

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
EXECUTIVE SUMMARY	i
TABLE OF CONTENTS	xxv
1 INTRODUCTION	1-1
1.1 DE BEERS.....	1-1
1.1.1 Project Proponent	1-1
1.1.2 Corporate Profile	1-1
1.1.3 Canadian Corporations	1-3
1.2 PROJECT OVERVIEW	1-5
1.2.1 Exploration Program	1-5
1.2.2 Snap Lake Diamond Project	1-10
1.3 REGULATORY PROCESS	1-11
1.3.1 Environmental Assessment Process	1-11
1.3.2 Project Licences, Permits, Authorizations, and Lease	1-13
1.4 TERMS OF REFERENCE	1-15
1.5 REPORT ORGANIZATION	1-17
1.6 REFERENCES	1-18
1.7 UNITS, ACRONYMS, AND GLOSSARY.....	1-19
2. PROJECT ALTERNATIVES AND OPPORTUNITIES	2-1
2.1 INTRODUCTION	2-1
2.1.1 Terms of Reference	2-1
2.1.2 Component Description and Organization.....	2-2
2.2 SITE AND FOOTPRINT.....	2-3
2.3 MINING METHODS.....	2-3
2.3.1 Large Open Pit.....	2-4
2.3.2 Smaller Open Pit.....	2-5
2.3.3 No Open Pit.....	2-7
2.3.4 Underground Mining	2-7
2.4 WASTE ROCK AND PROCESSED KIMBERLITE MANAGEMENT	2-7
2.5 WATER MANAGEMENT.....	2-8
2.6 EMPLOYEE WORK SCHEDULE	2-11
2.7 EMPLOYEE LIVING CONDITIONS.....	2-12
2.8 ENERGY SOURCES	2-14
2.8.1 Diesel	2-14
2.8.2 Wind Turbines	2-15
2.8.3 Solar Energy	2-16
2.8.4 Fuel Cell	2-17
2.8.5 Propane.....	2-18
2.9 POWER REDUCTION.....	2-19
2.10 TRANSPORTATION	2-20
2.11 DECOMMISSIONING AND RECLAMATION	2-21
2.11.1 Underground Mine	2-21
2.11.2 Mill and Ancillary Facilities.....	2-21
2.11.3 Roadways and Airstrip.....	2-22
2.11.4 Quarries	2-22
2.11.5 North Pile	2-23

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
2.12 REFERENCES	2-24
2.13 UNITS, ACRONYMS, AND GLOSSARY.....	2-24
3 PROJECT DESCRIPTION	3-1
3.1 INTRODUCTION	3-1
3.1.1 Terms of Reference	3-1
3.1.2 Component Description and Organization.....	3-4
3.1.3 Snap Lake Diamond Project Overview	3-4
3.2 SCHEDULES	3-10
3.3 MINING	3-11
3.4 KIMBERLITE PROCESSING	3-14
3.5 MINE WASTE ROCK, PROCESSED KIMBERLITE, AND SOLID WASTE MANAGEMENT	3-16
3.5.1 Waste Rock Management.....	3-16
3.5.2 Processed Kimberlite Management.....	3-17
3.5.3 Solid Waste Management.....	3-18
3.5.3.1 Waste Management Plan	3-18
3.5.3.2 Incinerator and Waste Transfer Storage Area.....	3-19
3.5.3.3 Landfill Site	3-19
3.5.3.4 Land Farm	3-19
3.5.3.5 Specific Materials Waste Handling	3-20
3.6 WATER MANAGEMENT.....	3-21
3.6.1 Introduction	3-21
3.6.2 Water Management System Summary	3-21
3.6.3 Water Balance.....	3-23
3.6.4 Water Supply and Distribution	3-23
3.6.5 Water Management System	3-25
3.6.5.1 Underground Water Quantity.....	3-25
3.6.5.2 Underground Water Quality	3-26
3.6.6 Surface Water	3-26
3.6.6.1 Site Runoff	3-26
3.6.6.2 North Pile	3-27
3.6.6.2.1 Internal Water Collection System.....	3-27
3.6.6.2.2 External Water Collection System	3-27
3.6.7 Water Treatment and Discharge to Snap Lake	3-28
3.6.7.1 Water Management Pond.....	3-28
3.6.8 Water Treatment Plant.....	3-29
3.6.9 Sewage Treatment.....	3-30
3.7 SITE SUPPORT FACILITIES AND STORAGE	3-31
3.7.1 Service and Camp Complex	3-31
3.7.2 Consumables Storage	3-31
3.7.2.1 Fuel	3-33
3.7.2.2 Explosives.....	3-33
3.7.2.3 Cement	3-34
3.7.2.4 Unheated Storage.....	3-34
3.7.2.5 Stockpiles, Laydowns, and Parking Areas	3-35
3.7.3 Sand, Crushed Rock/Ore, and Concrete Facilities	3-35
3.7.3.1 Quarry Locations	3-35
3.7.3.2 Rock Stockpile and Storage Area.....	3-37

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
3.7.3.3 Crushed Ore Storage and Conveying Equipment	3-37
3.7.3.4 Aggregate Crushing and Concrete Batch Plant	3-37
3.7.4 Power Generation and Distribution	3-38
3.7.5 Site Energy Use	3-38
3.8 AIRSTRIPE, ROADS, AND TRANSPORTATION.....	3-39
3.8.1 Airstrip	3-39
3.8.2 Site Roads.....	3-39
3.8.3 Winter Access Road	3-39
3.8.4 Transportation	3-40
3.8.5 Mobile Equipment	3-40
3.9 MINE OPERATIONS	3-41
3.9.1 Management	3-41
3.9.1.1 Mine Management Advisory Committee.....	3-41
3.9.1.2 Hiring Commitment	3-41
3.9.1.3 Recruitment, Employment, and Training Strategy.....	3-41
3.9.1.4 Northern Business Opportunities.....	3-43
3.9.1.5 Work Rotation Schedules	3-44
3.9.2 Key Policies and Plans	3-44
3.9.3 Environmental Management System	3-45
3.9.4 Diamond Sorting, Valuation, and Marketing	3-45
3.10 DECOMMISSIONING AND CLOSURE	3-46
3.10.1 Underground Mine	3-46
3.10.2 North Pile	3-46
3.10.3 Water Management Pond.....	3-47
3.10.4 Site Facilities.....	3-47
3.11 REFERENCES	3-48
3.12 UNITS, ACRONYMS, AND GLOSSARY.....	3-48
4 CONSULTATION	4-1
4.1 TERMS OF REFERENCE	4-1
4.2 PUBLIC CONSULTATION	4-2
4.2.1 Introduction	4-2
4.2.2 Consultation Methods	4-3
4.2.3 Community Consultation	4-7
4.2.3.1 Introduction	4-7
4.2.3.2 Community Consultation Plan	4-8
4.2.3.3 Community Participation and Consultation to Date	4-11
4.2.4 Consultation With Other Groups	4-17
4.3 TRADITIONAL KNOWLEDGE	4-21
4.3.1 Introduction	4-21
4.3.2 Traditional Knowledge Consultation	4-22
4.3.2.1 Lutsel K'e Dene First Nation.....	4-22
4.3.2.2 North Slave Métis Alliance.....	4-23
4.3.2.3 Yellowknives Dene First Nation.....	4-24
4.3.2.4 Dogrib Treaty 11	4-25
4.3.3 Traditional Knowledge Use	4-25
4.3.4 Lutsel K'e Traditional Knowledge Study of the Snap Lake Area	4-27
4.4 REFERENCES	4-28
4.5 ACRONYMS AND GLOSSARY.....	4-28

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
5 SOCIO-ECONOMIC IMPACT ASSESSMENT.....	5-1
5.1 SCOPE OF ASSESSMENT	5-1
5.1.1 Terms of Reference	5-1
5.1.2 Component Description and Organization.....	5-4
5.1.3 Assessment Approach	5-6
5.1.3.1 Key Issues and Key Questions.....	5-6
5.1.3.2 Temporal Considerations.....	5-7
5.1.4 Study Communities.....	5-8
5.1.5 Assessment Methods.....	5-8
5.1.5.1 SEIA Practice and Methods.....	5-10
5.1.5.2 Snap Lake SEIA Methods and Techniques.....	5-11
5.1.5.2.1 Issue Identification	5-12
5.1.5.2.2 Profiling	5-12
5.1.5.2.3 Impact Prediction and Analysis.....	5-13
5.1.5.2.4 Identification of Impact Management Measures.....	5-13
5.1.5.2.5 Evaluation.....	5-13
5.1.5.3 Methodology Limitations	5-14
5.1.5.3.1 Uncertainties	5-17
5.1.5.3.2 Assumptions	5-18
5.1.5.3.3 Limitations to the Application of Residual Impact Criteria.....	5-19
5.1.5.4 Direct, Indirect, and Induced Impacts	5-19
5.1.5.5 Causes and Effects of Socio-economic Impacts	5-21
5.2 BASELINE.....	5-27
5.2.1 Northwest Territories.....	5-27
5.2.1.1 Regional Setting	5-27
5.2.1.2 Forces of Change within the NWT	5-27
5.2.1.3 Social and Economic Trends in the 1980s and 1990s	5-29
5.2.1.3.1 Population	5-29
5.2.1.3.2 Population by Community Size	5-30
5.2.1.3.3 Employment	5-31
5.2.1.3.4 Income.....	5-33
5.2.1.3.5 Average Number of Persons Per Dwelling	5-34
5.2.1.3.6 Migration.....	5-36
5.2.1.3.7 Education	5-36
5.2.1.3.8 Summary.....	5-38
5.2.1.4 NWT Economy in the Future	5-38
5.2.2 Historical Aboriginal Interest in the Snap Lake Area	5-40
5.2.2.1 Background.....	5-40
5.2.2.2 Existing Treaty and Land Claims.....	5-41
5.2.2.2.1 Treaty 8	5-41
5.2.2.2.2 Treaty 11	5-42
5.2.2.3 Land Uses.....	5-42
5.2.2.4 Aboriginal Spiritual Relationship to the Land.....	5-43
5.2.2.5 Individual and Community Wellness.....	5-44
5.2.3 Profiles of Primary Communities.....	5-46
5.2.3.1 Definitions and Limitations	5-46
5.2.3.2 Lutsel K'e	5-48
5.2.3.2.1 Background	5-48
5.2.3.2.2 Population	5-48

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
5.2.3.2.3 Employment	5-49
5.2.3.2.4 Education	5-50
5.2.3.2.5 Traditional Activities	5-50
5.2.3.2.6 Mother Tongue	5-51
5.2.3.2.7 Community Services	5-51
5.2.3.2.8 Housing	5-52
5.2.3.2.9 Crime	5-52
5.2.3.2.10 Income	5-53
5.2.3.3 Gameti	5-53
5.2.3.3.1 Background	5-53
5.2.3.3.2 Population	5-53
5.2.3.3.3 Employment	5-54
5.2.3.3.4 Education	5-55
5.2.3.3.5 Traditional Activities	5-56
5.2.3.3.6 Mother Tongue	5-56
5.2.3.3.7 Community Services	5-57
5.2.3.3.8 Housing	5-57
5.2.3.3.9 Crime	5-58
5.2.3.3.10 Income	5-58
5.2.3.4 Rae/Edzo	5-59
5.2.3.4.1 Background	5-59
5.2.3.4.2 Population	5-59
5.2.3.4.3 Employment	5-60
5.2.3.4.4 Education	5-60
5.2.3.4.5 Traditional Activities	5-61
5.2.3.4.6 Mother Tongue	5-61
5.2.3.4.7 Community Services	5-62
5.2.3.4.8 Housing	5-62
5.2.3.4.9 Crime	5-63
5.2.3.4.10 Income	5-63
5.2.3.5 Wha Ti	5-64
5.2.3.5.1 Background	5-64
5.2.3.5.2 Population	5-64
5.2.3.5.3 Employment	5-64
5.2.3.5.4 Education	5-65
5.2.3.5.5 Traditional Activities	5-66
5.2.3.5.6 Mother Tongue	5-66
5.2.3.5.7 Community Services	5-67
5.2.3.5.8 Housing	5-67
5.2.3.5.9 Income	5-68
5.2.3.6 Wekweti	5-68
5.2.3.6.1 Background	5-68
5.2.3.6.2 Population	5-68
5.2.3.6.3 Employment	5-69
5.2.3.6.4 Education	5-70
5.2.3.6.5 Traditional Activities	5-71
5.2.3.6.6 Mother Tongue	5-71
5.2.3.6.7 Community Services	5-71
5.2.3.6.8 Housing	5-72
5.2.3.6.9 Crime	5-72
5.2.3.6.10 Income	5-72

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
5.2.3.7 Dettah	5-73
5.2.3.7.1 Background	5-73
5.2.3.7.2 Population	5-73
5.2.3.7.3 Employment	5-74
5.2.3.7.4 Education	5-74
5.2.3.7.5 Traditional Activities	5-75
5.2.3.7.6 Mother Tongue	5-75
5.2.3.7.7 Housing	5-76
5.2.3.7.8 Crime.....	5-76
5.2.3.7.9 Income.....	5-76
5.2.3.8 Yellowknife and N'Dilo	5-76
5.2.3.8.1 Background	5-76
5.2.3.8.2 Population	5-77
5.2.3.8.3 Employment	5-77
5.2.3.8.4 Education	5-78
5.2.3.8.5 Traditional Activities	5-79
5.2.3.8.6 Mother Tongue	5-79
5.2.3.8.7 Housing	5-80
5.2.3.8.8 Crime.....	5-80
5.2.3.8.9 Income.....	5-80
5.2.3.9 North Slave Métis Alliance.....	5-81
5.2.4 Employment Catchment Communities	5-81
5.3 IMPACT ASSESSMENT	5-82
5.3.1 Recent Experiences, Issues, and Concerns.....	5-82
5.3.1.1 Overview of Recent Experiences and Trends	5-82
5.3.1.1.1 Individuals	5-83
5.3.1.1.2 Current Aboriginal Mine Workers.....	5-84
5.3.1.1.3 Families	5-86
5.3.1.1.4 Communities	5-87
5.3.1.2 Community Concerns	5-94
5.3.1.2.1 Introduction.....	5-94
5.3.1.2.2 Key Socio-economic Issues and Concerns	5-95
5.3.1.3 Other Key Stakeholders.....	5-101
5.3.1.3.1 Private Sector.....	5-101
5.3.1.3.2 Public Sector	5-102
5.3.1.3.3 Non-governmental Women's Organizations	5-103
5.3.2 Economic Impact Assessment.....	5-104
5.3.2.1 Models and Assumptions.....	5-105
5.3.2.1.1 Input-output Models	5-105
5.3.2.1.2 NWT Bureau of Statistics Input-Output Model Description	5-106
5.3.2.1.3 Statistics Canada Input-Output Model	5-106
5.3.2.1.4 Tax and Fiscal Impact Model	5-107
5.3.2.1.5 Input-output Model Assumptions	5-108
5.3.2.1.6 Employment and Income	5-109
5.3.2.1.7 Economic Impacts.....	5-109
5.3.2.1.8 Tax and Fiscal Impacts	5-109
5.3.2.1.9 Inflation and Cost of Living Impacts	5-110
5.3.2.2 Canada Impacts.....	5-111
5.3.2.2.1 Construction Phase.....	5-111
5.3.2.2.2 Operations Phase	5-113

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
	5-113
	5-114
5.3.2.3 Northwest Territories Impacts.....	5-115
5.3.2.3.1 Construction Phase.....	5-115
5.3.2.3.2 Operations Phase	5-115
5.3.2.3.3 Mine Closure Phase	5-116
5.3.2.3.4 Overall NWT Cumulative Economic Impacts	5-116
5.3.2.3.5 Tax and Fiscal Impacts	5-117
5.3.2.4 Summary of Economic Impact Assessment.....	5-122
5.3.3 Socio-economic Impact Assessment.....	5-122
5.3.3.1 Introduction	5-122
5.3.3.2 Predicted Socio-economic Impacts	5-124
5.3.3.3 Overview of Impacts on Individuals, Families, and Communities	5-127
5.3.3.4 Impacts of Mining Job Training and Education	5-129
5.3.3.4.1 Individuals	5-130
5.3.3.4.2 Families	5-131
5.3.3.4.3 Communities	5-132
5.3.3.5 Impacts of Rotational Schedule	5-133
5.3.3.5.1 Individuals	5-134
5.3.3.5.2 Families	5-135
5.3.3.5.3 Communities	5-136
5.3.3.6 Impacts of Transition to Wage Economy.....	5-137
5.3.3.6.1 Individuals	5-137
5.3.3.6.2 Families	5-139
5.3.3.6.3 Communities	5-140
5.3.4 Impact Management Measures	5-143
5.3.4.1 Introduction	5-143
5.3.4.1.1 An Integrated and Adaptive Approach	5-143
5.3.4.1.2 Partnerships	5-144
5.3.4.2 Recruitment, Training, and Employment	5-148
5.3.4.2.1 Hiring Priorities	5-148
5.3.4.2.2 Recruitment and Employment Strategies	5-148
5.3.4.2.3 Literacy Programs	5-150
5.3.4.2.4 On-site Learning Centre.....	5-151
5.3.4.2.5 Employment Training Programs.....	5-151
5.3.4.3 Health and Wellness.....	5-153
5.3.4.3.1 Substance Abuse Prevention and Treatment	5-153
5.3.4.3.2 Community Liaison Personnel	5-155
5.3.4.3.3 Family Support Services	5-156
5.3.4.3.4 Money Management Training	5-156
5.3.4.3.5 Transportation to the Site.....	5-157
5.3.4.3.6 Cultural Awareness Programs	5-157
5.3.4.3.7 Aboriginal Traditional Practice Support.....	5-158
5.3.4.4 Economic Development.....	5-158
5.3.4.4.1 Business Development Support.....	5-158
5.3.4.4.2 Contracts and Contact Lists	5-159
5.3.5 Evaluation of Residual Impacts.....	5-159
5.3.6 Monitoring	5-162
5.4 SUMMARY AND CONCLUSION	5-163
5.5 REFERENCES	5-164

