small mammal populations occurs along riparian areas and the wetter, moist forest communities in depression areas, primarily along riparian corridors. Encroachment in any way off existing trail systems and degradation of wooded areas adjacent to these habitats along with coarse woody debris removal is the greatest issue associated with small mammal habitat loss for the mountain.

Mitigation

-
- Apply BMPs for wetlands and riparian areas.
 - Retain and avoid, where possible, an abundance of coarse woody debris necessary for microclimate protection and cover.
 - Retain and avoid, where possible, trees with loose bark in forested and riparian areas.
 - Retain and avoid, where possible, areas of dense herbaceous and/or shrub layers, and forest litter.

Large Mammals

By providing BMPs for small mammals, the life prerequisites for large mammals are also maintained.

Best Management Practice: Habitat Restoration

Passive Trail Decommissioning

The goal in decommissioning trails is to slow surface run-off, and make the old trail indistinguishable from the surrounding area. Trails scheduled for closure that are of low use and without significant surface water flow may be decommissioned passively. Trails scheduled for passive decommissioning are expected to readily return to a natural condition over time once use is discontinued.



Figure 12: Trail-side restoration.

The protocol for passive decommissioning may include:

- Signage at significant access points indicating trail closure and recommended alternative route/experience.
- Addition of vegetation debris and coarse woody debris throughout trail corridor for 20 m at all significant access points (may not be required for very-low use trails).
- Transplant hardy understory species (i.e. Sword Fern, Salmon Berry) from adjacent areas of abundance to the trail corridor for 20 m at all significant access points (may not be required for very-low use trails).
- Removal of all man-made structures.
- Annual monitoring. Should monitoring reveal passive decommissioning to be unsuccessful, active closure protocols may be considered.

Active Trail Decommissioning

Trails scheduled for closure that are of high use and/or have significant surface water flow require active decommissioning. Trails scheduled for active decommissioning are expected to require a high level of deterrent to prevent recreational use. Furthermore, measures may be required to mitigate continued erosion from surface water flow and restoration of heavily disturbed areas. Segments of trail abandoned for new, sustainable re-routes usually require active decommissioning. The protocol for active decommissioning may include:

- Signage at significant access points indicating trail closure and recommended alternative route/experience.
- Removal of all man-made structures.
- Identification of sources of surface water flow and mitigation by placement of logs perpendicular to the trail and/or trenching to shed water off the former trail tread.

-
- For trail re-routing, the organic duff layer excavated from new trail tread should be used to cover old trail tread.
 - Addition of vegetation debris and coarse woody debris throughout trail corridor with a focus within 50 m of all significant access points.
 - Transplant hardy native species (i.e. Sword Fern, Salmon Berry) from adjacent areas of abundance to the trail corridor focusing within 50 m of all significant access points. Vegetation planting can be augmented with nursery stock native species. Species choice should include consideration of the local environment and the VEC of forest structure diversity.
 - Semi-annual monitoring. Should monitoring reveal active closure to be unsuccessful the by-law officer should be notified.

Trail-side Restoration

Restoration of area suffering from excessive disturbance due to users, dogs or sedimentation may be accelerated with active restoration protocols. Before proceeding with restoration, it is imperative that the cause of the disturbance be diagnosed and remedied following the applicable BMPs. Resources should be applied to actively restore a disturbed area only after the cause has been addressed.

- Adherence to the sustainable trail design core concepts and application of BMPs including using low impact techniques to obtain materials adjacent to the trail (see BMP *Use of Native Materials*) will minimize the requirement for trail-side restoration.
- Transplant hardy native species (i.e. Sword Fern, Salmon Berry) from areas of abundance to the disturbed area. Vegetation planting can be augmented with nursery stock native species. Species choice should include consideration of the local environment and the VEC of forest structure diversity.
- For disturbed areas where no organic soil remains it may be required to add organic soil to prevent continued erosion from rain splashing and to retain adequate moisture for planting survival. Organic soil may be sourced from nearby new trail construction projects.

Best Management Practice: Use of Native Materials

The DNV has developed the principal of balancing recreational needs with ecological conservation. We should strive for this balance when using native materials for trail construction and maintenance. Unlimited use of native materials would severely degrade other forest values, while an outright prohibition on the use of native materials would unnecessarily limit trail maintenance and increase maintenance costs.

Native materials used for trail maintenance and construction include wood and soil. Both soil and wood provide a foundation for ecological integrity of the area. The following BMPs are meant to provide a balance between responsible resource use and ecological integrity.

Soil

Soil is limited in location and volume within the area and not a renewable resource having a reversibility timeframe of 1,000 to 10,000+ years.

- Import soil when practical. Favour pit-run native soils. Beware of invasive species and other contaminants (know your source). All imported soils are to be authorized by the DNV staff.
- Cobbles and boulders may be used but not sourced from riparian areas, wetlands or other ESAs.
- Cobbles and boulders in outcropping microhabitats should be avoided where possible and may only be sourced upon completion of a snake/reptile assessment. See BMPs for Amphibians and Reptiles.
- Sourcing rock from bedrock outcropping and erratics (very large boulders) with a rock drill is not permitted in the interest of preserving natural history.
- Native soils may be sourced from borrow pits following the borrow pit BMPs below.
- Minimizing the effective trail tread will minimize the soil resources required for construction and maintenance.



Figure 13: Standing dead wood can be high value wildlife habitat.

Borrow pits

These practices are advised for borrow pits:

- Locate borrow pits well off the trail for safety and aesthetic considerations.

-
- Scout for suitable soil deposits with a hand auger; look for above average grade deposits (mounds) with a minimal organic layer and interfering vegetation.
 - Fewer, larger pits are preferable to multiple smaller pits. Use low impact techniques such as zip-lines to transport the material over large distances.
 - Stockpile organic soils for later decommissioning of exhausted borrow pits.
 - Create only a single access trail to the borrow pit to minimize off trail impact. Flag access route if necessary (particularly on trail days).
 - Flag and record locations of active borrow pits for future use and eventual restoration.
 - Restore borrow pit when exhausted by grading area and covering with stockpiled organic soil. Either transplant native species from areas of abundance or import native species from nursery stock.

There are several practices that are not advised for borrow pits. These include:

- Borrow pits are not permitted in riparian areas, wetlands, or ESAs.
- Avoid sub-grade excavations (deep holes).
- Do not locate borrow pits adjacent to tree root-balls due to adverse impact to trees.
- Do not disturb soils from tipped up root-balls of fallen trees as they provide micro-habitats for small mammals and increase structure and plant diversity.

Wood

Live Trees

Second growth wood is abundant and ubiquitous in the Alpine Area and a renewable resource having a reversibility timeframe of 20 to 100 years. In a managed forest, certain trees have different values based on their place in the forest succession, their abundance within a given area, and their positioning in relation to other trees. It is beyond the scope of this document to develop a comprehensive forest management policy; however, such a policy is planned by the DNV. Until such time, harvesting of live trees should be the exclusive responsibility of experienced DNV staff and volunteers with authorization from DNV staff.

The existing DNV Tree Policy (*see Appendix D*) should be referenced and the following BMPs considered within its context.

- Cedar is the only timber suitable for trail building due to its natural rot resistance. The rot resistance increases with the age of the wood.
- Import timber whenever practical. Consider developing a volunteer wood salvage program for tree removal in DNV urban and interface areas including the DNV Hazard Tree removal program.

-
- Favour sourcing Cedar trees from areas where Cedar is the dominant tree species.
 - Sourcing Cedar trees from areas with low tree species diversity (Cedar <5%) is prohibited.
 - Only source Cedar trees to a maximum 25% of like-age Cedar trees in the local area.
 - Favour stunted Cedar trees shaded out by other dominant trees.
 - Consider use of mature Cedar trees with synergies for positive forest management gains (i.e. enhanced gap-replacement, promotion of understory) and bring to the attention of the DNV Arborist for approval.
 - Leave future dominant trees.
 - Sourcing of trees is not permitted in riparian areas, wetlands, or other ESAs.
 - Felled trees not used in construction should be cut into smaller sections and distributed throughout the forest interior; placement should be in areas that either “create” or “accentuate” micro habitats for wildlife (for example, brush piles for ground nesting birds).

Standing Dead Wood

Standing dead wood can be high value wildlife habitat (*see Figure 13*). Discretion is required when using this resource.

- Encourage utilization of standing dead trees removed for tree-hazard concerns.
- Avoid use of standing dead wood when possible.
- Removal of wildlife trees is not permitted unless they represent a safety hazard. A wildlife tree is a tree that is either dead or dying and contains one or more holes or cavities that could be used by wildlife for a variety of purposes including nesting, and raising young, denning, roosting, resting, feeding, catching food, escaping predators, and hibernating (T.R.E.E.S. 1994)
- Always check for dry-rot (unsuitable).
- Sourcing of trees is not permitted in riparian areas, wetlands, or ESAs.

Large Woody Debris

- Large woody debris (LWD) can be high value wildlife habitat. Discretion is required when using this resource. Large sections of old-growth cedar are favoured for use as decking on bridges and TTF’s due to its straight grain and excellent strength and rot resistance.
- Use imported wood, live trees, standing dead trees or recent windfall trees where possible.

-
- Approximately 50% of seasonal windfall may be harvested from the trail vicinity, with the rest left as a future nutrient and habitat source.

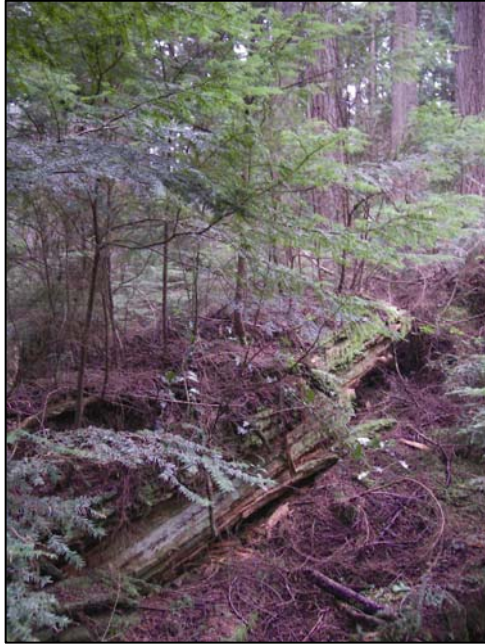


Figure 14: Nurse logs are not to be used for trail building material.

- Use of nurse trees (fallen trees with new tree re-growth) is not permitted (*see Figure 14*).
- Sourcing of LWD is not permitted in riparian areas, wetlands, or other ESAs.

Contact the DNV District Arborist and/or Trail and Habitat Co-coordinator for permits and further advice on the use of native materials.

District Arborist
District of North Vancouver Parks
604-990-3809

Trail and Habitat Coordinator
District of North Vancouver Parks
604-990-3806

Best Management Practice: Technical Trail Features

Technical Trail Features (TTFs) are obstacles on the trail that require concentrated negotiation. They can be a natural feature, such as a steep rock slab; man-made, such as a ladder bridge; or a combination of natural and man-made features. Due to the technical nature of TTFs, increased impacts can be expected due to falling, congregation, and user avoidance.



Figure 15: Providing alternatives to an advanced TTF.

It is important to consider appropriate siting and design elements to minimize the potential for adverse impact related to TTFs.

- TTFs are not permitted in riparian areas, wetlands, or ESAs.
- Situate more difficult TTFs (where spectators congregate and users will make multiple attempts) in appropriate locations, such as on flat skid roads and areas with low VEC occurrence. Physical barriers may be used to limit the footprint of areas prone to disturbance from congregating.
- TTFs should be of appropriate difficulty with respect to the trail, to keep the majority of users on their bikes.
- Provide alternatives to advanced TTFs such as an easier TTF or a ride-around (see Figure 15).
- Ensure the approach to TTFs is free of mud and water as mud and water increase the likelihood of users failing to negotiate the TTF.
- Do not attach TTFs to live trees. TTFs must be constructed to be stable and free-standing.

TTF construction guidelines are provided in the Trail Guidelines (see Chapter 2).

Best Management Practice: Trail Maintenance Ecological Sensitivity Preparation

The following checklist can be carried out by responsible persons prior to conducting a trail construction or maintenance project.

Check Riparian Areas

Riparian Areas are to be identified and flagged in the field to prevent intrusion by work crews during construction and maintenance activities (see *Figure 16*).



Figure 16: Flag riparian areas prior to trail construction activities.

Identify Wildlife Trees

Reconnoiter for wildlife trees and flag and record any wildlife trees identified.

Identify Bird Nests

Reconnoiter, flag and record bird nests.

Locate ESAs

Reconnoiter, flag and record other ESAs.

Identify Soil Borrow Pits

Soil borrow pits are to be identified with one access route flagged (see *BMP Use of Native Materials*)

Pre-determine Wood Source

Should the construction/maintenance plan include the use of native wood, wood sources shall be pre-determined in consideration of diversity and abundance (see *BMP Use of Native Materials*)

Review and Sensitivity

Ecological Sensitivity shall be reviewed with the trail crew at the onset of work (concurrent with Health and Safety Plan).

Assign Responsibility

One person shall be dedicated as responsible for Ecological Sensitivity oversight during the project.

Trail Completion

All flagging shall be removed upon completion of the trail maintenance/construction.

Best Management Practice: New Trail Construction

Ninety percent of the life-cycle maintenance costs of a trail are dictated by the layout of a trail. Therefore it is imperative that a sustainable layout is achieved prior to committing to trail construction.

New trails and trail re-routes of significant length (>50m) should be designed by knowledgeable persons trained in the core concepts of sustainable trail design.

New trail routes shall incorporate available, up to date ecological information.

The layout of new trails and trail re-routes of significant length (>50m) shall be approved by DNV Parks prior to construction.



Figure 17: Protecting tree roots with rock armouring.

*For more information on **trail design** refer to the DNV Trail Guidelines (Chapter 2), Parker 2004 and IMBA 2004, Part 4.*

With all BMPs in mind, the following are the steps taken in construction of a new trail once a sustainable layout has been mapped.

