

## TABLE OF CONTENTS

### Part I: The Conservation Area and the Planning Process

1.0 INTRODUCTION .....	1
1.1 Introduction to the Management Plan.....	1
1.2 History of Establishment.....	1
1.3 Highlights of the Conservation Area.....	2
1.4 Objectives of the Management Plan.....	4
2.0 PROCESS AND METHODOLOGY .....	7
2.1 Public Consultation .....	7
2.1.1 Informal Meetings .....	7
2.1.2 Public Open Houses.....	7
2.1.3 Workshops .....	8
2.2 Biophysical Inventory and Analysis .....	8
2.2.1 Plots for Vegetation and Soils.....	8
2.2.2 Wildlife Surveys .....	10
2.2.3 Bird Surveys .....	10
2.2.4 Bat Surveys.....	10
2.2.5 Habitat Suitability Models .....	12
2.2.6 Watercourses .....	12
2.2.7 Assessment of Critical Ecological Components .....	12
2.3 Inventory of Historical, Cultural and Visual Resources.....	14
2.3.1 Historical and Cultural Inventory and Analysis .....	14
2.3.2 Visual Inventory and Analysis .....	14
2.4 Inventory of Facilities and Trails .....	15
2.5 Concept Design Plans.....	15
3.0 THE CONSERVATION AREA ENVIRONMENT .....	17
3.1 Climate and Microclimate .....	17
3.2 Terrain.....	17
3.2.1 Geology and Soils .....	17
3.2.2 Soil Erosion .....	18
3.2.3 Slope Stability .....	20
3.2.4 Public Safety Issues .....	20
3.3 Vegetation .....	22
3.3.1 Vegetation Species.....	22
3.3.1.1 Common Plants Found on Burnaby Mountain.....	22
3.3.1.2 Rare Plants .....	23
3.3.1.3 Exotic and Invasive Species.....	25
3.3.2 Vegetation Communities .....	25
3.3.3 Forest Structure and Succession.....	28
3.3.4 Forest Health and Diversity .....	29
3.3.5 Vegetation Management Issues .....	30
3.3.5.1 Human Disturbance .....	30
3.3.5.2 Fire Management.....	30
3.3.5.3 Hazard Trees .....	31
3.3.5.4 Maintenance of Scenic Views.....	31

3.3.5.5 Utility Corridors .....	31
3.4 Wildlife and Habitat .....	31
3.4.1 Wildlife Species .....	32
3.4.1.1 Common Species Found on Burnaby Mountain.....	32
3.4.1.2 Provincially-Listed Species.....	33
3.4.1.3 Introduced Species .....	34
3.4.2 Habitat Types .....	36
3.4.2.1 Forested Habitats .....	36
3.4.2.2 Grasses and Disturbed Landscapes.....	38
3.4.2.3 Aquatic Habitats .....	40
3.4.2.4 Habitat Diversity and Connectivity.....	40
3.4.3 Wildlife Issues.....	41
3.4.3.1 Habitat Loss and Fragmentation .....	41
3.4.3.2 Human Disturbance .....	42
3.4.3.3 Black-tailed Deer Management.....	42
3.4.3.4 Regional Wildlife Issues .....	43
3.5 Watercourses .....	43
3.5.1 Distribution.....	43
3.5.2 Groundwater .....	44
3.5.3 Brunette Watershed.....	44
3.5.4 Burrard Inlet Watershed .....	46
3.5.5 Aquatic Habitat Types .....	47
3.5.5.1 In-Stream Aquatic Habitat .....	47
3.5.5.2 Riparian Vegetation Habitat .....	48
3.5.6 Issues Affecting Watercourses .....	48
3.5.6.1 Human Disturbance .....	48
3.5.6.2 Future Development at SFU.....	49
3.5.6.3 Water Quality .....	49
3.5.7 Stream Stewardship .....	50
3.6 Environmentally and Ecologically important areas .....	50
3.6.1 Regional Significance.....	50
3.6.2 Locally Significant Areas .....	50
3.6.3 Human Disturbance .....	52
3.7 Historical, Cultural and Recreational Resources .....	53
3.7.1 Historical Resources .....	53
3.7.2 The Centennial Pavilion area.....	53
3.7.3 The Former Target Range Sites.....	54
3.7.4 Recreational Facilities .....	54
3.7.5 Protection of Significant Historical and Cultural Resources .....	56
3.8 Visual Resources .....	56
3.9 Recreation .....	58
3.9.1 Opportunities and Use .....	58
3.9.2 The Trail Network .....	59
3.9.3 Activity Profiles .....	59
3.9.3.1 Pedestrian Use .....	59
3.9.3.2 Mountain Biking .....	62
3.9.3.3 Equestrian Use .....	63