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
5.6 UNITS, ACRONYMS, AND GLOSSARY.....	5-166
6 RESOURCE USES	6-1
6.1 SCOPE OF ASSESSMENT	6-1
6.1.1 Terms of Reference	6-1
6.1.2 Component Description and Organization.....	6-2
6.1.3 Assessment Approach	6-3
6.1.3.1 Key Issues and Key Questions.....	6-3
6.1.3.2 Impact Assessment	6-5
6.1.3.3 Temporal Considerations.....	6-6
6.1.4 Study Area	6-6
6.1.5 General Assessment Method.....	6-8
6.1.5.1 Residual Impact Criteria	6-8
6.1.5.2 Definitions of Criteria	6-11
6.1.5.3 Environmental Consequence	6-16
6.1.6 Specific Assessment Methods	6-18
6.1.6.1 Heritage Resources	6-19
6.1.6.1.1 Definitions.....	6-19
6.1.6.1.2 Reports.....	6-19
6.1.6.1.3 Management Processes	6-20
6.1.6.1.4 Methods.....	6-21
6.1.6.2 Traditional Land Use.....	6-23
6.1.6.3 Aesthetic Quality.....	6-24
6.2 HERITAGE RESOURCES	6-26
6.2.1 Baseline	6-26
6.2.1.1 Introduction	6-26
6.2.1.2 Archaeological Sites	6-27
6.2.2 Impact Assessment.....	6-38
6.2.2.1 Introduction	6-38
6.2.2.2 Key Question HR-1: What Impacts Will the Snap Lake Diamond Project Have on Heritage Resources?	6-39
6.2.2.2.1 Linkage Analysis	6-39
6.2.2.2.2 Mitigation	6-40
6.2.2.2.3 Impact Analysis	6-42
6.2.2.2.4 Residual Impact Classification	6-42
6.2.2.2.5 Monitoring.....	6-44
6.2.2.3 Key Question HR-2: What Impacts Will the Snap Lake Winter Access Road Have on Heritage Resources?	6-44
6.2.2.3.1 Linkage Analysis	6-44
6.2.2.3.2 Mitigation	6-45
6.2.2.3.3 Impact Analysis	6-48
6.2.2.3.4 Residual Impact Classification	6-48
6.2.2.3.5 Monitoring.....	6-49
6.3 TRADITIONAL LAND USE	6-50
6.3.1 Baseline	6-50
6.3.1.1 Historical Land Use.....	6-50
6.3.1.2 Recent Traditional Land Use	6-52
6.3.1.3 Traditionally Significant Areas	6-54
6.3.2 Impact Assessment.....	6-55
6.3.2.1 Introduction	6-55

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
6.3.2.2 Key Question TLU-1: What Impacts Will the Snap Lake Diamond Project Have on the Availability of Land for Traditional Land Use Purposes?.....	6-56
6.3.2.2.1 Linkage Analysis	6-56
6.3.2.2.2 Mitigation	6-56
6.3.2.2.3 Impact Analysis	6-57
6.3.2.2.4 Residual Impact Classification	6-57
6.3.2.3 Key Question TLU-2: What Impacts Will the Snap Lake Diamond Project Have on Traditionally Significant Areas?.....	6-58
6.3.2.3.1 Linkage Analysis	6-58
6.4 NON-TRADITIONAL RESOURCE USE	6-59
6.4.1 Baseline	6-59
6.4.1.1 Ecologically Representative Areas	6-59
6.4.1.1.1 Existing Protected Areas.....	6-59
6.4.1.1.2 Proposed Protected Areas.....	6-62
6.4.1.1.3 Potential Protected Areas	6-62
6.4.1.1.4 Other Areas of Interest.....	6-63
6.4.1.2 Subsurface Resources	6-64
6.4.1.2.1 Granular Resources	6-64
6.4.1.2.2 Mineral Claims	6-64
6.4.1.2.3 Mineral Exploration and Extraction	6-64
6.4.1.3 Access	6-66
6.4.1.4 Hunting.....	6-66
6.4.1.4.1 Introduction.....	6-66
6.4.1.4.2 Domestic Hunting.....	6-68
6.4.1.4.3 Sport Hunting	6-68
6.4.1.4.4 Trapping	6-69
6.4.1.5 Fishing	6-69
6.4.1.5.1 Commercial Fishing	6-69
6.4.1.5.2 Sport Fishing	6-69
6.4.1.5.3 Natural History Viewing	6-69
6.4.1.5.4 Snowmobiling	6-70
6.4.1.6 Permanent and Seasonal Camps.....	6-70
6.4.2 Impact Assessment.....	6-71
6.4.2.1 Introduction	6-71
6.4.2.2 Key Question RU-1: What Impacts Will the Snap Lake Diamond Project Have on Existing Protected Ecologically Representative Areas?.....	6-73
6.4.2.2.1 Linkage Analysis	6-73
6.4.2.3 Key Question RU-2: What Impacts Will the Snap Lake Diamond Project Have on the Potential to Establish Protected Areas?.....	6-73
6.4.2.3.1 Linkage Analysis	6-73
6.4.2.3.2 Mitigation	6-73
6.4.2.3.3 Impact Analysis	6-74
6.4.2.3.4 Residual Impact Classification	6-74
6.4.2.4 Key Question RU-3: What Impacts Will the Snap Lake Diamond Project Have on Natural Resource Use?.....	6-76
6.4.2.4.1 Linkage Analysis	6-76
6.4.2.4.2 Mitigation	6-77
6.4.2.4.3 Impact Analysis	6-78

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
6.4.2.4.4 Residual Impact Classification	6-79
6.4.2.4.5 Monitoring.....	6-81
6.5 AESTHETIC QUALITY.....	6-82
6.5.1 Baseline	6-82
6.5.2 Impact Assessment.....	6-82
6.5.2.1 Introduction	6-82
6.5.2.2 Key Question VQ-1: What Impacts Will the Snap Lake Diamond Project Have on the Visual Quality of Snap Lake and Environs?	6-83
6.5.2.2.1 Linkage Analysis	6-83
6.5.2.2.2 Mitigation	6-83
6.5.2.2.3 Impact Analysis	6-84
6.5.2.2.4 Residual Impact Classification	6-85
6.6 TIBBITT-CONTWOYTO WINTER ROAD.....	6-90
6.6.1 Baseline	6-90
6.6.1.1 Lockhart Lake Camp.....	6-90
6.6.1.2 Tibbitt-Contwoyto Winter Road.....	6-92
6.6.2 Impact Assessment.....	6-95
6.6.2.1 Introduction	6-95
6.6.2.2 Key Question TCWR-1: What Impact Will the Snap Lake Diamond Project Have on the Lockhart Lake Camp?	6-96
6.6.2.2.1 Linkage Analysis	6-96
6.6.2.2.2 Mitigation	6-96
6.6.2.2.3 Impact Analysis	6-96
6.6.2.2.4 Residual Impact Classification	6-96
6.6.2.3 Key Question TCWR-2: What Impact Will the Snap Lake Diamond Project Have on the Tibbitt-Contwoyto Winter Road?	6-97
6.6.2.3.1 Linkage Analysis	6-97
6.6.2.3.2 Mitigation	6-98
6.6.2.3.3 Impact Analysis	6-98
6.6.2.4 Residual Impact Classification.....	6-99
6.6.2.5 Monitoring	6-100
6.7 CONCLUSIONS.....	6-102
6.7.1 Heritage Resources	6-102
6.7.2 Traditional Land Use	6-104
6.7.3 Non-traditional Resource Use.....	6-104
6.7.4 Aesthetic Quality	6-107
6.7.5 Tibbitt-Contwoyto Winter Road	6-109
6.8 REFERENCES	6-109
6.9 UNITS, ACRONYMS, AND GLOSSARY.....	6-112
7 AIR QUALITY.....	7-1
7.1 SCOPE OF ASSESSMENT	7-1
7.1.1 Terms of Reference	7-1
7.1.2 Component Description and Organization.....	7-2
7.1.3 Assessment Approach	7-3
7.1.3.1 Key Issues and Key Questions.....	7-3
7.1.3.2 Assessment Cases	7-4
7.1.3.3 Temporal Considerations.....	7-5

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
7.1.4 Study Area	7-5
7.1.5 Assessment Methods.....	7-9
7.1.5.1 Criteria Compounds.....	7-9
7.1.5.1.1 NWT Air Quality Standards	7-10
7.1.5.1.2 Federal Objectives and Standards.....	7-10
7.1.5.1.3 Canada-Wide Standards.....	7-11
7.1.5.1.4 Summary of Regulatory Criteria for Ambient Air Quality.....	7-11
7.1.5.2 Deposition Criteria	7-12
7.1.5.3 Air Modelling Approach.....	7-13
7.1.5.3.1 CALPUFF Dispersion Model.....	7-15
7.1.5.3.2 Model Limitations	7-16
7.1.5.3.3 NO _x to NO ₂ Conversion Methods	7-16
7.1.5.3.4 Background Levels of Acid-Forming Compounds.....	7-17
7.1.5.4 Assessment Method	7-19
7.2 BASELINE	7-27
7.2.1 Introduction	7-27
7.2.2 Local Meteorology and Background Air Quality.....	7-27
7.2.2.1 Local Meteorology	7-27
7.2.2.1.1 Wind Speed and Direction	7-28
7.2.2.1.2 Atmospheric Stability.....	7-34
7.2.2.1.3 Atmospheric Mixing Heights.....	7-36
7.2.2.1.4 Temperature.....	7-37
7.2.2.1.5 Solar Radiation.....	7-38
7.2.2.2 Air Quality Monitoring	7-40
7.2.2.2.1 Total Suspended Particulates	7-40
7.2.2.2.2 Snow	7-44
7.2.2.2.3 Dustfall	7-48
7.2.3 Baseline Regional Emissions.....	7-48
7.3 IMPACT ASSESSMENT	7-49
7.3.1 Introduction	7-49
7.3.2 Project Emissions.....	7-49
7.3.2.1 Power Plant	7-49
7.3.2.2 Mine Air Heaters and Water Heaters.....	7-50
7.3.2.3 Underground Activities.....	7-50
7.3.2.4 Quarry and Mobile Surface Emissions	7-51
7.3.2.5 Process Plant.....	7-51
7.3.2.6 Other Project Emissions	7-52
7.3.2.7 Summary of Project Emissions.....	7-53
7.3.2.8 Emissions of Trace Air Compounds	7-53
7.3.3 Air Quality Predictions.....	7-55
7.3.3.1 Particulate Matter.....	7-55
7.3.3.1.1 Total Suspended Particulates	7-56
7.3.3.1.2 PM ₁₀	7-61
7.3.3.1.3 PM _{2.5}	7-62
7.3.3.2 Sulphur Dioxide (SO ₂)	7-71
7.3.3.3 Oxides of Nitrogen	7-72
7.3.3.4 Other Air Compounds	7-85
7.3.3.4.1 Polycyclic Aromatic Hydrocarbons (PAH).....	7-85
7.3.3.4.2 Trace Metals	7-85

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
7.3.3.5 Potential Acid Input.....	7-92
7.3.4 Key Question AQ-1: What Impacts will Air Emissions from the Snap Lake Diamond Project Have on Air Quality?	7-93
7.3.4.1 Linkage Analysis.....	7-93
7.3.4.2 Impact Analysis.....	7-93
7.3.4.3 Residual Impact Classification.....	7-99
7.3.5 Key Question AQ-2: What Impacts Will Air Emissions from the Snap Lake Diamond Project Have on the Deposition of Acid Forming Compounds?	7-101
7.3.5.1 Linkage Analysis.....	7-101
7.3.5.2 Impact Analysis.....	7-101
7.3.5.3 Impact Classification.....	7-104
7.3.6 Key Question AQ-3: What Air Quality Impacts Will Result from Construction Activities at Snap Lake Diamond Project?	7-105
7.3.6.1 Linkage Analysis.....	7-105
7.3.7 Key Question AQ-4: What Impacts Will the Snap Lake Diamond Project Have on Visibility near Snap Lake?.....	7-106
7.3.7.1 Linkage Analysis.....	7-106
7.3.7.2 Impact Analysis.....	7-106
7.3.7.3 Impact Classification.....	7-113
7.3.8 Key Question AQ-5: What Impacts Will the Snap Lake Diamond Project Have on the Production and Management of Greenhouse Gas Emissions?	7-114
7.3.8.1 Linkage Analysis.....	7-114
7.3.8.2 Impact Analysis.....	7-115
7.3.8.3 Impact Classification.....	7-116
7.4 MITIGATION AND MONITORING.....	7-117
7.4.1 Project Mitigation.....	7-117
7.4.2 Air Quality and Meteorological Monitoring	7-117
7.5 CONCLUSIONS.....	7-119
7.6 REFERENCES	7-123
7.7 UNITS, ACRONYMS, AND GLOSSARY.....	7-127
8 NOISE	8-1
8.1 SCOPE OF ASSESSMENT.....	8-1
8.1.1 Terms of Reference	8-1
8.1.2 Component Description and Organization.....	8-1
8.1.3 Assessment Approach	8-2
8.1.3.1 Key Issues and Key Questions.....	8-2
8.1.3.2 Assessment Cases	8-2
8.1.3.3 Temporal Considerations.....	8-3
8.1.4 Study Area	8-3
8.1.5 Methods	8-7
8.1.5.1 Environmental Noise Descriptors	8-7
8.1.5.2 Noise Impact Criteria	8-8
8.1.5.3 Sound Attenuation	8-10
8.1.5.4 Sound Levels Predictions	8-11
8.1.5.4.1 Construction Noise	8-11
8.1.5.4.2 Operation Noise	8-11
8.1.5.5 Impact Classification Method.....	8-12

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
8.2 BASELINE	8-17
8.2.1 Introduction	8-17
8.2.2 Ambient Noise Survey	8-17
8.2.3 Ambient Sound Levels	8-17
8.3 IMPACT ASSESSMENT	8-19
8.3.1 Introduction	8-19
8.3.2 Key Question N-1: What Impacts Will Construction of the Snap Lake Diamond Project Have on Environmental Noise?	8-21
8.3.2.1 Linkage Analysis.....	8-21
8.3.2.2 Impact Analysis.....	8-21
8.3.2.2.1 Construction Site.....	8-21
8.3.2.2.2 Construction Traffic.....	8-24
8.3.2.3 Impact Classification.....	8-25
8.3.3 Key Question N-2: What Impacts Will Operation of the Snap Lake Diamond Project Have on Environmental Noise?	8-26
8.3.3.1 Linkage Analysis.....	8-26
8.3.3.2 Mitigation	8-27
8.3.3.3 Impact Analysis.....	8-27
8.3.3.3.1 Active Mine Site	8-27
8.3.3.3.2 Traffic	8-29
8.3.3.3.3 Mine Site and Traffic	8-38
8.3.3.4 Impact Classification.....	8-38
8.4 CONCLUSIONS.....	8-40
8.4.1 Construction Noise Impact.....	8-40
8.4.2 Operation Noise Impact	8-42
8.5 REFERENCES	8-46
8.6 UNITS, ACRONYMS, AND GLOSSARY.....	8-48
9 AQUATIC RESOURCES.....	9-1
9.1 SCOPE OF ASSESSMENT	9-1
9.1.1 Terms of Reference	9-1
9.1.2 Component Description and Organization.....	9-3
9.1.3 Assessment Approach	9-4
9.1.3.1 Key Issues and Key Questions.....	9-4
9.1.3.2 Impact Assessment	9-4
9.1.3.3 Temporal Considerations.....	9-6
9.1.4 Study Area	9-6
9.1.5 Assessment Methods.....	9-10
9.1.5.1 Residual Impact Criteria	9-10
9.1.5.2 Definitions of Criteria	9-13
9.1.5.3 Environmental Consequence	9-13
9.2 HYDROGEOLOGY	9-21
9.2.1 Baseline Setting	9-21
9.2.1.1 Introduction	9-21
9.2.1.2 General Setting	9-21
9.2.1.3 Groundwater Quality.....	9-23
9.2.1.4 Hydrostratigraphy and Groundwater Flow.....	9-28
9.2.1.4.1 Shallow Groundwater Flow Regime.....	9-28
9.2.1.4.2 Deep Groundwater Flow Regime.....	9-30
9.2.2 Impact Assessment.....	9-33

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
9.2.2.1 Introduction	9-33
9.2.2.2 Analytical Methods.....	9-35
9.2.2.2.1 Groundwater Flow Model	9-35
9.2.2.2.2 Water Quality Models.....	9-45
9.2.2.2.3 Seepage Water Model	9-47
9.2.2.3 Assessment Method	9-47
9.2.2.4 Key Question HG-1: Will the Underground Mine for the Snap Lake Diamond Project Change Groundwater Quantity and Groundwater Levels?.....	9-48
9.2.2.4.1 Linkage Analysis	9-48
9.2.2.4.2 Mitigation	9-48
9.2.2.4.3 Analysis of Changes	9-49
9.2.2.4.4 Residual Groundwater Changes	9-52
9.2.2.5 Key Question HG-2: Will the Underground Mine for the Snap Lake Diamond Project Change Groundwater Quality?	9-54
9.2.2.5.1 Linkage Analysis	9-54
9.2.2.5.2 Mitigation	9-55
9.2.2.5.3 Analysis of Changes	9-55
9.2.2.5.4 Residual Groundwater Changes	9-60
9.2.2.6 Key Question HG-3: Will the Surface Facilities for the Snap Lake Diamond Project Change Groundwater Quantity and Groundwater Levels?.....	9-61
9.2.2.6.1 Linkage Analyses	9-61
9.2.2.7 Key Question HG-4: Will the Surface Facilities for the Snap Lake Diamond Project Change Groundwater Quality?	9-62
9.2.2.7.1 Linkage Analysis	9-62
9.2.2.7.2 Mitigation	9-62
9.2.2.7.3 Analysis of Changes	9-63
9.2.2.7.4 Residual Groundwater Changes	9-74
9.2.3 Monitoring and Studies	9-75
9.2.3.1 Additional Studies	9-75
9.2.3.2 Monitoring	9-76
9.3 HYDROLOGY	9-77
9.3.1 Baseline	9-77
9.3.1.1 Introduction	9-77
9.3.1.2 General Setting.....	9-77
9.3.1.2.1 Regional Drainage	9-77
9.3.1.2.2 Local Drainage	9-81
9.3.1.3 Climate.....	9-81
9.3.1.3.1 Data Sources	9-82
9.3.1.3.2 Air Temperature	9-86
9.3.1.3.3 Precipitation	9-92
9.3.1.3.4 Evaporation and Evapotranspiration.....	9-110
9.3.1.3.5 Solar Radiation.....	9-117
9.3.1.3.6 Wind	9-117
9.3.1.4 Hydrology.....	9-117
9.3.1.4.1 Surface Hydrology Monitoring Program.....	9-117
9.3.1.4.2 Streamflow Modelling.....	9-125