- Clear the trail corridor (see Chapter 2 for trail corridor dimensions by trail type).
- Map in detail the center of the trail tread. Pin flags work well in this application.
- Excavate organic soil within the trail tread and stockpile for later use in restoration upon completion of construction. Excess organic soil may be broadcast throughout the adjacent forest floor.
- Remove minor interfering roots from tread. Protect major roots with rock armouring (*see Figure 17*).
- Augment trail tread with mineral soil and compact it.
- Anticipate where trail users may leave the tread and add natural features to corral users onto trail tread.
- Restore disturbed areas including borrow pits.

*For more information on **trail construction** refer to IMBA 2004, Part 6.*

Best Management Practice: Tools

Standard Tools

Bow Saw – used for cutting small diameter wood and pruning larger branches and roots.

Fro – used for splitting cedar. An axe is not recommended for safety reasons.

Grub Hoe – a multipurpose tool that acts as a hoe and pick axe. Effective for loosening native soils for extraction. Smaller short handled versions are very useful for rock armouring.

Hand Auger – used for drilling holes for wood piles and supports. Also used for reconnaissance of subsurface soil and groundwater conditions during trail sighting and exploration for borrow pits.

Hand Tamper – effective for compacting trail tread.

Hammer – used for construction of wooden structures.

McLeod – a multipurpose tool that acts as a rake, blade and tamper (see Figure 18).

Pruning Shears – used for pruning smaller branches and roots.

Pulaski – a multipurpose tool that acts as hoe and axe.

Rake – useful for removing fallen tree debris from trail corridor and for habitat restoration.

Sledgehammer – available in varying sizes and effective for nailing in large spikes to pounding in wood piles.

Spade (round-nose shovel) – used for digging loose soil.

Splitting Wedge – used for splitting cedar. An axe is not recommended for safety reasons.



Figure 18: The McLeod is a multipurpose tool that acts as a rake, blade and tamper.

Ten Gallon Pail – effective for transporting soil and rocks over any terrain.

Wheelbarrow – effective for transporting soil and rocks over easier terrain.

Specialty Tools

Chainsaw – used for falling trees and preparing lumber for construction of structures. Chainsaw use requires DNV authorization, completion of a chainsaw safety course and Chainsaw specific personal protective equipment (PPE): work gloves, safety glasses, chaps, steel toe boots, hardhat and hearing protection.

Rock Drill and Rock Chisels – used for splitting larger rocks to use in trail construction. Rock drill requires a power source, usually a generator, and can be an efficient means of creating valuable trail building materials. Operator experience and specific personal protective equipment (PPE) required: work gloves, safety glasses, steel toe boots, hardhat and hearing protection.

Rolling Packer – A walk-behind roller usually filled with water used to compact the trail tread; only effective on semi-smooth to smooth trails.

Vibrating Packer - A gas powered walk-behind packer used to compact the trail tread; only effective on semi-smooth to smooth trails with vehicle access.

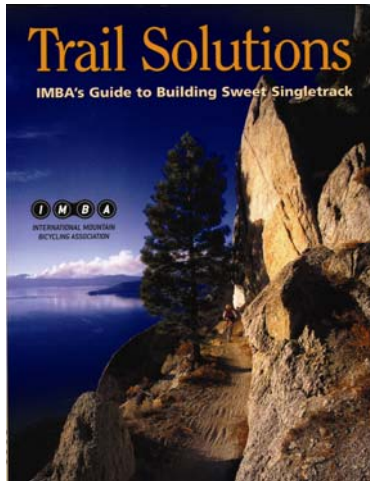
Zip line bucket system – a system consisting of a steel static line and bucket carrier on pulleys that is very effective and efficient mode of moving large volumes of soil over larger distances with less impact. Excellent for transporting soil from large burrow pits and imported soil stockpiles. This system may be augmented with a vehicle or winch to carry loads up hill. Operator experience and safety considerations required.

IMBA 2004 – pp 105-133 provides a comprehensive review of tools appropriate for trail-building and maintenance including trail building machines.

Health and Safety and Personal Protective Equipment (PPE)

The following PPE is mandatory for DNV staff and volunteer trail workers: work gloves, boots (steel-toe encouraged), safety glasses and hard hats also encouraged. A health and safety plan should be developed and communicated to trail workers according to Workers Compensation Board (WCB) protocols with one person designated the health and safety officer for the project. A health and safety meeting shall be conducted on the onset of the project and attended by all persons on the crew.

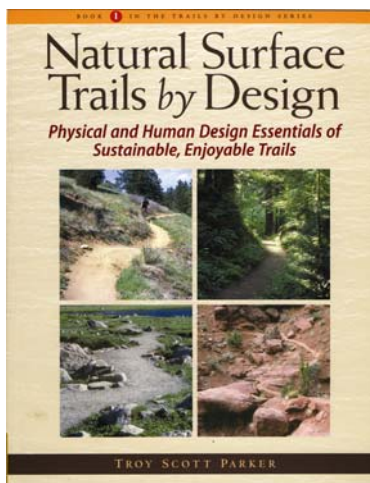
REFERENCES



International Mountain Bicycling Association. (2004) “Trail Solutions”. International Mountain Bicycling Association, Boulder, CO.

IMBA 2004 provides a resource for practical design solutions for trails and trail networks. *IMBA* is a handbook for overall trail construction and management and presents valuable proven techniques and practices. Presented in eight parts, the book covers land use partnerships, trail planning, sustainable trail design components, construction maintenance and tools of the trade.

This book is referred to in the text as *IMBA 2004*.



Parker, T. S. (2004) “Natural Surface Trails by Design”. Natureshape LLC, Boulder, Co.

Parker 2004 provides a solid foundation on the design theory of natural surfaced trails like those found within the DNV Alpine areas. Eleven core concepts affecting trail sustainability are presented. The core concepts cover both natural physical forces and human perception and habits and their interrelationship. An understanding of this key reference provides a solid foundation for persons undertaking trail construction and maintenance. In conjunction with training, this book is considered the most significant reference for realizing sustainable trails in the DNV Alpine areas.

This book is referred to in the text as *Parker 2004*.

Resort Municipality of Whistler. (2003 “Whistler Trail Standards: Environmental and Technical Trail Features”. Resort Municipality of Whistler, Whistler.



APPENDICES

APPENDIX A: GLOSSARY

Glossary of Terms for Best Management Practices and Trail Guidelines

Adverse environmental impact occurs when the quality of air, land or water substantially reduces the usefulness of the environment or its capacity to support life.

Armouring or rock armouring is the practice of arranging cobbles and boulders to create a very durable trail tread surface. Armouring is often used in areas prone to erosion, high physical stress, or as a measure to reduce impact to environmental components.

Dog-friendly refers to the design of trail components that are compatible with dog use and furthermore promotes dog use as to mitigate against off-trail impacts. Dog-friendly design is most often a consideration in bridge and structure design to be appropriate for dogs otherwise dogs may avoid the structure. This includes minimizing the grade, height and spacing between decking material.

Environmentally sensitive area (ESA) is a geographically contained area with unique physical or biological features that result in a greater susceptibility to adverse impacts. Examples of ESAs are wetlands, streams, rock outcroppings, and steep slopes.

Herpetofauna include amphibians and reptiles.

High water mark [as per the BC Riparian Area Regulation definition] means the visible high water mark of a stream where the presence and action of the water are so common and usual, and so long continued in all ordinary years, as to mark on the soil of the bed of the stream a character distinct from that of its banks, in vegetation, as well as in the nature of the soil itself, and includes the active floodplain”

Invasive plant species are plants that are not native to British Columbia and present a threat to natural ecosystems and biodiversity. A list of invasive plant species is provided in the Ministry of the Environment *Invasive Alien Species Framework for BC*

http://www.env.gov.bc.ca/wld/documents/alien_species_framework_BC_0205.pdf

Invasive plant species affecting the DNV Alpine Areas include:

- Japanese Knotweed (*Polygonum cuspidatum*).

-
- English ivy (*Hedera helix* L.),
 - Himalayan blackberry (*Rubus discolor* Weihe and Nees).
 - English holly, (*Ilex aquifolium*) – listed by Canadian Wildlife Service
 - Periwinkle (*Vinca minor*) - listed by Canadian Wildlife Service

Mature tree is of age greater than 120 years.

Non-permanent stream [as per BC Riparian Area Regulation Assessment methods definition] means a stream that typically contains continuous surface waters or flows for a period less than 6 months in duration and does not contain fish.

Old growth tree is of age greater than 250 years.

Permanent stream [as per BC Riparian Area Regulation Assessment methods definition] means a stream that typically contains continuous surface waters or flows for periods more than 6 months in duration.

Qualified environmental professional [as per BC Riparian Area Regulation] means an applied scientist or technologist, acting alone or together with another qualified environmental professional, if

- (a) the individual is registered and in good standing in British Columbia with an appropriate professional organization constituted under an Act, acting under that association's code of ethics and subject to disciplinary action by that association;
- (b) the individual's area of expertise is recognized in the assessment methods as one that is acceptable for the purpose of providing all or part of an assessment report in respect of that development proposal, and
- (c) the individual is acting within that individual's area of expertise.

Ravine [as per the BC Riparian Area Regulation definition] means a narrow, steep-sided valley that is commonly eroded by running water and has a slope grade greater than 3:1.

Top of bank [as per BC Riparian Area Regulation Assessment methods definition] means

- (a) the point closest to the boundary of the active floodplain of a stream where a break in the slope of the land occurs such that the grade beyond the break is flatter than 3:1 at any point for a minimum distance of 15 metres measured perpendicularly from the break, and

(b) for a floodplain area not contained in a ravine, the edge of the active floodplain of a stream where the slope of the land beyond the edge is flatter than 3:1 at any point for a minimum distance of 15 metres measured perpendicularly from the edge.

Top of ravine bank [as per the BC Riparian Area Regulation definition] means the first significant break in a ravine slope where the break occurs such that the grade beyond the break is flatter than 3:1 for a minimum distance of 15 meters measured perpendicularly from the break, and the break does not include a bench within the ravine that could be developed.

Riparian area [as per the BC Riparian Area Regulation definition] means a streamside protection and enhancement area (SPEA).

Riparian assessment area [as per the BC Riparian Area Regulation definition] means

(a) for a stream, the 30 meter strip on both sides of the stream, measured from the high water mark;

(b) for a ravine less than 60 meters wide, a strip on both sides of the stream measured from the high water mark to a point that is 30 meters beyond the top of the ravine bank, and

(c) for a ravine 60 meters wide or greater, a strip on both sides of the stream measured from the high water mark to a point that is 10 meters beyond the top of the ravine bank”.

Streamside protection and enhancement area [as per the BC Riparian Area Regulation definition] means an area:

(a) adjacent to a stream that links aquatic to terrestrial ecosystems and includes both existing and potential riparian vegetation and existing and potential adjacent upland vegetation that exerts an influence on the stream, and

(b) the size of which is determined according to this regulation on the basis of an assessment report provided by a qualified environmental professional in respect of a development proposal.

Technical Trail Feature (TTF) is an obstacle be it natural, man-made or a combination of natural and man-made that require negotiation by a trail user. Examples of TTFs include an elevated bridge, rock face, or drop off.

Valued Ecosystem Components are ecological features or ecosystem components that are of special consideration due to sensitivity to human impact. VECs that were considered in planning for Fromme Mountain included:

(a) Riparian areas, based on minimum setback requirements.

(b) SARA/Red and Blue listed species identified for the area.

-
- (c) Old growth forest ecosystems, especially in the resource management zones.
 - (d) Species and vegetation structural diversity.

Vernal Pool is an ephemeral wetland (temporary pools of water), usually devoid of fish, and thus allow the safe development of natal amphibian and insect species.

Wetland means land that is inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal conditions does support, vegetation typically adapted for life in saturated soil conditions, including swamps, marshes, bogs, fens, estuaries and similar areas that are not part of the active floodplain of a stream. Wetlands are considered “streams” under the BC Riparian Area Regulation except when the wetland does not support fish or drain into a watercourse that supports fish.

APPENDIX B: CONSULTATION MATERIALS AND SUMMARIES

LIST OF CONSULTATIONS

**Fromme Mountain Stakeholder Workshop #1, March 1st
2007:**

**Fromme Mountain Stakeholder Workshop #2, May 24th
2007**

Alpine Recreation Reference Group (ARRG), June 7th 2007

Fromme Mountain Open House, September 27th 2007

FROMME MOUNTAIN STAKEHOLDER WORKSHOP # 1

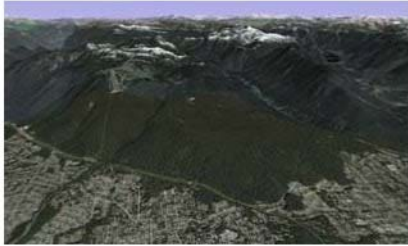
- Agenda
- Presentation Materials
- Hand-outs
- Summary Results

Agenda

TIME	TOPIC
6:30PM	Welcome and Project History
6:45PM	Evening instructions
6:50PM	Breakout Session I
7:35PM	Breakout Session II
8:20PM	Breakout Session III
9:00PM	Report Back
9:25PM	Wrap Up
9:30PM	Close

Presentation Materials

Fromme Mountain Trail Classification Plan Stakeholder Workshop March 1, 2007



Workshop Outline

1. Welcome
2. Project background and work completed to date
3. Today's key outcomes:
 - Identification and confirmation of key 'focus' areas
 - Identification and confirmation of proposed Valued Ecosystem Components (VECs)
 - Identification and confirmation of proposed Valued Community Components (VCCs)
 - Confirmation of map trail names and locations

Trail Sustainability Evaluation

- Primarily a field evaluation conducted by Bear Environmental
- Conducted upon completion of the Ecological Evaluation
- Application of the Trail Sustainability Evaluation Form



Trail Sustainability Evaluation

- Evaluations will capture information from four components key to trail sustainability:
 - User Experience
 - Biophysical Impact
 - Erosion
 - Management Considerations
- Evaluations will be refined pending stakeholder and staff input and the findings of the Ecological Evaluation.