3.9.3.4 Off-Leash Dogs .....	63
3.9.3.5 Other Uses of the Conservation Area.....	64
3.9.4 User Conflicts.....	64
3.9.5 Impacts of Increased Use of the Conservation Area .....	65
3.9.6 Access.....	65
3.9.7 Links to Other Parks and Greenspaces .....	65
3.10 Education and Interpretation .....	67
3.11 Research and Monitoring .....	68
3.12 Conservation Area Administration.....	68
3.13 Regional and Community Cooperation .....	69
3.13.1 Community Outreach.....	69
3.13.2 Cooperation with SFU.....	70
3.13.3 Cooperation with Landowners and Lease Holders .....	70

## **Part II: The Management Plan**

4.0 CONSERVATION AREA VISION AND POLICY .....	73
4.1 Conservation Area Mandate .....	73
4.2 Conservation Area Vision.....	73
4.3 Appropriate Activities.....	73
4.4 Conservation Area Policy .....	74
4.4.1 Conservation Policy .....	74
4.4.2 Recreation Policy.....	74
4.4.3 Land Use Policy .....	75
5.0 MANAGEMENT GUIDELINES .....	77
5.1 Terrain.....	77
5.2 Vegetation .....	77
5.3 Wildlife and Habitat .....	78
5.4 Watercourses .....	79
5.5 Environmentally and Ecologically Important Areas .....	79
5.6 Cultural and Heritage Resources .....	80
5.7 Visual and Scenic Resources.....	80
5.8 Access and Linkages.....	81
5.9 Recreation Management .....	81
5.10 Conservation Area Facilities .....	82
5.11 Education and Interpretation .....	82
5.12 Research and Monitoring .....	83
5.13 Regional and Community Cooperation .....	83
6.0 OBJECTIVES AND RECOMMENDATIONS.....	85
6.1 Terrain.....	85
6.2 Vegetation .....	86
6.3 Wildlife and Habitat .....	88
6.4 Watercourses .....	92
6.5 Environmentally and Ecologically Important Areas .....	93
6.6 Historical and Cultural Resources.....	93
6.7 Visual and Scenic Resources.....	94

6.8 Access and Linkages.....	94
6.9 Recreation Management .....	95
6.10 Conservation Area Facilities .....	97
6.11 Education and Interpretation .....	98
6.12 Research and Monitoring .....	100
6.13 Regional and Community Cooperation .....	101
<b>7.0 DESIGN CONCEPTS.....</b>	<b>103</b>
7.1 Habitat Blocks .....	103
7.2 Trail Concept Plan.....	103
7.2.1 Trails for Pedestrians (Hikers) .....	103
7.2.2 Trails for Cyclists (Mountain Bikers) .....	104
7.2.3 Equestrian Trails .....	104
7.2.4 Loop Trails .....	104
7.2.5 Summary of Trail Concepts .....	106
7.3 Parking Opportunities .....	106
7.4 Clearings in the Conservation Area .....	108
7.5 Long-term Potential Options.....	108
7.6 Design Parameters .....	110
7.6.1 Design Parameters for Trails .....	110
7.6.1.1 Multi-Use Pedestrian / Cycling / Equestrian Trails .....	110
7.6.1.2 Pedestrian / Cycling / Trans-Canada Trail .....	110
7.6.1.3 Pedestrian /Cycling Trail.....	112
7.6.1.4 Pedestrian Only Trail.....	112
7.6.1.5 Cycling Only Trail .....	112
7.7 Design Parameters for Signage .....	112
7.7.1.1 Entry Signage .....	112
7.7.1.2 Park Orientation Maps.....	112
7.7.1.3 Trail Signs .....	112
7.7.1.4 Interpretive Signage .....	113
<b>8.0 CONSERVATION AREA PROGRAM ELEMENTS.....</b>	<b>125</b>
8.1 Mountain Bike Conditional Review .....	125
8.2 Public Advisory Committee .....	125
8.3 Interpretive Program.....	126
8.4 Educational Programs .....	126
8.5 Enforcement Program.....	127
8.6 Public Safety Program .....	127
8.7 Research Programs .....	128
8.8 Special Events .....	128
8.9 Maintenance Program.....	129
<b>9.0 IMPLEMENTATION STRATEGY .....</b>	<b>131</b>
9.1 Phasing .....	131
9.1.1 Phase I – Priorities for Implementation.....	131
9.1.2 Short-term Recommendations.....	132
9.1.3 Long-term Recommendations.....	132
9.1.4 Ongoing Actions .....	134
9.2 Preliminary Costing .....	136
9.2.1 Trails .....	136

