



# TREASURY METALS

INCORPORATED

## GOLIATH GOLD PROJECT DRYDEN, ON ENVIRONMENTAL IMPACT STATEMENT



Treasury Metals Incorporated  
130 King Street West, Suite 3680  
Toronto, Ontario M5X 1B1  
T: (416) 214-4654  
F: (416) 599-4959

September 2017





## TABLE OF CONTENTS

	<b>PAGE</b>
<b>ACKNOWLEDGEMENTS.....</b>	<b>i</b>
<b>GLOSSARY.....</b>	<b>iii</b>
<b>ACRONYMS, ABBREVIATIONS AND SYMBOLS.....</b>	<b>x</b>
<b>1.0 INTRODUCTION AND PROJECT OVERVIEW.....</b>	<b>1-1</b>
1.1 The Proponent .....	1-1
1.1.1 Corporate Management Structure .....	1-3
1.1.2 Insurance and Liability Management .....	1-3
1.1.3 Occupational Health and Safety Plan .....	1-4
1.1.4 Environmental Management Plan.....	1-5
1.2 Project Overview .....	1-7
1.2.1 Project Location.....	1-7
1.2.2 Project History .....	1-12
1.2.3 Land Ownership .....	1-12
1.2.4 Current Land Uses .....	1-14
1.3 Need for the Project.....	1-15
1.4 Project Timeline.....	1-15
1.5 Regulatory Framework.....	1-16
1.5.1 Canada.....	1-16
1.5.2 Ontario .....	1-20
1.5.3 Federal and Provincial Alignment .....	1-23
1.6 Participants in the Environmental Assessment.....	1-24
1.6.1 Indigenous Communities .....	1-25
1.6.2 Federal Government.....	1-26
1.6.3 Provincial Government .....	1-27
1.6.4 Municipal Government.....	1-27
1.6.5 Public and Non-governmental Organizations.....	1-28
1.7 Document Organization .....	1-28
<b>2.0 ASSESSMENT OF ALTERNATIVES.....</b>	<b>2-1</b>
2.1 Background.....	2-1
2.2 Assessment Methodology .....	2-1
2.2.1 Project Alternatives.....	2-1
2.2.2 Alternatives to the Project.....	2-7
2.3 Project Alternatives – Construction and Operations .....	2-8
2.3.1 Mining.....	2-8
2.3.2 Minewater Management .....	2-11
2.3.3 Mine Rock and Overburden Management .....	2-14
2.3.4 Processing Methodology .....	2-18



**TABLE OF CONTENTS (continued)**

	<b>PAGE</b>
2.3.5	Process Effluent Treatment .....2-22
2.3.6	Tailings Storage Facility.....2-25
2.3.7	Water Supply.....2-59
2.3.8	Water Discharge Location .....2-61
2.3.9	Watercourse Realignments .....2-62
2.3.10	Infrastructure and Buildings .....2-64
2.3.11	Aggregate Supply .....2-67
2.3.12	Non-hazardous Solid Waste Management .....2-68
2.3.13	Hazardous Solid Waste Management.....2-68
2.3.14	Domestic Sewage Management.....2-68
2.3.15	Explosives Storage Facility.....2-70
2.3.16	Electrical Power Supply .....2-70
2.4	Project Alternatives - Closure.....2-73
2.4.1	Open Pit Closure .....2-74
2.4.2	Underground Closure .....2-76
2.4.3	Waste Rock Storage Area Closure .....2-77
2.4.4	Minewater Management System Closure .....2-78
2.4.5	Tailings Storage Facility Closure .....2-80
2.4.6	Buildings and Equipment Closure.....2-83
2.4.7	Infrastructure Closure .....2-84
2.4.8	Drainage Closure.....2-86
2.5	Summary of Alternatives .....2-88
<b>3.0</b>	<b>INTRODUCTION .....3-1</b>
3.1	Existing Infrastructure and Facilities.....3-1
3.1.1	Roads.....3-6
3.1.2	Power .....3-6
3.1.3	Railway.....3-8
3.1.4	Warehousing and Office Facilities .....3-8
3.1.5	Dams and Impoundments.....3-8
3.2	Project Phases and Schedule .....3-8
3.2.1	Site Preparation and Construction Phase .....3-10
3.2.2	Operations Phase.....3-12
3.2.3	Closure Phase.....3-12
3.2.4	Post Closure (Care and Maintenance).....3-13
3.3	Open Pit Mine .....3-13
3.3.1	Overburden Stripping .....3-13
3.3.2	Surface and Mine Water Management .....3-13
3.3.3	Open Pit Design .....3-14
3.3.4	Open Pit Mine Operations .....3-15



**TABLE OF CONTENTS (continued)**

	<b>PAGE</b>
3.4	Underground Mine .....3-16
3.5	Stockpiles .....3-19
3.5.1	Mine Rock Stockpile .....3-20
3.5.2	Overburden Stockpile .....3-23
3.5.3	Low-Grade Ore and Other Stockpiles .....3-23
3.6	Processing .....3-24
3.6.1	Process Description.....3-25
3.6.2	Site Layout and Infrastructure.....3-25
3.6.3	Pipelines.....3-28
3.6.4	Crushing, Ore Storage and Mill Feed.....3-28
3.6.5	Milling .....3-29
3.6.6	Gravity and Carbon-in-leach (CIL) .....3-29
3.7	Tailings Storage Facility (TSF) .....3-33
3.7.1	Embankment Height and Construction .....3-35
3.7.2	Tailings Storage Facility Embankment.....3-39
3.7.3	Seepage Control .....3-47
3.7.4	Embankment Stability and Seepage .....3-47
3.7.5	Tailings Management .....3-49
3.7.6	Monitoring .....3-50
3.8	Water Management .....3-52
3.8.1	General Approach .....3-52
3.8.2	Mine Water Management .....3-53
3.8.3	Water Supply for Process Plant Operations.....3-54
3.8.4	Potable Water and Other Water Requirements.....3-54
3.8.5	Tailings Storage Facility Water Management.....3-55
3.8.6	Water Balance.....3-59
3.8.7	Cyanide Management .....3-60
3.8.8	Process Effluent Treatment and Discharge.....3-3
3.8.9	Final Effluent Treatment .....3-4
3.8.10	Effluent Discharge Structure.....3-7
3.8.11	Water Management Structures.....3-7
3.8.12	Watercourse Realignment .....3-7
3.8.13	Aquatic Habitat Rehabilitation.....3-8
3.9	Fuel and Chemical Management .....3-8
3.10	Domestic and Industrial Waste.....3-8
3.11	Access and Security .....3-8
3.12	Power Supply .....3-10
3.12.1	Plant Distribution Services and Transformer.....3-10
3.12.2	Emergency Power .....3-10



**TABLE OF CONTENTS (continued)**

	<b>PAGE</b>
3.13 Other Facilities and Infrastructure .....	3-13
3.13.1 Explosives Storage Facility .....	3-13
3.13.2 Additional Facilities .....	3-14
3.14 Closure and Decommissioning .....	3-14
3.14.1 Open Pit Mine .....	3-14
3.14.2 Underground Mine .....	3-15
3.14.3 Stockpiles .....	3-16
3.14.4 Tailings Storage Facility (TSF) .....	3-16
3.14.5 Aggregate Sources .....	3-18
3.14.6 Buildings, Machinery, Equipment, and Infrastructure .....	3-18
3.14.7 Petroleum Products, Chemicals, and Explosives .....	3-18
3.14.8 Roads, Pipelines, and Power Distribution .....	3-18
3.14.9 Site Drainage and Water Structures .....	3-19
3.14.10 Dewatering Infrastructure .....	3-19
3.14.11 Waste Management .....	3-19
3.14.12 Other Facilities and Infrastructure .....	3-19
3.15 Refinements to the Project Incorporated in the Original EIS .....	3-20
3.16 Refinements to the Project since Filing the Original EIS .....	3-23
3.16.1 Perimeter Ditching .....	3-23
3.16.2 Surface and Mine Water Management .....	3-23
3.16.3 Stockpiles .....	3-24
3.16.4 Site Layout and Infrastructure .....	3-24
3.16.5 Tailings Storage Facility .....	3-25
3.16.6 Water Management .....	3-26
3.16.7 Watercourse Realignment .....	3-26
3.16.8 Explosives Storage Facility .....	3-26
3.16.9 Closure and Decommissioning .....	3-27
<b>4.0 ACCIDENTS AND MALFUNCTIONS .....</b>	<b>4-1</b>
4.1 Background .....	4-1
4.2 Approach .....	4-2
4.2.1 Data Input .....	4-2
4.2.2 Risk Registers and Risk Matrices .....	4-8
4.3 Effects of Failure Modes on Environmental Valued Components .....	4-11
4.3.1 Identification of Potential Interactions between Failure Modes with Intermediate and Receptor Valued Components .....	4-11
4.3.2 Failure of Tailing Storage Facility .....	4-14
4.3.3 Spills/Releases .....	4-20
4.3.4 Cyanide .....	4-25





**TABLE OF CONTENTS (continued)**

	<b>PAGE</b>
4.4	Natural Hazards .....4-29
4.4.1	Extreme Floods .....4-29
4.4.2	Natural Fires.....4-32
4.4.3	Earthquakes .....4-33
4.4.4	Tornadoes .....4-34
4.4.5	Climate Change.....4-37
4.5	Conclusions .....4-44
<b>5.0</b>	<b>EXISTING ENVIRONMENT .....5-1</b>
5.1	Climate and Meteorology .....5-1
5.1.1	Study Area and Data Sources .....5-1
5.1.2	Climate Overview .....5-2
5.1.3	Climate Conditions .....5-2
5.2	Air Quality .....5-2
5.2.1	Air Quality Study Area .....5-2
5.2.2	Assessment Criteria and Methods .....5-2
5.2.3	Baseline Air Quality Sources .....5-6
5.2.4	Existing Baseline Air Quality .....5-8
5.3	Acoustic and Light Environment.....5-9
5.3.1	Baseline Noise Levels .....5-9
5.3.2	Baseline Light Levels.....5-12
5.4	Geology .....5-14
5.4.1	Geological Setting .....5-14
5.4.2	Deposit Geology.....5-14
5.4.3	Geochemistry .....5-19
5.5	Terrain & Soil .....5-28
5.5.1	Regional Soil Classification .....5-28
5.5.2	Local Soil Classification.....5-30
5.5.3	Soil Nutrient Baseline .....5-30
5.5.4	Soil Chemical Baseline.....5-36
5.5.5	Summary of Soils in the LSA.....5-37
5.5.6	Sediment .....5-38
5.6	Hydrogeology .....5-41
5.6.1	Hydrogeological Setting.....5-41
5.6.2	Overburden Aquifer Conditions.....5-41
5.6.3	Bedrock Aquifer Conditions .....5-48
5.6.4	Groundwater Development.....5-53
5.6.5	Conceptual Hydrogeological Model .....5-53



**TABLE OF CONTENTS (continued)**

	<b>PAGE</b>
5.7	Surface Hydrology .....5-55
5.8	Aquatic Resources.....5-59
5.8.1	Surface Water Quality .....5-59
5.8.2	Sediment Samples .....5-67
5.8.3	Benthic Invertebrate Community.....5-71
5.8.4	Fish and Fish Habitat.....5-75
5.9	Terrestrial Resources.....5-93
5.9.1	Natural Heritage Areas .....5-93
5.9.2	Vegetation .....5-93
5.9.3	Wetlands .....5-98
5.9.4	Mammals.....5-105
5.9.5	Birds .....5-107
5.9.6	Amphibians and Reptiles .....5-108
5.9.7	Invertebrates .....5-108
5.9.8	Significant Wildlife Habitat .....5-109
5.10	Migratory Birds .....5-110
5.11	Species at Risk .....5-111
5.11.1	Definition .....5-111
5.11.2	Potential Species at Risk.....5-111
5.11.3	Observed Species at Risk .....5-114
5.12	Human Environment .....5-115
5.12.1	Land Use.....5-115
5.12.2	Social Factors.....5-116
5.12.3	Economic Factors.....5-119
5.12.4	Heritage Resources.....5-122
5.12.5	Aboriginal Peoples.....5-124
<b>6.0</b>	<b>Description of Project Effects.....6-1</b>
6.1	Methods Used in the Assessment of Project Effects .....6-1
6.1.1	Integration of Public and Aboriginal Feedback.....6-1
6.1.2	Integration of Responses to Round 1 Information Requests .....6-1
6.1.3	Selection of Valued Components (VCs) and Indicators .....6-1
6.1.4	Selection of Study Areas .....6-58
6.1.5	Selection of Temporal Boundaries .....6-93
6.1.6	Approaches for Prediction/Description of Project Effects .....6-96
6.1.7	Approach for Evaluating Cumulative Effects.....6-98
6.1.8	Approach for Determination of Significance.....6-98
6.2	Terrain and Soils.....6-99
6.2.1	Potential Effects of the Project on the Environment .....6-99
6.2.2	Effects Prediction Methods.....6-100
6.2.3	Project Effects Avoidance Measures Used in Predictions .....6-102