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
9.3.1.4.3 Synthesized Flow Data for the Snap Lake Outlet.....	9-127
9.3.1.4.4 Historical Water Elevations for Snap Lake.....	9-129
9.3.1.4.5 Flood Magnitude and Frequency	9-130
9.3.1.4.6 Flow Duration Analysis.....	9-131
9.3.1.4.7 Lake Flushing Rates	9-132
9.3.1.4.8 Peak Flows from Small Watersheds	9-132
9.3.1.4.9 Lake Ice.....	9-135
9.3.2 Impact Assessment.....	9-136
9.3.2.1 Introduction	9-136
9.3.2.2 Key Question H1: What Impacts Will the Snap Lake Diamond Project Have on Near-surface Water Tables and Flows, and Water Levels in Receiving Streams, Lakes, and Wetlands?	9-138
9.3.2.2.1 Linkage Analysis	9-138
9.3.2.2.2 Mitigation	9-139
9.3.2.2.3 Impact Analysis	9-140
9.3.2.2.4 Residual Impact Classification	9-148
9.3.2.2.5 Monitoring.....	9-151
9.3.2.3 Key Question H-2: What Impacts Will the Snap Lake Diamond Project Have on Sediment Yields and Sediment Concentrations in Receiving Streams, Lakes, and Wetlands?	9-152
9.3.2.3.1 Linkage Analysis	9-152
9.3.2.3.2 Mitigation	9-152
9.3.2.3.3 Impact Analysis	9-153
9.3.2.3.4 Residual Impact Classification	9-154
9.3.2.3.5 Monitoring.....	9-154
9.4 WATER QUALITY	9-155
9.4.1 Baseline Setting	9-155
9.4.1.1 Introduction	9-155
9.4.1.2 Snap Lake Water Quality.....	9-163
9.4.1.3 Reference Lake and North Lake Water Quality.....	9-172
9.4.1.4 Small Lakes Water Quality	9-175
9.4.1.5 Stream Water Quality	9-180
9.4.1.6 Sediment Quality in Snap Lake and Reference Lake.....	9-180
9.4.1.7 Summary and Conclusions.....	9-180
9.4.1.8 Lockhart River Watershed	9-185
9.4.1.8.1 Water Quality	9-185
9.4.1.8.2 Sediment Quality.....	9-196
9.4.1.9 Lake Acidification in the Regional Study Area.....	9-196
9.4.1.9.1 Background Information	9-196
9.4.1.9.2 Acid-sensitivity of Regional Lakes	9-199
9.4.2 Impact Assessment.....	9-201
9.4.2.1 Introduction	9-201
9.4.2.1.1 General Water Quality Assessment Methods	9-203
9.4.2.2 Key Question WQ-1: What Impacts Will the Snap Lake Diamond Project Have on Surface Water Quality?	9-208
9.4.2.2.1 Linkage Analysis	9-208
9.4.2.2.2 Mitigation	9-212
9.4.2.2.3 Impact Analysis Methods	9-213

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
9.4.2.2.4 Impact Analysis Results	9-222
9.4.2.2.5 Residual Impact Classification	9-242
9.4.2.2.6 Monitoring.....	9-246
9.4.2.2.7 Additional Studies	9-246
9.4.2.2.8 Monitoring.....	9-246
9.4.2.3 Key Question WQ-2: What Impacts Will the Snap Lake Diamond Project Have on Regional Water Quality in the Lockhart River Watershed?.....	9-247
9.4.2.3.1 Linkage Analysis	9-247
9.4.2.3.2 Monitoring.....	9-248
9.4.2.4 Key Question WQ-3: What Impacts Will Acidifying Emissions from the Snap Lake Diamond Project Have on Regional Waterbodies?	9-248
9.4.2.4.1 Background	9-248
9.4.2.4.2 Linkage Analysis	9-250
9.4.2.4.3 Mitigation	9-250
9.4.2.4.4 Impact Analysis Methods	9-251
9.4.2.4.5 Impact Analysis Results	9-252
9.4.2.4.6 Residual Impact Classification	9-256
9.4.2.4.7 Monitoring.....	9-257
9.5 AQUATIC ORGANISMS AND HABITAT.....	9-258
9.5.1 Baseline	9-258
9.5.1.1 Introduction	9-258
9.5.1.2 Methods	9-258
9.5.1.2.1 Introduction.....	9-258
9.5.1.2.2 Phytoplankton and Zooplankton Sampling	9-261
9.5.1.2.3 Benthic Invertebrate Community Sampling.....	9-261
9.5.1.2.4 Fisheries Sampling.....	9-262
9.5.1.2.5 Bathymetry	9-265
9.5.1.2.6 Fish Habitat Mapping	9-266
9.5.1.2.7 Stream Surveys.....	9-266
9.5.1.3 Summary of Results for Snap Lake.....	9-266
9.5.1.3.1 Phytoplankton	9-266
9.5.1.3.2 Zooplankton	9-267
9.5.1.3.3 Benthic Invertebrates	9-268
9.5.1.3.4 Fish Inventory	9-269
9.5.1.3.5 Fish Tissue Analysis	9-270
9.5.1.3.6 Bathymetry	9-271
9.5.1.3.7 Fish Habitat	9-271
9.5.1.3.8 Lake Trout Spawning Survey.....	9-276
9.5.1.4 Summary of Results for Reference and Regional Lakes	9-277
9.5.1.4.1 Phytoplankton	9-277
9.5.1.4.2 Zooplankton	9-278
9.5.1.4.3 Benthic Invertebrate Community.....	9-279
9.5.1.4.4 Fish Inventory.....	9-279
9.5.1.4.5 Fish Tissue Analysis	9-280
9.5.1.5 Inland Lakes and Streams	9-280
9.5.1.5.1 Bathymetry	9-280
9.5.1.5.2 Fish Inventory.....	9-284
9.5.1.5.3 Fish Habitat	9-284
9.5.1.5.4 Stream Surveys.....	9-287

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
9.5.1.6 Ecological Process in Local Study Area Lakes	9-287
9.5.1.6.1 Chemical Variables	9-287
9.5.1.6.2 Ecological Variables.....	9-292
9.5.2 Impact Assessment.....	9-294
9.5.2.1 Introduction	9-294
9.5.2.2 Key Question F-1: What Impacts Will the Snap Lake Diamond Project Have on the Quality and Quantity of Non-fish Aquatic Organisms?	9-298
9.5.2.2.1 Linkage Analysis	9-299
9.5.2.2.2 Mitigation	9-300
9.5.2.2.3 Impact Analysis	9-301
9.5.2.2.4 Residual Impact Classification	9-322
9.5.2.2.5 Level of Certainty in the Impact Assessment.....	9-327
9.5.2.3 Key Question F-2: What Impacts Will the Snap Lake Diamond Project Have on Fish Habitat?	9-327
9.5.2.3.1 Linkage Analysis	9-327
9.5.2.3.2 Mitigation	9-332
9.5.2.3.3 Impact Analysis	9-334
9.5.2.3.4 Residual Impact Classification	9-346
9.5.2.3.5 Monitoring.....	9-349
9.5.2.4 Key Question F-3: What Impacts Will the Snap Lake Diamond Project Have on Fish Health?	9-350
9.5.2.4.1 Linkage Analysis	9-350
9.5.2.4.2 Mitigation	9-352
9.5.2.4.3 Impact Analysis	9-353
9.5.2.4.4 Residual Impact Classification	9-365
9.5.2.4.5 Level of Certainty in the Impact Assessment.....	9-367
9.5.2.5 Key Questions F-4: What Impacts Will the Snap Lake Diamond Project Have on Fish Abundance?	9-369
9.5.2.5.1 Linkage Analysis for Snap Lake.....	9-369
9.5.2.5.2 Linkage Analysis for the North Lakes	9-371
9.5.2.5.3 Impact Analysis	9-373
9.5.2.5.4 Residual Impact Classification	9-379
9.5.2.5.5 Monitoring.....	9-381
9.6 CONCLUSIONS.....	9-382
9.6.1 Hydrogeology	9-383
9.6.1.1 Changes in Groundwater Quantity and Levels.....	9-383
9.6.1.2 Changes in Groundwater Quality	9-384
9.6.2 Hydrology	9-385
9.6.2.1 Snap Lake Water Levels and Flows	9-385
9.6.2.2 Snap Lake Sediment Yields	9-387
9.6.2.3 North Lakes Water Levels and Flows	9-387
9.6.3 Water Quality	9-388
9.6.3.1 Snap Lake.....	9-388
9.6.3.2 North Lakes	9-390
9.6.3.3 Regional Study Area.....	9-393
9.6.3.4 Acidifying Emissions	9-393
9.6.4 AQUATIC ORGANISMS AND HABITAT SECTION	9-393
9.6.4.1 Snap Lake.....	9-394
9.6.4.2 North Lakes	9-394
9.6.4.3 Regional Study Area.....	9-402

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
9.7 REFERENCES	9-402
9.8 UNITS, ACRONYMS, AND GLOSSARY.....	9-416
10 TERRESTRIAL RESOURCES.....	10-1
 10.1 SCOPE OF ASSESSMENT	10-1
10.1.1 Terms of Reference	10-1
10.1.2 Component Description and Organization.....	10-3
10.1.3 Assessment Approach.....	10-4
10.1.3.1 Key Issues and Key Questions.....	10-4
10.1.3.2 Impact Assessment	10-5
10.1.3.3 Temporal Considerations.....	10-6
10.1.4 Study Area	10-6
10.1.5 Assessment Methods	10-8
10.1.5.1 Residual Impact Criteria	10-8
10.1.5.2 Definitions of Criteria	10-13
10.1.5.3 Environmental Consequence	10-13
10.1.5.4 Valued Ecosystem Components	10-19
 10.2 GEOLOGY AND TERRAIN	10-20
10.2.1 Baseline	10-20
10.2.1.1 Introduction	10-20
10.2.1.2 Terrain.....	10-23
10.2.1.2.1 Setting	10-23
10.2.1.2.2 Methods.....	10-23
10.2.1.2.3 Terrain Units.....	10-24
10.2.1.3 Geology.....	10-25
10.2.1.4 Geological Hazards and Seismicity	10-26
10.2.1.5 Permafrost	10-31
10.2.2 Impact Assessment	10-34
10.2.2.1 Introduction	10-34
10.2.2.2 Key Question GT-1: What Direct Impacts Will the Snap Lake Diamond Project Have on Terrain Units in the Local Study Area?.....	10-36
10.2.2.2.1 Linkage Analysis	10-37
10.2.2.2.2 Mitigation.....	10-37
10.2.2.2.3 Impact Analysis	10-38
10.2.2.2.4 Residual Impact Classification	10-39
10.2.2.2.5 Monitoring.....	10-40
10.2.2.3 Key Question GT-2: What Impacts Will the Snap Lake Diamond Project Quarrying Have on the Esker?	10-40
10.2.2.3.1 Linkage Analysis	10-40
10.2.2.3.2 Mitigation.....	10-41
10.2.2.3.3 Impact Analysis	10-42
10.2.2.3.4 Residual Impact Classification	10-42
10.2.2.3.5 Monitoring.....	10-43
10.2.2.4 Key Question GT-3: What Impacts to the Snap Lake Diamond Project Will Occur Due to the Seismic Characteristics of the Region?	10-43
10.2.2.4.1 Linkage Analyses	10-43
10.2.2.5 Key Question GT-4: What Impacts Will the Snap Lake Diamond Project Have on the Ground Thermal Regime?	10-44

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
10.2.2.5.1 Linkage Analysis	10-44
10.2.2.5.2 Mitigation	10-45
10.2.2.5.3 Impact Analysis	10-45
10.2.2.5.4 Residual Impact Classification	10-51
10.2.2.6 Key Question GT-5: What Impacts Will the Presence of Ground Ice Have on the Stability of Containment Structures?	10-52
10.2.2.6.1 Linkage Analysis	10-52
10.2.2.7 Key Question GT-6: What Impacts Will Freeze-back of the North Pile Have on Surface Water Quality?	10-53
10.2.2.7.1 Linkage Analysis	10-53
10.2.2.8 Key Question GT-7: What Impacts Will Climate Change Have on the Development?	10-53
10.2.2.8.1 Linkage Analysis	10-53
10.3 ELC AND BIODIVERSITY.....	10-55
10.3.1 Baseline	10-55
10.3.1.1 Introduction	10-55
10.3.1.2 Study Areas	10-58
10.3.1.3 General Setting.....	10-59
10.3.1.4 Methods	10-60
10.3.1.4.1 Field Investigations	10-60
10.3.1.4.2 Mapping.....	10-60
10.3.1.4.3 Biodiversity	10-62
10.3.1.5 Ecological Land Classification	10-66
10.3.1.6 Rare and Traditional Plant Potentials	10-70
10.3.1.7 Biodiversity	10-73
10.3.1.7.1 Landscape Level Biodiversity	10-73
10.3.1.7.2 Ecosystem Level Biodiversity.....	10-76
10.3.2 Impact Assessment	10-77
10.3.2.1 Introduction	10-77
10.3.2.1.1 Key Questions	10-77
10.3.2.1.2 Linkage Diagram	10-80
10.3.2.1.3 Assessment Method.....	10-80
10.3.2.2 Key Question ELC-1: What Direct Impacts Will the Snap Lake Diamond Project Have on Ecological Land Classification Units?	10-83
10.3.2.2.1 Linkage Analysis	10-83
10.3.2.2.2 Mitigation	10-83
10.3.2.2.3 Impact Analysis	10-84
10.3.2.2.4 Residual Impact Classification	10-89
10.3.2.2.5 Monitoring.....	10-93
10.3.2.3 Key Question ELC-2: What Direct Impacts Will the Snap Lake Diamond Project Have on Biodiversity?	10-93
10.3.2.3.1 Linkage Analysis	10-93
10.3.2.3.2 Mitigation	10-93
10.3.2.3.3 Impact Analysis	10-94
10.3.2.3.4 Residual Impact Classification	10-99
10.3.2.3.5 Monitoring.....	10-100
10.3.2.4 Key Question ELC-3: What Indirect Impacts Will Air Emissions from the Snap Lake Diamond Project Have on Vegetation (ELC Unit) Health?	10-101

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
10.3.2.4.1 Linkage Analysis	10-101
10.3.2.4.2 Mitigation	10-105
10.3.2.4.3 Impact Analysis	10-106
10.3.2.4.4 Residual Impact Classification	10-109
10.3.2.4.5 Monitoring.....	10-111
10.3.2.5 Key Question ELC-4: What Indirect Impacts Will Water Releases from the Snap Lake Diamond Project Have on Vegetation (ELC Unit) Health?	10-111
10.3.2.5.1 Linkage Analysis	10-111
10.3.2.5.2 Mitigation.....	10-112
10.3.2.5.3 Impact Analysis	10-112
10.3.2.5.4 Residual Impact Classification	10-113
10.3.2.5.5 Monitoring.....	10-114
10.4 WILDLIFE	10-115
10.4.1 Baseline	10-115
10.4.1.1 Introduction	10-115
10.4.1.2 Study Area	10-116
10.4.1.3 Methods	10-119
10.4.1.3.1 Valued Ecosystem Components.....	10-119
10.4.1.3.2 Caribou.....	10-119
10.4.1.3.3 Grizzly Bears, Wolves, and Foxes	10-122
10.4.1.3.4 Wolverines.....	10-123
10.4.1.3.5 Upland Breeding Birds	10-124
10.4.1.3.6 Raptors.....	10-126
10.4.1.3.7 Waterfowl	10-126
10.4.1.4 Results	10-128
10.4.1.4.1 Caribou.....	10-128
10.4.1.4.2 Grizzly Bears, Wolves, and Foxes	10-139
10.4.1.4.3 Wolverines.....	10-142
10.4.1.4.4 Upland Breeding Birds	10-142
10.4.1.4.5 Raptors.....	10-145
10.4.1.4.6 Waterfowl	10-147
10.4.2 Impact Assessment	10-148
10.4.2.1 Introduction	10-148
10.4.2.2 Key Question W-1: What Impacts Will the Snap Lake Diamond Project Have on Wildlife Habitat?	10-149
10.4.2.2.1 Linkage Analysis	10-149
10.4.2.2.2 Mitigation.....	10-153
10.4.2.2.3 Impact Analysis	10-154
10.4.2.2.4 Residual Impact Classification	10-160
10.4.2.2.5 Monitoring.....	10-165
10.4.2.3 Key Question W-2: What Impacts Will the Snap Lake Diamond Project Have on Wildlife Movement and Behaviour?	10-165
10.4.2.3.1 Linkage Analysis	10-165
10.4.2.3.2 Mitigation	10-167
10.4.2.3.3 Impact Analysis	10-168
10.4.2.3.4 Residual Impact Classification	10-174
10.4.2.4 Key Question W-3: What Impacts Will the Snap Lake Diamond Project Have on Wildlife Abundance?	10-184
10.4.2.4.1 Linkage Analysis	10-184