Focus Areas

- Focused on "areas of concern" identified by the ecological evaluation, stakeholders and DNV staff.
- Preliminary Focus Areas Identified:
 - Trails within the Mosquito Creek Preservation zone.
 - Preservation Zone boundary west of Mosquito Creek.
 - Trails located in areas with slopes > 50%.
 - Trails crossing/adjacent to riparian areas.

Biological Assesment Rationale

Rationale Recap

This form of Ecosystem Evaluation will:

1. Provide a common platform to resume stakeholder discussions with an increased capacity; and
2. Provide an understanding of the Study ecosystem ensuring transparency in the process and the opportunity for consensus building.



METHODOLOGY

Once trails for decommissioning and retention have been identified our Methodology for assessment will include as follows:

1. Assess features associated with the Study Area that are required by the Department of Fisheries and Oceans (DFO) in a scoping document; and
2. Following the field verification surveys, all drainages for the Study Area will be cross-referenced with existing information and classified as sensitive or not based on DFO criteria and be focused on applicable VECs.

Wildlife Survey

Wildlife corridor integrity considered important factor in the decommissioning or addition of trails.

1. Wildlife ratings for VECs and for planning and the utilization of habitats sustained within the Study Area will be performed
2. Of particular concern will be the identified VECs
3. Information for field data will be assessed from areas such as:
 - i. Existing information presently and historically, will be identified by site visits;
 - ii. Through historical sightings collected from organizations like the Vancouver Natural History Society (VNHS), other environmental groups, and stakeholder consultation.

Wildlife Survey (continued)

4. Presence/non-detection methodology, samples of representative habitat/vegetation polygon structure will be delineated confirmed and/or assessed for wildlife utilization (i.e. breeding, resting and migrating) using as much as possible Resource Inventory Committee Protocols.
5. Information collected will provide a qualitative measure of wildlife species use and diversity, relative to daily surveys, and will allow for a relatively accurate assessment of wildlife use by cross-referencing habitat structure with wildlife life requisites.

Wildlife Survey (continued)

6. Use Habitat/Vegetation Survey to assess species presence for habitat/trail under scrutiny.
7. Provide a rating for each habitat and its significance, 0-100% occurrence for VECs life requisites (i.e., breeding, resting and migrating) using BC Wildlife Habitat Rating Standards" (Version 2.0, 1999)

BENEFITS OF METHOD

1. Provides a sound logical assessment of its significance to wildlife on a "site" and "site-in context" basis;
2. Evaluates a study site's significance as a whole (corridor system); and
3. Its function in the landscape as a smaller component of the overall ecosystem for wildlife

Hand-outs

BREAK OUT QUESTIONS

TABLE ONE: Identify and confirm key focus areas. *Criteria is not only environmental.*

- Are there additional focus areas? Where and why?

Key focus areas are geographical areas that require special attention due to significant environmental or community concerns.

Focus areas currently identified include (*see attached for more detailed listing*):

- Mountain View Park Wetland Area
- Baden Powell Trail
- Preservation Zone boundary west of Mosquito Creek due to ecological sensitivity, trail density and location adjacent to multi-purpose recreation zone
- Trails within the Mosquito Creek Preservation zone.
- Trails adjacent/crossing riparian areas
- Trails located in areas with slopes >50%
- Areas and trailheads adjacent to residential neighbourhoods.
- Trails on private property

TABLE TWO: Identify and confirm proposed Valued Ecosystem Components (VECs). (*See attached for more detailed listing*)

- Are there additional VECs that should be considered?
- Why are they important?
- Please list in order of priority.

VECs are ecological features or ecosystem components that are of special consideration due to sensitivity to human impact.

VECs currently include, listed in order of priority:

- Riparian areas (based on min DFO setback requirements per Streamside Protection Regulation)
- Sara/Red-Blue listed species identified for the area
- Old growth forest ecosystems, specially in the resource management zones
- Species and vegetation structural diversity

TABLE THREE: Identify and confirm Valued Community Components (VCCs). (*See attached for more detailed listing*)

- Are there additional Valued Community Components?
- Why are they important?
- Please list in order of priority.

VCCs are community issues or concerns that need to be planned for in the creation of best management practices and trail classification.

VCCs currently include:

- Trail use has low environmental impact
- Trail user experience is preserved
- Trails are sustainably built and safe to use
- There is a positive trail user/resident interface
- Trails provide an economic benefit
- Trails provide educational and interpretive benefits
- Reporting mechanisms are in place to inform DNV about trail conditions
- Volunteer stewardship is actively managed in keeping with the above VCCs and VECs.
- Historical artifacts are preserved
- Private property boundaries are respected

Species-at-risk to be identified on Mt. Fromme

Y/N	Common Name	Y/N	Common Name	Y/N	Common Name
	American beaver		Hermit thrush		Solitary vireo
	American dipper		House finch		Song sparrow
	American goldfinch		Hutton's vireo		Spotted towhee
	American robin		Little brown myotis		Steller's jay
	Anna's hummingbird		Long-toed salamander		Striped skunk
	Bald eagle		MacGillivray's warbler		Swainson's thrush
	Band-tailed pigeon		Mallard duck		Tailed frog
	Barn swallow		Marten		Three-toed woodpecker
	Barred owl		Mink		Townsend's big-eared bat
	Bewick's wren		Mourning dove		Townsend's vole
	Big brown bat		Mule deer		Townsend's warbler
	Black bear		Nashville warbler		Tree swallow
	Black-capped chickadee		North American opossum		Trowbridge's shrew
	Black-headed grosbeak		Northern alligator lizard		Vagrant shrew
	Black-tailed deer		Northern flicker		Varied thrush
	Blue grouse		Northern flying squirrel		Violet-green swallow
	Bobcat		Northern pygmy owl		Warbling vireo
	Brewer's blackbird		Northern saw-whet owl		Western garter snake
	Brown creeper		Northwestern crow		Western red-backed salamander
	Brown-headed cowbird		Northwestern garter snake		Western screech owl
	Bushtit		Northwestern salamander		Western tanager
	California myotis		Orange-crowned warbler		Western toad
	Canada goose		Pacific jumping mouse		Western wood-pewee
	Cedar waxwing		Pacific treefrog		White-crowned sparrow
	Chestnut-backed chickadee		Pacific-slope flycatcher		Willow flycatcher
	Coast mole		Pileated woodpecker		Wilson's warbler
	Common garter snake		Pine siskin		Winter wren
	Common raven		Porcupine		Wolverine
	Common shrew		Purple finch		Yellow warbler
	Common yellowthroat		Purple martin		Yellow-rumped warbler
	Cooper's hawk		Raccoon		Yuma myotis
	Cougar		Red fox		
	Coyote		Dusky shrew		
	Creeping vole		Red squirrel		
	Dark-eyed junco		Red-breasted nuthatch		
	Deer mouse		Red-breasted sapsucker		
	Douglas squirrel		Red-legged frog		
	Downy woodpecker		Red-tailed hawk		
	Ensatina salamander		Red-winged blackbird		
	Fox sparrow		Rock dove		
	Golden-crowned kinglet		Rough-skinned newt		
	Golden-crowned sparrow		Ruby-crowned kinglet		
	Gray jay		Ruffed grouse		
	Great horned owl		Rufous hummingbird		
	Hairy woodpecker		Rufous-sided towhee		
	Hammond's flycatcher		Snowshoe hare		

Summary Results

OVERVIEW

On March 1st a stakeholder workshop was held for Fromme Mountain. The aim was to secure additional information on ecosystem and community values important to the creation of a trail classification system and best management practices.

Participants were also asked to identify key focus areas where they felt significant planning and assessment attention should be paid. Invitations were sent to over 75 stakeholder groups. Approximately 22 participants attended.

Good discussions were had at the break-out tables. Many values were confirmed, and additional information on the state of the trails was secured. An appreciation of the many benefits offered by Fromme Mountain – both ecological and recreational – was clearly expressed.

The intention of the evening was to continue to build on an existing information base. All previously collected information will be considered in the planning work for Fromme Mountain, **in addition to** the information collected on March 1st. Participants were provided with a detailed listing of information that will continue to be used in the Fromme Mountain process.

Information gathered from the following studies will also be included in planning work:

- Diamond Head report
- BEAR mapping and corridor information from Bear Hazard Assessment (2006)
- Grouse Mountain trail evaluation

For those interested in reviewing the Diamond Head report, it can be found at: <http://www.dnv.org/article.asp?c=988> and select Ecosystem Analysis button.

A detailed summary of the information shared throughout the evening follows.

THREE KEY DISCUSSION TOPICS

ONE: Identify and confirm key focus areas. Are there additional focus areas? Where and why?

While some new focus areas were identified, some of which fall under Valued Ecosystem Components and Valued Community Components listed below, many areas discussed were a confirmation of those that had been presented in past focus groups, meetings and consultations.

Key focus areas are geographical areas that require special attention due to significant environmental or community concerns.

- Focus areas previously identified:
- Upper area above 7th and east
- Baden Powell Trail

-
- Areas west of Pink Starfish
 - Service road area, around gates and east to Mt. View Park
 - Wetland areas including Mountain View Park Wetland
 - Preservation Zone boundary west of Mosquito Creek due to ecological sensitivity, trail density and location adjacent to multi-purpose recreation zone
 - Trails within the Mosquito Creek Preservation zone
 - Trails adjacent/crossing riparian areas
 - Trails located in areas with slopes >50%
 - Areas and trailheads adjacent to residential neighbourhoods
 - Trails on private property

New focus areas identified:

- Trail access via the Mosquito Creek Trail. Bring bikers up the Mosquito Creek Trail and use Powerline to facilitate access to the trail network, dispersing bottleneck at Borthwick Rd.
- The entire second growth forest of Fromme Mountain as it will change into an old growth forest through succession. Trail network should be minimized to reduce impact on forest maturation.

Previously identified focus areas confirmed:

- Mountain View wetland
- Baden Powel Trail
- Mosquito Creek at Pipeline intersection
- Private properties (due to vandalism; fire; liability)
- Old growth areas
- Lower Griffin just up from McNair Dr.
- Additional focus areas listed under VECs and VCCs

TWO: Identify and confirm proposed Valued Ecosystem Components (VECs).

Are there additional VECs that should be considered? Why are they important?

VECs are ecological features or ecosystem components that are of special consideration due to sensitivity to human impact.

Much discussion was had on the locations of various VECs, with wildlife sightings, old growth stands, and drainage problems identified. New VECs included emerging geographical features due to changes in weather patterns and their influence on the local landscape.

VECs previously identified fell into 4 main categories:

1. Riparian areas/Watercourses
2. Sara/Red, blue-listed species
3. Old growth forest ecosystems
4. Species and vegetation structural diversity

New VECs:

- Small canyons resulting from intensified drainage should be considered due to the interesting geological and soil information newly exposed on ravine/canyon walls. Canyons are located north of Mt. Hwy above the 1st and 2nd switchbacks.
- Blow-down to be protected/left in place
- Bird feeding areas; habitat for songbirds.
- Ecotones

Previously identified VECs confirmed

- Riparian/drainage areas (hydrology study along service road)
- Species at risk: red-legged frogs are breeding at Mt. View Wetland
- Old growth areas
- Species and vegetation structural diversity:
- Invasive species need to be managed. Holly infestation located just south of old Mt. Hwy between Pink Starfish and Granny's
- Ash grove northwest of Mosquito Creek is a bear feeding area.
- Establish a historical species list
- Assess impact of commercial dog walking on species diversity/wildlife sightings
- Logs, snags, wildlife trees, deciduous trees

TABLE THREE: Identify and confirm Valued Community Components (VCCs). Are there additional Valued Community Components? Why are they important?

VCCs are community issues or concerns that need to be planned for in the creation of best management practices and trail classification.

A great deal of discussion was had around VCCs previously listed, confirming their importance. Detail was provided on where various community concerns and values were located.

Previously identified VCCs were numerous, and fell into 4 main categories:

-
- Trail use has low environmental impact
 - Trail user experience preserved
 - Trail safety
 - Positive trail user and resident interface

Previously identified community concerns confirmed:

1. Trail use has low environmental impact
 - Off-leash dog impacts around Mt. View Wetland
 - Night-riding of trails to be managed/controlled. Closure notices to be issued and enforced. Close Mt. View Park gate at night.
 - Reduce the number of trails (mountain biking, etc.)
 - Adaptive management approach for trail network recommended.
 - Trail density to be evaluated with consideration given to habitat protection, and reducing habitat fragmentation/habitat islands; small invertebrates that tend not to cross trails; increased spread of invasive plants
 - Mt. View Park should be a limited recreation zone, ideally a preservation zone. Decommission trails in this area.
 - Garbage cans required at trailheads
 - Manage erosion
 - on biking trail extending north from 3rd switchback on Mt. Highway
 - Collapsed drainage north of Mt. Hwy, running east-west past the switchbacks.
 -
2. Trail user experience preserved
 - Provide good signage, including easy to read for international visitors
 - Investigate multi-use
 - Provide easy access to the Baden Powell from the lower reaches
 - User education required – berries for wildlife should not be picked
 - Broken structures should be removed. E.g. around the powerline past the park.
 - Hikers have had no conflict with bikers; manage conflict between biking and hiking at trailheads and on steep slopes
 - Rails for hikers required on steep trails
 - Extend trail network to Seymour

-
- Trails that used to be hiking trails are now used as mountain biking trails.

Trail safety

- Portions of Baden Powell, and hiking trail running north of Baden Powell, west of Mosquito Creek, are dangerous due to cliffs/steep drop offs.
- Designate ride/dismount areas on trails
- Positive trail user and resident interface

Provide changing area and bathrooms

- Signage for private property; manage trails with respect to private property lot lines
- Create green buffer between trails and residential areas
- Parking concerns:
 - by-laws need to be enforced, and parking zones made permanent
 - Disperse parking, trail heads to avoid traffic congestion at Braemar Park
 - Parking proposed on St. Georges Ave. and St. Mary's Ave. Also on the Powerline Trail, west of the St. Mary's trail intersection; near Braemer
 - Concern that parking lots may encourage bus loads of people
 - Promote use of existing parking lots – schools, Safeway, etc.