**TABLE OF CONTENTS (continued)**

	<b>PAGE</b>
6.2.4	Predicted Effects .....6-103
6.2.5	Identified Mitigation..... 6-107
6.2.6	Residual Adverse Effects..... 6-108
6.2.7	Information to Address Round 1 Information Requests..... 6-109
6.3	Geology and Geochemistry..... 6-111
6.3.1	Potential Effects of the Project on the Environment ..... 6-111
6.3.2	Effects Prediction Methods ..... 6-114
6.3.3	Project Effects Avoidance Measures Used in Predictions ..... 6-118
6.3.4	Predicted Effects ..... 6-120
6.3.5	Identified Mitigation..... 6-124
6.3.6	Residual Adverse Effects..... 6-125
6.3.7	Information to Address Round 1 Information Requests..... 6-126
6.4	Noise ..... 6-127
6.4.1	Potential Effects of the Project on the Environment ..... 6-127
6.4.2	Effects Prediction Methods ..... 6-128
6.4.3	Project Effects Avoidance Measures Used in Predictions ..... 6-131
6.4.4	Predicted Effects ..... 6-132
6.4.5	Identified Mitigation..... 6-139
6.4.6	Residual Adverse Effects..... 6-140
6.4.7	Information to Address Round 1 Information Requests..... 6-143
6.5	Light ..... 6-144
6.5.1	Potential Effects of the Project on the Environment ..... 6-144
6.5.2	Effects Prediction Methods ..... 6-146
6.5.3	Project Effects Avoidance Measures Used in Predictions ..... 6-151
6.5.4	Predicted Effects ..... 6-151
6.5.5	Identified Mitigation..... 6-154
6.5.6	Residual Adverse Effects..... 6-155
6.5.7	Information to Address Round 1 Information Requests..... 6-156
6.6	Air Quality..... 6-156
6.6.1	Potential Effects of the Project on the Environment ..... 6-156
6.6.2	Effects Prediction Methods ..... 6-159
6.6.3	Project Effects Avoidance Measures Used in Predictions ..... 6-168
6.6.4	Predicted Effects ..... 6-169
6.6.5	Identified Mitigation..... 6-173
6.6.6	Residual Adverse Effects..... 6-174
6.6.7	Information to Address Round 1 Information Requests..... 6-177
6.7	Climate..... 6-178
6.7.1	Potential Effects of the Project on the Environment ..... 6-178
6.7.2	Effects Prediction Methods ..... 6-179
6.7.3	Project Effects Avoidance Measures Used in Predictions ..... 6-187
6.7.4	Predicted Effects ..... 6-187





**TABLE OF CONTENTS (continued)**

	<b>PAGE</b>
6.7.5	Identified Mitigation.....6-190
6.7.6	Residual Adverse Effects..... 6-190
6.7.7	Information to Address Round 1 Information Requests.....6-191
6.8	Surface Water Quality.....6-192
6.8.1	Potential Effects of the Project on the Environment ..... 6-192
6.8.2	Effects Prediction Methods ..... 6-193
6.8.3	Project Effects Avoidance Measures Used in Predictions .....6-210
6.8.4	Predicted Effects ..... 6-210
6.8.5	Identified Mitigation.....6-225
6.8.6	Residual Adverse Effects.....6-228
6.8.7	Information to Address Round 1 Information Requests..... 6-229
6.9	Surface Water Quantity..... 6-231
6.9.1	Potential Effects of the Project on the Environment ..... 6-231
6.9.2	Effects Prediction Methods ..... 6-232
6.9.3	Project Effects Avoidance Measures Used in Predictions ..... 6-240
6.9.4	Predicted Effects ..... 6-241
6.9.5	Identified Mitigation.....6-254
6.9.6	Residual Adverse Effects..... 6-256
6.9.7	Information to Address Round 1 Information Requests.....6-259
6.10	Groundwater Quality .....6-261
6.10.1	Potential Effects of the Project on the Environment ..... 6-261
6.10.2	Effects Prediction Methods ..... 6-262
6.10.3	Project Effects Avoidance Measures Used in Predictions .....6-262
6.10.4	Predicted Effects ..... 6-264
6.10.5	Identified Mitigation.....6-266
6.10.6	Residual Adverse Effects.....6-268
6.10.7	Information to Address Round 1 Information Requests..... 6-268
6.11	Groundwater Quantity..... 6-269
6.11.1	Potential Effects of the Project on the Environment ..... 6-269
6.11.2	Effects Prediction Methods ..... 6-271
6.11.3	Project Effects Avoidance Measures Used in Predictions ..... 6-275
6.11.4	Predicted Effects ..... 6-276
6.11.5	Identified Mitigation.....6-281
6.11.6	Residual Adverse Effects.....6-281
6.11.7	Information to Address Round 1 Information Requests.....6-282
6.12	Wildlife and Wildlife Habitat..... 6-283
6.12.1	Potential Effects of the Project on the Environment ..... 6-283
6.12.2	Effects Prediction Methods ..... 6-288
6.12.3	Project Effects Avoidance Measures Used in Predictions .....6-289
6.12.4	Predicted Effects ..... 6-290
6.12.5	Identified Mitigation.....6-303



**TABLE OF CONTENTS (continued)**

	<b>PAGE</b>
6.12.6	Residual Adverse Effects.....6-305
6.12.7	Information to Address Round 1 Information Requests.....6-306
6.13	Migratory Birds.....6-308
6.13.1	Potential Effects of the Project on the Environment .....6-308
6.13.2	Effects Prediction Methods .....6-312
6.13.3	Project Effects Avoidance Measures Used in Predictions .....6-312
6.13.4	Predicted Effects .....6-313
6.13.5	Identified Mitigation.....6-316
6.13.6	Residual Adverse Effects.....6-317
6.13.7	Information to Address Round 1 Information Requests.....6-317
6.14	Fish and Fish Habitat .....6-319
6.14.1	Potential Effects of the Project on the Environment .....6-319
6.14.2	Effects Prediction Methods .....6-322
6.14.3	Project Effects Avoidance Measures Used in Predictions .....6-322
6.14.4	Predicted Effects .....6-325
6.14.5	Identified Mitigation.....6-334
6.14.6	Residual Adverse Effects.....6-335
6.14.7	Information to Address Round 1 Information Requests.....6-336
6.15	Wetlands and Vegetation .....6-338
6.15.1	Likely Effects of the Project on the Environment.....6-338
6.15.2	Effects Prediction Methods .....6-339
6.15.3	Project Effects Avoidance Measures Used in Predictions .....6-341
6.15.4	Predicted Effects .....6-342
6.15.5	Identified Mitigation.....6-345
6.15.6	Residual Adverse Effects.....6-345
6.15.7	Information to Address Round 1 Information Requests.....6-346
6.16	Land Use.....6-349
6.16.1	Potential Effects of the Project on the Environment .....6-349
6.16.2	Effects Prediction Methods .....6-352
6.16.3	Project Effects Avoidance Measures Used in Predictions .....6-355
6.16.4	Predicted Effects .....6-358
6.16.5	Identified Mitigation.....6-361
6.16.6	Residual Effects .....362
6.16.7	Information to Address Round 1 Information Requests.....362
6.17	Social.....6-375
6.17.1	Potential Effects of the Project on the Environment .....6-375
6.17.2	Effects Prediction Methods .....6-376
6.17.3	Project Effects Avoidance Measures Used in Predictions .....6-378
6.17.4	Predicted Effects .....6-379
6.17.5	Identified Mitigation.....6-383
6.17.6	Residual Effects .....6-384



**TABLE OF CONTENTS (continued)**

	<b>PAGE</b>
6.17.7 Information to Address Round 1 Information Requests.....	6-388
6.18 Economic Factors.....	6-389
6.18.1 Potential Effects of the Project on the Environment .....	6-389
6.18.2 Effects Prediction Methods .....	6-392
6.18.3 Effects Avoidance/Enhancement Measures Used in Predictions ...	6-399
6.18.4 Predicted Effects .....	6-399
6.18.5 Identified Mitigation.....	6-405
6.18.6 Residual Effects .....	6-406
6.18.7 Information to Address Round 1 Information Requests.....	6-411
6.19 Human Health.....	6-411
6.19.1 Potential Effects of the Project on the Environment .....	6-411
6.19.2 Effects Prediction Methods .....	6-414
6.19.3 Project Effects Avoidance Measures Used in Predictions .....	6-431
6.19.4 Predicted Effects .....	6-433
6.19.5 Identified Mitigation.....	6-434
6.19.6 Residual Adverse Effects.....	6-434
6.19.7 Information to Address Round 1 Information Requests.....	6-434
6.20 Heritage Resources .....	6-436
6.20.1 Potential Effects of the Project on the Environment .....	6-436
6.20.2 Effects Prediction Methods .....	6-439
6.20.3 Project Effects Avoidance Measures Used in Predictions .....	6-440
6.20.4 Predicted Effects .....	6-440
6.20.5 Identified Mitigation.....	6-441
6.20.6 Residual Adverse Effects.....	6-442
6.20.7 Information to Address Round 1 Information Requests.....	6-442
6.21 Aboriginal Peoples .....	6-443
6.21.1 Potential Effects of the Project on the Environment .....	6-443
6.21.2 Effects Prediction Methods .....	6-445
6.21.3 Project Effects Avoidance Measures Used in Predictions .....	6-445
6.21.4 Predicted Effects .....	6-447
6.21.5 Identified Mitigation.....	6-450
6.21.6 Residual Effects .....	6-451
6.21.7 Information to Address Round 1 Information Requests.....	6-456
6.22 Summary of Mitigation .....	6-462
6.23 Federal Consideration.....	6-466
6.23.1 Changes in Environmental Components within Federal Jurisdiction .....	6-467
6.23.2 Changes to Environment on Federal or Transboundary Lands .....	6-468
6.23.3 Changes to the Environment Linked or Incidental to Federal Decisions.....	6-468
6.23.4 Effects of Changes to the Environment on Aboriginal People .....	6-468



**TABLE OF CONTENTS (continued)**

	<b>PAGE</b>
6.23.5 Effects of Changes to the Environment Linked or Incidental to Federal Decisions.....	6-468
<b>7.0 Cumulative Effects .....</b>	<b>7-1</b>
7.1 Approach and Methodology .....	7-1
7.2 Scoping for Potential Cumulative Effects .....	7-1
7.2.1 Valued Components (VCs) for Assessing Cumulative Effects .....	7-2
7.2.2 Spatial Boundaries for Assessing Cumulative Effects.....	7-4
7.2.3 Temporal Boundaries for Assessing Cumulative Effects.....	7-7
7.2.4 Past Activities Considered for Assessing Cumulative Effects .....	7-11
7.2.5 Future Activities Considered for Assessing Cumulative Effects .....	7-11
7.3 Assessment of Cumulative Effects.....	7-15
7.3.1 Screening of Potential Cumulative Effects .....	7-15
7.3.2 Summary of Potential Cumulative Effects.....	7-27
<b>8.0 Determination of Significance .....</b>	<b>8-2</b>
8.1 Methodology for Assigning Significance for Residual Effects .....	8-2
8.1.1 Magnitude .....	8-2
8.1.2 Geographic Extent.....	8-22
8.1.3 Timing.....	8-22
8.1.4 Duration.....	8-27
8.1.5 Frequency .....	8-28
8.1.6 Reversibility .....	8-33
8.1.7 Likelihood.....	8-34
8.1.8 Determination of Significance .....	8-34
8.2 Terrain and Soils.....	8-36
8.2.1 Residual Adverse Effects Advanced for Determination of Significance .....	8-36
8.2.2 Description of Significance .....	8-36
8.2.3 Prediction Confidence and Uncertainty.....	8-38
8.3 Geology and Geochemistry.....	8-38
8.3.1 Residual Adverse Effects Advanced to Significance Assessment.....	8-38
8.3.2 Description of Significance .....	8-40
8.3.3 Prediction Confidence and Uncertainty.....	8-43
8.4 Noise.....	8-43
8.4.1 Residual Adverse Effects Advanced to Significance Assessment.....	8-43
8.4.2 Description of Significance .....	8-44
8.4.3 Prediction Confidence and Uncertainty.....	8-49
8.5 Light.....	8-49
8.6 Air Quality.....	8-49
8.6.1 Residual Adverse Effects Advanced to Significance Assessment.....	8-49



**TABLE OF CONTENTS (continued)**

	<b>PAGE</b>
8.6.2	Description of Significance .....8-51
8.6.3	Prediction Confidence and Uncertainty .....8-56
8.7	Climate.....8-56
8.7.1	Residual Adverse Effects Advanced for Determination of Significance.....8-56
8.7.2	Description of Significance .....8-57
8.7.3	Prediction Confidence and Uncertainty .....8-60
8.8	Surface Water Quality .....8-60
8.8.1	Residual and Adverse Effects Advanced to Significance Assessment .....8-60
8.8.2	Description of Significance .....8-60
8.8.3	Prediction Confidence and Uncertainty .....8-68
8.9	Surface Water Quantity.....8-68
8.9.1	Residual Adverse Effects Advanced to Significance Assessment....8-68
8.9.2	Description of Significance .....8-68
8.9.3	Prediction Confidence and Uncertainty .....8-77
8.10	Groundwater Quality .....8-77
8.11	Groundwater Quantity.....8-77
8.11.1	Residual Adverse Effects Advanced for Determination of Significance .....8-77
8.11.2	Description of Significance .....8-78
8.11.3	Prediction Confidence and Uncertainty .....8-81
8.12	Wildlife and Wildlife Habitat.....8-81
8.12.1	Residual and Adverse Effects Advanced to Significance Assessment .....8-81
8.12.2	Description of Significance .....8-81
8.13	Migratory Birds .....8-93
8.13.1	Residual and Adverse Effects Advanced to Significance Assessment .....8-93
8.13.2	Description of Significance .....8-93
8.14	Fish and Fish Habitat.....8-98
8.14.1	Residual Adverse Effects Advanced to Significance .....8-98
8.14.2	Description of Significance .....8-98
8.14.3	Prediction Confidence and Uncertainty .....8-101
8.15	Wetlands and Vegetation .....8-101
8.15.1	Residual Adverse Effects Advanced to Significance Assessment...8-101
8.15.2	Description of Significance .....8-101
8.16	Land Use.....8-107
8.16.1	Residual Effects Advanced to Significance Assessment.....8-107
8.16.2	Description of Significance .....8-107
8.17	Social.....8-120