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
10.4.2.4.2 Mitigation	10-189
10.4.2.4.3 Impact Analysis	10-192
10.4.2.4.4 Residual Impact Classification	10-192
10.5 CONCLUSIONS.....	10-200
10.5.1 Introduction	10-200
10.5.2 Geology and Terrain	10-201
10.5.2.1 Terrain Units in the Local Study Area.....	10-201
10.5.2.2 Esker Quarry.....	10-201
10.5.2.3 Seismic Characteristics	10-203
10.5.2.4 Ground Thermal Regime	10-203
10.5.2.5 Impact of Ground Ice on Containment Structures	10-204
10.5.2.6 Freeze-back of the North Pile and Climate Change.....	10-204
10.5.3 Ecological Land Classification and Biodiversity.....	10-206
10.5.3.1 Direct Loss	10-206
10.5.3.2 Biodiversity	10-209
10.5.3.3 Vegetation Health	10-209
10.5.4 Wildlife	10-210
10.5.4.1 Wildlife Habitat.....	10-210
10.5.4.2 Wildlife Movement and Behaviour.....	10-216
10.5.4.3 Wildlife Abundance	10-220
10.6 REFERENCES	10-231
10.7 UNITS, ACRONYMS, AND GLOSSARY.....	10-240
11 ENVIRONMENTAL HEALTH.....	11-1
11.1 SCOPE OF ASSESSMENT	11-1
11.1.1 Terms of Reference	11-1
11.1.2 Component Description and Organization.....	11-1
11.1.3 Assessment Approach.....	11-2
11.1.3.1 Key Issues and Key Questions.....	11-2
11.1.3.2 Assessment Cases	11-3
11.1.4 Study Areas	11-4
11.1.5 Assessment Methods	11-7
11.2 BASELINE	11-9
11.2.1 Introduction	11-9
11.2.2 Baseline Data	11-10
11.2.2.1 Air Quality	11-10
11.2.2.2 Fish Tissue Quality	11-11
11.2.2.3 Drinking Water Quality.....	11-11
11.2.2.4 Vegetation Quality	11-14
11.2.2.5 Soil Quality.....	11-16
11.3 IMPACT ANALYSIS	11-19
11.3.1 Introduction	11-19
11.3.2 Key Question EH-1: What Impacts Will the Snap Lake Diamond Project Have on Wildlife Health?	11-20
11.3.2.1 Linkage Analysis.....	11-20
11.3.2.1.1 Problem Formulation.....	11-20
11.3.2.1.2 Linkage Analysis	11-22
11.3.2.2 Mitigation	11-26
11.3.2.3 Impact Analysis.....	11-26
11.3.2.3.1 Exposure Assessment	11-27

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
11.3.2.3.2 Temporal and Spatial Boundaries.....	11-27
11.3.2.3.3 Receptor Exposure Parameters.....	11-29
11.3.2.3.4 Exposure Estimates	11-29
11.3.2.3.5 Toxicity Assessment	11-29
11.3.2.3.6 Risk Characterization.....	11-30
11.3.2.4 Residual Impact Classification.....	11-34
11.3.2.5 Mitigation and Monitoring.....	11-34
11.3.3 Key Question EH-2: What Impacts Will the Snap Lake Diamond Project Have on Human Health?	11-35
11.3.3.1 Linkage Analysis.....	11-35
11.3.3.1.1 Problem Formulation.....	11-35
11.3.3.1.2 Linkage Analysis	11-38
11.3.3.2 Mitigation	11-40
11.3.3.3 Impact Analysis.....	11-40
11.3.3.3.1 Exposure Assessment	11-40
11.3.3.3.2 Temporal and Spatial Boundaries.....	11-40
11.3.3.3.3 Receptor Exposure Parameters.....	11-41
11.3.3.3.4 Exposure Estimates	11-41
11.3.3.3.5 Toxicity Assessment	11-42
11.3.3.3.6 Risk Characterization	11-42
11.3.3.4 Residual Impact Classification.....	11-44
11.3.3.5 Mitigation and Monitoring.....	11-45
11.4 CONCLUSIONS.....	11-45
11.5 REFERENCES	11-46
11.6 UNITS, ACRONYMS, AND GLOSSARY.....	11-49

12 CUMULATIVE EFFECTS ASSESSMENT.....12-1

12.1 SCOPE OF ASSESSMENT.....	12-1
12.1.1 Introduction	12-1
12.1.2 Terms of Reference	12-3
12.1.3 Component Description and Organization.....	12-5
12.1.4 Assessment Approach.....	12-6
12.1.4.1 Key Issues and Key Questions.....	12-6
12.1.4.2 Cumulative Effects Analysis	12-8
12.1.4.3 Temporal Considerations.....	12-10
12.1.4.4 Mitigation	12-10
12.1.5 Study Areas	12-10
12.1.6 Assessment Methods	12-11
12.1.6.1 Residual Impact Criteria	12-11
12.1.6.2 Definitions of Criteria	12-15
12.1.6.3 Environmental Consequence	12-16
12.1.7 Monitoring	12-19
12.2 SOCIO-ECONOMICS.....12-19	
12.2.1 Scope of Socio-economic Cumulative Effects.....	12-19
12.2.2 Analysis of Impacts.....	12-22
12.2.2.1 Introduction	12-22
12.2.3 Employment Opportunities and Income Levels	12-24
12.2.3.1 Key Question SE-1: What Socio-economic Cumulative Impacts Will the Snap Lake Diamond Project Have on Employment Opportunity and Income Levels?	12-24

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
12.2.3.1.1 Discussion of Impacts	12-25
12.2.4 Increased Demand for Skilled Labour	12-27
12.2.4.1 Key Question SE-2: What Will the Snap Lake Diamond Project Contribute to the Socio-economic Cumulative Effects of Increased Demand for Skilled Labour?.....	12-27
12.2.4.1.1 Discussion of Impacts	12-28
12.2.5 Regional Economic Development	12-29
12.2.5.1 Key Question SE-3: What Cumulative Impacts Will the Snap Lake Diamond Project Have on Regional Economic Development?	12-29
12.2.5.1.1 Discussion of Impacts	12-30
12.2.6 Social Capacity of the Region	12-32
12.2.6.1 Key Question SE-4: What Socio-economic Cumulative Effects Will the Snap Lake Diamond Project Have on the Social Capacity of the Region?	12-32
12.2.6.1.1 Discussion of Impacts	12-33
12.2.7 Changes on Cultural Practices and Traditions of Aboriginal People.....	12-34
12.2.7.1 Key Question SE-5: What Cumulative Effects Will the Snap Lake Diamond Project Have on Changes in the Cultural Practices and Traditions of the Aboriginal People?...	12-34
12.2.7.1.1 Discussion of Impacts	12-35
12.3 RESOURCE USES	12-36
12.3.1 Introduction	12-36
12.3.1.1 Component Description and Organization.....	12-36
12.3.1.1.1 Key Issues and Key Questions	12-37
12.3.1.1.2 Residual Impact Criteria.....	12-37
12.3.2 Heritage Resources	12-39
12.3.2.1 Baseline	12-39
12.3.2.2 Cumulative Impact Assessment	12-41
12.3.2.2.1 Introduction.....	12-41
12.3.2.2.2 Linkage Analysis	12-42
12.3.2.2.3 Mitigation	12-42
12.3.2.2.4 Cumulative Impact Analysis	12-44
12.3.2.2.5 Residual Impact Classification	12-45
12.3.3 Traditional Land Use.....	12-46
12.3.3.1 Key Question CTLU-1: What Cumulative Impacts Will the Snap Lake Diamond Project Have on the Availability of Land for Traditional Land Use Purposes?.....	12-46
12.3.3.1.1 Linkage Analysis	12-46
12.3.4 Non Traditional Land Use	12-47
12.3.4.1 Key Question CRU-1: What Cumulative Impacts Will the Snap Lake Diamond Project Have on the Potential to Establish Protected Areas?	12-47
12.3.4.1.1 Linkage Analysis	12-47
12.3.4.2 Key Question CRU-2: What Cumulative Impacts Will the Snap Lake Diamond Project Have on Natural Resource Use?	12-47
12.3.4.2.1 Linkage Analysis	12-47
12.3.5 Aesthetic Quality.....	12-48
12.3.5.1 Key Question CVQ-1: What Cumulative Impacts Will the Snap Lake Diamond Project Have on Visual Quality?	12-48

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
	12-48
12.4 AIR QUALITY.....	12-48
12.4.1 Introduction	12-48
12.4.1.1 Component Description and Organization.....	12-48
12.4.1.1.1 Key Issues and Key Questions	12-49
12.4.1.1.2 Residual Impact Criteria.....	12-51
12.4.1.2 Description of the Cumulative Assessment Case	12-51
12.4.1.3 Air Modelling Approach.....	12-52
12.4.1.3.1 Model Limitations	12-53
12.4.1.3.2 NO _x to NO ₂ Conversion Methods	12-53
12.4.1.3.3 Background Levels of Acid-Forming Compounds.....	12-53
12.4.2 Modelled CEA Emissions	12-54
12.4.2.1 Summary of Snap Lake Diamond Project Emissions.....	12-54
12.4.2.2 EKATIT™ Diamond Mine.....	12-55
12.4.2.3 EKATIT™ Diamond Mine Expansion.....	12-55
12.4.2.4 Diavik Diamond Mine.....	12-56
12.4.2.5 Tahera Jericho Diamond Mine	12-57
12.4.2.6 Lupin Gold Mine.....	12-57
12.4.2.7 Summary of CEA Case Emissions	12-58
12.4.3 Air Quality Predictions	12-58
12.4.3.1 Particulate Matter.....	12-59
12.4.3.1.1 Total Suspended Particulates	12-59
12.4.3.1.2 PM ₁₀	12-60
12.4.3.1.3 PM _{2.5}	12-63
12.4.3.2 Sulphur Dioxide	12-66
12.4.3.3 Oxides of Nitrogen	12-69
12.4.3.4 Potential Acid Input.....	12-73
12.4.4 Cumulative Impact Assessment	12-79
12.4.4.1 Introduction	12-79
12.4.4.1.1 Linkage Analysis	12-79
12.4.4.2 Cumulative Impact Analysis	12-80
12.4.4.3 Residual Impact Classification.....	12-83
12.5 NOISE.....	12-86
12.5.1 Introduction	12-86
12.5.1.1 Component Description and Organization.....	12-86
12.5.1.1.1 Key Issues and Key Questions	12-88
12.5.1.1.2 Residual Impact Criteria.....	12-88
12.5.2 Cumulative Impact Assessment	12-88
12.5.2.1 Introduction	12-88
12.5.2.1.1 Linkage Analysis	12-89
12.5.2.1.2 Environmental Noise Descriptors.....	12-91
12.5.2.1.3 Noise Impact Criteria.....	12-92
12.5.2.1.4 Sound Attenuation.....	12-94
12.5.2.1.5 Sound Levels Predictions.....	12-95
12.5.2.2 Cumulative Impact Analysis	12-96
12.5.2.3 Residual Impact Classification.....	12-97
12.6 AQUATIC RESOURCES	12-98
12.6.1 Introduction	12-98
12.6.1.1 Component Description and Organization.....	12-98
12.6.1.1.1 Key Issues and Key Questions	12-99

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
12.6.2 Hydrogeology.....	12-102
12.6.2.1 Cumulative Impact Assessment	12-102
12.6.2.2 Key Question CHG-1: What Cumulative Impact Will the Underground Mine for the Snap Lake Diamond Project Have on Groundwater Quantity and Groundwater Levels? ..	12-102
12.6.2.2.1 Linkage Analysis	12-102
12.6.2.3 Key Question CHG-2: What Cumulative Impact Will the Underground Mine for the Snap Lake Diamond Project Have on Groundwater Quality? ..	12-102
12.6.2.3.1 Linkage Analysis	12-102
12.6.2.4 Key Question CHG-3: What Cumulative Impact Will the Surface Facilities for the Snap Lake Diamond Project Have on Groundwater Quantity and Groundwater Levels? ..	12-103
12.6.2.4.1 Linkage Analysis	12-103
12.6.2.5 Key Question CHG-4: What Cumulative Impact Will the Surface Facilities for the Snap Lake Diamond Project Have on Groundwater Quality? ..	12-104
12.6.2.5.1 Linkage Analysis	12-104
12.6.3 Hydrology.....	12-104
12.6.3.1 Cumulative Impact Assessment	12-104
12.6.3.2 Key Question CH-1: What Cumulative Impact Will the Snap Lake Diamond Project Have on Near-surface Water Tables and Flows, and Water Levels in Receiving Streams, Lakes, and Wetlands? ..	12-104
12.6.3.2.1 Linkage Analysis	12-104
12.6.3.3 Key Question CH-2: What Cumulative Impact Will the Snap Lake Diamond Project Have on Sediment Yields, and Sediment Concentrations in Receiving Streams, Lakes and Wetlands? ..	12-105
12.6.3.3.1 Linkage Analysis	12-105
12.6.4 Water Quality	12-106
12.6.4.1 Cumulative Impact Assessment	12-106
12.6.4.2 Key Question CA-1: What Cumulative Impacts Will the Snap Lake Diamond Project Have on Water Quality? ..	12-106
12.6.4.2.1 Linkage Analysis	12-106
12.6.5 Fish and Fish Habitat.....	12-107
12.6.5.1 Cumulative Impact Assessment	12-107
12.6.5.2 Key Question CAO-1: What Cumulative Impacts Will the Snap Lake Diamond Project Have on Fish and Fish Habitat? ..	12-107
12.6.5.2.1 Linkage Analysis	12-107
12.7 TERRESTRIAL RESOURCES	12-110
12.7.1 Introduction	12-110
12.7.1.1 Component Description and Organization.....	12-110
12.7.1.1.1 Key Issues and Key Questions	12-111
12.7.1.1.2 Residual Impact Criteria.....	12-113
12.7.2 Geology.....	12-114
12.7.2.1 Cumulative Impact Assessment	12-114

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
12.7.2.2 Key Question CG-1: What Cumulative Impacts Will the Snap Lake Diamond Project Have on Permafrost and Ground Thermal Regime?	12-114
12.7.2.2.1 Linkage Analysis	12-114
12.7.3 ELC, Terrain and Biodiversity	12-114
12.7.3.1 Cumulative Impact Assessment	12-114
12.7.3.2 Key Question CELCTB-1: What Cumulative Impacts Will the Snap Lake Diamond Project Have on ELC, Terrain and Biodiversity?	12-114
12.7.3.2.1 Linkage Analysis	12-114
12.7.4 Wildlife and Wildlife Habitat	12-116
12.7.4.1 Cumulative Impact Assessment	12-116
12.7.4.2 Key Question CW-1: What Cumulative Impacts Will the Snap Lake Diamond Project Have on Wildlife and Wildlife Habitat?	12-116
12.7.4.2.1 Linkage Analysis	12-116
12.7.4.3 Cumulative Impact Analysis	12-121
12.7.4.3.1 Linkage of Mining Activities to Potential Effects.	12-121
12.7.4.3.2 Direct Habitat Loss.....	12-121
12.7.4.3.3 Indirect Habitat Loss	12-121
12.7.4.3.4 Change in Abundance.....	12-122
12.7.4.3.5 Change in Movement and Behaviour.....	12-122
12.7.4.3.6 Cumulative Impact Analysis For Snap Lake Diamond Project.....	12-123
12.7.4.4 Residual Impact Classification.....	12-130
12.7.4.4.1 Direct Habitat Loss.....	12-130
12.7.4.4.2 Indirect Loss of Habitat From Fugitive Dust.....	12-132
12.7.4.4.3 Change in Abundance.....	12-133
12.7.4.4.4 Change in Movement and Behaviour.....	12-134
12.7.4.5 Discussion	12-135
12.8 ENVIRONMENTAL HEALTH.....	12-139
12.8.1 Wildlife Health Impact Analysis	12-139
12.8.1.1 Introduction	12-139
12.8.1.1.1 Constraints to the Assessment of Cumulative Effects on Wildlife Health	12-139
12.8.1.2 Key Question CEH-1: What Cumulative Impacts Will the Snap Lake Diamond Project and Other Regional Developments Have on Wildlife Health?	12-142
12.8.1.2.1 Linkage Analysis (Problem Formulation)	12-142
12.8.1.2.2 Receptor Selection.....	12-142
12.8.1.2.3 Chemicals of Concern (Chemical Identification)	12-143
12.8.1.2.4 Exposure Pathways and Linkage Analysis	12-144
12.8.1.3 Impact Analysis.....	12-147
12.8.1.3.1 Exposure Assessment	12-147
12.8.1.3.2 Toxicity Assessment	12-149
12.8.1.3.3 Risk Characterization.....	12-152
12.8.1.3.4 Residual Impact Classification	12-154
12.8.2 Human Health Impact Analysis	12-154
12.8.2.1 Introduction	12-154