TRAIL ADDITIONS/CORRECTIONS

- McKay Creek incorrectly labeled
- Per Gynt incorrectly classified as multi-use. Hiking only.
- Unnamed trail running up east side of Mosquito Creek, including the far west branch, incorrectly labeled as biking trail. Hiking only.
- Multi-use trail runs parallel and North-Northwest to Lower Griffin. Source of silt into Mt. View Park.
- Trail extending north off last switchback on Mt. Hwy is/should be hiking trail only.
- St. Georges is/should be hiking only.
- Proposed climbing route could be a multi-use trail. Currently used as such.
- Additional road (worked on by Grouse Mt. Resort?) runs west of proposed climbing route to the ski resort.

-
- Multi-use trail west of McNair, connecting to the Baden Powell, has been decommissioned.
 - ‘Trail decommissioned’ sign on trail running north from Mosquito Creek incorrect. Used by hikers and bikers.
 - Lillooet Road incorrectly labeled. Should be Seymour Pathway.

ADDITIONAL TRAIL INFORMATION/RECOMMENDATIONS

- Northernmost end of proposed climbing route has waterfalls and no bridge.
- ‘Killer Trail’ to become multi-use (including horseback riding?)
- Wildlife sightings:
 - Bear sighting on old Mt. Highway between 2nd and 3rd switchback;
 - Cougar sighting on old Mt. Highway north of Proposed Staging Area #2
- Bottom of ‘Ladies Only’, south of Baden Powell, as a new link and connector to McNair. Parking and staging area recommended.
- Use cleared land for filtration plant as potential parking space
- McKay creek wash out on hiking trail north of Baden Powell intersection
- Squatters are located north of Baden Powell between ‘Bobsled’ and ‘Grannies’
- Re-route BCMC as used by people going through it to the Grouse Grind
- Lower portion of Cedar Trail also used by mountain bikes. Some concern over bikers using portions of Cedar Trail.
- Unnamed trail north of Kirkford is very steep and not likely used for biking
- Old GVRD service road extending south of Lower Griffin could be used as a bike access point. Used by children in the winter for tobogganing.
- Recommend a trail user fee. Funds to be used for maintenance purposes. Maintenance to be shared between DNV; GVRD; others.
- Recommend decommissioning all trails east of Cedar Mill Trail due to steep slopes
- Area north of Upper Griffin is washed out
- Make Granny’s an intermediate, multi-use trail to take load off Mt. Hwy
- Make Baden Powell west of Upper Boundary to Mosquito Creek a more robust trail, easier to use for mountain bikes to help disperse bike traffic.
- Mosquito Creek trail should be hiking only due to steepness
- Squeaky Elboy infrequently used
- Dump trail hard to find.

-
- Most people don't ride uphill from 7th Secret
 - Northernmost end of proposed climbing route has waterfalls and no bridge.
 - A forest management strategy for Fromme needs to be implemented
 - A small portion of the network should be disabled access
 - Daytime commercial use and programming should be limited or eliminated (i.e. recreational Bike Camps)
 - Boundaries of management zones may need to soften and follow geography/natural systems/features of the mountain
 - Change label on Management Zone Plan to include reference to 'private' lands and not just District owned lands
 - Locate and integrate a report on eagles for the western region of the study area
 - BC Parks website has a section on Best Management Practices
 - It was recommended to contact people with specific information that would be willing to attend a field reconnaissance trip to point out specific zones

FROMME MOUNTAIN STAKEHOLDER WORKSHOP #2

May 24th 2007

- Agenda
- Presentation Materials
- Hand-outs
- Summary Results

Agenda

Workshop Outline

- | | |
|-----------------------------------|------------------|
| 1. Welcome and project background | Barry Potvin |
| 2. Summary of work to date | Consultant team |
| 3. Summary of recommendations | Consultant team |
| 4. Map Reviews | All Participants |
| 5. Feedback | All Participants |

Wrap up by 9:30 pm

Presentation Materials

**Fromme Mountain Trail
Classification Plan
Workshop # 2**

May 24, 2007




Workshop Outline

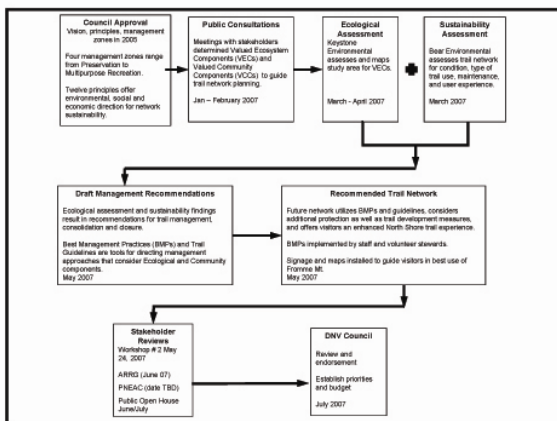
1. Welcome and project background	Barry Potvin
2. Summary of work to date	Consultant team
3. Summary of recommendations	Consultant team
4. Map Reviews	All Participants
5. Feedback	All Participants

Wrap up by 9:30 pm

Presentation Outline

1. Overview of the process to date
2. Ecological assessment summary
3. Trail sustainability evaluation summary
4. Recommended trail network
5. Recommended trail management
6. Working with Best Management Practices
7. Managing with sustainability guidelines in mind

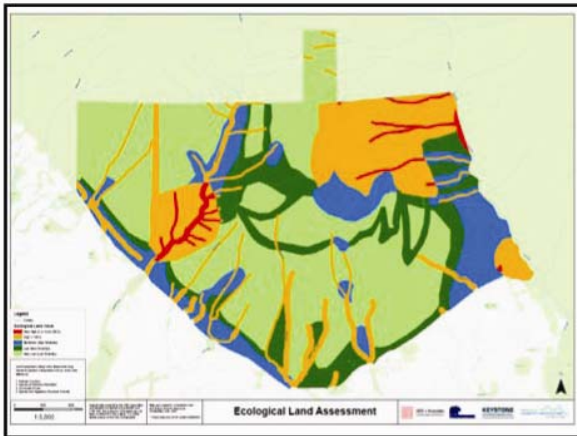
Alpine Area Recreation Strategy Project Flow Chart



Ecological Assessment

The following Ecological Land Assessment map was created based on Valued Ecosystem Components (VECs)

- VECs have been defined through collaboration and consultation with stakeholders. They include:
 - 1) Riparian corridors
 - 2) Species at risk/ Red and blue listed
 - 3) Old Growth Forest
 - 4) Structural Diversity - High, Moderate and Low significance on species numbers
- If 2 VECs intersected, then the area was considered as having Very High habitat value
- There are some broad assumptions



Trail Sustainability Evaluation

- Methodology developed from *Natural Surface Trails by Design* [Parker 2004] and the core concepts for trail sustainability.
- Primarily a field evaluation conducted by Bear Environmental
- Recorded on a Trail Sustainability Evaluation Form

Pikeville Mountain Trail Classification Project	
Sample Evaluation Form	
1. Trail Section Number	Trail Assessment Date
2. Name	Assessor
3. Trail Status	Trail Mileage
4. Distance	Trail Type
5. Trail Type	Trail Use - (Hike Only, Dog Run, etc.)
6. Planned Frequency of Use	Trail Use - (Hike Only, Dog Run, etc.)
7. Trail Use Schedule	Trail Use - (Hike Only, Dog Run, etc.)
8. Trail Difficulty	Trail Use - (Hike Only, Dog Run, etc.)
9. Length	Trail Use - (Hike Only, Dog Run, etc.)
10. Elevation	Trail Use - (Hike Only, Dog Run, etc.)
11. State of TN	Trail Use - (Hike Only, Dog Run, etc.)
12. Number of Trails	Trail Use - (Hike Only, Dog Run, etc.)
13. Condition of Trail	Trail Use - (Hike Only, Dog Run, etc.)
14. Accessibility of Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
15. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
16. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
17. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
18. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
19. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
20. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
21. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
22. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
23. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
24. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
25. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
26. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
27. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
28. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
29. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
30. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
31. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
32. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
33. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
34. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
35. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
36. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
37. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
38. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
39. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
40. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
41. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
42. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
43. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
44. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
45. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
46. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
47. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
48. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
49. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)
50. Trailhead	Trail Use - (Hike Only, Dog Run, etc.)

Trail Sustainability Evaluation

1) User Experience

- Level of Use
- Facilitation of multiple users
- Facilitation of multiple levels of use
- Incorporation of landscape
- Harmony (appropriateness with physical environment, flow)
- Playfulness (meets user's expectations and needs)
- Efficiency (adequacy for desired pace and connectivity)
- Safety

Trail Sustainability Evaluation

2) Biophysical Impact

- Impact to trees and vegetation
- Impact to riparian areas and watercourses
- Soil displacement

Trail Sustainability Evaluation

3) Erosion

- Tread degradation
- Fall-line vs. contour orientation
- Soil displacement
- Trail watershed
- Surface runoff issues

Trail Sustainability Evaluation

4) Management Considerations

- Accessibility for maintenance
- Abundance of appropriate native materials for maintenance
- Level of stewardship
- Tread sustainability
- Structure integrity

Trail Evaluation Form

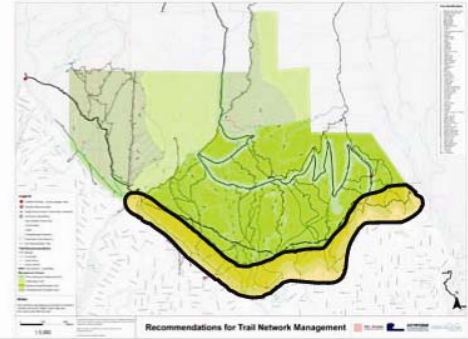
Fromme Mountain Trail Classification Project

Trail Evaluation Form

1	Trail Section Number	
2	Section	
3	Trail Name	
4	Trail Type	
5	Management Responsibility of User	
6	Trail Use Summary	
7	Trail Difficulty	
8	Length	
9	Gradient	
10	Type of View	
11	Number of Views	
12	Number of Views	
13	Scenic Quality of Landscape	
14	Historical	
15	Recreational	
16	Ecological	
17	Trail Degradation	
18	Trail Maintenance	
19	Adjacent Property	
20	Proximity to Riparian Areas	
21	Proximity to Forest Areas	
22	Proximity to Wetlands	
23	Proximity to Sensitive	

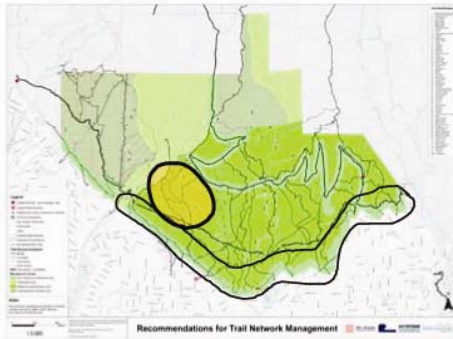
Recommended Trail Network

The interface



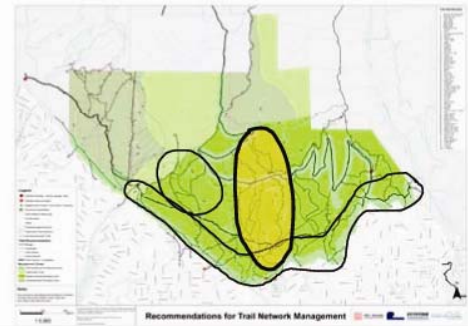
Recommended Trail Network

Protection a priority on the west side of Fromme Mt. study area



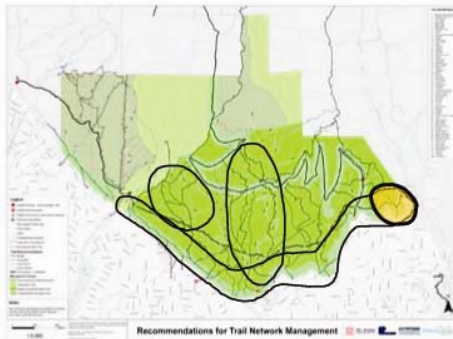
Recommended Trail Network

Fromme Mt. as a premier mountain biking destination for local residents and regional visitors



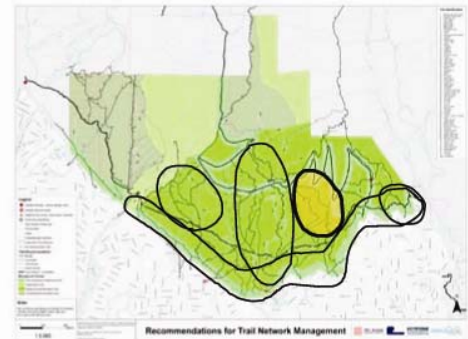
Recommended Trail Network

Protecting Species at Risk through trail design and BMPs



Recommended Trail Network

Future considerations for increasing sustainable recreation opportunities



Trail Guidelines

The Guidelines adapt existing models for trail guidelines to the specific circumstances of DNV, to create a document that clarifies principles, policies and procedures for land managers, trail workers, and the community at large.



Our Approach

- Review the available guideline/standards including LSCR, Surrey, Whistler, Rossland and IMBA
- Consider Fromme Mountain Recreation Management Zones
- Consider regional consistency (ratings, terminology, etc.)
- Consider DNV trail network

Table of Contents (Draft)

- | | |
|---|---|
| 1. Introduction and Objectives | 6. Management guidelines (maintenance, monitoring, unauthorized trail policy) |
| 2. Trail Categories Defined | |
| 3. Trail Difficulty Ratings Defined | 7. Terminology (Glossary) |
| 4. Environmental guidelines (Principals and higher level BMPs) | Appendix A - References and Recommended Readings |
| 5. Mountain Bike Technical Trail Feature Guidelines (general principles, construction techniques and materials) | Appendix B - Trail Construction and Maintenance BMPs |

What happens next?