**TABLE OF CONTENTS (continued)**

	<b>PAGE</b>
8.17.1 Residual Effects Advanced to Significance Assessment.....	8-120
8.17.2 Description of Significance .....	8-120
8.18 Economic .....	8-124
8.18.1 Residual Effects Advanced to Significance Assessment.....	8-124
8.18.2 Description of Significance .....	8-124
8.19 Human Health .....	8-132
8.20 Heritage Resources .....	8-132
8.21 Aboriginal Peoples.....	8-132
8.21.1 Residual Effects Advanced to Significance Assessment.....	8-132
8.21.2 Description of Significance .....	8-140
8.21.3 Prediction Confidence and Uncertainty.....	8-148
8.22 Federal Considerations.....	8-148
8.22.1 Changes in Environmental Components within Federal Jurisdiction .....	8-148
8.22.2 Changes to Environment on Federal or Transboundary Lands.....	8-148
8.22.3 Changes to the Environment Linked or Incidental to Federal Decisions .....	8-148
8.22.4 Effects of Changes to the Environment on Aboriginal People .....	8-149
8.22.5 Effects of Changes to the Environment Linked or Incidental to Federal Decisions .....	8-149
<b>9.0 PUBLIC AND INDIGENOUS ENGAGEMENT.....</b>	<b>9-1</b>
9.1 Introduction.....	9-1
9.1.1 Treasury Metals Website.....	9-2
9.1.2 Local Information Centre .....	9-3
9.2 Project Milestones.....	9-3
9.3 Interested Parties .....	9-4
9.3.1 General Public.....	9-5
9.3.1.1 Local Residents .....	9-5
9.3.1.2 Wabigoon/Dryden .....	9-5
9.3.1.3 Participation of Government Agencies .....	9-6
9.3.2 Indigenous Communities .....	9-8
9.3.2.1 Wabigoon Lake Ojibway Nation .....	9-8
9.3.2.2 Eagle Lake First Nation.....	9-9
9.3.2.3 Whitefish Bay First Nation .....	9-9
9.3.2.4 Lac Seul First Nation.....	9-10
9.3.2.5 Wabauskang First Nation .....	9-10
9.3.2.6 Grassy Narrows First Nation .....	9-10
9.3.2.7 Lac des Mille Lacs First Nation.....	9-11
9.3.2.8 Métis Nation of Ontario .....	9-11
9.3.2.9 Aboriginal People of Wabigoon .....	9-11



**TABLE OF CONTENTS (continued)**

	<b>PAGE</b>
9.3.2.10 Grand Council Treaty #3 .....	9-12
9.3.2.11 Other Indigenous Organizations .....	9-12
9.4 General Public Engagement .....	9-13
9.4.1 General Public Comment Opportunities.....	9-13
9.4.1.1 Local Residents .....	9-13
9.4.1.2 City of Dryden .....	9-15
9.4.2 General Public Concerns.....	9-18
9.4.3 Measures to Address General Public Concerns .....	9-19
9.5 Indigenous Community Engagement .....	9-23
9.5.1 Wabigoon Lake Ojibway Nation.....	9-27
9.5.1.1 Wabigoon Lake Ojibway Nation Concerns .....	9-29
9.5.2 Eagle Lake First Nation .....	9-31
9.5.2.1 Eagle Lake First Nation Concerns.....	9-32
9.5.3 Whitefish Bay First Nation .....	9-33
9.5.3.1 Whitefish Bay First Nation Concerns.....	9-34
9.5.4 Lac Seul First Nation .....	9-35
9.5.4.1 Lac Seul First Nation Concerns.....	9-36
9.5.5 Wabauskang First Nation .....	9-36
9.5.5.1 Wabauskang First Nation Concerns.....	9-37
9.5.6 Grassy Narrows First Nation.....	9-38
9.5.6.1 Grassy Narrows First Nation Concerns .....	9-38
9.5.7 Lac des Mille Lacs First Nation.....	9-38
9.5.7.1 Lac des Mille Lacs First Nation Concerns .....	9-39
9.5.8 Métis Nation of Ontario .....	9-39
9.5.8.1 Métis Nation of Ontario Concerns .....	9-40
9.5.9 Aboriginal People of Wabigoon.....	9-40
9.5.9.1 Aboriginal People of Wabigoon Concerns .....	9-41
9.5.10 Grand Council Treaty #3.....	9-41
9.5.10.1 Grand Council Treaty #3 Concerns .....	9-41
9.5.11 Measures to Address Concerns.....	9-42
9.6 Outstanding Indigenous and General Public Concerns .....	9-49
<b>10.0 COMMITMENT REGISTRY.....</b>	<b>10-1</b>
<b>11.0 BENEFITS TO CANADIANS .....</b>	<b>11-1</b>
<b>12.0 ENVIRONMENTAL MANAGEMENT PLANS.....</b>	<b>12-1</b>
12.1 Project Environmental Management Plan .....	12-2
12.1.1 Objectives / Overview .....	12-2
12.1.2 Applications.....	12-3
12.2 Waste Management Plan.....	12-3



**TABLE OF CONTENTS (continued)**

	<b>PAGE</b>
12.2.1 Objectives / Overview .....	12-3
12.2.2 Applications .....	12-3
12.3 Water Management Plan .....	12-4
12.3.1 Objectives / Overview .....	12-4
12.3.2 Applications .....	12-4
12.3.3 Management Triggers and Adaptive Responses .....	12-4
12.4 Tailings Management Plan.....	12-7
12.4.1 Objectives / Overview .....	12-7
12.4.2 Applications .....	12-8
12.5 Cyanide Management Plan.....	12-8
12.5.1 Objectives / Overview .....	12-8
12.5.2 Application.....	12-8
12.6 Noise Management Plan.....	12-9
12.6.1 Objectives / Overview .....	12-9
12.6.2 Application.....	12-9
12.6.3 Management Triggers and Adaptive Responses .....	12-9
12.7 Best Management Practices Plan for Dust.....	12-11
12.7.1 Objectives / Overview .....	12-11
12.7.2 Application.....	12-11
12.7.3 Management Triggers and Adaptive Responses for Air Quality .....	12-11
12.8 Greenhouse Gas Management Plan.....	12-12
12.8.1 Objectives / Overview .....	12-12
12.8.2 Application.....	12-12
12.9 Wildlife Management Plan .....	12-12
12.9.1 Objectives / Overview .....	12-12
12.9.2 Application.....	12-13
12.9.3 Management Triggers and Adaptive Responses .....	12-13
12.10 Fish Management Plan .....	12-13
12.10.1 Objectives / Overview .....	12-13
12.10.2 Application.....	12-14
12.10.3 Management Triggers and Adaptive Responses .....	12-14
12.11 Archaeological and Cultural Heritage Resource Management Plan .....	12-14
12.11.1 Objectives / Overview .....	12-14
12.11.2 Application.....	12-15
12.12 Socio-Economic Management Plan .....	12-15
12.12.1 Objectives / Overview .....	12-15
12.12.2 Application.....	12-15
12.13 Emergency and Spill Response Management Plan.....	12-16
12.13.1 Objectives / Overview .....	12-16
12.13.2 Application.....	12-16
12.14 Dam Safety Management Plan .....	12-16



**TABLE OF CONTENTS (continued)**

	<b>PAGE</b>
12.14.1 Objectives / Overview .....	12-16
12.14.2 Application.....	12-17
12.15 Transportation and Access Management Plan.....	12-17
12.15.1 Objectives / Overview .....	12-17
12.15.2 Application.....	12-17
12.16 Mine Rock Management Plan .....	12-18
12.16.1 Objectives / Overview .....	12-18
12.16.2 Application.....	12-18
12.17 Hazardous Materials Management Plan .....	12-18
12.17.1 Objectives / Overview .....	12-18
12.17.2 Application.....	12-19
12.18 Fuel Handling and Storage Management Plan.....	12-19
12.18.1 Objectives / Overview .....	12-19
12.18.2 Application.....	12-19
12.19 Explosives Management Plan .....	12-20
12.19.1 Objectives / Overview .....	12-20
12.19.2 Application.....	12-20
12.20 Occupational Health and Safety Plan.....	12-20
12.20.1 Objectives / Overview .....	12-20
12.20.2 Application.....	12-21
12.21 Communications Management Plan.....	12-21
12.21.1 Objectives / Overview .....	12-21
12.21.2 Application.....	12-21
12.22 Applicability of Management Plans to Disciplines.....	12-21
<b>13.0 ENVIRONMENTAL MONITORING PROGRAM.....</b>	<b>13-1</b>
13.1 Introduction.....	13-1
13.2 Terrain and Soils .....	13-1
13.2.1 Overview and Objectives of Proposed Monitoring.....	13-1
13.2.2 Proposed Monitoring Program.....	13-2
13.2.3 Reporting.....	13-2
13.3 Geology and Geochemistry.....	13-3
13.3.1 Overview and Objectives of Proposed Monitoring.....	13-3
13.3.2 Proposed Monitoring Programs .....	13-3
13.3.3 Reporting.....	13-5
13.4 Noise and Vibration.....	13-5
13.4.1 Overview and Objectives of Proposed Monitoring.....	13-5
13.4.2 Proposed Monitoring Programs .....	13-6
13.4.3 Reporting.....	13-8
13.5 Light.....	13-8
13.5.1 Overview and Objectives of Proposed Monitoring.....	13-8



**TABLE OF CONTENTS (continued)**

	<b>PAGE</b>
13.5.2 Proposed Monitoring Program.....	13-9
13.5.3 Reporting.....	13-9
13.6 Air Quality.....	13-9
13.6.1 Overview and Objectives of Proposed Monitoring.....	13-9
13.6.2 Proposed Monitoring Program.....	13-10
13.6.3 Reporting.....	13-11
13.7 Climate.....	13-11
13.7.1 Overview and Objectives of Proposed Monitoring.....	13-11
13.7.2 Proposed Monitoring Program.....	13-11
13.7.3 Reporting.....	13-11
13.8 Surface Water Quality.....	13-12
13.8.1 Overview and Objectives of Proposed Monitoring.....	13-12
13.8.2 Proposed Monitoring Program.....	13-12
13.8.3 Reporting.....	13-13
13.9 Surface Water Quantity.....	13-2
13.9.1 Overview and Objectives of Proposed Monitoring.....	13-2
13.9.2 Proposed Monitoring Program.....	13-2
13.9.3 Reporting.....	13-3
13.10 Groundwater Quality.....	13-3
13.10.1 Overview and Objectives of Proposed Monitoring.....	13-3
13.10.2 Proposed Monitoring Program.....	13-4
13.10.3 Reporting.....	13-8
13.11 Groundwater Quantity.....	13-9
13.11.1 Overview and Objectives of Proposed Monitoring.....	13-9
13.11.2 Proposed Monitoring Program.....	13-9
13.11.3 Reporting.....	13-10
13.12 Wildlife and Wildlife Habitat.....	13-10
13.12.1 Overview and Objective of Proposed Monitoring.....	13-10
13.12.2 Proposed Monitoring Program.....	13-11
13.12.3 Reporting.....	13-12
13.13 Migratory Birds.....	13-13
13.14 Fish and Fish Habitat.....	13-13
13.14.1 Overview and Objectives of Proposed Monitoring.....	13-13
13.14.2 Proposed Monitoring Programs.....	13-14
13.14.3 Reporting.....	13-15
13.15 Wetlands and Vegetation.....	13-15
13.15.1 Overview and Objectives of Proposed Monitoring.....	13-15
13.15.2 Proposed Monitoring Program.....	13-16
13.15.3 Reporting.....	13-17
13.16 Land Use.....	13-17
13.16.1 Overview and Objectives of Proposed Monitoring.....	13-17





## TABLE OF CONTENTS (continued)

	<b>PAGE</b>
13.16.2 Reporting.....	13-18
13.17 Social.....	13-18
13.17.1 Overview and Objectives of Proposed Monitoring.....	13-18
13.17.2 Reporting.....	13-19
13.18 Economic.....	13-19
13.18.1 Overview and Objectives of Proposed Monitoring.....	13-19
13.18.2 Reporting.....	13-20
13.19 Human Health.....	13-20
13.20 Heritage Resources .....	13-20
13.21 Aboriginal Peoples .....	13-20
13.21.1 Reporting.....	13-21
13.22 Summary.....	13-21
<b>14.0 Conclusions .....</b>	<b>14-1</b>
<b>15.0 REFERENCES .....</b>	<b>15-1</b>



## LIST OF TABLES

		PAGE
Table 1.1-1:	Proponent Contact Information.....	1-2
Table 1.5.2-1:	Anticipated Provincial Permits .....	1-20
Table 1.5.3-1:	Anticipated Federal Permits .....	1-23
Table 2.2.1.4-1:	Financial criteria for the alternatives assessment .....	2-4
Table 2.2.1.4-2:	Technical feasibility criterion for the alternatives assessment.....	2-4
Table 2.2.1.4-3:	Environmental Criteria for the Alternatives Assessment .....	2-5
Table 2.2.1.4-4:	Closure Criteria for the Alternatives Assessment.....	2-7
Table 2.3.4.4-1:	Comparison of Process Methodologies using Evaluation Criteria .....	2-20
Table 2.3.5-1:	Alternatives for Water Management, Source, Effluent, Destruction, and Receivers .....	2-23
Table 2.3.6.1-1:	Identification of TSF Candidates and General Location .....	2-29
Table 2.3.6.1-2:	Identification of TSF Methodology of Tailings Disposal.....	2-29
Table 2.3.6.1-3:	Identification of Minewater Pond Candidates and General Location .....	2-29
Table 2.3.6.4-1:	Multiple Accounts Analysis Base Case Results .....	2-49
Table 2.3.6.4-2:	Multiple Accounts Values .....	2-49
Table 2.3.6.4-3:	Environmental Indicator Analysis.....	2-52
Table 2.3.6.4-4:	Technical Indicator Analysis .....	2-53
Table 2.3.6.4-5:	Project Economics Indicator Analysis .....	2-54
Table 2.3.6.4-6:	Socio-economic Indicator Analysis .....	2-55
Table 2.3.6.4-7:	Environmental Sub-Account Analysis .....	2-57
Table 2.3.6.4-8:	Technical Sub-Account Analysis .....	2-57
Table 2.3.6.4-9:	Project Economics Sub-Account Analysis .....	2-58
Table 2.3.6.4-10:	Socio-economic Sub-Account Analysis .....	2-58
Table 2.5-1:	Summary of Alternatives .....	2-88
Table 3.2-1:	Key Project Components Listed by Phase.....	3-10
Table 3.7.4-1:	CDA Guidelines.....	3-48
Table 3.8.5.3-1:	Tailings Rate of Rise .....	3-57
Table 3.8.6-1:	Conceptual Water Balance for Operations (average year).....	3-0
Table 3.8.6-2:	Conceptual Water Balance for Operations (dry year) .....	3-1
Table 3.8.6-3:	Conceptual Water Balance for Operations (wet year).....	3-2
Table 3.8.8-1:	Process Effluent Discharge Qualities .....	3-3
Table 3.8.9-1:	Final Effluent Discharge Quality .....	3-6
Table 3.15-1:	Changes to the Project since Initially Proposed.....	3-20
Table 4.2.1-1:	FMEA Workshop Participants.....	4-3
Table 4.2.1.7-1:	Ratings for Likelihood of Failure Modes.....	4-5
Table 4.2.1.7-2:	Rating for Severity of Failure Modes .....	4-7
Table 4.2.1.8-1:	Criteria for Risk Matrix.....	4-8
Table 4.2.2.1-1:	Summary of Residual Risk Ranks .....	4-9
Table 4.2.2.1-2:	Risk Level by Impact Category .....	4-9
Table 4.2.2.2-1:	Summary of Identified Environmental Residual Risks.....	4-10