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
12.8.2.2 Key Question CEH-2: What Cumulative Impacts Will the Snap Lake Diamond Project and Other Regional Developments Have on Human Health?.....	12-155
12.8.2.2.1 Linkage Analysis (Problem Formulation)	12-155
12.8.2.2.2 Receptor Selection.....	12-155
12.8.2.2.3 Chemicals of Concern.....	12-155
12.8.2.2.4 Exposure Pathways and Linkage Analysis	12-155
12.8.2.3 Impact Analysis.....	12-157
12.8.2.3.1 Exposure Assessment	12-157
12.8.2.3.2 Risk Characterization.....	12-158
12.8.2.3.3 Certainty	12-159
12.8.2.3.4 Residual Impact Classification	12-159
12.9 CONCLUSIONS.....	12-159
12.10 REFERENCES	12-168
12.11 UNITS, ACRONYMS, GLOSSARY.....	12-178
 13 ACCIDENTS AND MALFUNCTIONS	13-1
13.1 SCOPE OF ASSESSMENT	13-1
13.1.1 Terms of Reference	13-1
13.1.2 Component Description and Organization.....	13-1
13.1.3 Assessment Approach.....	13-3
13.1.3.1 Key Issues and Key Questions.....	13-3
13.1.3.2 Assessment Cases	13-4
13.1.3.3 Temporal Considerations	13-4
13.1.4 Study Areas	13-4
13.1.5 Assessment Methods	13-5
13.2 BASELINE	13-9
13.3 IMPACT ASSESSMENT	13-10
13.3.1 Introduction	13-10
13.3.2 What Impacts will Potential Accidents and Malfunctions at the Snap Lake Diamond Project Site Have On the Development and the Environment?.....	13-10
13.3.3 What Impacts Will Potential Accidents and Malfunctions On the Winter Road Have On the Environment?	13-19
13.4 CONCLUSIONS.....	13-28
13.5 REFERENCES	13-29
13.6 UNITS, ACRONYMS, AND GLOSSARY.....	13-30
 14. CORPORATE COMMITMENTS.....	14-1
14.1 INTRODUCTION	14-1
14.2 COMMUNITY RELATIONS, COMMUNITY CONSULTATION, AND COMMUNITY INVOLVEMENT	14-2
14.3 TRAINING, HIRING, EMPLOYMENT, AND ECONOMIC DEVELOPMENT.....	14-4
14.4 HEALTH AND SAFETY.....	14-4
14.5 ENVIRONMENT.....	14-15
14.6 MONITORING	14-15

LIST OF TABLES

Table 1.3-1	Regulatory Permits, Licences, and Authorizations Required for the Snap Lake Diamond Project	1-13
Table 1.4-1	Terms of Reference for the Preparation and Submission of the EA Report.....	1-16
Table 2.1-1	Terms of Reference for Project Alternatives and Opportunities.....	2-1
Table 2.8-1	Summary of Average Annual Wind Speeds at Northwest Territories Locations	2-16
Table 3.1-1	Terms of Reference for Project Description	3-1
Table 3.2-1	Highlights of Construction, Operations, and Closure	3-10
Table 3.6-1	Summary of Water Balance for Full-scale Mining (2005 - 2026)	3-24
Table 3.7-1	List of Consumables Stored at Snap Lake	3-32
Table 4.1-1	Terms of Reference for Public Consultation.....	4-1
Table 4.2-1	Snap Lake Diamond Project Community Consultation Plan	4-9
Table 4.2-2	Meetings with Communities.....	4-13
Table 4.2-3	Meetings with Government and Non-Governmental Organizations.....	4-18
Table 5.1-1	Terms of Reference for Social, Economic, and Cultural Components.....	5-2
Table 5.1-2	Key Questions Addressed in the Socio-economic Impact Assessment Section.....	5-7
Table 5.1-3	Techniques, Sources of Information, and Outcomes of the Snap Lake Diamond Project SEIA Methodology Steps.....	5-15
Table 5.1-4	Categories of Uncertainties and Examples of Information Gaps	5-18
Table 5.2-1	Northwest Territories Population, 1986 - 1999.....	5-30
Table 5.2-2	Northwest Territories Labour Force, 1986 and 1999	5-31
Table 5.2-3	Persons Per Dwelling in the Northwest Territories and Canada, 1981 - 1996	5-34
Table 5.2-4	Immigration Status in the Northwest Territories, 1986 and 1999	5-36
Table 5.2-5	People Who Moved from Another Community for Employment Purposes, Northwest Territories 1999	5-36
Table 5.2-6	Highest Level of Schooling in the Northwest Territories, 1989 to 1999	5-37
Table 5.2-7	Lutsel K'e Population by Age and Gender	5-49
Table 5.2-8	Lutsel K'e Employment Participation.....	5-49
Table 5.2-9	Lutsel K'e Education Levels	5-50
Table 5.2-10	Lutsel K'e Traditional Activities Participation.....	5-51
Table 5.2-11	Lutsel K'e Language Use	5-51
Table 5.2-12	Lutsel K'e Historical Indicators of Crowding	5-52
Table 5.2-13	Lutsel K'e Crime Frequency	5-52
Table 5.2-14	Lutsel K'e Average Household Income by Year.....	5-53
Table 5.2-15	Gameti Population by Age and Gender.....	5-54
Table 5.2-16	Gameti Employment Participation	5-55
Table 5.2-17	Gameti Education Levels.....	5-56
Table 5.2-18	Gameti Traditional Activities Participation	5-56
Table 5.2-19	Gameti Language Use.....	5-57
Table 5.2-20	Gameti Historical Indicators of Crowding	5-58
Table 5.2-21	Gameti Average Household Income by Year	5-58
Table 5.2-22	Rae/Edzo Population by Age and Gender	5-59
Table 5.2-23	Rae/Edzo Employment Participation.....	5-60
Table 5.2-24	Rae/Edzo Education Levels	5-61
Table 5.2-25	Rae/Edzo Traditional Activities Participation.....	5-61
Table 5.2-26	Rae/Edzo Language Use	5-62
Table 5.2-27	Rae Edzo Historical Indicators of Crowding	5-62
Table 5.2-28	Rae/Edzo Crime Frequency	5-63
Table 5.2-29	Rae/Edzo Average Household Income by Year.....	5-63

LIST OF TABLES (CONTINUED)

Table 5.2-30	Wha Ti Population by Age and Gender	5-64
Table 5.2-31	Wha Ti Employment Participation	5-65
Table 5.2-32	Wha Ti Education Levels	5-66
Table 5.2-33	Wha Ti Traditional Activities Participation	5-66
Table 5.2-34	Wha Ti Language Use	5-67
Table 5.2-35	Wha Ti Historical Indicators of Crowding	5-68
Table 5.2-36	Wha Ti Average Household Income by Year	5-68
Table 5.2-37	Wekweti Population by Age and Gender Breakdown	5-69
Table 5.2-38	Wekweti Employment Participation	5-69
Table 5.2-39	Wekweti Education Levels	5-70
Table 5.2-40	Wekweti Traditional Activities Participation	5-71
Table 5.2-41	Wekweti Language Use	5-71
Table 5.2-42	Wekweti Historical Indicators of Crowding	5-72
Table 5.2-43	Dettah Population by Age and Gender	5-73
Table 5.2-44	Dettah Employment Participation	5-74
Table 5.2-45	Dettah Education Levels	5-74
Table 5.2-46	Dettah Traditional Activities Participation	5-75
Table 5.2-47	Dettah Language Use	5-76
Table 5.2-48	Dettah Historical Indicators of Crowding	5-76
Table 5.2-49	Yellowknife Population by Age and Gender	5-77
Table 5.2-50	Yellowknife Employment Participation	5-78
Table 5.2-51	Yellowknife Education Levels	5-79
Table 5.2-52	Yellowknife Traditional Activities Participation	5-79
Table 5.2-53	Yellowknife Language Use	5-79
Table 5.2-54	Yellowknife Historical Indicators of Crowding	5-80
Table 5.2-55	Yellowknife Crime Frequency	5-80
Table 5.2-56	Yellowknife Average Household Income by Year	5-81
Table 5.3-1	Economic Impacts of the Snap Lake Diamond Project	5-112
Table 5.3-2	Total Cumulative Economic Impacts (2004-2027) of the Snap Lake Diamond Project	5-114
Table 5.3-3	Tax and Fiscal Impacts of the Snap Lake Diamond Project	5-118
Table 5.3-4	Cumulative Tax and Fiscal Impacts (2004-2027) of the Snap Lake Diamond Project	5-119
Table 5.3-5	Cumulative Corporate Income Tax and Royalty Impacts (2004-2027) of the Snap Lake Diamond Project	5-120
Table 5.3-6	Total Cumulative Tax and Fiscal Impacts of the Snap Lake Diamond Project	5-120
Table 5.3-7	Predicted Direct, Indirect, and Induced Impacts	5-125
Table 5.3-8	Key Issues and Concerns Addressed by the Socio-economic Impact Management Measures	5-146
Table 6.1-1	Terms of Reference for Resource Uses	6-1
Table 6.1-2	Key Questions Related to Resource Uses	6-5
Table 6.1-3	Definitions of Impact Criteria for Resource Uses	6-12
Table 6.1-4	Generic Residual Impact Classification	6-16
Table 6.2-1	Archaeological Sites Identified in the Snap Lake Diamond Project Development Area	6-29
Table 6.2-2	Classification of Residual Impacts of the Snap Lake Diamond Project on Heritage Resources	6-43
Table 6.2-3	Classification of Residual Impacts of the Winter Access Road on Heritage Resources	6-48
Table 6.3-1	Classification of the Residual Impact on Traditional Land Use Areas	6-57

LIST OF TABLES (CONTINUED)

Table 6.4-1	Classification of the Residual Impact on Ecologically Representative Areas	6-75
Table 6.4-2	Classification of the Residual Impact on Non-traditional Natural Resource Use	6-80
Table 6.5-1	Classification of the Residual Impacts On Visual Quality.....	6-88
Table 6.6-1	Tibbitt-Contwoyto Historic Operating Window.....	6-94
Table 6.6-2	Classification of the Residual Impact on Lockhart Lake Camp	6-97
Table 6.6-3	Classification of the Residual Impacts on the Tibbitt-Contwoyto Winter Road	6-99
Table 7.1-1	Terms of Reference for Air Quality	7-1
Table 7.1-2	Key Questions for Air Quality	7-4
Table 7.1-3	Resulting Air Quality Regional Study Area Dimensions for the 16 Cardinal Downwind Directions.....	7-6
Table 7.1-4	Criteria Compounds Assessed for the Snap Lake Diamond Project	7-9
Table 7.1-5	Relevant Ambient Air Quality Criteria.....	7-12
Table 7.1-6	Deposition Criteria for Acid Forming Emissions	7-14
Table 7.1-7	Background PAI Values at Snare Rapids.....	7-19
Table 7.1-8	Impact Classification Criteria for the Snap Lake Diamond Project.....	7-20
Table 7.1-9	Magnitude Characterization of Criteria Air Compounds for the Snap Lake Diamond Project	7-21
Table 7.1-10	Generic Residual Impact Classification.....	7-25
Table 7.2-1	Description of the On-Site Meteorological Monitoring Station.....	7-28
Table 7.2-2	Observed Wind Speeds and Directions at Snap Lake	7-32
Table 7.2-3	Frequency of Wind Speeds and Directions at Snap Lake.....	7-33
Table 7.2-4	Observed Monthly Wind Speeds at Snap Lake.....	7-34
Table 7.2-5	Description of Pasquill-Gifford Stability Categories.....	7-35
Table 7.2-6	Observed Monthly Surface Temperatures at Snap Lake	7-37
Table 7.2-7	Monthly Solar Radiation at Snap Lake	7-38
Table 7.2-8	Monitoring Results for Total Suspended Particulates at Hi-Vol Station A	7-42
Table 7.2-9	Monitoring Results for Total Suspended Particulates at Hi-Vol Station B	7-42
Table 7.2-10	Monitoring Results for Total Suspended Particulates at Hi-Vol Station C	7-43
Table 7.2-11	Monitoring Results for Total Suspended Particulates at Snap Lake	7-43
Table 7.2-12	Trace Metals Concentrations from Snow Survey	7-47
Table 7.3-1	Power Plant Emissions.....	7-50
Table 7.3-2	Emissions from Mine Air Heaters and Water Heaters.....	7-50
Table 7.3-3	Emissions from Underground Mining Activities	7-51
Table 7.3-4	Emissions from the Quarry and Mobile Surface Equipment	7-51
Table 7.3-5	Process Plant Emissions	7-52
Table 7.3-6	Emissions from Other Activities at the Snap Lake Diamond Project	7-52
Table 7.3-7	Summary of Project Emissions.....	7-53
Table 7.3-8	Metals and Polycyclic Aromatic Hydrocarbons Present in Diesel and Processed Kimberlite.....	7-54
Table 7.3-9	Maximum Application TSP Predictions	7-56
Table 7.3-10	Maximum Application PM ₁₀ Predictions	7-61
Table 7.3-11	Maximum Application PM _{2.5} Predictions	7-62
Table 7.3-12	Maximum Application SO ₂ Predictions	7-71
Table 7.3-13	Maximum Application NO _x and NO ₂ Predictions.....	7-72
Table 7.3-14	Predicted PAH Concentrations for the Application Case	7-86
Table 7.3-15	Predicted PAH Deposition for the Application Case	7-87
Table 7.3-16	PAH Predictions for Use in the Environmental Health Assessment	7-88
Table 7.3-17	Predicted Trace Metal Concentrations for the Application Case.....	7-89
Table 7.3-18	Predicted Trace Metal Deposition for the Application Case.....	7-90

LIST OF TABLES (CONTINUED)

Table 7.3-19	Trace Metal Predictions for Use in the Environmental Health Assessment.....	7-91
Table 7.3-20	Maximum Application PAI Predictions.....	7-92
Table 7.3-21	Spatial Extent for Predicted Application PAI Values	7-93
Table 7.3-22	Summary of Project Emissions.....	7-94
Table 7.3-23	Summary of Predictions for Criteria Air Compounds	7-98
Table 7.3-24	Residual Impact Classification of Changes to the Ambient Air Quality for Criteria Air Compounds	7-100
Table 7.3-25	Summary of Acid Forming Emissions	7-103
Table 7.3-26	Summary of PAI Predictions.....	7-103
Table 7.3-27	Residual Impact Classification for Changes to Acid Deposition.....	7-104
Table 7.3-28	Parameters Used to Calculate Visible Plume Heights	7-108
Table 7.3-29	Mean Monthly Atmospheric Parameters at Snap Lake	7-109
Table 7.3-30	Maximum "Steam Plume" Height Under Calm ^(a) Conditions	7-110
Table 7.3-31	Maximum 24-hour Extinction Coefficient and Visible Range	7-113
Table 7.3-32	Summary of Project Emissions.....	7-115
Table 7.3-33	National and Provincial GHG Emissions	7-116
Table 8.1-1	Tourist Site Locations	8-4
Table 8.1-2	Typical Sound Levels of Common Noises.....	8-9
Table 8.1-3	Definitions of Impact Criteria for Noise	8-14
Table 8.1-4	Generic Residual Impact Classification.....	8-16
Table 8.2-1	Monitored Hourly Average Sound Levels and Wind Speed, July 11-12, 2001	8-18
Table 8.3-1	Typical Maximum Construction Equipment Sound Levels at 15 Metres	8-23
Table 8.3-2	Predicted Average Sound Levels for Construction Site Noise at Various Distances from the Site	8-23
Table 8.3-3	Classification of Residual Impacts of Noise during the Construction Phase.....	8-26
Table 8.3-4	Predicted Average Sound Levels for Mine Site Operation at Various Distances from the Site	8-28
Table 8.3-5	Predicted Sound Levels for Truck Traffic at Various Distances from the Winter Road.....	8-32
Table 8.3-6	Predicted Sound Levels for Air Traffic at Various Distances from the Airstrip.....	8-35
Table 8.3-7	Classification of Residual Impacts of Noise during the Operation Phase	8-40
Table 9.1-1	Terms of Reference for Aquatic Resources	9-1
Table 9.1-2	Key Questions Addressed in the Aquatic Resources Section.....	9-5
Table 9.1-3	Definitions of Impact Criteria for Aquatic Resources	9-14
Table 9.1-4	Generic Residual Impact Classification.....	9-19
Table 9.2-1	Summary of Baseline Groundwater Quality	9-24
Table 9.2-2	Summary of Packer Testing Intervals, Water Levels, and Hydraulic Conductivity Results	9-29
Table 9.2-3	Hydrogeologic Parameters of Hydrostratigraphic Units	9-31
Table 9.2-4	Hydraulic Properties of Hydrogeologic Units and Leakance Factors in the Groundwater Model	9-41
Table 9.2-5	Summary of Estimated Concentrations of Deep Groundwater from the Underground Mine at Post-closure.....	9-58
Table 9.2-6	Summary of Estimated Concentrations for North Pile Seepage Water	9-64
Table 9.2-7	Summary of Estimated Concentrations for Water Management Pond Seepage Water.....	9-70
Table 9.3-1	Data Available from Environment Canada Weather Stations	9-84
Table 9.3-2	Short Term Climate Stations with Available Data within 300 km of the Snap Lake Diamond Project.....	9-85

LIST OF TABLES (CONTINUED)