3 stations around the room:

- Ecological Assessment map
- Management Map
- Recommended trail network

Please make comments either on the map with the mylar or make notes on the questionnaire form. (30 minutes)

Reconvene as group of the whole for clarification, feedback on trail network (90 minutes)

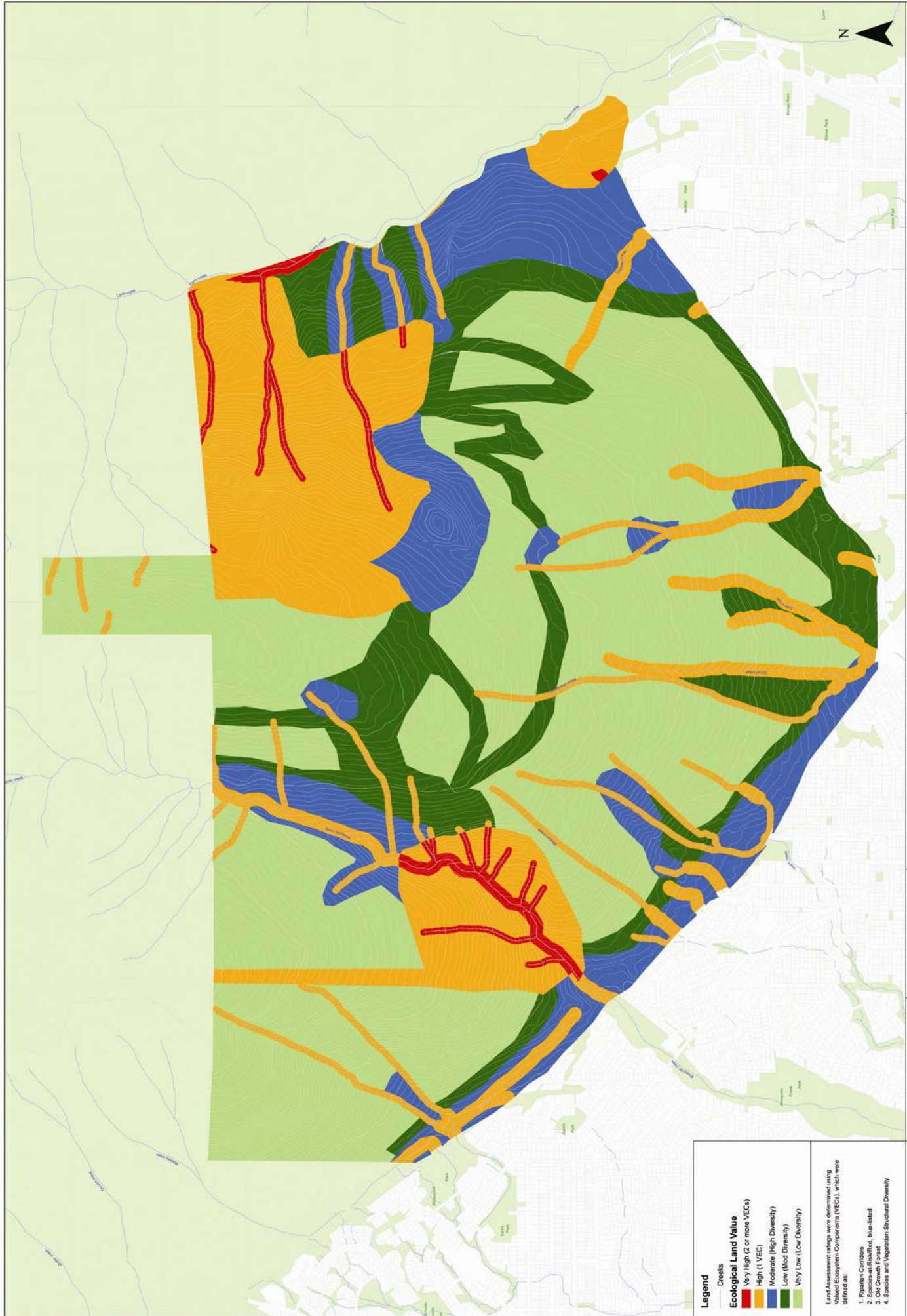


Best Management Practices Approach

- Specific to the North Shore Environment
- BMPs are grounded in the fundamental principles of sustainable trail design [Parker 2004].
- Follow a *diagnosis and cure* approach
- For each BMP the core concepts and rationale are presented followed by recommendations for mitigation

Best Management Practices Approach

- | | |
|---|--|
| 3.1 Off Trail Impacts | 3.8 Use of Native Materials |
| 3.2 Surface Water Flow | 3.8.1 Soil |
| 3.3 Tread Wear | 3.8.2 Wood |
| 3.4 Vegetation | 3.9 Technical Trail Features |
| 3.5 Environmentally Sensitive Areas | 3.10 Trail Maintenance Ecological Sensitivity Preparation |
| 3.6 Wildlife | 3.11 New Trail Construction |
| 3.6.1 Birds | 3.12 Tools |
| 3.6.2 Amphibians and Reptiles | 3.12.1 Standard Tools |
| 3.6.3 Small Mammals | 3.12.2 Specialty Tools |
| 3.7 Habitat Restoration | 3.12.3 Health and Safety and Personal Protective Equipment (PPE) |
| 3.7.1 Passive Trail Decommissioning | |
| 3.7.2 Active Trail Decommissioning | |
| 3.7.3 Trail-side Restoration | |

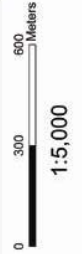


Legend

- Creeks
- Ecological Land Value**
- Very High (2 or more VECs)
- High (1 VEC)
- Moderate (High Diversity)
- Low (Mod Diversity)
- Very Low (Low Diversity)

Land Assessment ratings were determined using Valued Ecosystem Components (VECs), which were defined as:

1. Riparian Corridors
2. Species-at-Risk/Red, Blue-listed
3. Old Growth Forest
4. Species and Vegetation Structural Diversity

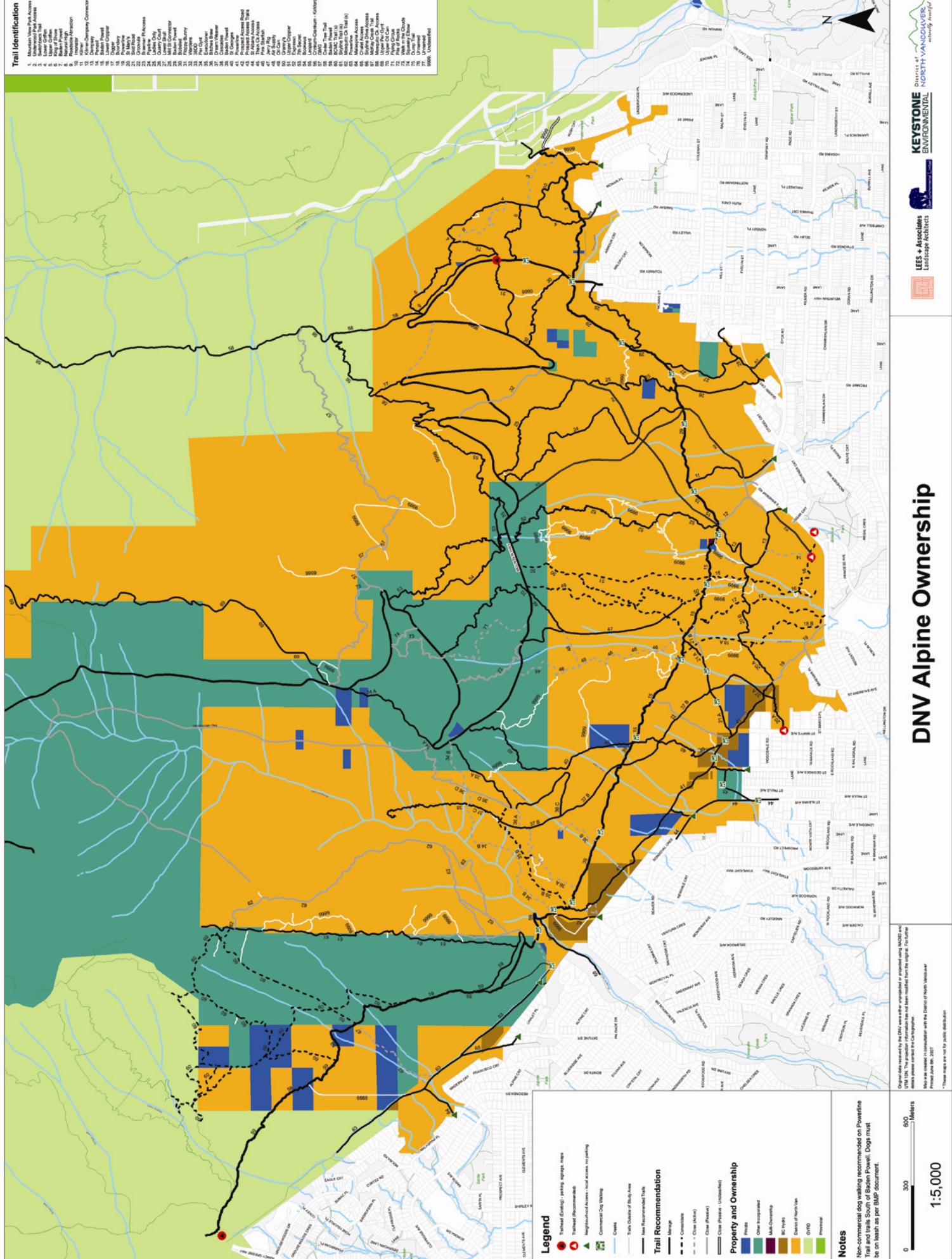


Original data received by the DNV were either UTM 10N. The projection information has not been modified from the original. For further details please contact the Cartographer.

Map was created in consultation with the City of Vancouver.
 Printed May 24th, 2007
 * These maps are not for public distribution

Ecological Land Assessment





Trail Identification

1	Alpine View Park Access
2	Alpine View Park
3	Alpine View Park
4	Alpine View Park
5	Alpine View Park
6	Alpine View Park
7	Alpine View Park
8	Alpine View Park
9	Alpine View Park
10	Alpine View Park
11	Alpine View Park
12	Alpine View Park
13	Alpine View Park
14	Alpine View Park
15	Alpine View Park
16	Alpine View Park
17	Alpine View Park
18	Alpine View Park
19	Alpine View Park
20	Alpine View Park
21	Alpine View Park
22	Alpine View Park
23	Alpine View Park
24	Alpine View Park
25	Alpine View Park
26	Alpine View Park
27	Alpine View Park
28	Alpine View Park
29	Alpine View Park
30	Alpine View Park
31	Alpine View Park
32	Alpine View Park
33	Alpine View Park
34	Alpine View Park
35	Alpine View Park
36	Alpine View Park
37	Alpine View Park
38	Alpine View Park
39	Alpine View Park
40	Alpine View Park
41	Alpine View Park
42	Alpine View Park
43	Alpine View Park
44	Alpine View Park
45	Alpine View Park
46	Alpine View Park
47	Alpine View Park
48	Alpine View Park
49	Alpine View Park
50	Alpine View Park
51	Alpine View Park
52	Alpine View Park
53	Alpine View Park
54	Alpine View Park
55	Alpine View Park
56	Alpine View Park
57	Alpine View Park
58	Alpine View Park
59	Alpine View Park
60	Alpine View Park
61	Alpine View Park
62	Alpine View Park
63	Alpine View Park
64	Alpine View Park
65	Alpine View Park
66	Alpine View Park
67	Alpine View Park
68	Alpine View Park
69	Alpine View Park
70	Alpine View Park
71	Alpine View Park
72	Alpine View Park
73	Alpine View Park
74	Alpine View Park
75	Alpine View Park
76	Alpine View Park
77	Alpine View Park
78	Alpine View Park
79	Alpine View Park
80	Alpine View Park



DNV Alpine Ownership

Notes
 Non-commercial dog walking recommended on Powertone trail and trails on Sideri Powell. Dogs must be on leash at all times.
 *These maps are not for public distribution.

0 300 600 Meters
 1:5,000

Legend

- Trailhead (starting) - yellow triangle
- Trailhead (terminating) - red triangle
- Trailhead (access) - green triangle
- Commercial Dog Walking - dog icon
- Other - blue square
- Trails Outside of Study Area - dashed line
- Non-Recommended Trails - solid line
- Recommended Trails - solid line with arrow
- Waypoint - black dot
- Contour - dashed line with elevation
- Clear (Forest) - white area
- Clear (Pasture) - light green area
- Other (Forest) - dark green area
- Other (Pasture) - light blue area
- Other (Water) - blue area
- Other (Woods) - dark blue area
- Other (Mud) - brown area
- Other (Rock) - grey area
- Other (Gravel) - yellow area
- Other (Sand) - orange area
- Other (Dirt) - red area
- Other (Ice) - white area