**LIST OF TABLES (continued)**

	<b>PAGE</b>
Table 4.3.1-1: Description, Prevention, and Responses to Potential Medium Environmental Residual Risk Failure Modes .....	4-12
Table 4.3.2.2-1: Minimum Factors of Safety .....	4-15
Table 4.4.5-1: Projections for Changes in Climate (relative to 1971 to 2000) .....	4-41
Table 4.4.5-2: Projections for Mean Changes in Climate (relative to 1971 to 2000) .....	4-42
Table 5.1.1-1: Climate Data Availability for Dryden .....	5-1
Table 5.1.3-1: Climate Data Used in Assessment .....	5-3
Table 5.2.2-1: Air Quality Assessment Criteria .....	5-5
Table 5.2.4-1: Measured Ambient Air Quality Data from the MOE Monitoring Stations .....	5-8
Table 5.2.4-2: Estimated Background Concentrations of Airborne Metals .....	5-9
Table 5.3.1.3-1: Ambient Sound Levels at the Goliath Gold Project .....	5-11
Table 5.3.2.3-1: Baseline Light Levels within the Light Study Area .....	5-13
Table 5.4.3.3-1: Estimated Volumes of Mined Materials.....	5-21
Table 5.4.3.3-2: Estimated Volumes of Mine Waste Rock.....	5-22
Table 5.4.3.4-1: Sample Numbers for Static Tests on Waste Rock Material.....	5-23
Table 5.6.2.2-1: Overburden Hydraulic Conductivity Testing Summary.....	5-45
Table 5.6.2.3-1a: 2013/2014 Quality Monitoring Data .....	5-46
Table 5.6.2.3-1b: 2013/2014 Groundwater Monitoring Data .....	5-46
Table 5.6.2.3-1c: 2013/2014 Groundwater Monitoring Data .....	5-47
Table 5.6.2.4-1: Groundwater Quality .....	5-49
Table 5.6.3.2-1: Hydraulic Conductivity Summary of Bedrock Units .....	5-52
Table 5.7-1: Average Daily Discharge, 2012 to 2013 .....	5-57
Table 5.8.1-1: Location and Dates for Surface Water Sample Collection .....	5-61
Table 5.8.1-2: Water Quality Parameters Measured .....	5-62
Table 5.8.1.2-1: PWQO for Freshwater .....	5-63
Table 5.8.1.3-1: Summary of Baseline Surface Water Quality Results .....	5-64
Table 5.8.1.3-2: Summary of Baseline Surface Water Quality by Waterbody .....	5-65
Table 5.8.1.3-1: Surface Water PWQO Exceedances .....	5-66
Table 5.8.2-1: Sediment Parameters Measured .....	5-69
Table 5.8.2.1-1: MOE Sediment Effects Levels .....	5-69
Table 5.8.2.2-1: PSQG Exceedances .....	5-70
Table 5.8.3-1: Benthic Invertebrate Sample Locations .....	5-72
Table 5.8.3.2-1: Summary Indices for Benthic Invertebrate from Blackwater Creek, 2011 .....	5-74
Table 5.8.3.2-2: Summary Indices for Benthic Invertebrate from Blackwater Creek, 2012.....	5-74
Table 5.8.3.2-2: Summary Indices for Benthic Invertebrate from Thunder Lake Tributary 2 and Thunder Lake Tributary 3, 2012.....	5-75
Table 5.8.4.1 1: Fish Species Present in Thunder Lake .....	5-77
Table 5.8.4.2-1: Fish species present in Wabigoon Lake .....	5-81



**LIST OF TABLES (continued)**

	<b>PAGE</b>
Table 5.8.4.3-1:	Fish Catches in Blackwater Creek and Thunder Lake Tributaries.....5-87
Table 5.8.4.5-1:	Total Mercury Concentrations in Walleye and Sauger Muscle .....5-90
Table 5.8.4.5-2:	Collection Location and Year, Species Composition and Mercury Concentration of Forage Fish 2011 and 2012.....5-92
Table 5.9.2.1-1:	Ecosites of the RSA and LSA.....5-94
Table 5.9.3.3-1:	Summary of OWES Scores for Evaluated Wetlands.....5-102
Table 5.9.3.3-2:	Species at Risk Encountered During Wetland Surveys .....5-105
Table 5.9.4-1:	Summary of Large Mammals and Furbearers identified in the LSA .....5-106
Table 5.9.4-2:	Small Mammal Trapping Summary .....5-106
Table 5.9.5-1:	Summary of Bird SAR observed in the LSA .....5-108
Table 5.9.8-1:	Assessment of Specialized Wildlife Habitat in the LSA.....5-109
Table 5.9.8-2:	Assessment of Seasonal Concentrations of Wildlife in the LSA.....5-109
Table 5.11.2-1:	Listed and Locally Rare Vascular Plants with Known or Potential Occurrence within the RSA .....5-111
Table 5.11.2-2:	Wildlife Species at Risk Potentially Occurring or Known to Occur within the LSA and RSA .....5-113
Table 5.12.2.2-1:	Education Facilities in the Study Area .....5-117
Table 5.12.2.2-2:	Level of Education in Thunder Bay and Kenora.....5-117
Table 5.12.2.3-1:	Health Services and Programs in the Study Area.....5-117
Table 5.12.2.4-1:	Housing Supply in the Study Area .....5-118
Table 5.12.2.5-1:	Police Services and Crime in the Study Area .....5-119
Table 5.12.3.1-1:	Labour Force, Labour Participation and Employment in the Study Area .....5-120
Table 5.12.3.2-1:	Income Levels in the Study Area Compared to Provincial Average .....5-120
Table 5.12.5.2-1:	White-Tailed Deer Hunting Activity .....5-126
Table 5.12.5.2-2:	Moose Hunting Activity .....5-126
Table 6.1.3.1-1:	Terrain and Soil VCs, Indicators and Measures.....6-3
Table 6.1.3.2-1:	Geology and Geochemistry VCs, Indicators and Measures.....6-4
Table 6.1.3.3-1:	Noise VCs, Indicators and Measures.....6-7
Table 6.1.3.4-1:	Light VCs, Indicators and Measures .....6-8
Table 6.1.3.5-1:	Air Quality VCs, Indicators and Measures .....6-10
Table 6.1.3.6-1:	Climate VCs, Indicators and Measures.....6-11
Table 6.1.3.7-1:	Surface Water Quality VCs, Indicators and Measures .....6-12
Table 6.1.3.8-1:	Surface Water Quantity VCs, Indicators and Measures .....6-13
Table 6.1.3.9-1:	Groundwater Quality VCs, Indicators and Measures .....6-14
Table 6.1.3.10-1:	Groundwater Quantity VCs, Indicators and Measures .....6-15
Table 6.1.3.11-1:	Wildlife and Wildlife Habitat VCs, Indicators and Measures .....6-17
Table 6.1.3.11-2:	Justification for the Selection of Wildlife and Wildlife Habitat VCs, Indicators and Measures .....6-18
Table 6.1.3.12-1:	Migratory Birds VCs, Indicators and Measures.....6-23
Table 6.1.3.13-1:	Fish and Fish Habitat VCs, Indicators and Measures .....6-24



**LIST OF TABLES (continued)**

	<b>PAGE</b>
Table 6.1.3.14-1: Wetlands and Vegetation VCs, Indicators and Measures .....	6-25
Table 6.1.3.15-1: Land and Resource Use VCs, Indicators, and Measures.....	6-27
Table 6.1.3.15-2: Rationale for Land and Resource Use VC Selection .....	6-28
Table 6.1.3.16-1: Social VCs, Indicators and Measures .....	6-38
Table 6.1.3.16-2: Rationale for Social VC Selection.....	6-38
Table 6.1.3.17-1: Economic VCs, Indicators and Measures .....	6-43
Table 6.1.3.17-2: Rationale for Economic VC Selection .....	6-44
Table 6.1.3.18-1: Human Health VCs, Indicators and Measures.....	6-48
Table 6.1.3.19-1: Heritage Resources VCs, Indicators and Measures .....	6-50
Table 6.1.3.20-1: Aboriginal People VCs, Indicators, and Measures.....	6-51
Table 6.1.3.20-2: Rationale for Aboriginal People VC Selection.....	6-52
Table 6.1.3.21-1: Summary of Valued Components.....	6-57
Table 6.2.4.1-1: Pit Lake Water Quality and Seepage Quality (dry TSF cover option) .....	6-104
Table 6.2.6-1: Residual Adverse Effects on Terrain and Soils.....	6-109
Table 6.3.4.1-1: Pit Lake Water Quality and Seepage Quality (dry TSF cover option) .....	6-120
Table 6.3.4.2-1: Pit Lake Water Quality and Seepage Quality (wet TSF cover option).....	6-122
Table 6.3.5-1: Predicted Adverse Effects for Pit Lake Water Quality .....	6-124
Table 6.3.7-1: Residual Adverse Effects on Pit Lake Water Quality .....	6-125
Table 6.4.4.1-1: Ambient Noise Predictions, Site Preparations and Construction.....	6-132
Table 6.4.4.1-2: Areas with Noise Predicted above 50 dBA, Site Preparations and Construction .....	6-134
Table 6.4.4.1-3: Blasting Noise Predictions, Site Preparations and Construction .....	6-134
Table 6.4.4.1-4: Blasting Vibration Predictions, Site Preparations and Construction .....	6-134
Table 6.4.4.1-5: Absolute Sound Pressure Predictions, Site Preparations and Construction.....	6-135
Table 6.4.4.1-6: Change in Percent Highly Annoyed, Site Preparations and Construction.....	6-135
Table 6.4.4.2-1: Ambient Noise Predictions, Operations .....	6-135
Table 6.4.4.2-2: Areas with Noise Predicted above 50 dBA, Operations .....	6-136
Table 6.4.4.2-2: Blasting Noise Predictions, Operations.....	6-136
Table 6.4.4.2-3: Blasting Vibration Predictions, Operations.....	6-137
Table 6.4.4.2-4: Absolute Sound Pressure Predictions, Operations .....	6-137
Table 6.4.4.2-5: Change in Percent Highly Annoyed, Operations.....	6-137
Table 6.4.4.3-1: Ambient Noise Predictions, Closure .....	6-138
Table 6.4.4.3-2: Areas with Noise Predicted above 50 dBA, Closure .....	6-138
Table 6.4.4.3-3: Absolute Sound Pressure Predictions, Operations .....	6-139
Table 6.4.4.3-4: Change in Percent Highly Annoyed, Operations.....	6-139
Table 6.4.6-1: Residual Adverse Effects for Noise .....	6-140





**LIST OF TABLES (continued)**

	<b>PAGE</b>
Table 6.5.2-1:	Plant and Mine Infrastructure Illumination Design Criteria .....6-146
Table 6.5.2-2:	Process Plant and Mine Infrastructure Light Fixture Technical Specifications.....6-150
Table 6.5.4-1:	Predicted Light Effects at Sensitive Receptor Locations.....6-154
Table 6.5.5-1:	Predicted Light Trespass Levels.....6-155
Table 6.6.2.1-1:	Appendices Listing Detailed Emission Calculations.....6-161
Table 6.6.2.2-1:	Comparison of Air Emissions by Phase.....6-166
Table 6.6.4.1-1:	Air Emissions: Site Preparation and Construction .....6-169
Table 6.6.4.2-1:	Air Emissions: Operations .....6-170
Table 6.6.4.2-2:	Predicted Air Quality Effects: Operations.....6-171
Table 6.6.4.3-1:	Air Emissions: Closure .....6-173
Table 6.6.6-1:	Residual Adverse Air Quality Effects .....6-174
Table 6.7.2.1-1:	Fossil Fuel Consumption .....6-181
Table 6.7.2.1-2:	GHG Emission Factors.....6-181
Table 6.7.2.2-1:	Projections of Climate Change (AR4) in Northwestern Ontario.....6-182
Table 6.7.2.2-2:	Projections of Climate Change (AR5) in Northwestern Ontario.....6-183
Table 6.7.2.2-3:	Canadian GHG Emissions by Province .....6-183
Table 6.7.2.2-4:	Canadian GHG Emissions by Sector.....6-184
Table 6.7.2.2-5:	Canadian GHG Emissions within the Heavy Industry Sector .....6-184
Table 6.7.2.2-6:	Historic Global GHG Emissions.....6-185
Table 6.7.2.2-7:	Projected AR4 Increases in Global GHG Emissions.....6-186
Table 6.7.4.1-1:	Project GHG Emissions, Site Preparation and Construction Phase .....6-188
Table 6.7.4.1-2:	Project GHG Emissions, Operation Phase .....6-188
Table 6.7.4.1-3:	Project GHG Emissions, Closure Phase.....6-189
Table 6.7.4.2-1:	Comparison of Project to Canadian and Ontario GHG Emissions .....6-189
Table 6.7.4.2-2:	Comparison of Project GHG Emissions to Changes in Global Emissions.....6-190
Table 6.7.6-1:	Predicted Residual Adverse Effects for Climate .....6-191
Table 6.8.2.1-1:	Background Surface Water Quality .....6-197
Table 6.8.2.2-1:	Flow Data used for Modelling Surface Water Quality.....6-200
Table 6.8.2.4-1:	Surface Water Discharge Volumes during Operations.....6-201
Table 6.8.2.4-2:	Treated Effluent Discharge Quality.....6-203
Table 6.8.2.6-1:	Surface Water Discharge Volumes during Post-closure .....6-206
Table 6.8.2.6-2:	Seepage Discharge Volumes to Receiving Waters during Post-closure .....6-206
Table 6.8.4.2-1:	Receiving Water Quality Results for TL1 .....6-212
Table 6.8.4.2-2:	Receiving Water Quality Results for TL2 .....6-213
Table 6.8.4.2-3:	Receiving Water Quality Results for TL3 .....6-214
Table 6.8.4.2-4:	Receiving Water Quality Results for HB1 .....6-215
Table 6.8.4.2-5:	Receiving Water Quality Results for LC1.....6-216