Table 9.3-3	Long Term Climate Stations Selected for Regional Analysis of Temperature	9-86
Table 9.3-4	Statistics of Derived Extreme Hourly and Average Monthly Air Temperature at Snap Lake.....	9-89
Table 9.3-5	Long-term Climate Stations Selected for the Regional Analysis of Precipitation	9-92
Table 9.3-6	Recorded Mean Annual Rainfall, Snowfall, and Total Precipitation	9-94
Table 9.3-7	Derived Long-term Mean Annual Rainfall, Snowfall, and Precipitation at Snap Lake	9-94
Table 9.3-8	Derived Monthly and Annual Rainfall (mm) at Snap Lake, 1942 - 2001	9-99
Table 9.3-9	Derived Monthly and Annual Snowfall (cm) at Snap Lake, 1942 - 2001.....	9-101
Table 9.3-10	Derived Monthly and Annual Precipitation (mm) at Snap Lake, 1942 - 2001	9-103
Table 9.3-11	Recorded Precipitation at Nearby Short-term Climate Stations	9-105
Table 9.3-12	Derived Mean and Extreme Monthly Precipitation at Snap Lake.....	9-108
Table 9.3-13	Derived Mean and Extreme Annual Rainfall, Snowfall, and Precipitation at Snap Lake	9-108
Table 9.3-14	Frequencies of Long-duration Extreme Rainfall at Snap Lake.....	9-109
Table 9.3-15	Frequencies of Short-duration Extreme Rainfall at Snap Lake	9-109
Table 9.3-16	Lake Evaporation Estimates.....	9-111
Table 9.3-17	Monthly Lake Evaporation Estimates for the Local Study Area	9-113
Table 9.3-18	Mean Annual Water Balance Parameters.....	9-113
Table 9.3-19	Annual Water Balance Analysis for the Waldron River Basin	9-114
Table 9.3-20	Basin Evapotranspiration Analysis Based on Land Classification Information for the Terrestrial Regional Study Area	9-115
Table 9.3-21	Evapotranspiration Estimates for Various Terrain Types in the Terrestrial Regional Study Area	9-116
Table 9.3-22	Snow Survey Sampling Site Locations, 1999 to 2001	9-120
Table 9.3-23	Snowcourse Survey Results, 1999 - 2001	9-123
Table 9.3-24	Stream Discharge Monitoring Results, 1999 and 2000.....	9-124
Table 9.3-25	Manual Discharge Measurements, 1999 and 2000	9-124
Table 9.3-26	Lake Level Monitoring Results, 1999 and 2000	9-125
Table 9.3-27	Flood Frequency Analysis for the Lockhart and Indin Rivers.....	9-129
Table 9.3-28	Estimate of Flood Magnitude and Frequency for the Outlet of Snap Lake	9-131
Table 9.3-29	Flow Duration Analysis for Snap Lake Outlet.....	9-132
Table 9.3-30	Comparison of Runoff between Snap Lake Outflow and the H4 Tributary ...	9-133
Table 9.3-31	Runoff From Natural Surfaces at the Snap Lake Diamond Project Site	9-134
Table 9.3-32	Runoff From Various Types of Disturbed and Reclaimed Surfaces at the Snap Lake Diamond Project Site	9-134
Table 9.3-33	Estimate of Lake Ice Occurrence, Duration, and Thickness for Snap Lake... 9-136	
Table 9.3-34	Summary of Snap Lake Water Balance Parameters Over Selected Periods.....	9-141
Table 9.3-35	Changes to Runoff Rates for Watersheds in the Vicinity of the Snap Lake Mine	9-144
Table 9.3-36	Summary of Snap Lake Elevations Over Project Operations	9-145
Table 9.3-38	Classification of Residual Impacts on Near Surface Water Tables and Flows, and Water Levels in Receiving Streams, Lakes, and Wetlands	9-150
Table 9.3-39	Classification of Residual Impacts of Surface Disturbances on Sediment Yields and Concentrations in Receiving Streams, Lakes, Ponds, and Wetlands.....	9-154
Table 9.4-1	Sampling Periods and Number of Sampling Stations in the Aquatic Baseline Sampling Program.....	9-156

LIST OF TABLES (CONTINUED)

Table 9.4-2	Summary of Baseline Water Quality in Snap Lake from 1998-2001.....	9-164
Table 9.4-3	Baseline Water Quality from Additional Snap Lake Stations in 2000 and 2001	9-168
Table 9.4-4	Baseline Water Quality in the Reference Lake and North Lake, 1999.....	9-173
Table 9.4-5	Baseline Water Quality in Small Lakes in the Snap Lake Watershed.....	9-176
Table 9.4-6	Baseline Water Quality in Inlet and Outlet Streams, 1998-2001	9-181
Table 9.4-7	Baseline Sediment Chemistry in Snap Lake and the Reference Lake	9-184
Table 9.4-8	Summary of Water Quality in the Lockhart River Watershed, 1993/1994	9-186
Table 9.4-9	Summary of Water Quality in the Lockhart River Watershed, 1999.....	9-187
Table 9.4-10	Summary of Water Quality in the Lockhart River at the Outlet of Artillery Lake, 1969 to 2000.....	9-190
Table 9.4-11	Summary of Seasonal Water Quality in the Lockhart River at the Outlet of Artillery Lake, 1969-2000.....	9-192
Table 9.4-12	Summary of Sediment Quality in the Lockhart River Watershed, 1993/1994.....	9-197
Table 9.4-13	Summary of Sediment Quality in the Lockhart River Watershed, 1999	9-198
Table 9.4-14	Summary of Water Chemistry Data Related to Acid Sensitivity of Regional Lakes.....	9-199
Table 9.4-15	Water Quality and Sediment Quality Impact Magnitudes Ratings for the Protection of Aquatic Life.....	9-208
Table 9.4-16	Summary of Project Water Release Rates to Snap Lake	9-215
Table 9.4-17	Sewage Treatment Plant Discharge Water Quality Specifications	9-217
Table 9.4-18	Predicted Water Chemistry for the Mine Water Discharge during Construction and Operations.....	9-222
Table 9.4-19	Predicted Water Chemistry in Snap Lake during Construction and Operations	9-226
Table 9.4-20	Summary of Site-specific Water Quality Benchmarks.....	9-227
Table 9.4-21	Maximum Extent of Snap Lake that is Predicted to Exceed Site-specific Water Quality Benchmarks or a General Water Quality Guideline	9-227
Table 9.4-22	Simulated Average Summer Nutrient and Chlorophyll a Concentrations in Snap Lake, Baseline and Operations	9-233
Table 9.4-23	Predicted Maximum Water Chemistry for Seepage and Runoff during Construction, Operations, and Post-Closure.....	9-235
Table 9.4-24	Predicted Water Chemistry for Groundwater Flow to the North and Northeast Lakes during Closure.....	9-238
Table 9.4-25	Simulated Water Quality in the North and Northeast Lakes during Post- closure	9-240
Table 9.4-26	Classification of Residual Impacts on the Water Quality of Snap Lake for the Protection of Aquatic Life.....	9-243
Table 9.4-27	Classification of Residual Impacts on the Water Quality of Snap Lake for Drinking Water Supply.....	9-243
Table 9.4-28	Classification of Residual Impacts of Post-Closure Groundwater Discharge to Lakes North of Snap Lake for the Protection of Aquatic Life	9-244
Table 9.4-29	Classification of Residual Impacts of Post-Closure Groundwater Discharge to Lakes North of Snap Lake for Drinking Water Supply	9-244
Table 9.4-30	Maximum Predicted Changes in Total Dissolved Solids Concentrations in Lakes Downstream of Snap Lake	9-248
Table 9.4-31	Predicted Acid Input (PAI) Deposition Rates and Critical Loads for Select Lakes in the Regional Study Area	9-254
Table 9.4-32	Classification of Residual Impacts of Acidifying Emissions on Regional Waterbodies	9-256
Table 9.5-1	Components of the 1999 and 2001 Fisheries Survey	9-262

LIST OF TABLES (CONTINUED)

Table 9.5-2	Snap Lake Total Phosphorus, Total Kjeldahl Nitrogen and Chlorophyll a Concentrations in 1999.....	9-267
Table 9.5-3	Zooplankton Biomass in Snap Lake in 1999	9-268
Table 9.5-4	Benthic Invertebrate Data Collected in Snap Lake, Fall 1999.....	9-269
Table 9.5-5	Summary of Fish Captured in Snap Lake, 1998 ¹	9-269
Table 9.5-6	Summary of Fish Species Captured in Snap Lake, 1999	9-270
Table 9.5-7	Summary of Shoreline Habitat and Slope Type for Snap Lake.....	9-274
Table 9.5-8	Summary of Major Aquatic Habitat Areas in Snap Lake	9-275
Table 9.5-9	Snap Lake Fish Habitat Descriptions	9-276
Table 9.5-10	Reference Lake Total Phosphorus, Total Kjeldahl Nitrogen, and Chlorophyll a Concentrations in 1999	9-277
Table 9.5-11	Reference Lake Zooplankton Biomass in 1999	9-278
Table 9.5-12	Benthic Invertebrate Data Collected in the Reference Lake, Fall 1999	9-279
Table 9.5-13	Fish Species Captured in the Reference Lake in 1999 and MacKay Lake in 2001	9-280
Table 9.5-14	Summary of Fish Species Captured in Small Lakes, 1999 and 2001	9-284
Table 9.5-15	Summary of 1999 Lake Habitat and Fish Capture Investigations	9-285
Table 9.5-16	Snap Lake Stream Survey Results for Streams with Fish Habitat Potential, 1999.....	9-288
Table 9.5-17	Snap Lake Stream Survey Results Ephemeral Channels, 1999.....	9-291
Table 9.5-18	Salinity Optima for Phytoplankton Species	9-307
Table 9.5-19	Cation Comparison Data for Snap Lake and Other Forested Tundra Lakes	9-309
Table 9.5-20	Predicted Chronic Sediment Toxicity Values for Copper	9-315
Table 9.5-21	Residual Impact Classification for Changes to Non-Fish Aquatic Organisms in Snap Lake	9-323
Table 9.5-22	Residual Impact Classification for Changes to Non-Fish Aquatic Organisms in NL5 and NL6, Water Column Only.....	9-324
Table 9.5-23	Residual Impact Classification for Changes to Non-fish Aquatic Organisms in the North Lake.....	9-325
Table 9.5-24	Residual Impact Classification for Changes to Non-Fish Aquatic Organisms in the North Lake.....	9-326
Table 9.5-25	Habitat Areas Lost to the Water Intake and Mine Water Outlet Structures in Relation to Snap Lake and the Northeast Peninsula.....	9-336
Table 9.5-26	Exploitation and Abundance Weightings for Fish Species in Snap Lake.....	9-337
Table 9.5-27	Net Change in Habitat Units Between Baseline and Construction and Operations with Weightings Applied.....	9-338
Table 9.5-28	Net Change in Habitat Units Between Baseline and Post Closure Periods With Weightings Applied.....	9-339
Table 9.5-29	Total Habitat Units Lost or Created in Snap Lake for Each Fish Species.....	9-340
Table 9.5-30	Predicted Dust Accumulation Along the Perimeter of the Northwest Peninsula, Snap Lake.....	9-340
Table 9.5-31	Predicted Dust Accumulation Over Active Lake Trout Spawning Beds in Snap Lake	9-341
Table 9.5-32	Residual Impact Classification for Changes to Fish Habitat	9-347
Table 9.5-33	Residual Impact Classification for Application Case Impacts of the Snap Lake Diamond Project on Chronic Effects on Fish Health in Snap Lake	9-366
Table 9.5-34	Residual Impact Classification for Impacts of post-closure Groundwater Discharge to Fish Health in NL5 and NL6	9-367
Table 9.5-35	Residual Impact Classification for Impacts of Post-closure Groundwater Discharge to Fish Health in the North and Northeast Lakes	9-368

LIST OF TABLES (CONTINUED)

Table 9.5-36	Calculated Overpressure and Ground Vibration Values for Varying Distances from Underground Blasting Activity	9-374
Table 9.5-37	Summary of Residual Impacts to Fish in the North and Northeast Lakes	9-376
Table 9.5-38	Classification of Residual Impacts to Fish Population Abundance in the Snap Lake	9-380
Table 10.1-1	Terms of Reference for Terrestrial Resources	10-1
Table 10.1-2	Key Questions Addressed in the Terrestrial Resources Section	10-4
Table 10.1-3	Definitions of Impact Criteria for Terrestrial Resources	10-14
Table 10.1-4	Generic Residual Impact Classification	10-18
Table 10.2-1	Terrain Units in the Local Study Area	10-24
Table 10.2-2	Seismic Risk Data for the Snap Lake Diamond Project Location	10-29
Table 10.2-3	Direct Losses and Alterations of Terrain Units in the Local Study Area	10-39
Table 10.2-4	Classification of Residual Impacts to Terrain Units in the Local Study Area	10-39
Table 10.2-5	Area of Esker Landforms Affected within the Regional Study Area	10-42
Table 10.2-6	Classification of Residual Impacts of Loss and Disturbances to the Esker ...	10-42
Table 10.2-7	Material Properties Used in the Thermal Analyses of the North Pile	10-47
Table 10.2-8	Surface Temperature Distribution Used in the Thermal Analyses of the North Pile	10-47
Table 10.2-9	Classification of Residual Impacts to the Ground Thermal Regime	10-52
Table 10.3-1	Ecological Land Classification Units for Biodiversity Assessment	10-62
Table 10.3-2	Landscape Level Biodiversity Indices	10-63
Table 10.3-3	Ecosystem Level Ranking for Biodiversity Potential	10-64
Table 10.3-4	Ecological Land Classification Units within the Study Areas	10-66
Table 10.3-5	Rare and Traditional Plant Potential Rating for the Study Areas	10-71
Table 10.3-6	Traditional Plants in the Study Areas	10-72
Table 10.3-7	Landscape Level Biodiversity in the Regional Study Area	10-73
Table 10.3-8	Landscape Level Biodiversity in the Local Study Area	10-75
Table 10.3-9	Ecosystem Level Biodiversity in the Study Areas	10-76
Table 10.3-10	Direct Losses or Alterations of Existing Ecological Land Classification Units in the Local Study Area	10-85
Table 10.3-11	Direct Losses or Alterations of Existing Ecological Land Classification Units in the Regional Study Area	10-86
Table 10.3-12	Direct Losses or Alterations of Rare and Traditional Plant Potentials in the Local Study Area	10-88
Table 10.3-13	Direct Losses or Alterations of Rare and Traditional Plant Potential in the Regional Study Area	10-88
Table 10.3-14	Classification of Residual Impacts on Ecological Land Classification Units and Valued Ecosystem Components in the Regional Study Area	10-90
Table 10.3-15	Landscape Level Biodiversity in the Local Study Area	10-96
Table 10.3-16	Change in Landscape Level Biodiversity in the Local Study Area	10-96
Table 10.3-17	Landscape Level Biodiversity in the Regional Study Area	10-97
Table 10.3-18	Change in Landscape Level Biodiversity in the Regional Study Area	10-98
Table 10.3-19	Ecosystem Level Biodiversity in the Regional and Local Study Areas	10-99
Table 10.3-20	Classification of Residual Impacts on Biodiversity	10-100
Table 10.3-21	SO ₂ Predictions and Regulatory Guidelines for Emissions	10-102
Table 10.3-22	NO ₂ Predictions and Regulatory Guidelines for Emissions	10-102
Table 10.3-23	ELC Units Exposed to Dust within the 50 m Buffer of the Local Study Area	10-107
Table 10.3-24	ELC Units Exposed to Dust during Baseline in the Regional Study Area	10-108
Table 10.3-25	ELC Units in the Regional Study Area Exposed to Dust from the Project ...	10-108
Table 10.3-26	Classification of Residual Impacts of Air Emissions on Vegetation Health..	10-109

LIST OF TABLES (CONTINUED)

Table 10.3-27	Classification of Residual Impacts of Water Releases on Plant (ELC Unit) Health	10-114
Table 10.4-1	Number of Caribou Observed during the Northern and Southern Migration, 1999 and 2000.....	10-139
Table 10.4-2	Mean ($\pm 1SE$) Annual Density (1999 and 2000) of Upland Breeding Bird Species.....	10-143
Table 10.4-3	Mean ($\pm 1SE$) Density, Species Richness, and Species Diversity of Upland Breeding Birds among Habitat Types and Year	10-144
Table 10.4-4	History of Occupancy for Raptor Nest Sites Located within the Regional Study Area.....	10-145
Table 10.4-5	Summary of Linkage Validation for Impacts to Wildlife Habitat.....	10-153
Table 10.4-6	Expected Direct Loss or Alteration of Existing Habitat Types in the Local and Regional Study Areas.....	10-155
Table 10.4-7	Predicted Proportional Loss (%) of Habitat Types within an Individual's Home Range Due to the Footprint of the Snap Lake Diamond Project	10-157
Table 10.4-8	Classification of Residual Impacts of Site Clearing to Wildlife Habitat.....	10-158
Table 10.4-9	Classification of Residual Impacts of Dust to Wildlife Habitat.....	10-162
Table 10.4-10	Classification of Residual Impacts of Reclamation to Wildlife Habitat	10-163
Table 10.4-11	Summary of Linkage Validation for Impacts to Wildlife Movement and Behaviour.....	10-167
Table 10.4-12	Classification of Residual Impacts to Wildlife Movement and Behaviour....	10-175
Table 10.4-13	Summary of Linkage Validation for Impacts to Wildlife Abundance.....	10-189
Table 10.4-14	Classification of Residual Impacts to Wildlife Abundance.....	10-193
Table 11.1-1	Terms of Reference for Environmental Health	11-1
Table 11.2-1	Concentrations of Metals and Polycyclic Aromatic Hydrocarbons in Snow, May 2001	11-13
Table 11.2-2	Concentrations of Metals in Lichen, June 2001	11-16
Table 11.2-3	Concentrations of Metals and Polycyclic Aromatic Hydrocarbons in Soil, June 2001	11-18
Table 11.3-1	Number of Days per Year that Wildlife Receptors May be Present in the LSA and RSA	11-28
Table 11.3-2	Exposure Ratios for the Baseline and Application Cases for Wildlife that Inhabit Both the Local Study Area and Regional Study Area.....	11-31
Table 11.3-3	Exposure Ratios for the Baseline and Application Cases for Wildlife that Live Entirely within the Local Study Area or Regional Study Area.....	11-32
Table 11.3-4	Exposure Ratios for the Post-Closure Case for Wildlife that Could be Exposed to Water in the North Lake	11-33
Table 11.3-5	Exposure Ratios Related to People Hunting within the Local Study Area	11-43
Table 11.3-6	Exposure Ratios for People in Communities.....	11-43
Table 12.1-1	Terms of Reference for Cumulative Effects Assessment.....	12-3
Table 12.1-2	Projects Considered as Potential Linkages in the Cumulative Effects Assessment	12-5
Table 12.1-3	Key Questions Addressed in the Cumulative Effects Assessment Section	12-7
Table 12.1-4	Definitions of Impact Criteria for Environmental Components	12-16
Table 12.1-5	Generic Residual Impact Classification.....	12-18
Table 12.2-1	Mine Employment Levels During Construction and Operation Phases	12-25
Table 12.3-1	Definitions of Magnitude for Resource Uses	12-39
Table 12.3-2	Classification of Residual Impacts of the Cumulative Impact of Snap Lake Diamond Project on Heritage Resources	12-45
Table 12.4-1	Magnitude Characterization of CEA Case Air Compounds for the Snap Lake Diamond Project	12-51
Table 12.4-2	Projects Included in the Cumulative Effects Assessment Case	12-52