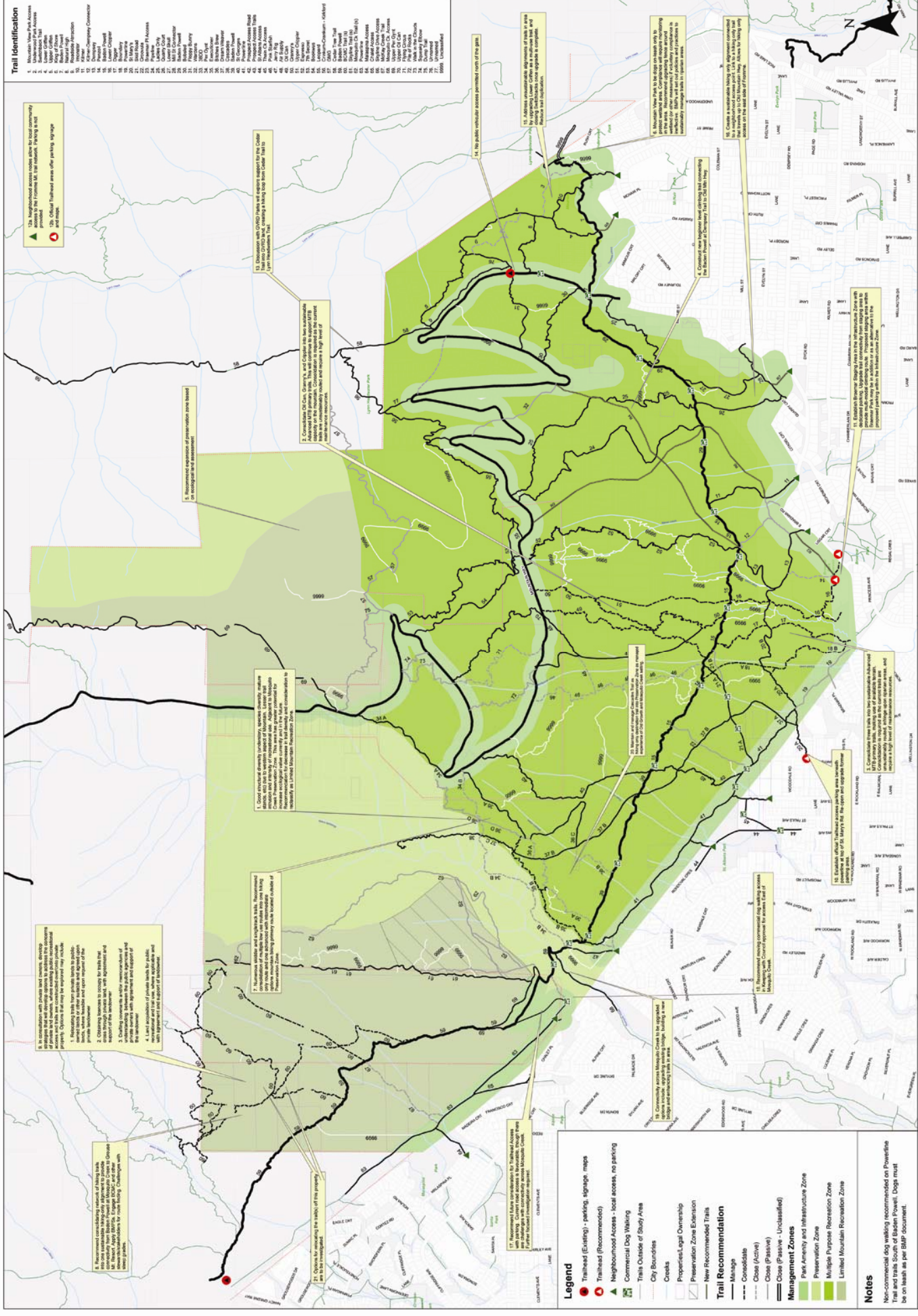
Trail Recommendation

- Waypoint
- Contour
- Clear (Forest)
- Clear (Pasture)
- Other (Forest)
- Other (Pasture)
- Other (Water)
- Other (Woods)
- Other (Mud)
- Other (Rock)
- Other (Gravel)
- Other (Sand)
- Other (Dirt)
- Other (Ice)

Property and Ownership

- Other (Forest)
- Other (Pasture)
- Other (Water)
- Other (Woods)
- Other (Mud)
- Other (Rock)
- Other (Gravel)
- Other (Sand)
- Other (Dirt)
- Other (Ice)

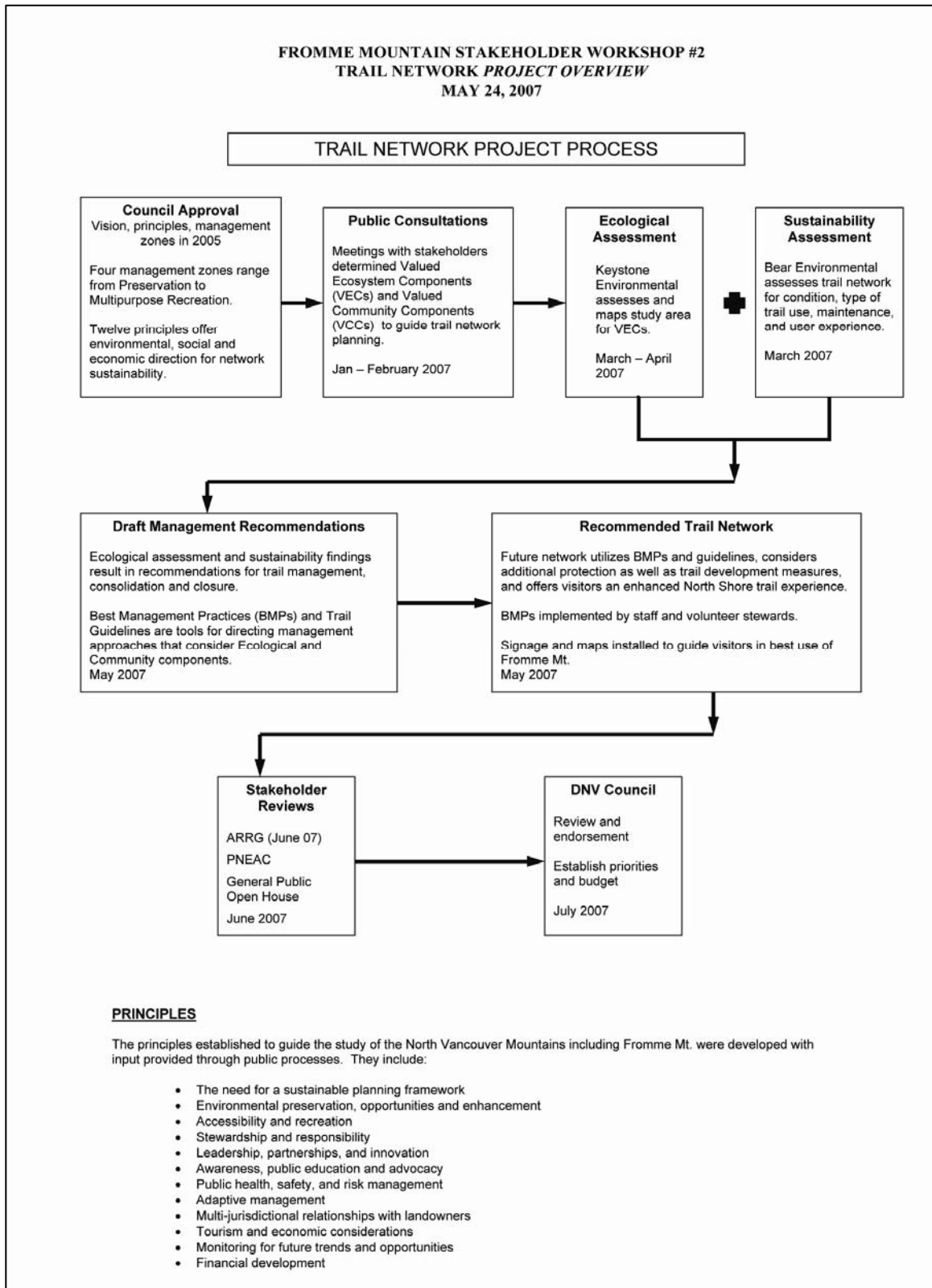
Map data provided by the DNV team or copyright or provided using data from the District of North Vancouver. All other data is the property of the respective owners. Map was created in consultation with the District of North Vancouver. Printed June 18th, 2021



Recommendations for Trail Network Management

Map was prepared by the District of North Vancouver in cooperation with the City of North Vancouver, the City of West Vancouver, and the City of Richmond. The map is intended for informational purposes only. It is not intended to be used for legal or financial purposes. The District of North Vancouver is not responsible for any errors or omissions on this map.

Hand-outs



DEVELOPING VECs AND VCCs

Through consultations with staff and community stakeholders, and keeping in mind the guiding principles above, a number of Valued Ecosystem Components and Valued Community Components were identified to provide direction to assessments of the study area. These included the following:

VECs

- Riparian areas/watercourses
- Species at risk/ Red and blue listed
- Old growth forest ecosystems
- Species and vegetation structural diversity

Structural diversity captured a number of considerations including the importance of living forest components and coarse woody debris.

VCCs

- Trail use has low environmental impact
- Trail user experience is preserved
- Trails are safe to use
- There is a positive trail (user) and resident interface.

A number of detailed considerations were captured under these four main headings ranging from the need for an accessible trail network, to appropriately located staging areas and reduced erosion and compaction on trails.

LINKING MANAGEMENT GUIDELINES AND BEST MANAGEMENT PRACTICES TO ASSESSMENT FINDINGS

The ecological assessment of the Fromme Mountain study area provided information around the location and nature of high value habitat areas. It was determined that:

- Many riparian corridors exist in the study area;
- That old growth areas exist in smaller patches and mostly away from existing trails;
- High structural diversity tends to be located in higher use areas.

How trails are managed – that is, maintenance practices on-the-ground, deciding when to close or consolidate trails, preparing and enforcing policies related to the use of forest materials on site –effectively addresses high value ecosystem components. Management practices and guidelines also address sustainable design and long term trail use.

The trail sustainability assessment of Fromme Mountain recognized that the trail network has not been planned and/or designed in a sustainable manner. It has evolved organically as a network of social trails and historic skid roads. As a consequence, almost all existing trails have significant sections of unsustainable alignments. While various trails are widely and at times intensely used, the ongoing existence of these trails have largely been as a result of volunteer maintenance. Much needs to be done to improve the sustainability of the trail network, addressing both the trail user experience, while at the same time reducing environmental impacts. In some cases, it is recommended to consolidate or close trails. In many others, it means better application of maintenance efforts.

Guidance on how best to manage the Fromme Mountain Trail Network will be included in two accompanying documents:

- **Trail Guidelines**
- **Best Management Practices.**

The Trail Guidelines provide the overarching framework for management decisions. The framework provides:

- Direction on designing trails suitable for various users, with different levels of ability
- Environmental guidelines and standards
- Principles for trail maintenance and deactivation
- Guidelines for the establishment of Mountain Bike Technical Trail features.

A sub-component to the guidelines is the Best Management Practices (BMPs) document. With mountain biking a key activity in the Fromme Mountain study area, BMPs have been written specifically for managing mountain bike use. This more detailed document illustrates how to best build and maintain trails that:

- Reduce off-trail impacts
- Manage surface water flow and tread wear
- Reduce impacts on vegetation and environmentally sensitive areas
- Better protect wildlife, birds, amphibians, reptiles and small mammals
- Restore habitat in the trail building and management process.

The BMPs also provide:

- Specific, on-the-ground guidance for how to decommission trails
- Trail-side restoration measures
- Practices for use/non-use of native materials including soil and wood
- Technical trail features practices
- new trail construction practices, and
- Ecologically sensitive trail maintenance practices.

The Trail Guidelines and Best Management practices are core documents to be used in conjunction with the individual trail recommendation maps. All these management tools should be applied within an adaptive management approach, as people continue to visit and contribute to the North Vancouver mountain experience. The Trail Guidelines and Best Management Practices will be completed in Summer 2007 and will be brought forward for further reviews.

RECOMMENDED NETWORK AND MANAGEMENT PLAN QUESTIONNAIRE

1. Do the proposed management recommendations and the proposed trail network respond to the principles approved by council?

Principles are listed as:

- Sustainable planning framework
- Environmental preservation, opportunities and enhancement
- Accessibility and recreation
- Stewardship and responsibility
- Leadership, partnerships, and innovation
- Awareness, public education and advocacy
- Public health, safety, and risk management
- Adaptive management
- Multi-jurisdictional relationships with landowners
- Tourism and economic considerations
- Monitoring for future trends and opportunities
- Financial development

2. Do you feel that Valued Ecosystem Components (VECs) and Valued Community Components (VCC's) have been addressed?

Valued Ecosystem Components	Valued Community Components
• Riparian Corridors	• Trail use has low environment impact
• Species-at-risk/Red and blue listed	• Trail user experience is preserved
• Old Growth Forest	• Trails are safe to use
• Structural Diversity	• Positive trail user and resident interface achieved

3. Do you agree in principle with a new trail to improve access to Mt. Hwy, and another new trail to offer a hiking only option on the east side of the study area?

4. Overall, what aspects of the recommendations for management and recommended trail network do you support?

5. What aspects of the recommendations for management and recommended trail network do you have concerns with? What are your concerns?

6. Do you have any additional comments for us?

Summary Results

OVERVIEW

On May 24, 2007, the Fromme Mountain consulting team presented the results of their work to date. The completed ecological assessment, management recommendations, and a profile of the recommended future trail network were provided for feedback from stakeholders.

The ecological assessment was conducted by Libor Michalak from Keystone Environmental Ltd. It provided information around the location and nature of high value habitat areas. It was determined that:

- many riparian corridors exist in the study area;
- old growth areas exist in smaller patches and mostly away from existing trails;
- high structural diversity tends to be located in higher use areas.

How trails are managed – that is, maintenance practices on-the-ground, deciding when to close or consolidate trails, preparing and enforcing policies related (for example) to the use of forest materials on site –will effectively address high value ecosystem components. Management practices and guidelines will also address sustainable design and long term trail use.

The trail sustainability evaluation of Fromme Mountain was completed by Bear Environmental. The evaluation recognized that the trail network has not been planned and/or designed in a sustainable manner. It has evolved organically as a network of social trails and historic skid roads. As a consequence, almost all existing trails have significant sections of unsustainable alignments. While various trails are widely and at times intensely used, the ongoing existence of these trails have largely been as a result of volunteer maintenance. Much needs to be done to improve the sustainability of the trail network, addressing both the trail user experience, while at the same time reducing environmental impacts. In some cases, it has been recommended to consolidate or close trails. In many others, recommendations are for better application of maintenance efforts.

It was noted that guidance on how best to manage the Fromme Mountain Trail Network will be included in two accompanying documents:

- Trail Guidelines
- Best Management Practices (BMPs)

For the workshop, recommendations for management were presented visually with a map. These recommendations were derived by combining the ecological assessment with the sustainability evaluation of the current trail network. In addition to

determining which trails needed active management, consolidation or closure, several new trails were recommended for hiking and multi-use.

The recommended trail network takes into consideration management recommendations, and rates the new network according to a variety of uses (hiking, biking, multi-use) and varying degrees of difficulty (beginner/intermediate/advanced/extreme).

Participants in the workshop were asked for their feedback on the three main components:

- Ecological assessment
- Recommendations for management
- Recommended trail network

Summary of Large Group Discussion

As part of a large group discussion, participants were asked to identify what they supported or particularly liked about the recommendations to date. Comments included:

- Recognition of Mosquito Creek as a valued ecosystem
- Proposed alternate access points
- Proposed new sustainable multi-use route to connect with Old Mountain Hwy
- Alternate trails where possible when closures/consolidation were recommended
- Public education regarding private land ownership
- Classification system is comprehensive
- Recognition of the core trail network as having international significance

Participants were also to identify their concerns. Find below detailed recommendations, requests and questions posed by those in attendance.