**LIST OF TABLES (continued)**

	<b>PAGE</b>
Table 6.8.4.2-6: Receiving Water Quality Results for BW1 .....	6-217
Table 6.8.4.2-7: Receiving Water Quality Results for BW2 .....	6-218
Table 6.8.4.2-8: Receiving Water Quality Results for TL .....	6-219
Table 6.8.4.2-9: Receiving Water Quality Results for WL.....	6-220
Table 6.8.4.5-1: Adverse Effect for Surface Water Quality during Operations .....	6-223
Table 6.8.5.4-1: Adverse Effects for Surface Water Quality Effects during Post-closure (TSF dry cover).....	6-226
Table 6.8.5.4-2: Adverse Effects for Surface Water Quality Effects during Post-closure (TSF wet cover) .....	6-227
Table 6.8.6-1: Residual Adverse Effects on Surface Water Quality during Operations .....	6-228
Table 6.8.6-2: Residual Adverse Effects on Surface Water Quality during Post-Closure.....	6-230
Table 6.9.2.3-1: Fresh Water Takings from Thunder Lake Tributary 2 and 3 during Operations .....	6-236
Table 6.9.2.3-2: Effluent Discharge Volumes during Operations .....	6-236
Table 6.9.2.5-1: Discharge Rates from Open Pit to Blackwater Creek during Post-closure .....	6-238
Table 6.9.4.2-1: Surface Water Hydrology Results for Operations, Average Year Conditions.....	6-242
Table 6.9.4.2-2: Surface Water Hydrology Results for Operations, Dry Year Conditions .....	6-242
Table 6.9.4.2-3: Surface Water Hydrology Results for Operations, Wet Year Conditions .....	6-243
Table 6.9.4.2-4: Changes in Surface Water Inflows to Lakes .....	6-244
Table 6.9.4.4-1: Surface Water Hydrology Results for Post-Closure, Average Year Conditions (dry cover TSF).....	6-246
Table 6.9.4.4-2: Surface Water Hydrology Results for Post-Closure, Dry Year Conditions (dry cover TSF).....	6-246
Table 6.9.4.4-3: Surface Water Hydrology Results for Post-Closure, Wet Year Conditions (dry cover TSF).....	6-247
Table 6.9.4.4-4: Surface Water Hydrology Results for Post-Closure, Average Year Conditions (wet cover TSF) .....	6-248
Table 6.9.4.4-5: Surface Water Hydrology Results for Post-Closure, Dry Year Conditions (wet cover TSF) .....	6-248
Table 6.9.4.4-6: Surface Water Hydrology Results for Post-Closure, Wet Year Conditions (wet cover TSF) .....	6-249
Table 6.9.4.4-7: Changes in Surface Water Inflows to Lakes .....	6-250
Table 6.9.5-1: Adverse Effects for Surface Water Quantity during Operations .....	6-251
Table 6.8.5-2: Adverse Effects for Surface Water Quantity during Post-closure (dry TSF cover) .....	6-253



**LIST OF TABLES (continued)**

	<b>PAGE</b>
Table 6.9.5-3: Adverse Effects for Surface Water Quantity during Post-closure (wet TSF cover).....	6-255
Table 6.9.6-1 : Residual Adverse Effects for Surface Water Quantity during Operations .....	6-257
Table 6.9.6-2: Residual Adverse Effects for Surface Water Quantity during Post-closure .....	6-258
Table 6.10.4.4-1: Estimated Seepage Quantities during Post-Closure .....	6-266
Table 6.11.4.2-1: Potential Risk to Private Wells.....	6-278
Table 6.11.4.4-1: Estimated Seepage Quantities during Post-Closure .....	6-281
Table 6.11.6-1: Residual Adverse Effects on Groundwater Quantity .....	6-282
Table 6.12.4.5-1: Summary of Adverse Effects for Wildlife and Wildlife Habitat .....	6-301
Table 6.12.4.5-2: Predicted Adverse Effects on Wildlife and Wildlife Habitat.....	6-302
Table 6.12.6-1: Residual Adverse Effects on Wildlife and Wildlife Habitat.....	6-305
Table 6.13.4.5-1: Summary of Adverse Effects for Migratory Birds .....	6-315
Table 6.13.4.5-2: Predicted Adverse Effects on Migratory Birds.....	6-316
Table 6.13.6-1: Residual Adverse Effects on Migratory Birds.....	6-317
Table 6.14.4.5-1: Summary of Adverse Effects for Fish and Fish Habitat.....	6-332
Table 6.14.45-2: Predicted Adverse Effects for Fish and Fish Habitat.....	6-333
Table 6.14.6-1: Predicted Residual Adverse Effects for Fish and Fish Habitat .....	6-336
Table 6.15.4.1-1: Direct Effects on Wetlands during Site Preparation and Construction Phase.....	6-342
Table 6.15.4.1-2: Direct Effects on Vegetation during Site Preparation and Construction Phase.....	6-343
Table 6.15.4.5-1: Predicted Adverse Effects for Wetlands and Vegetation.....	6-344
Table 6.15.6-1: Residual Adverse Effects on Wetlands and Vegetation .....	6-346
Table 6.16.1-1: Potential Effects on Land and Resource Use .....	6-349
Table 6.16.3-1: Land and Resource Use Effects Avoidance Measures .....	6-355
Table 6.16.4-1: Summary of Predicted Land and Resource Use Effects .....	6-359
Table 6.16.6-1: Mitigation Measures Applicable to Land and Resource Use Effects .....	6-361
Table 6.16.9-1: Residual Effects for Land and Resource Use .....	6-363
Table 6.17.3-1: Social Effects Avoidance/Enhancement Measures Considered.....	6-378
Table 6.17.4-1: Predicted Social Effects by Project Phase .....	6-379
Table 6.18-1: Potential Economic Effects by Project Phase .....	6-390
Table 6.18.4.1-1: Economic Effects .....	6-399
Table 6.18.7.2-1: Employment Effects .....	6-401
Table 6.18.6.3-1: Government Revenues .....	6-403
Table 6.19.2.1-1: Screening for COCs in Waste Rock .....	6-419
Table 6.19.2.1-2: Screening for COCs in Tailings .....	6-421
Table 6.19.2.1-3: Screening for COCs in Air and Dust.....	6-423
Table 6.19.2.1-4: Operations Phase Surface Water Predictions.....	6-425



**LIST OF TABLES (continued)**

	<b>PAGE</b>
Table 6.19.2.1-5: Post-closure Phase Water Predictions for Blackwater Creek Catchment.....	6-427
Table 6.19.2.1-7: Post-closure Phase Water Predictions for Thunder Lake Catchment.....	6-428
Table 6.18.2.2-1: Toxicity Reference Values (TRVs) used in Health Assessment.....	6-429
Table 6.16.4-1: Predicted Effects of the Project on Human Health.....	6-434
Table 6.21.3-1: Aboriginal Peoples Effects Avoidance Measure Considered .....	6-445
Table 6.21.4-1: Predicted Aboriginal Peoples Effects by Project Phase .....	6-447
Table 6.21.5.1-1: Mitigation and Enhancement Measures for Aboriginal Peoples Effects .....	6-450
Table 6.22-1: Summary of Mitigation Measures .....	6-462
Table 7.2.1-1: Summary of Valued Components (VCs) and Predicted Residual Effects .....	7-2
Table 7.2.2-1: Spatial Extents for use in Assessing Cumulative Effects .....	7-4
Table 7.2.3-1: Temporal Boundaries for use in Assessing Cumulative Effects .....	7-8
Table 7.3.1-1: Cumulative Effects Screening for Terrain and Soils.....	7-15
Table 7.3.1-2: Cumulative Effects Screening for Geology and Geochemistry.....	7-16
Table 7.3.1-3: Cumulative Effects Screening for Noise .....	7-16
Table 7.3.1-4: Cumulative Effects Screening for Air Quality .....	7-17
Table 7.3.1-5: Cumulative Effects Screening for Surface Water Quality .....	7-18
Table 7.3.1-6: Cumulative Effects Screening for Surface Water Quantity.....	7-19
Table 7.3.1-7: Cumulative Effects Screening for Groundwater Quantity .....	7-20
Table 7.3.1-8: Cumulative Effects Screening for Wildlife and Wildlife Habitat.....	7-21
Table 7.3.1-9: Cumulative Effects Screening for Migratory Birds.....	7-22
Table 7.3.1-10: Cumulative Effects Screening for Fish and Fish Habitat .....	7-22
Table 7.3.1-11: Cumulative Effects Screening for Wetlands and Vegetation .....	7-23
Table 7.3.1-12: Cumulative Effects Screening for Land Use .....	7-24
Table 7.3.1-13: Cumulative Effects Screening for Social Factors.....	7-25
Table 7.3.1-14: Cumulative Effects Screening for Economic Factors .....	7-25
Table 7.3.1-15: Cumulative Effects Screening for Aboriginal Peoples .....	7-26
Table 7.3.2-1: Summary of Cumulative Effects Screening .....	7-28
Table 8.1.1.1-1: Indicators and Measures for the Natural Landscapes VC .....	8-3
Table 8.1.1.1-2: Levels of Magnitude for Terrain and Soils .....	8-3
Table 8.1.1.2-1: Assessment Criteria for Pit Water Quality.....	8-4
Table 8.1.1.2-2: Levels of Magnitude for Pit Lake Water Quality .....	8-5
Table 8.1.1.3-1: Levels of Magnitude for Noise .....	8-9
Table 8.1.1.5-1: Criteria Considered in Evaluating Effects for Air Quality .....	8-10
Table 8.1.1.5-2: Levels of Magnitude for Air Quality .....	8-11
Table 8.1.1.6-1: Levels of Magnitude for Climate .....	8-12



**LIST OF TABLES (continued)**

	<b>PAGE</b>
Table 8.1.1.7-1: Criteria Considered in Evaluating Effects for Surface Water Quality .....	8-13
Table 8.1.1.7-2: Levels of Magnitude for Surface Water Quality.....	8-14
Table 8.1.1.8-1: Levels of Magnitude for Surface Water Quantity .....	8-15
Table 8.1.1.10-1: Levels of Magnitude for Groundwater Quantity.....	8-16
Table 8.1.1.11-1: Levels of Magnitude for Wildlife and Wildlife Habitat .....	8-17
Table 8.1.1.12-1: Levels of Magnitude for Migratory Birds .....	8-18
Table 8.1.3.3-1: Levels of Timing for Noise .....	8-23
Table 8.2.1-1: Residual Adverse Effects on Terrain and Soils.....	8-36
Table 8.2.2.1-1: Levels of Magnitude for Terrain and Soils .....	8-37
Table 8.2.2.7-1: Determination of Significance for Terrain and Soils .....	8-39
Table 8.3.1-1: Residual Adverse Effects on Pit Lake Water Quality .....	8-40
Table 8.3.2.7-1: Determination of Significance for Geology and Geochemistry .....	8-42
Table 8.4.1-1: Residual Adverse Effects for Noise .....	8-43
Table 8.4.2.7-1: Determination of Significance for Noise.....	8-48
Table 8.6.1-1: Residual Adverse Effects on Air Quality .....	8-50
Table 8.6.2.1-1: Levels of Magnitude for Residual Adverse Effects on Air Quality.....	8-51
Table 8.6.2.7-1: Determination of Significance for Air Quality.....	8-55
Table 8.7.1-1: Residual Adverse Effects on Climate.....	8-57
Table 8.7.2.7-1: Determination of Significance for Climate.....	8-59
Table 8.8.1-1: Residual Adverse Effects on Surface Water Quality during Operations .....	8-61
Table 8.8.1-2: Residual Adverse Effects on Surface Water Quality during Post- Closure.....	8-62
Table 8.8.2.1-1: Levels of Magnitude for Residual Adverse Effects on Surface Water Quality .....	8-63
Table 8.8.2.2-1: Geographic Extent for Residual Adverse Effects on Surface Water Quality.....	8-64
Table 8.8.2.4-1: Levels of Duration for Residual Adverse Effects on Surface Water Quality.....	8-65
Table 8.8.2.7-1: Determination of Significance for Surface Water Quality .....	8-67
Table 8.9.1-1: Residual Adverse Effects on Surface Water Quantity during Operations .....	8-69
Table 8.9.1-2: Residual Adverse Effects on Surface Water Quantity during Post- closure .....	8-70
Table 8.9.2.1-1: Levels of Magnitude for Surface Water Quantity during Operations .....	8-71
Table 8.9.2.1-2: Levels of Magnitude for Surface Water Quantity during Post- closure .....	8-72
Table 8.9.2.4-1: Levels of Duration for Residual Adverse Effects on Surface Water Quantity.....	8-73