LIST OF TABLES (CONTINUED)

Table 12.4-3	Summary of Project Emissions.....	12-55
Table 12.4-4	EKATIT™ Diamond Mine Emissions	12-55
Table 12.4-5	EKATIT™ Diamond Mine Expansion Emissions	12-56
Table 12.4-6	Diavik Diamond Mine Emissions	12-56
Table 12.4-7	Tahera Jericho Diamond Mine Emissions.....	12-57
Table 12.4-8	Lupin Gold Mine Emissions	12-57
Table 12.4-9	Summary of Regional Emissions	12-58
Table 12.4-10	Maximum CEA Case TSP Predictions	12-60
Table 12.4-11	Maximum CEA Case PM ₁₀ Predictions	12-63
Table 12.4-12	Maximum CEA Case PM _{2.5} Predictions.....	12-66
Table 12.4-13	Maximum CEA Case SO ₂ Predictions.....	12-69
Table 12.4-14	Maximum CEA Case NO _x and NO ₂ Predictions	12-73
Table 12.4-15	Maximum CEA Case PAI Predictions	12-77
Table 12.4-16	Spatial Extent for Predicted CEA Case PAI Values	12-79
Table 12.4-17	Comparison of Project and Regional Emissions	12-81
Table 12.4-18	Comparison of Predicted Concentrations for the Application and CEA Case Modelling	12-82
Table 12.4-19	Summary of Predictions for Criteria Air Compounds	12-83
Table 12.4-20	Residual Impact Classification for Cumulative Air Quality Effects	12-85
Table 12.5-1	Projects Considered as Linkages in the Cumulative Effects Assessment	12-89
Table 12.5-2	Primary Communities in the Region.....	12-90
Table 12.5-3	Tourist Site Locations	12-91
Table 12.5-4	Typical Sound Levels of Common Noises.....	12-93
Table 12.5-5	Predicted Sound Levels for Truck Traffic At Various Distances from the Tibbitt-Contwoyto Winter Road	12-96
Table 12.5-6	Residual Impact Classification for Cumulative Effects of Noise from the Snap Lake Diamond Project during the Operation Phase	12-98
Table 12.6-1	Definitions of Magnitude for Hydrology and Water Quality for Cumulative Effects Assessment	12-101
Table 12.6-2	Impact Magnitude Definitions for Aquatic Organisms and Habitat.....	12-101
Table 12.6-3	Cumulative Effects Assessment for Fugitive Dust (TSP) Accumulation Along the Northeast Peninsula and Spawning Beds in Snap Lake	12-109
Table 12.7-1	Definitions of Magnitude for Terrestrial Resource Components	12-113
Table 12.7-2	Projects Considered as Potential Linkages in the Cumulative Effects Assessment for Wildlife	12-117
Table 12.7-3	Identification of Wildlife VECs that Require Cumulative Effects Assessment	12-118
Table 12.7-4	Direct Loss of Existing Habitat Types Due to Each Project within the CEA Study Area	12-124
Table 12.7-5	Predicted Proportional Loss (%) of Habitat Types Due to Each Project Within the Home Range of the Bathurst Caribou Herd. An Estimate of Annual Home Range is Provided in Parentheses.....	12-125
Table 12.7-6	Predicted Proportional Loss (%) of Habitat Types Due to Each Project Within the Home Range of Grizzly Bears. An Estimate of Annual Home Range is Provided in Parentheses.....	12-125
Table 12.7-7	Predicted Proportional Loss (%) of Habitat Types Due to Each Project Within the Home Range of Wolves. An Estimate of Summer Home Range is Provided in Parentheses.....	12-126
Table 12.7-8	Predicted Proportional Loss (%) of Habitat Types Due to Each Project Within the Home Range of Wolverines. An Estimate of Annual Home Range is Provided in Parentheses.....	12-127

LIST OF TABLES (CONTINUED)

Table 12.7-9	Residual Impact Classification for Cumulative Effects of Direct Habitat Loss from the Snap Lake Diamond Project on Wildlife Populations	12-131
Table 12.7-10	Residual Impact Classification for Cumulative Effects of Fugitive Dust from the Snap Lake Diamond Project on Wildlife Populations.....	12-132
Table 12.7-11	Residual Impact Classification for Cumulative Effects of Change in Abundance from the Snap Lake Diamond Project on Wildlife Populations .	12-133
Table 12.7-12	Residual Impact Classification for Cumulative Effects of Change in Movement and Behaviour from the Snap Lake Diamond Project on Wildlife Populations	12-134
Table 12.8-1	Receptors Evaluated in the CEA.....	12-142
Table 12.8-2	Chemicals that might be Emitted by the Projects Evaluated in the Cumulative Effects Assessment.....	12-143
Table 12.8-3	Projects that May Affect Wildlife	12-145
Table 12.8-4	Qualitative Rankings of Relative Concentrations from Diamond Mines and the Winter Road Compared to the Snap Lake Diamond Project	12-149
Table 13.1-1	Definition of Levels of Environmental Consequence.....	13-8
Table 13.1-2	Generic Project Risk Matrix	13-9
Table 13.3-1	Accident Assessment Worksheet.....	13-13
Table 13.3-2	Eight Identified Mine Site Risks Located on the Project Risk Matrix.....	13-18
Table 13.3-3	Estimated Distribution of Truck Transportation on the Tibbitt-Contwoyto Winter Road, 2008.....	13-20
Table 13.3-4	Transportation of Hazardous Material Consumables to Snap Lake Diamond Project, 2008	13-20
Table 13.3-5	Historical Truck Spill Record on the Tibbitt-Contwoyto Winter Road.....	13-22
Table 13.3-6	Aquatic Life Toxicity Thresholds for Hazardous Materials	13-24
Table 13.3-7	Fish-Bearing Lake Sizes Along the Winter Road	13-26
Table 13.3-8	Material Spill Scenarios	13-26
Table 13.3-9	Seven Identified Winter Road Risks Located on the Project Risk Matrix.....	13-27
Table 14.2-1	Summary of De Beers Canada Commitments	14-3
Table 14.2-2	Summary of Proposed Mitigation Measures and Proposed Monitoring Plans for the Snap Lake Diamond Project	14-5

LIST OF FIGURES

Figure 1.1-1	Organization Chart	1-4
Figure 1.2-1	Location of Snap Lake Diamond Project Northwest Territories	1-6
Figure 1.2-2	Camsell/Snap Lake Mineral Claims/Leases and Mine Surface Leases (Applied For)	1-8
Figure 1.2-3	Snap Lake Advanced Exploration Program General Site Arrangement	1-9
Figure 2.3-1	Alternatives Considered for Mining and Processed Kimberlite Storage on the Northwest Peninsula.....	2-6
Figure 2.4-1	Alternative Considered for Processed Kimberlite Storage South of the Northwest Peninsula.....	2-9
Figure 3.1-1	Location of Snap Lake Diamond Project Northwest Territories	3-5
Figure 3.1-2	Location of Simplified Cross-section of the Kimberlite Dyke	3-6
Figure 3.1-3	Snap Lake Diamond Project Overall Site Plan.....	3-8
Figure 3.1-4	Snap Lake Diamond Project Facilities Site Plan	3-9
Figure 3.3-1	Snap Lake Diamond Project Underground Development	3-12
Figure 3.4-1	Snap Lake Diamond Project Kimberlite 3000 tpd Process Flow Diagram	3-15
Figure 3.6-1	Snap Lake Diamond Project Overall Water Flow Patterns	3-22
Figure 3.7-1	Snap Lake Diamond Project Winter Road Access	3-36
Figure 4.2-1	Community Consultation Photos	4-4
Figure 4.2-2	Community Consultation Photos	4-5
Figure 5.1-1	Primary Communities and Employment Catchment Communities	5-9
Figure 5.1-2	Relationships Between Direct, Indirect, and Induced Impacts	5-21
Figure 5.1-3	Relationships Between an Industrial Development Project and Traditional Aboriginal Activities	5-23
Figure 5.1-4	Relationships/Linkages Between an Industrial Development Project and Traditional Aboriginal Activities	5-25
Figure 5.2-1	Northwest Territories Population Growth and Projections, 1981-2018	5-30
Figure 5.2-2	Population Share by Community Size, 1976-2018	5-31
Figure 5.2-3	Northwest Territories Employment Rate, 1984 to 1996	5-32
Figure 5.2-4	Northwest Territories Employment Rate by Community Type, 1989-1999.....	5-32
Figure 5.2-5	Average Income in the Northwest Territories and Canada, 1994 - 1997	5-33
Figure 5.2-6	Average Income in Northwest Territories Communities, 1991 - 1997	5-34
Figure 5.2-7	Average Persons Per Dwelling in the Northwest Territories and Canada, 1981 to 1996.....	5-35
Figure 5.2-8	Percentage of Houses with Six or More People.....	5-35
Figure 5.2-9	Northwest Territories Population 15 and Older by Highest Level of Schooling.....	5-37
Figure 5.2-10	Socio-economic Study Communities.....	5-47
Figure 5.2-11	Lutsel K'e Employment Rate by Education Levels, 1996.....	5-50
Figure 5.2-12	Gameti Employment Rate by Education Levels, 1996.....	5-55
Figure 5.2-13	Rae/Edzo Employment Rate by Education Levels, 1996.....	5-60
Figure 5.2-14	Wha Ti Employment Rate by Education Levels, 1996	5-65
Figure 5.2-15	Wekweti Employment Rate by Education Levels, 1996.....	5-70
Figure 5.2-16	Dettah Employment Rate by Education Levels, 1996	5-75
Figure 5.2-17	Yellowknife Employment Rate by Education Levels, 1996	5-78
Figure 6.1-1	Local and Regional Study Areas for Resource Uses	6-7
Figure 6.1-2	Tibbitt-Contwoyto Winter Road Local Study Area.....	6-9
Figure 6.1-3	Generic Environmental Consequence.....	6-17
Figure 6.2-1	Heritage Resources in the Vicinity of Snap Lake Diamond Project Development	6-33
Figure 6.2-2	Heritage Resource Sites Close to the Warburton Bay Portage of the Tibbitt-Contwoyto Winter Road and Portage 1 of the Snap Lake Winter Access Road	6-34

LIST OF FIGURES (CONTINUED)

Figure 6.2-3	Heritage Resource Sites Close to Portage 2 of the Snap Lake Winter Access Road	6-35
Figure 6.2-4	Heritage Resource Sites Close to Portages 3 to 6 of the Snap Lake Winter Access Road	6-36
Figure 6.2-5	Heritage Resources in the Vicinity of the Snap Lake Diamond Project Potential Gravel Sources.....	6-37
Figure 6.2-6	Heritage Resources Linkage Diagram	6-39
Figure 6.2-7	View Northeast of Archaeological Investigations at KkNv-6 on the North Side of Portage 2 Along the Snap Lake Winter Access Road	6-46
Figure 6.2-8	View Northeast of Lithic Scatter in East-central Portion of KkNv-6.....	6-47
Figure 6.3-1	Traditional Land Use Areas and Traditionally Significant Areas Linkage Diagram	6-55
Figure 6.4-1	Coppermine River Upland Ecoregion and Proposed Protected Area in the Vicinity of the Snap Lake Diamond Project	6-61
Figure 6.4-2	Granular Resources in the Vicinity of the Snap Lake Diamond Project	6-65
Figure 6.4-3	Non-traditional Natural Resource Use Linkage Diagram	6-72
Figure 6.5-1	Visual Quality Linkage Diagram	6-83
Figure 6.5-2	View of Fully Developed North Pile from the Boundary of the Local Study Area (Looking West).....	6-86
Figure 6.5-3	View of Fully Developed North Pile from the North Shore Vent Raise (Looking Southwest).....	6-87
Figure 6.6-1	Tibbitt-Contwoyto Winter Road and Lockhart Lake Camp Locations	6-91
Figure 6.6-2	Actual and Projected Traffic Volume Estimates 1995 – 2020 Tibbitt-Contwoyto Winter Road.....	6-93
Figure 6.6-3	Tibbitt-Contwoyto Winter Road Linkage Diagram	6-95
Figure 6.7-1	Classification of Residual Impacts to Heritage Resources and Traditional Land Use Areas	6-103
Figure 6.7-2	Classification of Residual Impacts to Ecologically Representative Areas and Natural Resource Use	6-106
Figure 6.7-3	Classification of Residual Impacts to Visual Quality, the Lockhart Camp, and the Tibbitt-Contwoyto Winter Road	6-108
Figure 7.1-1	Regional Study Area for Air Quality Assessment.....	7-7
Figure 7.1-2	Generic Environmental Consequence.....	7-23
Figure 7.2-1	Snap Lake Diamond Project Monitoring Stations.....	7-29
Figure 7.2-2	Windrose of Observed Wind Speeds and Directions at Snap Lake.....	7-31
Figure 7.2-3	Frequency of Wind Speeds at Snap Lake.....	7-33
Figure 7.2-4	Observed Fluctuations of Wind Directions at Snap Lake.....	7-35
Figure 7.2-5	Frequency of Pasquill-Gifford Stability Conditions at Snap Lake.....	7-36
Figure 7.2-6	Summary of Monthly Mixing Heights at Snap Lake	7-37
Figure 7.2-7	Observed Monthly Surface Temperatures at Snap Lake	7-38
Figure 7.2-8	Monthly Solar Radiation at Snap Lake	7-39
Figure 7.2-9	Hourly Solar Radiation at Snap Lake	7-39
Figure 7.2-10	Snap Lake Diamond Project Snow Sampling Locations	7-45
Figure 7.3-1	Maximum 24-Hour Application TSP Predictions	7-57
Figure 7.3-2	Annual Application TSP Predictions.....	7-59
Figure 7.3-3	Maximum 24-Hour Application PM ₁₀ Predictions	7-63
Figure 7.3-4	Annual Application PM ₁₀ Predictions	7-65
Figure 7.3-5	Maximum 24-Hour Application PM _{2.5} Predictions.....	7-67
Figure 7.3-6	Annual Application PM _{2.5} Predictions	7-69
Figure 7.3-7	Maximum 1-Hour Application SO ₂ Predictions	7-73
Figure 7.3-8	Maximum 24-Hour Application SO ₂ Predictions.....	7-75
Figure 7.3-9	Annual Application SO ₂ Predictions	7-77

LIST OF FIGURES (CONTINUED)

Figure 7.3-10	Maximum 1-Hour Application NO ₂ Predictions.....	7-79
Figure 7.3-11	Maximum 24-Hour Application NO ₂ Predictions.....	7-81
Figure 7.3-12	Annual Application NO ₂ Predictions	7-83
Figure 7.3-13	Application Potential Acid Input (PAI) Predictions.....	7-95
Figure 7.3-14	Linkage Diagram for Ambient Air Quality	7-97
Figure 7.3-15	Linkage Diagram for Deposition of Acid Forming Compounds	7-102
Figure 7.3-16	Air Linkage Diagram for Construction Impacts.....	7-106
Figure 7.3-17	Linkage Diagram for Project Visibility.....	7-107
Figure 7.3-18	Maximum 24-hour Extinction Coefficients	7-111
Figure 7.3-19	Linkage Diagram for Key Question AQ-5	7-114
Figure 7.5-1	Classification of Residual Impacts to the Ambient Air Quality and PAI.....	7-121
Figure 8.1-1	Regional Study Area for Noise Assessment	8-5
Figure 8.1-2	Local Study Area for Noise Assessment.....	8-6
Figure 8.1-3	Generic Environmental Consequence.....	8-15
Figure 8.3-1	Linkage Diagram for Environmental Noise	8-20
Figure 8.3-2	Predicted Sound Levels in the RSA from Facility Operation	8-30
Figure 8.3-3	Predicted Sound Levels in the LSA from Facility Operation	8-31
Figure 8.3-4	Predicted Sound Levels in the RSA from Facility Operation and Winter Road Traffic	8-34
Figure 8.3-5	Predicted Sound Levels in the RSA from Facility Operation and Small Aircraft Landing and Take-off	8-36
Figure 8.3-6	Predicted Sound Levels in the RSA from Facility Operation and Large Aircraft Landing and Take-off	8-37
Figure 8.3-7	Predicted Sound Levels for Facility Operation, Winter Road Traffic and Large Aircraft Landing and Take-off.....	8-39
Figure 8.4-1	Classification of Residual Impact of Noise during Construction.....	8-43
Figure 8.4-2	Classification of Residual Impact of Noise during Operation	8-45
Figure 9.1-1	Regional Study Area for Aquatic Resources	9-8
Figure 9.1-2	Local Study Area for Aquatic Resources.....	9-9
Figure 9.1-3	Generic Environmental Consequence.....	9-18
Figure 9.2-1	Local Study Area for Hydrology.....	9-22
Figure 9.2-2	Piper Plot Showing Major Ion Trends in Baseline Groundwater	9-26
Figure 9.2-3	Lake Elevations and Inferred Baseline Groundwater Flow Directions	9-32
Figure 9.2-4	Linkage Diagram for Groundwater	9-35
Figure 9.2-5	Conceptual Hydrogeologic Model of Proposed Snap Lake Mine Area	9-36
Figure 9.2-6	Map View of Finite-element Mesh of Hydrologic Study Area	9-39
Figure 9.2-7	Cross Section of Groundwater Model Showing Discretization and Layering	9-40
Figure 9.2-8	Predicted Total Groundwater Inflow to Underground Mine and Uncertainty Analysis	9-42
Figure 9.2-9	Lakewater as a Percentage of Total Mine Inflow	9-44
Figure 9.2-10	Predicted Maximum Water Level Drawdown in the Deep Groundwater Flow System	9-50
Figure 9.2-11	Predicted Recovery of Groundwater Levels During Post-Closure	9-51
Figure 9.2-12	Effect of Mining on Groundwater Levels, Deep Groundwater Flow System.....	9-53
Figure 9.2-13	Post-Closure Pathway of Groundwater in Contact with Mine Workings	9-56
Figure 9.2-14	Selected Major Ion Concentration Trends for North Pile Seepage Estimates	9-66
Figure 9.2-15	Selected Metal Concentration Trends for North Pile Seepage Estimates	9-67
Figure 9.2-16	Selected Major Ion Concentration Trends for Water Management Pond Seepage Estimates	9-72