It was noted that in many cases, concerns of the participants will be addressed through the BMPs and Guidelines, which are currently underway. The consulting team's recommendations were to address community needs and ecological impacts. While a balance can be difficult to achieve, proposed changes to the current trail network has significantly increased habitat protection on Fromme Mountain, while simultaneously providing for improved community access to trails that offer better recreational experiences. There were several comments made with regards to trails on the east side of Fromme Mountain, and concern with mountain-biking as an activity in the study area. Participants were reminded that much of the area has been approved by council as a Multipurpose Recreation Zone. The intent of the

Classification Plan has been to develop a sustainable trail network within the zones approved by Council. In two cases, due to new information regarding ecological sensitivity, recommendations have been made to extend Preservation Zone boundaries.

Feedback regarding trails on private property was offered as a reminder that trail re-routing still needs to occur in the northwest corner of the study. It continues to be a recommendation by the consulting team that trails in this area need additional consideration and stakeholder involvement in determining best routes up the mountain.

Recommendations, requests and questions posed:

- Trails need to be diverted away from private property.
- There is concern that second growth forest is identified as having the lowest value. Team clarified that this is a relative ranking and while rated the lowest amongst selected criteria, it does have value.
- Re-planting of cedars at a site level is required.
- Reminder that BMPs should address restoration. Team clarified that this will be the case. The application of BMPs and Guidelines will be brought forward by staff.
- Reminder that tree removal for technical riding structures may still occur and will need to be addressed.
- Enforcement is required to effectively implement recommendations. DNV clarified/confirmed that some additional enforcement has already been put in place.
- Reminder that recommendations need to be adapted to account for changing technology and site conditions.
- Seasonal closures were requested for special protection of species in peak dispersal periods. This is particularly an issue around Mt. View Park and pond. A focused management approach on a trail by trail basis was suggested.
- Active management is recommended given year round, full day use of Fromme Mountain.
- Parking issues exist in the Mt. Hwy area. The North side of Braemar as a proposed parking area was in the 2007 Capital Plan. DNV active management will help address parking issues.
- Request for rationale behind changes to Imonator and Roadside Attraction. It was clarified that Roadside Attraction is a straight, featureless trail, and that in the interest of reducing trail density in the area, was a good candidate for closure. Imonator was targeted as a trail requiring upgrades as it offers a good trail experience but needs improvements to maintenance practices.
- Climate change needs to be incorporated into the management of trails.

-
- Proposed beginner MTB area between 2nd and 3rd switchbacks should be by the 1st switchback to bring the area closer to new riders. King's Crawl should be retained for beginner riders.
 - There is inadequate protection around Mt. View pond. There are still too many trails.
 - Commercial use of the area (races, special events, etc.) has high neighborhood impacts. It was asked how commercial use was going to be managed.
 - A question was posed about why changes were recommended to Pink Starfish and Lower Brew. Team clarified that these were in response to achieving greater environmental protection on the western aspect of Fromme Mountain. Protection measures have been achieved by designating a hiking only route to the Cascades, reducing the number of MTB routes, and recommending the establishment of a Limited Recreation Zone buffer on the edge of Mosquito Creek Preservation Zone.
 - Pink Starfish is not a sustainable route, exists in an already low trail density area, and presented a good opportunity for trail consolidation.
 - Request to manage one area as a test/trial site for the application of recommendations. It was recommended that the area around Mt. View be the test site. There was a request for the precautionary principle to apply with respect to dog walking and multi-use in the pond area.
 - Recommendation that single site application of management practices doesn't work, and that management practices need to be applied on a system-wide basis.
 - Reminder that the budget process needs to incorporate outcomes from the trail classification work.
 - Request that real costs for management be highlighted in the budgeting process, especially as Parks are vulnerable to budget cuts. Recommendation to charge for the use of the trail system.
 - Request to have colour-coded land ownership shown on a separate map.
 - People would like to see the ecological assessment overlaid with the trail network.

Additional Feedback

Participants were also invited to provide feedback directly onto maps presenting findings from the ecological assessment; recommendations for management; and the recommended future trail network.

Additional comments included:

- Trails crossing private lands northwest of Skyline need to be considered for diversion as they impact streams and headwaters in the area.
- Lower Old Mountain Hwy needs to be shown on the maps

-
- King's Crawl was highlighted as a trail used by beginners. There is a request to have an uphill bike trail replace King's Crawl if the latter is closed.
 - Oil Can has recently been developed into a XC climb. It is requested that there be an 'expert' uphill climbing trail in the vicinity of Oil Can.
 - Beginner Trails were highlighted – one in the vicinity of Jerry Rig, and Wardens.
 - Keep the surface of the Baden Powell natural, not gravel, to better support trail runners.
 - Could a portion of the Baden Powell be re-routed to allow west-traveling riders to pedal uphill?
 - MTB area on the Recommended Trail Network should be 1/3 the proposed size
 - Request to have the Upper Lynn Valley catchment area designated as a Limited Mountain Recreation Zone.
 - Bobsled Trail is used by hikers as a shortcut on to the old Mt. Hwy.

Summary Feedback from Questionnaires

Participants were provided with questionnaires that asked for additional feedback. Thirteen questionnaires were returned of the approximately 21 participants who attended the workshop. Responses are categorized and summarized below. The questionnaires also asked for feedback on trail and management recommendations. Responses echoed those shared in the large group discussion, which have been detailed above.

DO THE PROPOSED MANAGEMENT RECOMMENDATIONS AND THE PROPOSED TRAIL NETWORK RESPOND TO THE PRINCIPLES APPROVED BY COUNCIL?

Close to half the respondents answered 'yes.' Several of the respondents were not in full support of the principles themselves, while two others did not reply to this question. Several respondents indicated that they would like further discussion and to see the recommendations in a written format versus a map. Additional responses included:

Trails in general, and mountain biking on Fromme Mountain in particular, do not meet the principle of a sustainable planning framework or environmental preservation.

Trails around the pond area do not meet the principle of environmental preservation, opportunities and enhancement.

A user fee needs to be established to meet the principle of economic consideration.

The first two points of feedback provided above need to be considered in light of current zoning for the area which designates this portion of Fromme Mt. as a Multipurpose Recreation Zone. Mountain-biking and hiking are approved activities within these zones.

DO YOU FEEL THAT VALUED ECOSYSTEM COMPONENTS (VECS) AND VALUED COMMUNITY COMPONENTS (VCCS) HAVE BEEN ADDRESSED?

Responses were mixed with some replying affirmatively, particularly with respect to riparian corridors, while others were concerned that either VECs or VCCs were given more consideration than the other. Additional comments included:

- VECs have not been addressed in Mt. View area as bike trails disrupt habitat in the area.
- There was a reminder to properly survey trail users to determine the level of riding at night and in inclement weather before trail use restrictions are put into place.
- Limiting access to commercial dog walkers to the upper trails may lead to increased public interaction.
- There was a reminder to consider management costs and ensure that future budgets for trail management on Mountain are assigned appropriately.
- A positive trail user and resident interface has been achieved so far.

DO YOU AGREE IN PRINCIPLE WITH A NEW TRAIL TO IMPROVE ACCESS TO MT. HWY, AND ANOTHER NEW TRAIL TO OFFER A HIKING ONLY OPTION ON THE EAST SIDE OF THE STUDY AREA?

Most respondents replied affirmatively. There was one request to further reduce trails on Fromme Mountain, and another that tentatively supported the new trail as long as adjacent residents have their concerns met first.

DO YOU HAVE ADDITIONAL COMMENTS?

Some respondents indicated that the work to date was well done. Others had reminders or requests. These included:

- Vernal pools are located in the Mt. View park and pond area and require additional protection.
- Recommendation that MTB trails be restricted to low and very low diversity areas.
- Request to consider rescue costs of, and rescue access in, the trail network
- Request for additional access points for commercial dog walkers.
- Recommend user pay approach or parking meters.
- Washroom facilities need to be provided.
- Request for fewer trails.
- Encouragement of mountain bikers and trail runners to work together with DNV staff to develop interpretive signage about how trails were changed or re-routed to restore habitat and educate people when it is not environmentally sensitive to be on the trails (while indicating alternative trails that are appropriate during these times).

FROMME MOUNTAIN Open House

SEPTEMBER 27th 2007

- Agenda
- Presentation Materials
- Hand-outs

Agenda

FROMME MOUNTAIN

OPEN HOUSE AGENDA

- | | |
|-------------|--|
| 6:30 – 7:00 | Participant review of information boards |
| 7:00 – 7:40 | DNV introduction and review of project |
| 7:10 – 7:40 | Consultant presentation of assessment approaches and draft recommendations |
| 7:40 – 9:30 | Participant provision of feedback on recommendations |

Presentation Materials



MANAGING SUSTAINABLE TRAILS GUIDELINES & BEST MANAGEMENT PRACTICES

Guidelines

Trail Guidelines for Fromme Mountain provide an overarching framework, and general guidance for District of North Vancouver (DNV) staff, interest groups, and individuals on how to address recreational trail management issues. They clarify principles, policies and procedures. The guidelines have been adapted from existing trail guideline models to respond to DNV circumstances and North Shore conditions.

The Trail Guidelines:

- Categorize and define different trail types.
- Provide difficulty ratings for trails including beginner, intermediate, advanced, and expert.
- Provide environmental guidelines, including principals and higher level BMPs.
- Offer direction on Mountain Bike Technical Trail Features including construction techniques and materials.
- Recommend a complete signage program for trails that includes trailhead kiosks and on-trail signs, maps, safety information and trail etiquette for users.
- Give direction as to how often trails need to be monitored; conditions that would trigger a maintenance response; and the conditions under which a trail would be considered for closure and deactivation.



St. Mary's trail. Intermediate, multi-use trail. Maximum trail grade of 25% is typical of intermediate rating.



Ladies Only trail. Advanced mountain-biking primary trail. Elevated bridges and a maximum grade of 30% are typical of advanced rating.

Best Management Practices

Best Management Practices (BMPs) are on-the-ground construction strategies and maintenance methods designed to minimize the environmental impact of recreational trails and maximize overall trail sustainability. BMPs are not mandatory. They are applied wherever and whenever possible to enhance ongoing trail management. Intended BMP users are DNV staff and volunteers who will be working in the field. Fromme Mountain BMPs have been tailored to the climate, physical geography and ecology of the North Vancouver Alpine Area. They are to be used in conjunction with the DNV Trail Guidelines and the Trail Classification Plan in the overall management of the Alpine Area recreational trail network.

There are twelve BMPs:

- Off Trail Impacts
- Surface Water Flow
- Tread Wear
- Vegetation
- Environmentally Sensitive Areas
- Wildlife
- Habitat Restoration
- Use of Native Materials
- Technical Trail Features
- Trail Maintenance Ecological Sensitivity Preparation
- New Trail Construction
- Tools

BMPs provided on this board are samples only, with portions of text taken from a comprehensive Best Management Practices report provided to the DNV.

BMP: Vegetation

The loss of soil through tread wear can destabilize a tree making it more susceptible to windfall. The physical impact of trail users (boots and tires) on exposed roots can make the tree more susceptible to a variety of diseases.

- Locate (or re-locate) trails away from old growth trees at a distance of 1.5X the drip line to trunk distance. Where old growth trees present an unavoidable attraction, use boardwalks/steps to provide intimate access for trail users without adverse impact to the root network.
- Use rock armouring techniques to protect large roots exposed on the trail tread. Bridges and boardwalks may also be incorporated.



BMP: Vegetation Access to old growth

BMP: Environmentally Sensitive Areas (ESAs)

ESAs include wetlands, creeks, riparian areas and areas of significant ecological value. ESAs warrant special consideration with respect to managing recreational trails.

Riparian Areas

- Riparian areas should be avoided through the re-routing of trails where feasible.
- Trail segments within riparian areas should receive priority for maintenance and monitoring.
- Keep trail users on the trail and minimize soil displacement.
- Trail technical features should not be located in riparian areas.
- Sourcing of natural materials for trail construction and maintenance is not permitted in riparian areas.

Wetlands

- Wetlands are inappropriate locations for trails, and should be avoided through the re-routing of trails where feasible. Otherwise, boardwalks wide enough to be used safely by all users (relative to the type of trail and trail users) are required.
- Dogs should be leashed or prohibited from trails traversing wetlands.



BMP: Environmentally Sensitive Areas Multi-use boardwalk in a wet area

BMP: Use of Native Materials

Live Trees

- Harvesting of live trees should be the exclusive responsibility of experienced DNV staff and volunteers with authorization from DNV staff.
- Sourcing of trees is not permitted in riparian areas, wetlands, or other ESAs.

Standing Dead Wood

- Standing dead wood can be valuable wildlife habitat. Discretion is required when using this resource.
- Avoid use of standing dead wood when possible.
- Encourage utilization of standing dead trees removed for tree-hazard concerns.

Large Woody Debris (LWD)

- Approximately 50% of seasonal windfall may be harvested from the trail vicinity, with the rest left as a future nutrient and habitat source.
- Sourcing of LWD is not permitted in riparian areas, wetlands, or other ESAs.



BMP: Use of Native Materials Unless a safety hazard, removal of wildlife trees is not permitted

BMP: Technical Trail Features (TTFs)

TTFs are obstacles on the trail that require concentrated negotiation. They can be a natural feature, such as a steep rock slab; man-made, such as a ladder bridge; or a combination of natural and man-made features. Due to the technical nature of TTFs, increased impacts can be expected due to falling, congregation, and user avoidance. It is important to consider appropriate siting and design elements to minimize the potential for adverse impacts related to TTFs.

- TTFs should be of appropriate difficulty with respect to the trail, to keep the majority of users on their bikes.
- Provide alternatives to advanced TTFs such as an easier TTF or a ride-around.
- Do not attach TTFs to live trees. TTFs must be constructed to be stable and free-standing.