**LIST OF TABLES (continued)**

	<b>PAGE</b>
Table 8.9.2.5-1: Levels of Frequency for Surface Water Quantity .....	8-74
Table 8.9.2.6-1: Levels of Reversibility for Residual Adverse Effects on Surface Water Quantity .....	8-75
Table 8.9.2.7-1: Determination of Significance for Surface Water Quantity .....	8-76
Table 8.11.1-1: Residual Adverse Effects on Groundwater Quantity .....	8-78
Table 8.11.2.7-1: Determination of Significance for Groundwater Quantity .....	8-80
Table 8.12.1-1: Residual Adverse Effects on Wildlife and Wildlife Habitat.....	8-82
Table 8.12.2.1-1: Levels of Magnitude for Residual Adverse Effects on Wildlife and Wildlife Habitat .....	8-83
Table 8.12.2.2-1: Levels of Geographic Extent for Residual Adverse Effects on Wildlife and Wildlife Habitat .....	8-84
Table 8.12.2.3-1: Levels of Timing for Residual Adverse Effects on Wildlife and Wildlife Habitat .....	8-85
Table 8.12.2.4-1: Levels of Duration for Residual Adverse Effects on Wildlife and Wildlife Habitat .....	8-87
Table 8.12.2.5-1: Levels of Frequency for Residual Adverse Effects on Wildlife and Wildlife Habitat .....	8-88
Table 8.12.2.6-1: Levels of Reversibility for Residual Adverse Effects on Wildlife and Wildlife Habitat .....	8-89
Table 8.12.2.7-1: Determination of Significance for Wildlife and Wildlife Habitat .....	8-90
Table 8.13.1-1: Residual Adverse Effects on Migratory Birds.....	8-94
Table 8.13.2.1-1: Levels of Magnitude for Residual Adverse Effects on Migratory Birds.....	8-94
Table 8.13.2.2-1: Levels of Geographic Extent for Residual Adverse Effects on Migratory Birds .....	8-94
Table 8.13.2.3-1: Levels of Timing for Residual Adverse Effects on Migratory Birds .....	8-96
Table 8.12.2.4-1: Levels of Duration for Residual Adverse Effects on Migratory Birds .....	8-96
Table 8.13.2.5-1: Levels of Frequency for Residual Adverse Effects on Migratory Birds.....	8-96
Table 8.13.2.6-1: Levels of Reversibility for Residual Adverse Effects on Migratory Birds.....	8-97
Table 8.13.2.7-1: Determination of Significance for Migratory Birds .....	8-97
Table 8.14.2.7-1: Determination of Significance for Fish and Fish Habitat .....	8-100
Table 8.15.1-1: Predicted Residual Adverse Effects on Wetlands and Vegetation .....	8-102
Table 8.15.2.1-1: Levels of Magnitude for Adverse Effects on Wetlands and Vegetation.....	8-102
Table 8.15.2.2-1: Levels of Geographic Extent for Adverse Effects on Wetlands and Vegetation.....	8-102
Table 8.15.2.3-1: Levels of Timing for Adverse Effects on Wetlands and Vegetation .....	8-103





**LIST OF TABLES (continued)**

	<b>PAGE</b>
Table 8.14.2.4-1: Levels of Duration for Adverse Effects on Wetlands and Vegetation .....	8-103
Table 8.15.2.5-1: Levels of Frequency for Adverse Effects on Wetlands and Vegetation.....	8-105
Table 8.15.2.6-1: Levels of Reversibility for Adverse Effects on Wetlands and Vegetation.....	8-105
Table 8.15.2.7-1: Determination of Significance for Wetlands and Vegetation .....	8-106
Table 8.16.1-1: Summary of Residual Land and Resource Use Effects .....	8-108
Table 8.18.1-1: Summary of Residual Economic Effects.....	8-128
Table 8.21.1-1: Summary of Residual Aboriginal Peoples Effects.....	8-136
Table 10.0-1: Commitments for the Project.....	10-1
Table 11.0-1: Benefits to Canadians .....	11-1
Table 12.22-1: Cross Reference of EMPs to Project Disciplines .....	12-23
Table 13.10.2-1: Location and Type of Groundwater Quality Monitoring .....	13-7
Table 13.22-1: Summary of the EA Monitoring Programs .....	13-22
Table 14.0-1: Disciplines and VCs used in the Revised EIS Assessment.....	14-2
Table 14.0-2: Summary of Predicted Effects in Revised EIS.....	14-4
Table 14.0-3: Summary of Cumulative Effects in Revised EIS .....	14-8
Table 14.0-4: Summary of the Determination of Significance in Revised EIS.....	14-15



## LIST OF FIGURES

	<b>PAGE</b>
Figure 1.1.1-1: Corporate Management Structure .....	1-3
Figure 1.2.1-1: Location of the Goliath Gold Project (Regional Scale) .....	1-8
Figure 1.2.1-2: Location of the Goliath Gold Project (Local Scale) .....	1-9
Figure 1.2.1-3: Treaty Areas – Regional Scale .....	1-10
Figure 1.2.1-4: Indigenous Communities .....	1-11
Figure 1.2.3-1: Claims and Dispositions Goliath Gold Project.....	1-13
Figure 2.3.6.1-1: Location of Tailings Storage Facility Candidate Alternatives.....	2-27
Figure 2.3.6.1-2: Location of Minewater Pond Candidate Alternatives.....	2-28
Figure 2.3.6.1-3: Alternative A Configuration.....	2-31
Figure 2.3.6.1-4: Alternative B Configuration.....	2-32
Figure 2.3.6.1-5: Alternative C Configuration.....	2-33
Figure 2.3.6.1-6: Alternative D Configuration.....	2-34
Figure 2.3.10-1: Plant and Ancillary Infrastructure Alternatives .....	2-66
Figure 3.0-1A: General Arrangement Operations Phase.....	3-2
Figure 3.0-1B: General Arrangement Operations Phase (Plant Site Details) .....	3-3
Figure 3.0-1C: General Arrangement Operations Phase (Administration Area).....	3-4
Figure 3.0-1D: General Arrangement of Project Post-Closure Phase.....	3-5
Figure 3.1-1: Project Office.....	3-6
Figure 3.1.1-1: Existing Infrastructure.....	3-7
Figure 3.2-1: Goliath Gold Project Phases and Schedule .....	3-9
Figure 3.3.1-1: Aerial View of Proposed Open Pit .....	3-14
Figure 3.4-1: Projected Longitudinal Section .....	3-17
Figure 3.4-2: Plan View at 50EL.....	3-18
Figure 3.5.1-1: Ultimate Open Pit, Waste Rock, Overburden, and Low-Grade Ore Stockpiles.....	3-21
Figure 3.5.1-2: Plan View Goliath Ultimate Pit with Inpit Waste Rock Dumps.....	3-22
Figure 3.6-1: Aerial View of the Proposed Processing Plant Location .....	3-24
Figure 3.6.6-1: Overall Process Plant Preferred Option, Process Flow Diagram .....	3-30
Figure 3.7-1: Aerial View of Proposed Tailings Storage Facility Location .....	3-35
Figure 3.7.1-1: Location 1 Stage-Storage Curve .....	3-37
Figure 3.7.1-2: Location 1 Embankment Staging.....	3-38
Figure 3.7.2-1: Location 1, Stage 1 Plan .....	3-40
Figure 3.7.2-2: Location 1, Stage 4 Plan .....	3-41
Figure 3.7.2-3: Location 1 Potential Cross Section.....	3-42
Figure 3.7.2.1-1: Conceptual Seepage/Runoff Collection Ditches .....	3-44
Figure 3.7.2.1-2: Conceptual Seepage/Runoff Collection Ditches .....	3-45
Figure 3.8.3-1: Tree Nursery Irrigation Ponds for Water Intake .....	3-55
Figure 3.8.6-1: Conceptual Water Balance Flow Diagram .....	3-61
Figure 3.11-1: Access Roads, Pipelines, and Water Management Infrastructure .....	3-9
Figure 3.12-1: Plant Power Supply and Power Distribution .....	3-11
Figure 3.12-2: Power Line Infrastructure .....	3-12



**LIST OF FIGURES (continued)**

	<b>PAGE</b>
Figure 5.2.1-1: Air Quality Local Study Area.....	5-4
Figure 5.2.3-1: Regional Air Quality Monitoring Stations .....	5-7
Figure 5.3.1.1-1: Baseline Noise and Light Monitoring Stations.....	5-10
Figure 5.4.2-1: Regional Geology.....	5-15
Figure 5.4.2.3-1: Bedrock Geology.....	5-18
Figure 5.4.2.3-2: Cross-sectional View of the Eastern High-Grade Shoot within the Main Zone .....	5-20
Figure 5.5.1-1: Regional Landforms .....	5-29
Figure 5.5.2-1: Soil Sampling Test Pit Location and Local Soil Classification .....	5-31
Figure 5.5.2-2: Project Site Overburden Geology and Soil Profile Location .....	5-32
Figure 5.5.2-3: Southwest to Northeast Cross-Section through Overburden (a) Southeast of Proposed Open Pit .....	5-33
Figure 5.5.2-4: Southwest to Northeast Cross-Section through Overburden (a) Northwest of Proposed Open Pit .....	5-34
Figure 5.6.1-1: Hydrogeological Model Domain and Boundary Conditions .....	5-42
Figure 5.6.2.1-1: Groundwater Level Contours.....	5-44
Figure 5.6.4-1: Private Water Wells and Surface Water Features .....	5-54
Figure 5.7-1: Hydrographic Network in the Goliath Gold Project Area .....	5-56
Figure 5.7-2: Hydrostation and Barometer Locations.....	5-58
Figure 5.8.1-1: Surface Water Quality Sampling Locations .....	5-60
Figure 5.8.2-1: Sediment Sampling Location.....	5-68
Figure 5.8.3-1: Benthic Invertebrate Sampling Locations .....	5-73
Figure 5.8.4-1: Local Study Area (LSA) and Regional Study Area (RSA) for Fish and Fish Habitat.....	5-76
Figure 5.8.4.1-1: Locations of Known and Potential Lake Trout and/or Lake Whitefish Spawning Habitat in Bays at East End of Thunder Lake.....	5-78
Figure 5.8.4.1-2: Fish Habitat Characterization for Hoffstrom’s Bay, Thunder Lake.....	5-80
Figure 5.8.4.2-1: Potential Muskellunge and Northern Pike spawning habitat in and adjacent to Keplyn’s Bay, Lake Wabigoon.....	5-83
Figure 5.8.4.2-2: Fish Habitat Features in Keplyn’s Bay, Lake Wabigoon .....	5-84
Figure 5.8.4.3-1: Surficial Geology and Watercourses in the Local Study Area .....	5-85
Figure 5.9.2.1-1: Ecosites of the RSA and LSA.....	5-96
Figure 5.9.2.2-1: Forest Working Groups of the RSA and LSA.....	5-97
Figure 5.9.3.2-1: Assessed Wetlands within the Goliath Gold Project Area .....	5-99
Figure 5.12.5.1-1: Country Foods (Regional) .....	5-127
Figure 5.12.5.1-2: Country Foods (Local).....	5-128
Figure 6.1.4.1-1: General LSA and RSA .....	6-60
Figure 6.1.4.4-1: Noise LSA .....	6-62
Figure 6.1.4.4-2: Location of Sensitive Noise Receptors .....	6-64
Figure 6.1.4.4-3: Noise RSA .....	6-65
Figure 6.1.4.5-1: Location of Light Receptors and the Light LSA.....	6-67



**LIST OF FIGURES (continued)**

	<b>PAGE</b>
Figure 6.1.4.6-1: Air Quality LSA.....	6-68
Figure 6.1.4.6-2: Location of Sensitive Air Receptors.....	6-69
Figure 6.1.4.6-3: Air Quality RSA .....	6-71
Figure 6.1.4.8-1: Surface Water Quality RSA and LSA.....	6-74
Figure 6.1.4.8-2: Surface Water Quality Modelling Nodes .....	6-75
Figure 6.1.4.9-1: Surface Water Quantity Study Areas .....	6-77
Figure 6.1.4.9-2: Surface Water Quantity Modelling Nodes.....	6-78
Figure 6.1.4.10-1: Effects Assessment LSA and RSA for Hydrogeology .....	6-80
Figure 6.1.4.11-1: Private Water Wells within the Hydrogeological LSA .....	6-81
Figure 6.1.4.12-1: Wildlife and Wildlife Habitat Study Areas.....	6-83
Figure 6.1.4.14-1: Fish and Fish Habitat Study Areas .....	6-85
Figure 6.1.4.16 1: Land and Resource Use (Terrestrial) Study Area .....	6-87
Figure 6.1.4.16-2: Land and Resource Use (Aquatic) Study Area .....	6-88
Figure 6.1.4.17-1: Socio-economic Study Area .....	6-89
Figure 6.1.4.20-1: Heritage Resources Local Study Area (LSA).....	6-92
Figure 6.2.1-1: Terrain and Soils Linkage Diagram .....	6-101
Figure 6.2.4.1-1: Cross Section from South Hoffstrom’s Bay, Showing Relative Height of WRSA .....	6-105
Figure 6.2.4.1-2: Cross Section from North of Hoffstrom’s Bay, Showing Relative Height of WRSA .....	6-106
Figure 6.2.6-1: Spatial Extent of Effects for Terrain and Soils.....	6-110
Figure 6.3.1-1: Geology and Geochemistry Linkage Diagram .....	6-113
Figure 6.4.1-1: Noise Linkage Diagram .....	6-129
Figure 6.4.4.1-1: Predicted 50 dBA Contour, Site Preparation and Construction.....	6-133
Figure 6.4.4.2-1: Predicted 50 dBA Contour, Operations.....	6-136
Figure 6.4.4.3-1: Predicted 50 dBA Contour, Closure.....	6-138
Figure 6.4.6-1: Spatial Extents of Predicted Noise Effects.....	6-142
Figure 6.5.1-1: Light Linkage Diagram .....	6-145
Figure 6.5.2-1: Process Plant and Mine Infrastructure, Lighting Plan .....	6-148
Figure 6.5.4-1: Process Plant and Infrastructure, Lux Plot.....	6-152
Figure 6.5.4-2: Process Plant and Infrastructure, Rendered Plan View .....	6-153
Figure 6.5.6-1: Spatial Extent of Residual Light Effects .....	6-157
Figure 6.6.1-1: Air Quality Linkage Diagram.....	6-160
Figure 6.6.2.2-1: Modelled Source Configuration, Operations .....	6-167
Figure 6.6.2.2-2: Wind Rose for Dispersion Meteorological Data .....	6-168
Figure 6.6.6-1: Spatial Distribution of residual Air Quality Effects .....	6-176
Figure 6.7.1-1: Climate Linkage Diagram .....	6-180
Figure 6.8.1-1: Surface Water Quality Linkage Diagram.....	6-194
Figure 6.8.2.1-1: Locations of Background Water Quality Sampling Locations.....	6-196
Figure 6.8.2.2-1: Locations of Water Quality Modelling Node .....	6-198
Figure 6.8.2.2-2: Surface Water Quality Model Schematic, Existing Conditions .....	6-199