LIST OF FIGURES (CONTINUED)

Figure 9.2-17	Selected Metal Concentration Trends for Water Management Pond Seepage Estimates	9-73
Figure 9.3-1	Lockhart River Drainage.....	9-79
Figure 9.3-2	Snap Lake Watershed and Sub-watersheds.....	9-80
Figure 9.3-3	Locations of Regional Climate Stations.....	9-83
Figure 9.3-4	Recorded Monthly Air Temperatures at Regional Climate Stations.....	9-87
Figure 9.3-5	Comparison of Daily Mean Air Temperatures Recorded at Snap Lake, Lupin and Yellowknife.....	9-88
Figure 9.3-6	Comparisons of Mean Monthly Temperatures Recorded at Snap Lake, Salmita, Lupin, and Yellowknife	9-90
Figure 9.3-7	Derived Monthly Air Temperature Statistics for Snap Lake	9-91
Figure 9.3-8	Mean Monthly Precipitation Recorded at Contwoyo Lake and Lupin	9-93
Figure 9.3-9	Recorded Mean Annual Rainfall Isograph.....	9-95
Figure 9.3-10	Recorded Mean Annual Precipitation Isograph (Without Snowfall Undercatch Correction)	9-96
Figure 9.3-11	Mean Monthly Precipitation Recorded at Regional Climate Stations.....	9-98
Figure 9.3-12	Precipitation Statistics Derived for Snap Lake	9-106
Figure 9.3-13	Locations of Hydrology Monitoring Stations	9-119
Figure 9.3-14	Snowcourse Survey Results, 1999 - 2001	9-123
Figure 9.3-15	Hydrology Linkage Diagram	9-138
Figure 9.3-16	Location of Drainage Area Boundaries and Mine Facilities and Storage Areas	9-143
Figure 9.4-1	Lockhart Watershed and Flow Path	9-157
Figure 9.4-2	Water Sediment and Benthic Sampling Locations for Snap Lake, North Lake and Reference Lake (1998-2001).....	9-158
Figure 9.4-3	Water Sampling Locations for Streams and Small Lakes (1999-2001)	9-159
Figure 9.4-4	Lockhart Watershed Water and Sediment Sampling Stations – 1993 and 1994	9-160
Figure 9.4-5	Lockhart Watershed Water and Sediment Sampling Stations – 1999 and Artillery Lake Long-term Monitoring Station	9-161
Figure 9.4-6	Water Quality in Lakes Downstream of Snap Lake in March 1999.....	9-189
Figure 9.4-7	Water Quality at the Outlet of Artillery Lake (OA1)	9-195
Figure 9.4-8	Water Quality Assessment Linkage Diagram.....	9-209
Figure 9.4-9	Potential Seepage Areas and Proposed Project Water Discharge Location In Snap Lake.....	9-214
Figure 9.4-10	Conceptual Representation of Initial Mixing Characteristics of the Combined Discharge During Ice-Covered Conditions	9-219
Figure 9.4-11	Time Series of Simulated Ammonia Concentrations in Snap Lake, during Construction and Operations.....	9-225
Figure 9.4-12	Maximum Extent of Water Concentrations Predicted to be Above a Benchmark, Threshold, or Guideline in Snap Lake.....	9-228
Figure 9.4-13	Time Series of Simulated Total Dissolved Solids Concentrations in Snap Lake, during Construction, Operations, and Post-closure.....	9-230
Figure 9.4-14	Spatial Pattern of Total Dissolved Solids Concentrations in Snap Lake during Operations (year 19).....	9-231
Figure 9.4-15	Simulated Total Phosphorus Concentrations in Snap Lake during Construction and Operations (250 and 2000 m from the discharge)	9-233
Figure 9.4-16	Simulated Chlorophyll a Concentrations in Snap Lake during Construction and Operations (250 and 2000 m from the discharge)	9-234
Figure 9.4-17	Predicted Maximum, Average Chromium Concentrations in the North Lake	9-241

LIST OF FIGURES (CONTINUED)

Figure 9.4-18	Predicted Maximum, Average Chromium Concentrations in the Northeast Lake	9-242
Figure 9.4-19	Potential Acid Input (PAI) Predictions for the Snap Lake Diamond Project ...	9-253
Figure 9.5-1	Zooplankton and Phytoplankton Sampling Locations for Snap Lake and the Reference Lake (1999).....	9-259
Figure 9.5-2	Benthic Invertebrate Sampling Locations for Snap Lake and the Reference Lake (1999).....	9-260
Figure 9.5-3	Streams and Inland Lake Fisheries Sampling Locations (1999, 2001).....	9-263
Figure 9.5-4	Reference and Regional Lake Fisheries Sampling Locations (1999, 2001).....	9-264
Figure 9.5-5	Snap Lake Bathymetry Map	9-272
Figure 9.5-6	Snap Lake Shoreline, Nearshore, and Shoal Habitat Map	9-273
Figure 9.5-7	Bathymetry Map of Lakes IL2, IL3, IL4 and IL5.....	9-281
Figure 9.5-8	Bathymetry Map of Lakes IL6, IL7, IL8 and IL9.....	9-282
Figure 9.5-9	Bathymetry Map of Lakes NL1, NL2, NL3 and NL4	9-283
Figure 9.5-10	Aquatic Organisms and Habitat Linkage Diagram	9-297
Figure 9.5-11	Dust Deposition to Aquatic Habitats.....	9-342
Figure 9.6-1	Classification of Residual Impacts to Receiving Streams, Lakes and Wetlands.....	9-386
Figure 9.6-2	Classification of Residual Impacts to Snap Lake Water Quality	9-389
Figure 9.6-3	Classification of Residual Impacts of Groundwater Discharge to Lakes North of Snap Lake and Impacts of Acidifying Emissions on Regional Lakes	9-392
Figure 9.6-4	Classification of Residual Impacts of Changes to Non-fish Aquatic Organisms in Snap Lake, NL5 and NL6.....	9-395
Figure 9.6-5	Classification of Residual Impacts of Changes to Non-fish Aquatic Organisms in the Northeast Lake	9-396
Figure 9.6-6	Classification of Residual Impacts of Changes to Non-fish Aquatic Organisms in the North Lake.....	9-397
Figure 9.6-7	Classification of Residual Impacts of Changes to Fish Habitat.....	9-398
Figure 9.6-8	Classification of Residual Impacts of Chronic Effects on Fish Health in Snap Lake and Impacts of Groundwater Discharge to Fish Health in Lakes NL5 and NL6	9-399
Figure 9.6-9	Classification of Residual Impacts of Post-closure Groundwater Discharge to Fish Health in the North and Northeast Lakes	9-400
Figure 9.6-10	Classification of Residual Impacts of Changes to Fish Population Abundance in Snap Lake, NL5, NL6, and the North and Northeast Lakes....	9-401
Figure 10.1-1	Regional Study Area for Terrestrial Resources.....	10-7
Figure 10.1-2	Local Study Area for Terrestrial Resources	10-9
Figure 10.1-3	Generic Environmental Consequence.....	10-17
Figure 10.2-1	Regional Study Area for Terrain	10-21
Figure 10.2-2	Local Study Area for Terrain.....	10-22
Figure 10.2-3	Location of Simplified Cross-section of the Kimberlite Dyke	10-27
Figure 10.2-4	Epicenters of Potentially Damaging Earthquakes for the Past 100 Years	10-28
Figure 10.2-5	Epicenters of Earthquakes in Western Canada for the Past Five Years	10-30
Figure 10.2-6	Location of Thermistors During Advanced Exploration Program	10-33
Figure 10.2-7	Linkage Diagram for Geology and Terrain	10-36
Figure 10.3-1	Regional Study Area for ELC and Biodiversity.....	10-56
Figure 10.3-2	Local Study Area for ELC and Biodiversity	10-57
Figure 10.3-3	Ecological Land Classification Linkage Diagram	10-81
Figure 10.3-4	PAI Isopleth for Ecological Land Classification	10-104
Figure 10.4-1	Local and Regional Study Areas for Wildlife	10-118

LIST OF FIGURES (CONTINUED)

Figure 10.4-2	Caribou and Historic Caribou Trails in the Regional Study Area	10-121
Figure 10.4-3	Location of Sample Plots for Upland Breeding Birds	10-125
Figure 10.4-4	Location of Lakes Surveyed for Waterfowl.....	10-127
Figure 10.4-5	Distribution of Satellite-Collared Caribou During the Northern Migration, 1999.....	10-130
Figure 10.4-6	Distribution of Satellite-Collared Caribou During the Southern Migration, 1999.....	10-131
Figure 10.4-7	Distribution of Satellite-Collared Caribou During the Northern Migration, 2000.....	10-132
Figure 10.4-8	Distribution of Satellite-Collared Caribou During the Southern Migration, 2000.....	10-133
Figure 10.4-9	Caribou Numbers Along Transects During the Northern Migration, 1999- 2000.....	10-135
Figure 10.4-10	Caribou Snow-track Density (Number/4 km) Along Transects During the Northern Migration, 2000.....	10-136
Figure 10.4-11	Caribou Numbers Along Transects During the Southern Migration, 1999- 2000.....	10-137
Figure 10.4-12	Number of Historic Caribou Trails Along Transects During the Southern Migration, 2000	10-138
Figure 10.4-13	Location of Active Wolf and Fox Den Sites, 1999-2000.....	10-141
Figure 10.4-14	Location of Active Gyrfalcon and Peregrine Falcon Nest Sites, 1999- 2000.....	10-146
Figure 10.4-15	Wildlife Linkage Diagram.....	10-150
Figure 10.5-1	Classification of Residual Impacts to Terrain Units and Esker Loss/Disturbances	10-202
Figure 10.5-2	Classification of Residual Impacts to Ground Thermal Regime.....	10-205
Figure 10.5-3	Classification of Residual Impacts to Ecological Land Classification Units .	10-208
Figure 10.5-4	Classification of Residual Impacts to Biodiversity	10-211
Figure 10.5-5	Classification of Residual Impacts of Air Emissions to Vegetation Health... 10-212	
Figure 10.5-6	Classification of Residual Impacts of Water Releases to Plant Health	10-213
Figure 10.5-7	Classification of Residual Impacts of Site Clearing to Wildlife Habitat.....	10-214
Figure 10.5-8	Classification of Residual Impacts of Dust to Wildlife Habitat	10-217
Figure 10.5-9	Classification of Residual Impacts of Blasting to Wildlife Movement and Behaviour.....	10-218
Figure 10.5-10	Classification of Residual Impacts of Vehicle and Aircraft Traffic to Wildlife Movement and Behaviour	10-221
Figure 10.5-11	Classification of Residual Impacts of Winter and Esker Access Roads to Wildlife Movement and Behaviour	10-222
Figure 10.5-12	Classification of Residual Impacts of Habitat Fragmentation to Wildlife Movement and Behaviour.....	10-223
Figure 10.5-13	Classification of Residual Impacts of Wildlife to the Site to Wildlife Abundance	10-226
Figure 10.5-14	Classification of Residual Impacts Attractions of Wildlife-Human Interactions to Wildlife Abundance	10-227
Figure 10.5-15	Classification of Residual Impacts of Vehicle and Aircraft Traffic to Wildlife Abundance	10-228
Figure 10.5-16	Classification of Residual Impacts of Toxic Spills to Wildlife Abundance	10-229
Figure 10.5-17	Classification of Residual Impacts of Increased Access for Hunting and Fishing to Wildlife Abundance	10-230
Figure 11.1-1	Regional Study Area for Environmental Health.....	11-5
Figure 11.1-2	Local Study Area for Environmental Health	11-6
Figure 11.1-3	Health Risk Assessment Framework	11-8

LIST OF FIGURES (CONTINUED)

Figure 11.2-1	Snow Sampling Locations	11-12
Figure 11.2-2	Lichen Sampling Locations.....	11-15
Figure 11.2-3	Soil Sampling Locations	11-17
Figure 11.3-1	Wildlife Exposure Pathways	11-23
Figure 11.3-2	Wildlife Health Linkage Diagram	11-24
Figure 11.3-3	Human Exposure Pathways	11-37
Figure 11.3-4	Human Health Linkage Diagram	11-38
Figure 12.1-1	Location of Snap Lake Diamond Project Northwest Territories	12-2
Figure 12.1-2	Generic Environmental Consequence.....	12-17
Figure 12.2-1	Communities Considered for Assessing Cumulative Effects on Socio-economic Components.....	12-21
Figure 12.3-1	Spatial Boundary for Assessing Cumulative Effects on Resource Use	12-38
Figure 12.3-2	Heritage Resources Linkage Diagram	12-43
Figure 12.4-1	Spatial Boundary for Assessing Cumulative Effects on Air Quality.....	12-50
Figure 12.4-2	Maximum 24-Hour CEA Case TSP Predictions	12-61
Figure 12.4-3	Annual CEA Case TSP Predictions.....	12-62
Figure 12.4-4	Maximum 24-Hour CEA Case PM ₁₀ Predictions	12-64
Figure 12.4-5	Annual CEA Case PM ₁₀ Predictions.....	12-65
Figure 12.4-6	Maximum 24-Hour CEA Case PM _{2.5} Predictions	12-67
Figure 12.4-7	Annual CEA Case PM _{2.5} Predictions	12-68
Figure 12.4-8	Maximum 1-Hour CEA Case SO ₂ Predictions.....	12-70
Figure 12.4-9	Maximum 24-Hour CEA Case SO ₂ Predictions.....	12-71
Figure 12.4-10	Annual CEA Case SO ₂ Predictions	12-72
Figure 12.4-11	Maximum 1-Hour CEA Case NO ₂ Predictions	12-74
Figure 12.4-12	Maximum 24-Hour CEA Case NO ₂ Predictions	12-75
Figure 12.4-13	Annual CEA Case NO ₂ Predictions	12-76
Figure 12.4-14	CEA Case Potential Acid Input (PAI) Predictions.....	12-78
Figure 12.4-15	Linkage Diagram for Ambient Air Quality	12-80
Figure 12.5-1	Spatial Boundary for Assessing Cumulative Effects on Noise	12-87
Figure 12.6-1	Spatial Boundary for Assessing Cumulative Effects on Aquatic Resources.....	12-100
Figure 12.7-1	Spatial Boundaries for Assessing Cumulative Effects on Terrestrial Resources.....	12-112
Figure 12.8-1	Spatial Boundary for Assessing Cumulative Effects on Environmental Health	12-140
Figure 12.9-1	Classification of the Cumulative Residual Impacts of Noise During the Operation Phase and to Air Quality	12-161
Figure 12.9-2	Classification of the Cumulative Residual Impacts of Heritage Resources and of Direct Habitat Loss on Wildlife Populations	12-164
Figure 12.9-3	Classification of the Cumulative Residual Impacts of Fugitive Dust on Wildlife Populations	12-165
Figure 12.9-4	Classification of the Cumulative Residual Impacts of Change in Abundance on Wildlife Populations.....	12-166
Figure 12.9-5	Classification of the Cumulative Residual Impacts of Change in Movement and Behaviour on Wildlife Populations	12-167
Figure 13.1-1	Local Study Area for Accidents and Malfunctions	13-6
Figure 13.1-2	Regional Study Area for Accidents and Malfunctions	13-7
Figure 13.3-1	Fish Bearing Lakes Along the Winter Road	13-25

LIST OF APPENDICES

- Appendix I.1 De Beers Canada Mining Inc. Compliance Report
Appendix I.2 Final Terms of Reference for the De Beers Canada Mining Inc. Snap Lake Diamond Project
Appendix I.3 Terms of Reference Conformity Table
Appendix II.1 Opportunities and Trade-off Studies
Appendix III.1 North Pile Development Plan
Appendix III.2 Geochemistry Report
Appendix III.3 Waste Management Plan
Appendix III.4 Water Management Plan
Appendix III.5 Quarry Management Plan
Appendix III.6 Winter Road Operations
Appendix III.7 Loss Control Policy
Appendix III.8 Environmental Policy
Appendix III.9 Spill Contingency Plan
Appendix III.10 Emergency Response Plan
Appendix III.11 Decommissioning and Reclamation Plan Snap Lake Diamond Project Northwest Territories
Appendix IV.1 Community Consultation Documentation
Appendix IV.2 Public Notification Documentation
Appendix IV.3 Traditional Knowledge in the Na Yaghe Region: An Assessment of the Snap Lake Project
Appendix V.1 Employment Catchment Communities
Appendix V.2 Selected Information from the Labour Market in the Northwest Territories
Appendix V.3 Snap Lake Project Careers and Opportunities
Appendix V.4 Aboriginal Business Directory
Appendix V.5 Snap Lake Diamond Project Socio-economic Impact Scenarios
Appendix IX.1 Mine Site Water Quality
Appendix IX.2 Summary of 2001 Hydrogeological Drill Program
Appendix IX.3 Predicted Quantity of Water Discharged from the Snap Lake Diamond Project
Appendix IX.4 Climate and Hydrology Data
Appendix IX.5 Snap Lake Baseline Water and Sediment Quality Methods
Appendix IX.6 Baseline Water and Sediment Quality for Receiving Waters
Appendix IX.7 Water Quality Modelling
Appendix IX.8 Site-specific Water Quality Benchmarks and Mine Water Discharge Toxicity Testing
Appendix IX.9 Aquatic Organisms: Collection Methods and Technical Procedures
Appendix IX.10 Non-fish Aquatic Organisms Baseline Data
Appendix IX.11 Fish Baseline Data
Appendix IX.12 Fish Habitat Assessment - Supporting Information
Appendix IX.13 Blasting Report
Appendix X.1 Wildlife Data
Appendix XI.1 Environmental Health Methods