BMP: Technical Trail Features Ride-around option on a TTF

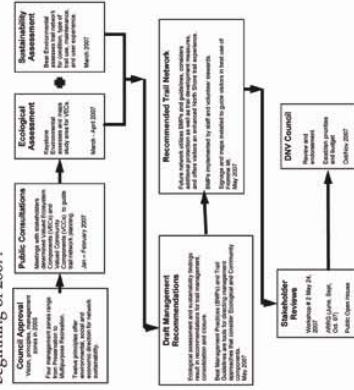




PLANNING for SUSTAINABLE TRAILS PROCESS

STAGES IN THE DEVELOPMENT OF THE PLAN

This Open House is a milestone in a multi-month project that has included consultations, on-site assessments, and tested recommendations. The development of the draft plan presented this evening has been guided by the vision, the principles, and the Recreation Management Zones that Council approved for Fromme Mountain in 2005. This chart illustrates the various stages that the production of the plan has gone through since the beginning of 2007.



METHODOLOGY

The Draft Fromme Mountain Sustainable Trail Use and Classification Plan used a multi-tiered approach to gather the information needed to make forward-looking recommendations.

Ecological Assessment
Background reports on the ecology of Fromme Mountain were reviewed. Consultation and collaboration with stakeholders identified key Valued Ecosystem Components (VECs) that were used to identify areas of sensitivity on the mountain. These VECs include:

- 1) Riparian corridors
- 2) Species at risk/ Red and blue listed species
- 3) Old Growth Forest
- 4) Structural Diversity - High, Moderate and Low significance on species numbers

Plot assessments were completed by a biologist with the Consulting Team. All available ecological information was then compiled and mapped, using a grading system to assign ecological land values to areas on the mountain. Where two or more VECs were present, a Very High Ecological Land Value was assigned; where one VEC was present, a High Ecological Land Value was assigned. Moderate to Very Low Ecological Land Values were assigned to those areas that had a range of high to low diversity of plant and animal species. This ecological information led to the application of guidelines and best management practices, informing recommendations made regarding particular trail types, intensity of trail use, and trail location. See Ecological Land Assessment Map for results.

Sustainability Assessment
Natural Surface Trails by Scott Parker, 2004 is one of the best, leading edge resources available to guide the assessment, design and management of sustainable trails. This resource and the core concepts described within it provided the foundation for the sustainability assessment on Fromme Mountain.

The assessment was primarily a field evaluation, with trail conditions recorded on a Trail Sustainability Evaluation Form. This form, and a guide to its use, has been provided to the District of North Vancouver to assist with future assessments of trail sustainability. Four key elements were assessed for each trail.

- 1) User Experience
 - Level of use
 - Facilitation of multiple users
 - Facilitation of multiple levels of use
 - Incorporation of landscape
 - Harmony (appropriateness with physical environment, flow)
 - Playfulness (meets user's expectations and needs)
 - Efficiency (adequacy for desired pace and connectivity)
 - Safety
- 2) Biophysical Impact
 - Impact to trees and vegetation
 - Impact to riparian areas and watercourses
 - Soil displacement
- 3) Erosion
 - Tread degradation
 - Fall-line vs. contour orientation
 - Soil displacement
 - Trail watershed
 - Surface runoff issues
- 4) Management Considerations
 - Accessibility for maintenance
 - Abundance of appropriate native materials for maintenance
 - Level of stewardship
 - Tread sustainability

RECOMMENDATIONS FOR TRAIL MANAGEMENT AND A FUTURE TRAIL NETWORK

Using the Recreation Management Zones approved by Council in 2005, layering on the ecological land assessment, and combining these with a review of sustainable trail use and design on the mountain, recommendations have been made for trail management and future trail designation.

Trail Guidelines and Best Management Practices have been produced that offer on-the-ground guidance and a management framework for staff and volunteers. Guidelines and Best Management Practices take a Sustainable Trails approach that assists with trail design, maintenance, and ongoing decision-making regarding trail use and landscape protection.

Management and classification maps have been produced that offer recommendations on:

- Trail closures for those trails that require unsustainable resource investment to keep open, or which are contributing to ecosystem degradation.
- Trail use including intensity of activity. Trail uses range from hiking-only to mountain-biking primary (primarily) and multi-use.
- Staging and parking areas.
- Trail connections and loops that provide users with the best trail experience possible, while balancing ecosystem protection.
- Areas to be considered for future trail development to meet the needs of diverse users
- Areas to be considered for additional protection based on ecological sensitivity.

Changes to trail coverage as a result of recommendations are as follows.
These estimates are working numbers only, as trail management and improved design will alter running lengths.

MTB Primary:	approximately 17km	Current network is approximately 83km
Hiking:	approximately 14km	New network is approximately 54km
Multituse:	approximately 22km	
MTB Only:	approximately 1km	New recommended trails are approximately 3km



Hand-outs



LEES + ASSOCIATES
Landscape Architects

FROMME MOUNTAIN OPEN HOUSE SEPTEMBER 27, 2007 FEEDBACK FORM

1. The Trail Guidelines and Best Management Practices (BMP) display boards present a series of environmental management, trail construction, and maintenance strategies to minimize environmental impact and maximize overall trail sustainability.

Are there specific BMP's you support the most?

Are there any additional BMPs you would add to the list?

2. The **TRAIL MANAGEMENT** map presents specific trail management recommendations. Which do you support the most and why?

Which do you support the least and why?

3. The **TRAIL NETWORK** map recommends different trail types (hiking, biking, multi-use, etc.), levels of difficulty, and in some cases, particular locations.

What recommended trail types and locations do you like best and why?

What recommended trail types and locations do you like least and why?

4. On the TRAIL NETWORK map, which of the proposed staging areas do you support the most? The least?

5. Do you have any additional comments for us?

Please return by October 1, 2007

LEES+Associates
#509 – 318 Homer St.
Vancouver, BC V6B 2V2
Email: dphilippe@elac.bc.ca Fax: 604-899-3805

Best Management Practices Approach

- 3.1 Off Trail Impacts
- 3.2 Surface Water Flow
- 3.3 Tread Wear
- 3.4 Vegetation
- 3.5 Environmentally Sensitive Areas
- 3.6 Wildlife
 - 3.6.1 Birds
 - 3.6.2 Amphibians and Reptiles
 - 3.6.3 Small Mammals
- 3.7 Habitat Restoration
 - 3.7.1 Passive Trail Decommissioning
 - 3.7.2 Active Trail Decommissioning
 - 3.7.3 Trail-side Restoration
- 3.8 Use of Native Materials
 - 3.8.1 Soil
 - 3.8.2 Wood
- 3.9 Technical Trail Features
- 3.10 Trail Maintenance Ecological Sensitivity Preparation
- 3.11 New Trail Construction
- 3.12 Tools
 - 3.12.1 Standard Tools
 - 3.12.2 Specialty Tools
 - 3.12.3 Health and Safety and Personal Protective Equipment (PPE)

Trail Guidelines

The Guidelines adapt existing models for trail guidelines to the specific circumstances of DNV, to create a document that clarifies principles, policies and procedures for land managers, trail workers, and the community at large.



Our Approach

- Review the available guideline/standards including LSCR, Surrey, Whistler, Rosslund and IMBA
- Consider Fromme Mountain Recreation Management Zones
- Consider regional consistency (ratings, terminology, etc.)
- Consider DNV trail network

Table of Contents (Draft)

- | | |
|---|---|
| 1. Introduction and Objectives | 6. Management guidelines (maintenance, monitoring, unauthorized trail policy) |
| 2. Trail Categories Defined | |
| 3. Trail Difficulty Ratings Defined | 7. Terminology (Glossary) |
| 4. Environmental guidelines (Principals and higher level BMPs) | Appendix A - References and Recommended Readings |
| 5. Mountain Bike Technical Trail Feature Guidelines (general principles, construction techniques and materials) | Appendix B - Trail Construction and Maintenance BMPs |

What happens next?

3 stations around the room:

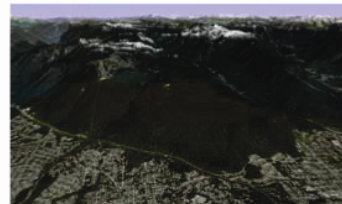
- Ecological Assessment map
- Management Map
- Recommended trail network

Please make comments either on the map with the mylar or make notes on the questionnaire form. (30 minutes)

Reconvene as group of the whole for clarification, feedback on trail network (30 minutes)

Fromme Mountain Trail Classification Plan Workshop # 2

May 24, 2007



APPENDIX C: TRAIL WORK PERMIT APPLICATION

**DISTRICT OF NORTH VANCOUVER
PARKS DEPARTMENT**

TRAIL MAINTENANCE PERMIT



This Parks Permit is issued to
.....
_____.

The Permit is valid from
on.

The Park's Department authorizes
to operate
_____.

The location of this work is
_____.

Authorized by: Date Issued
Graham Knell
Co-ordinator, Trails & Habitat

APPENDIX D: TREE PRESERVATION BY-LAW

Environmental Protection and Preservation Bylaw Bylaw No. 6515 (1993)

PART D **TREES (6727)**

Application

22. This part applies to
- trees* on slopes greater than 30%; and
 - wildlife trees*;
 - trees* on land owned by or in the possession of the District;
 - trees* protected by a restricted covenant pursuant to section 215 of the *Land Title Act* R.S.B.C. 1979, c 219);
 - trees* within *stream corridors* or the *waterfront*;
 - Western Yew *trees* *Taxus brevifolia* having a diameter greater than 0.25 metres, measured .80 metres above the natural ground level;
 - stumps which are a minimum of 1.5 metres in diameter, contains any spring board cuts, and are not in an active state of decay.
 - trees* having a diameter greater than 0.75 m measured 1 metre above the natural ground level.

(6919
6727)

Definitions

23. In this bylaw,

cut means limb, trim and top;

hazardous tree means a *tree* that is determined to be in a condition dangerous to people or property by a certified arbourist using International Society of Arboriculture Standards and Methods;

remove in relation to a *tree* means fell;

tree means a woody perennial plant usually having a single stem which has a diameter of at least 10 centimetres when measured from a height of 15 centimetres above the natural grade of the land.

wildlife tree means a *tree* that provides present or future habitat for the maintenance or enhancement of wildlife, and as defined in the British Columbia's Wildlife Tree Classification System published in "Wildlife Tree Management in British Columbia" co-published by Workers Compensation Board, British Columbia Silviculture Branch and Canada-British Columbia Partnership Agreement on Forest Resource Development, 1993;

(6727)

Delegation of Authority

- 23.1 The Environmental Protection Officer is authorized to:

- exempt an application for a Tree Permit from the requirements of section 29 (b) if the information to be submitted has otherwise been provided to the District;

-
- b. establish which of the terms and conditions set out in section 29.1 necessarily apply to the granting and use of a Tree Permit to achieve the purposes of that section;
 - c. to serve notice, under section 712 of the *Municipal Act* on a person who does not comply with section 42 to provide replacement *trees* or with a bylaw under section 711 to *remove* or *cut trees*, hedges, bushes or shrub; that, failing compliance with the notice, the District may take the required action at the expense of the person given the notice if the compliance is not achieved;
 - (i) in the case of a requirement referred to in subsection (1) (a), within 30 days of service, or;
 - (ii) in the case of a requirement referred to in subsection (1) (b), within 5 days of service.
 - d. an assessment or inspection of specified *trees* or sites for the purposes of Division (4.1) of the *Municipal Act*.

(6727)

Tree Cutting And Removal Or Damage To A Tree

- 24. No person may *cut* or remove a *tree* from land.
 - a. without a permit issued pursuant to Part F; or
 - b. contrary to a permit issued pursuant to Part F

(6727)

Damage To Trees Prohibited

- 25. No person may damage a *tree*
 - a. by any activity that would significantly interrupt or stop the flow in, or introduce a substance toxic into, the cambium layer of a *tree* by such means as cutting, scarring, constricting, piercing or crushing the cambium layer;
 - b. by applying or placing a substance in a concentration toxic to the *tree* on the leaves, limbs, trunk or roots of the *tree* or within the drip line of the *tree* or into groundwater flowing to the *tree*;
 - c. by failing to maintain the *tree* in a manner conducive to its survival, including methods set out in "Pruning and Tree Repair" and "British Columbia Landscape Standard";
 - d. by breaking limbs, topping, deadheading or pruning contrary to the methods set out in "Pruning and Tree Repair";
 - e. by doing any of the following within 3 metres or within the drip line of the *tree*, whichever is the greater distance:
 - i) *soil* compacting;
 - ii) *depositing* or removing of *soil*;
 - iii) placing of concrete or other hard or impervious surface; or
 - f. by doing any blasting within 2 metres of the drip line of a *tree*.

PART E

SIGNIFICANT TREES

(6727)

Designation of Significant Trees

26. Council considers the *trees* identified in Attachment D.3 - Heritage Trees, to be significant because of their importance for heritage or landmark value, or as wildlife habitat.

(6727)

Tree Removal Prohibitions

26.1 No person may

- a. remove a *tree* designated in section 26; or
- b. *cut a tree* designated in section 26
 - i) without a Tree Permit issued pursuant to Part F, which permit may be refused if the proposed *cutting* would alter the character of the *tree* or is not required to maintain the health or stability of the *tree*; or
 - ii) contrary to a Tree Permit issued pursuant to Part F.

(6727)

Evaluation of *Trees*

- 26.2 The Environmental Protection Officer shall review the plan submitted pursuant to section 29 to determine if any *tree* or stump might qualify for designation as significant *tree* and to recommend to Council an appropriate *tree* or stump for such designation.

(6727)

APPENDIX E: KEY INVASIVE SPECIES OF CONCERN

Himalayan Blackberry *Rubus armeniacus*
Periwinkle *Vinca minor*
English Ivy *Hedera helix*
English Holly *Ilex aquifolium*
Japanese Knotweed *Polygonum cuspidatum*
Scotch Broom *Cytisus scoparius*
Policeman's helmet *Impatiens Glandulifera*
Giant Hogweed *Heracleum mantegazzianum*
Lamium *Lamium galeobdolon*

This is a list in progress and may need to be revised over time as new plants emerge as invasive species.