**LIST OF FIGURES (continued)**

	<b>PAGE</b>
Figure 6.8.2.4-2: Surface Water Quality Model Operations Phase .....	6-202
Figure 6.8.2.6-1: Surface Water Quality Model Post-Closure Phase .....	6-208
Figure 6.9.1-1: Surface Water Quantity Linkage Diagram .....	6-233
Figure 6.9.2.3-1: Overlay of Project on Local Watersheds.....	6-237
Figure 6.9.2.5-1: Post-closure Watersheds and Land Use .....	6-239
Figure 6.9.6-1: Spatial Extent Surface Water Quantity Effects.....	6-260
Figure 6.10.1-1: Groundwater Quality Linkage Diagram.....	6-263
Figure 6.11.1-1: Groundwater Quantity Linkage Diagram.....	6-270
Figure 6.11.4.2-1: Predicted Groundwater Drawdown during Operations.....	6-277
Figure 6.12.1-1: Wildlife and Wildlife Habitat Linkage Diagram .....	6-286
Figure 6.12.1-2: Wildlife and Wildlife Habitat Linkage Diagram (continued).....	6-287
Figure 6.12.6-1: Spatial Extent Wildlife and Wildlife Habitat Effects .....	6-307
Figure 6.13.1-1: Migratory Birds Linkage Diagram .....	6-311
Figure 6.13.6-1: Spatial Extent Migratory Birds Effects .....	6-318
Figure 6.14.1-1: Fish and Fish Habitat Linkage Diagram.....	6-323
Figure 6.14.6-1: Spatial Extent Migratory Birds Effects .....	6-337
Figure 6.15.1-1: Wetlands and Vegetation Linkage Diagram.....	6-340
Figure 6.15.6-1: Spatial Extent of Wetland Effects .....	6-347
Figure 6.15.6-2: Spatial Extent of Vegetation Effects .....	6-348
Figure 6.16.1-1: Land and Resource Use Linkage Diagram .....	6-353
Figure 6.16.1-2: Land and Resource Use Linkage Diagram (continued) .....	6-354
Figure 6.16.6-1: Spatial Extent for Residual Effects on Harvesting.....	6-368
Figure 6.17.1-1: Social Linkage Diagram .....	6-377
Figure 6.18.1-1: Economic Linkage Diagram.....	6-391
Figure 6.19.1-1: Human Health Linkage Diagram.....	6-413
Figure 6.19.1-2: Conceptual Risk Model for Operations .....	6-416
Figure 6.19.1-3: Conceptual Risk Model for Post-closure.....	6-417
Figure 6.20.1-1: Heritage Resources Linkage Diagram .....	6-438
Figure 6.21.1-1: Aboriginal Peoples Linkage Diagram.....	6-444
Figure 6.21.6-1: Spatial Extent for Aboriginal Peoples Traditional Land Use .....	6-457
Figure 7.2.5-1: Future Projects Considered in the Cumulative Effects Assessment.....	7-13
Figure 8.1.8-1: Decision Tree for Determining Significance.....	8-35
Figure 13.8.2-1: Proposed Surface Water Sampling Locations .....	13-1
Figure 13.10.2-1: Proposed Groundwater Monitoring Network.....	13-6



## ACKNOWLEDGEMENTS

This document was prepared by Treasury Metals Inc. with the assistance of Amec Foster Wheeler (Amec Foster Wheeler). Document sections were authored as follows:

No.	EIS Section	Primary Author
1.0	Introduction and Project Overview	Treasury Metals / Amec Foster Wheeler
2.0	Assessment of Alternatives	Treasury Metals / Amec Foster Wheeler
3.0	Project Description	Treasury Metals / Amec Foster Wheeler
4.0	Accidents and Malfunctions	Treasury Metals
5.0	Existing Environment	Treasury Metals
6.0	Description of Project Effects	Amec Foster Wheeler
7.0	Cumulative Effects	Amec Foster Wheeler
8.0	Determination of Significance of Residual Effects	Amec Foster Wheeler
9.0	Aboriginal and Public Engagement	Treasury Metals
10.0	Summary of Commitments	Treasury Metals / Amec Foster Wheeler
11.0	Benefits to Canadians	Treasury Metals / Amec Foster Wheeler
12.0	Environmental Management Plans	Amec Foster Wheeler
13.0	Environmental Monitoring Program	Amec Foster Wheeler
14.0	Conclusions	Amec Foster Wheeler
15.0	References	Treasury / Amec Foster Wheeler

Technical studies and the resulting supporting documents appended to the revised EIS were conducted and prepared by the following:

Appendix		Primary Author
Appendix B	Optimization Study	Lycopodium Minerals Canada Ltd.
Appendix C	Mining Study	P&E Mining Consultants Inc.
Appendix D-1	Tailings Storage Facility	WSP
Appendix D-2	Multiple Account Analysis	Amec Foster Wheeler
Appendix E	Traffic Study	Keewatin-Aski Ltd.
Appendix F	Conceptual Water Balance	WSP
Appendix H	Acoustic Environment	RWDI Air Inc.
Appendix I	Light Environment	RWDI Air Inc.
Appendix J	Air Quality	RWDI Air Inc.
Appendix K	Geochemistry	EcoMetrix Incorporated
Appendix M	Hydrogeology	Amec Foster Wheeler
Appendix N	Surface Hydrology	DST Consulting Engineers Inc.
Appendix P	Aquatics Baseline Study	DST Consulting Engineers Inc.
Appendix Q	Summary Fisheries Baseline Report (2011–2016)	KBM Resource Group
Appendix R	Summary Wildlife Baseline Report (2011–2016)	KBM Resource Group





Appendix		Primary Author
Appendix S	Wetlands Baseline Study (2016)	KBM Resource Group
Appendix T	Socio-economic Baseline	GCK Consulting
Appendix U	Heritage Resources	Boreal Heritage Consulting
Appendix V	Public Engagement	Treasury Metals
Appendix W	Screening Level Risk Assessment	Tetra Tech Inc.
Appendix X	Alternatives Matrices	Tetra Tech Inc.
Appendix BB	Preliminary Economic Assessment	A.C.A. Howe International Limited
Appendix DD	Aboriginal Engagement Report	Treasury Metals
Appendix EE	Country Foods Assessment	Treasury Metals
Appendix GG	Tailings Storage Facility Failure Modeling	Tetra Tech WEI Inc.
Appendix HH	Failure Modes and Effects Analysis	Tetra Tech Inc.
Appendix II	Fisheries Compensation Strategy and Plans	Treasury Metals
Appendix JJ	Water Report	Amec Foster Wheeler

In addition to the studies appended to the revised EIS, The following technical studies were commissioned by Treasury Metals to support the early phases of the EA process, and had been appended to the original EIS:

Appendix	Primary Author
Environmental Baseline Study	KBM Resource Group
Geochemical Modeling	Tetra Tech WEI Inc.
Hydrogeology Modelling	Tetra Tech WEI Inc.



## GLOSSARY

Acid Rock Drainage	The acidic water that is created when sulphide minerals are exposed to air and water and produce sulphuric acid
AARL Method	Anglo American Research Laboratory Method of Carbon elution for metallurgical gold recovery
Alienation	An area of Crown land that has been withdrawn from staking or other use for surface rights, mining rights or both under various legislative authorities
Aggregate	Crushed rock or gravel screen to sizes for uses in road surfaces, concrete, and construction mixes
Anthropogenic	Generated by humans
Baseline	Conditions that would prevail if no actions were taken
Baseline Conditions	Pre-project environmental conditions
Bedrock	Solid rock that underlies loose material such as soil, sand, clay, or gravel
Bench	Horizontal surface which is used to provide an area from which the Open Pit machinery can dig down to the subsequent level
Berm	A constructed shelf that breaks the continuity of a slope, or artificial ridge of earth, with the purpose of reducing erosion, or to increase the thickness of the embankment at a point of change in a slope or defined water surface elevation, or to direct surface water runoff
Blanket Drain	Drainage method using a horizontally placed layer (blanket) of permeable material to allow for the drainage of water
Canadian Council of Ministers of the Environment (CCME)	A council made up of environmental ministers from provincial and federal levels of government that proposes nationally consistent environmental standards and objectives to achieve high levels of environmental quality for waste management, air pollution, and toxic chemicals across Canada



Canadian Environmental Assessment Act, 2012	Federal legislation respecting the environmental assessment of certain activities and the prevention of significant adverse environmental effects. Catchment Area – The area of land which drains into a body of water
Carcinogen	A substance directly involved in the promotion of cancer
Chemical of Potential Concern	Project-related chemicals, elements and compounds that have the potential to elicit adverse human or ecological health effects
Claims to Lease	Process of converting a mining claim into a lease. A mining claim grants its owner the exclusive rights to explore for minerals on a designated piece of land. The owner of a mining claim is not granted title or ownership to the land and cannot extract or sell any resources removed from the land. A mining claim can be converted into a lease. A lease grants its owner title and ownership to the land, permits the extracting and sale of extracted resources and removes the requirement to perform yearly assessment work.
Collection System	A series of constructed and maintained connected ditches and ponds that collect surface runoff and groundwater seepage that has come in contact with Project components
Crown Land	Land belonging to the province of Ontario. It does not include: (a) land, the surface rights, mining rights or the mining and surface rights of which are under lease or licence of occupation from the Crown; (b) land in the actual use or occupation of the Crown, the Crown in right of Canada, or of a department of the Government of Canada or a ministry of the Government of Ontario; (c) land the use of which is withdrawn or set apart or appropriated for a public purpose; or (d) land held by a ministry of the Government of Ontario (“terre de la Couronne”)
Crown Timber	Timber on public lands or timber that is the property of the Crown under the management of the Minister of Natural Resources on lands other than public lands
Crusher	A machine used to break down aggregate into smaller pieces



Cumulative Effects	The environment effects that are likely to result from a project in combination with other physical activities that have or will be carried out
Cyanidation	The addition of cyanide to the ground slurry consisting of mineralized rock material and water which forms a water soluble complex of gold
Cyanide Detoxification	The process of removing cyanide from tailings using a sulphur dioxide/air oxidation process
Coagulant	An agent added to induce a process of contact and adhesion whereby the particles of a dispersion form larger-size clusters
Decibel (dB)	A logarithmic measure of any measured physical quantity and commonly used in the measurement of sound
Dewatering	To remove groundwater or surface water from an area for construction purposes.
Doré	A semi-pure alloy of gold and silver created at the mine site and then transported to a refinery for further purification
Drawdown	The drop in the water table or level of water in the ground when water is being pumped
Drive	An underground tunnel or development drift created for access to the underground mining areas
Effluent	Partially or completely treated wastewater flowing out of a treatment facility
Electrowinning	The process in which a current is passed from an inert anode through a liquid solution containing the metal so that the metal is extracted as it is deposited onto the cathode
Flocculation	A process of contact and adhesion whereby the particles of dispersion form larger-size clusters
Grubbing	The removal and disposal of stumps and roots remaining after vegetation clearing



Hazard	A substance or other condition which that has the potential to cause harm to human, ecological or environmental receptors
Hazard Potential Classification (HPC)	A classification system defined by Ontario's Ministry of Natural Resources and Forestry that is used to determine the potential for flooding of dams
Illuminance	The total luminous flux (the perceived power of light) incident on a surface per unit area
Lowest Effect Level (LEL)	Indicating a level of sediment contamination that can be tolerated by the majority of benthic organisms
Luminance	Luminance is the luminous intensity (i.e., the power of light energy emitted) per unit area projected in a given direction. Luminance is measured in candela per square metre ( $\text{cd}/\text{m}^2$ ).
Lux	The unit of measure for light incidence either in or outside the facility is a lux. A lux is equal to 1 lumen per square metre ( $\text{lumen}/\text{m}^2$ ) where a lumen is a measure of total quantity of visible light emitted by a source, weighted according to the human eye.
Mineralization	The process by which minerals of interest are geographically or organically formed
Mining Claim	A parcel of land, including land under water, that has been staked and recorded in accordance with the Mining Act, 1990 and the regulations
Mining Rights	The rights to minerals located in, on or under the land. Also referred to as mineral rights
Mitigation Measures	Measures taken to reduce, eliminate, or control effects on the environment
Monitoring	Periodic or continuous surveillance or testing to determine the characteristics of a substance or the level of compliance with statutory requirements and/or pollutant levels in various media or in humans, plants, and animals



Ore	Rock or earth containing workable quantities of a mineral or minerals of commercial value
Overburden	Soil or other consolidated materials overlying bedrock
Phreatic	The uppermost level at which the groundwater can be found
Preg robbing	The absorption by carbonaceous components which preferentially absorbs gold and gold-cyanide complexes
Point of Impingement (POI)	A defined point or points set at a defined distance from a facility (usually between the facility and special community receptors) at which a specific limit for air pollutants must be met
Potable water	Water suitable for drinking
Portal	Ramp entrance to the underground from surface
Progressive Rehabilitation	Rehabilitation done continually and sequentially during the entire period that a project or mine hazard exists
Provincial Water Quality Objectives (PWQO)	Document published by the Ontario Ministry of Environment and Energy that establishes permitted levels of contaminants/ parameters in water in order to protect aquatic life and recreation
Jumbo	Drilling machine typically used for the development (drilling and blasting) of underground tunnels and infrastructure
Runoff	The portion of precipitation or melt water that flows over the soil making its way to surface water supplies
SAG mill	Semi Autogenous Mill that uses steel balls and the rock itself turned inside a cylinder to crush the rock to a finer particle size
Seepage	The slow movement of water through soil or rock
Severe Effect Level (SEL)	Indicating the level at which pronounced disturbance of the sediment dwelling community can be expected. This is the sediment concentration of a compound that would be detrimental to the majority of benthic species