9.2.2 Parking Areas .....	138
9.2.3 Signage.....	139
10.0 CONCLUSIONS .....	141
10.1 Framework for Future Conservation Area Planning.....	141
10.2 Review of the Management Plan .....	141
11.0 BIBLIOGRAPHY .....	143



## LIST OF FIGURES

Figure 0-1.	Trail Concept Plan .....	ix
Figure 1-1.	Regional Setting of Burnaby Mountain Conservation Area.....	3
Figure 1-2.	Burnaby Mountain Conservation Area.....	5
Figure 1-2a	Covenant Area Burnaby Mountain Conservation Area .....	6
Figure 2-1.	Burnaby Mountain Conservation Area Management Planning Process ...	9
Figure 2-2.	Field Sampling Locations .....	13
Figure 3-1.	Elevation and Contours of Burnaby Mountain Conservation Area .....	19
Figure 3-2.	Geology of Burnaby Mountain Conservation Area .....	21
Figure 3-3.	Vegetation Communities on Burnaby Mountain Conservation Area .....	27
Figure 3-4.	Habitat Suitability for Black-tailed Deer .....	35
Figure 3-5.	Habitat Suitability for Pileated Woodpecker .....	37
Figure 3-6.	Habitat Suitability for Bats .....	39
Figure 3-7.	Major Watercourses of Burnaby Mountain Conservation Area .....	45
Figure 3-8.	Relative Sensitivity According to Vegetation, Habitat and Watercourses.....	51
Figure 3-9.	Cultural and Recreational Resources.....	55
Figure 3-10.	View Opportunities on Burnaby Mountain Conservation Area.....	57
Figure 3-11.	Burnaby Mountain Conservation Area Activity Participation.....	61
Figure 3-12.	Linkages between Burnaby Mountain Conservation Area and Other Parks and Greenspaces.....	66
Figure 7-1.	Habitat Blocks.....	105
Figure 7-2.	Trail Concept Plan .....	107
Figure 7-3.	Major Loop Trails .....	109
Figure 7-4.	Sketch Plan of the Former Target Range Area .....	111
Figure 7-5.	Trail Hierarchy Sketches .....	114
Figure 7-6.	Trail Signage.....	115
Figure 7-7.	Trail Construction and Stabilization.....	119
Figure J-1.	North Side Options.....	199
Figure J-2.	West Side Options .....	201
Figure J-3.	South Side Options .....	203
Figure J-4.	East Side Options .....	205



## LIST OF TABLES

Table 2-1.	Data Collected during Biophysical Inventory of Burnaby Mountain.....	11
Table 3-1.	List of Provincially Rare and Endangered Plant Species Known or Expected to occur in the Vicinity of Burnaby Mountain.....	24
Table 3-2.	Vegetation Communities of Burnaby Mountain Conservation Area .....	26
Table 3-3.	Standard Codes for Vegetation Species .....	28
Table 3-4.	Provincial Classifications for Listed Species of Wildlife .....	34
Table 3-5.	Provincially-Listed Wildlife Species which may be Found within Burnaby Mountain Conservation Area.....	36
Table 3-6.	Main Trails and Current Trail Uses within the Burnaby Mountain Conservation Area .....	60
Table 9-1.	Priorities for Implementation .....	132
Table 9-2.	Summary of Phase I REcommendations.....	133
Table 9-3.	Summary of Phase II Recommendations .....	134
Table 9-4.	Summary of Phase III Recommendations .....	135
Table 9-5.	Summary of Ongoing Actions .....	135
Table 9-6.	Estimated Costs for Burnaby Mountain Conservation Area Trail Improvements .....	137
Table 9-7.	Estimated Costs for Signage for Burnaby Mountain Conservation Area.....	139



## **LIST OF APPENDICES**

A. Covenant for Establishing Burnaby Mountain Conservation Area .....	157
B. Planning and Design Principles for Environmentally Sensitive Areas (ESAs) in the City of Burnaby .....	163
C. Summary Results from Public Open Houses .....	165
D. Models for Determining Habitat Suitability .....	169
E. Ecological Sensitivity Analysis based on Vegetation, Habitat and Watercourse Values (VHW).....	173
F. Trail Condition and Use Chart.....	177
G. List of Vegetation Species found on Burnaby Mountain .....	181
H. Potential and Confirmed Fish, Mammal and Herptile Species on Burnaby Mountain .....	185
I. Potential and Confirmed Bird Species on Burnaby Mountain .....	191
J. Conceptual Options Considered for Burnaby Mountain Conservation area.....	197
K. Maintenance Checklist for Trails within Burnaby Mountain Conservation Area .....	209