Sky Glow	Refers to the illumination of the sky and/or clouds by light sources on the surface of the earth such as street lighting
Spillway	A gated or ungated hydraulic structure used to discharge water from a reservoir. An emergency spillway is a spillway that is designed to provide additional protection against overtopping of dams and is intended for use under extreme flood conditions or malfunction of the service spillway.
Surface Rights	Every right to land other than the mining rights
Spigotting	The placement or deposition of tailings material using the end of the pipe from the top of the tailings embankment
Tailings	Crushed or ground rock and process effluents that are generated in a mine processing plant
Thermostatically	Method of control using a thermostat to regulate airflow and temperature
Total Suspended Particulate (TSP)	Airborne particles that are less than 100 micrometres in size. They are used as a parameter to assess air quality
Total Suspended Solids (TSS)	Solid materials, including organic and inorganic, that are suspended in the water. They are used as a parameter to assess water quality.
Watercourse	Any flowing water including rivers, streams and overland flow paths
Watershed	A catchment basin or area including all of the land that is drained by a watercourse and its tributaries. Watershed boundaries are defined by heights of land. Boundaries are set where a height of land causes water to flow away from the watercourse.
Wildlife Management Unit (WMU)	An area identified by the Ontario Ministry of Natural Resources and Forestry that designates customized hunting regulations. There are 95 WMUs in Ontario.
Zone of Influence	The area of land within or adjacent to a construction site that potentially may be affected by vibrations emanating from a construction activity where the peak particle velocity measured at the point of reception is equal to or greater than 5 mm/sec at any frequency



## ACRONYMS, ABBREVIATIONS AND SYMBOLS

%	Percentage
#	Number
AARL	Anglo American Research Laboratories
ABA	Acid-base accounting
ABBO	Atlas of Breeding Birds in Ontario
AES	Atmospheric Environment Service
Ag	Silver
Al	Aluminum
ALS	ALS Laboratories
a.m.	Ante meridiem
AM	Amphibian station
ANFO	Ammonium nitrate/fuel oil
AP	Acid potential
Apr	April
ARD	Acid rock drainage
As	Arsenic
Au	Gold
Aug	August
Avg	Average
B	Boron
Ba	Barium
BACI	Before/after, control/impact



BBS	Breeding Bird Survey
BC	Sediment sampling site BC
Be	Beryllium
Bi	Bismuth
BMS	Biotite muscovite schist
Bq/L	Becquerel per litre
Br	Bromine
BS	Basal sand
BS	Biotite schist
°C	Degrees celsius
Ca	Calcium
CA	Catchment area
CAAQS	Canadian Ambient Air Quality Standards
CaCO <sub>3</sub>	Calcium carbonate
CaCO <sub>3</sub> NP	Calcium carbonate neutralization potential
Carb-NP	Carbonate neutralization potential
CBC	Christmas Bird Count
CCL	Cumming Cockburn Limited
CCME	Canadian Council of Ministers of the Environment
CCD	Counter Current Decantation
CCTV	Closed caption television
Cd	Cadmium
CDA	Canadian Dam Association



Ce	Cerium
CEC	Cation exchange capacity
CEAA	Canadian Environmental Assessment Agency
CIP	Carbon-in-pulp
CIL	Carbon-in-leach
Cl	Chloride
cm	Centimetres
CN	Cyanide
Cn	Curve number
CNR	Canadian National Railway
Co	Cobalt
CO	Carbon monoxide
COA	Canada-Ontario Agreement
CofA	Certificate of Approval for Discharge from Industrial Sewage Works
COC	Contaminants of concern
COPC	Constituents of potential concern
COSSARO	Committee on the Status of Species at Risk in Ontario
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
Cr	Chromium
Cs	Caesium
Cu	Copper
CVAAS	Cold vapour atomic absorption spectrophotometry
CWQG	Canadian Water Quality Guidelines



Cyanide-WAD	Weak acid dissociable cyanide
D	Simpson's Diversity Index
DCBC	Dryden Christmas Bird Count
dBA	Decibel (A-weighted)
DDC	Dryden Development Corporation
Dec	December
DEM	Digital elevation model
DFMC	Dryden Forest Management Company
DFO	Department of Fisheries and Oceans Canada
DO	Dissolved oxygen
dtpd	Dry tonnes per day
Dup	Duplicate sample
E	Endangered
EA	Environmental assessment
EAQA	Environmental air quality assessment
EC	Environment Canada
ECA	Environmental Compliance Approval
EDS	Environmental design storm
EEM	Environmental Effects Monitoring
e.g.	Example gratia
EIS	Environmental impact statement
EI	Elevation
ELC	Ecological Land Classification
EMP	Environmental management plan



EPA	Ontario Environmental Protection Act
EPP	Environmental preparedness plan
EPT	Ephemeroptera, Plecoptera and Trichoptera
ES	Ecosite
ESA	Environmental site assessment
Eu	Europium
FBMP	Forest Bird Monitoring Program
FDP	Final discharge point
Fe	Iron
Feb	February
FEL	Front-end loader
FL	Fork length
FLT	Fault zone
FMP	Forest management plan
FMU	Forest Management Unit
FMZ	Ontario Fisheries Management Zone
FoS	Factor of safety
FRI	Forest Resources Inventory
g	Gram
Ga	Gallium
GARD	Global acid rock drainage
GDE	Groundwater dependent ecosystems
GDP	Gross domestic product





Ge	Germanium
GHG	Greenhouse Gases
Goliath Gold Project	The Project
Gov	Government
H	Hydrogen
ha	Hectare
HCl	Hydrochloric acid
HCN	Hydrogen cyanide
HCT	Humidity cell tests
HDPE	High density polyethylene
Hf	Hafnium
Hg	Mercury
HMANA	Hawk Migration Association of North America
HPC	Hazard potential classification
HQ	Hazard quotient
Hr	Hour
HVAC	Heating, ventilation and air condition
HWR	Hanging wall rocks
Hwy	Highway
ICP-MS	Inductively coupled plasma mass spectroscopy
ID	Identification
IDF	Inflow design flood
IES	Illuminating Engineering Society
IESO	Independent electrical services operator



ILR	Intensive leach reactor
In	Indium
INAP	International Network for Acid Prevention
I/O	Input/output
IPWQO	Interim Provincial Water Quality Objectives
Ir	Iridium
Jan	January
JCTa	Sediment sampling site JCTa
K	Potassium
KCB	Klohn Crippen Berger
Kg	Kilogram
kHz	Kilohertz
Km	Kilometre
km/h	Kilometres per hour
km <sup>2</sup>	Square kilometre
kV	Kilovolt
kW	Kilowatt
L	Litre
La	Lanthanum
Lat	Latitude
lb	Pound
LEED	Leadership in Energy and Environmental Design
LEL	Low effect level
LHD	Load haul dump vehicles



LGO	Low-grade ore
Li	Lithium
Long.	Longitude
L/s	Litres per second
LSA	Local Study Area
Lu	Lutetium
LHD	Load haul dump
LWD	Large woody debris
m	Metre
M	Molar
m <sup>2</sup>	Square metre
m <sup>3</sup>	Cubic metre
m <sup>3</sup> /d	Cubic metres per day
m <sup>3</sup> /h	Cubic metres per hour
m <sup>3</sup> /s	Cubic metres per second
m/s	Metres per second
Mar	March
masl	Metres above sea level
Max	Maximum
mbg	Metres below grade
MCC	Motor control centers
MD	Mafic dyke
MDL	Method detection limit



MED	Median
MEND	Mine Environmental Neutral Drainage
meq/100g	Milliequivalents per 100 grams
mg	Milligrams
Mg	Magnesium
mg/kg	Milligrams per kilogram
mg/L	Milligrams per litre
min	Minutes
MISA	Municipal Industrial Strategy for Abatement
ML	Metal leaching
mm	Millimetre
MMER	Metal Mining Effluent Regulations
MMP	Marsh Monitoring Program
Mn	Manganese
MNDM	Ministry of Northern Development and Mines
Mo	Molybdenum
MOE	Ministry of the Environment
MOECC	Ministry of the Environment and Climate Change
MoELP	Ministry of Environment, Lands and Parks
MRA	Mine rock area
mS-NP	Modified Sobek Neutralization Potential
MSDS	Material Safety Data Sheet
MSED	Metasediments



MSS	Muscovite sericite schist
Mt	Megatonne
MTO	Ministry of Transportation
MTVOL	Metavolcanics
MZ	Main zone
N	North
Na	Sodium
NAAQO	National Ambient Air Quality Objectives
NAG	Non-acid generating
NaOH	Sodium hydroxide
NAR	Not at Risk
Nb	Niobium
Nd	Neodymium
NE	Northeast
NEL	No effect level
NG	Natural gas
NHIC	Natural Heritage Information Centre
NH4	Ammonium
Ni	Nickel
NMWL	Nominal molecular weight limit
NNP	Net neutralization potential
Nov	November
No	Number



NO <sub>2</sub>	Nitrogen dioxide
NO <sub>2</sub> <sup>-</sup>	Nitrite
NO <sub>3</sub>	Nitrate
NP	Neutralization potential
NPAG	Non-potentially acid generating
NPR	Neutralization potential ratio
NRCan	Natural Resources Canada
NTS	National Topographic System
NTU	Nephelometric Turbidity Unit
NW	Northwest
O <sub>2</sub>	Oxygen
OAAQC	Ontario Ambient Air Quality Criteria
OAHI	Ontario Aquatic Habitat Inventory
OB	Overburden
OBBA	Ontario Breeding Birds Atlas
OBM	Ontario Base Mapper
ODWS	Ontario Drinking Water Standards
OHSP	Occupational Health & Safety Plan
Oct	October
OH	Hydroxide
OIP	Ontario Institute of Pedology
OM	Organic matter
MNRF	Ontario Ministry of Natural Resources and Forestry





OMS	Operations, Maintenance and Surveillance
ON	Ontario
OOA	Ontario Odonata Atlas
OP	Ontario Parks
OPP	Ontario Provincial Police
OPSQG	Ontario Provincial Sediment Quality Guidelines
O.Reg	Ontario Regulation
OWES	Ontario Wetland Evaluation System
OWRA	Ontario Water Resources Act
P	Phosphorus
P <sub>5</sub>	5 <sup>th</sup> Percentile
P <sub>80</sub>	80 <sup>th</sup> Percentile
P <sub>95</sub>	95 <sup>th</sup> Percentile
PAG	Potentially acid generating
PAHs	Polycyclic Aromatic Hydrocarbons
Pb	Lead
PCS	Plant control system
PD	Project description
PM	Particulate matter
PM <sub>2.5</sub>	Particulate matter <2.5 microns
PM <sub>10</sub>	Particulate matter <10 microns
PP	Provincial Park
ppm	Parts per million



PPV	Peak particle velocity
psig	Pounds per square inch (gage)
PSQG	Provincial Sediment Quality Guidelines
PWQO	Provincial Water Quality Objectives
Q10,20,100 or 200 respectively	Peak flow expected to occur once every 10, 20, 100 or 200 years
QA	Quality Assurance
QBS	Quartz biotite schist
QC	Quality Control
QEG	Quartz eye gneiss
QP	Quartz porphyry
QSS	Quartz-sericite schist
R	Richness
Rb	Rubidium
REE	Rare Earth Element
RISC	Resources Inventory Standards Committee
RO	Reverse osmosis
ROI	Return on investment
ROM	Run of mill
RQD	Rock Quality Designation
RSA	Regional Study Area
S	Sulfur
S1,2,3	Three levels (1, 2, 3) of rarity
SAB	SAG and Ball Mill



SAG	Semi-Autogenous Grinding
SAR	Species at Risk
SARA	Species at Risk Act
SARO	Species at Risk in Ontario
Sb	Antimony
SBR	Shallow bedrock
Sc	Scandium
SC	Special Concern
SCWG	Soil Classification Working Group
SCS	Soil Conservation Service
S-del	Sulphur by mathematical difference
Se	Selenium
SEL	Severe Effect Level
Sept	September
SFE	Shake flask extraction
Si	Silicon
SLRA	Screening level risk assessment
Sm	Samarium
Sn	Tin
SNPR	Sulphide-sulphur based neutralization potential ratio values
SO <sub>2</sub>	Sulphur dioxide
SO <sub>4</sub>	Sulphate
SOM	Soil organic matter



Spp.	Species
Sr	Strontium
SR	Sound Recorder
SS	Surficial sand
STRAT	Stratigraphy
SW	Southwest
SW1,SW2, SW3	Surface Water Sampling Stations
SWD	Small woody debris
SWE	Snow water equivalent
T	Threatened
t/m <sup>3</sup>	Tonnes per cubic metre
Ta	Tantalum
TAC	Technical Advisory Committee
Tb	Terbium
T/D	Total and/or dissolved metal (oids)
TDS	Total Dissolved Solids
tc	Time of concentration
Te	Tellurium
Th	Thorium
Ti	Titanium
TIA	Tailings Impoundment Area
Tl	Thallium
TL1, TL1a, TL2, TL3	Sediment sampling sites



TMA	Tailings Management Area
TML	Transportable moisture limit
TML	Treasury Metals Incorporated
TMP	Tailings management plan
TOC	Total organic carbon
TOC-COMB	Total organic carbon, combined
TP	Test pit sites for soil sampling
tpd	Tonnes per day
TRV	Toxicity reference value
Trash	Unwanted material
TSF	Tailings storage facility
TSP	Total suspended particulates
TSS	Total suspended solids
U	Uranium
µg/g	Microgram per gram
µg/m <sup>3</sup>	Microgram per cubic metre
µm	Micrometre
UNESCO	United Nations Educational, Scientific and Cultural Organization
µs	Microsiemens
µs/cm	Microsiemens per centimetre
UTM	Universal Transverse Mercator
V	Vanadium
VC	Valued components



VESDA	Very early smoke detection alarm
VWP	Vibrating wire piezometer
W	Tungsten
WAD	Weak acid dissociable
WLON	Wabigoon Lake Ojibway Nation
WRA	Whole rock analyses
WRMA	Waste rock management area
WRSA	Waste rock storage area
WWIS	Water Well Information System
XRD	X-Ray diffraction
Yb	Ytterbium
YOY	Young of the year
Yr	Year
Zn	Zinc
ZOI	Zone of influence
Zr	Zirconium