
Table of Contents

EXECUTIVE SUMMARY	i
1.0 Introduction	1
1.1 Background	1
1.2 Project Overview	3
1.3 Identification of the Proponent	4
1.4 Project Purpose	4
1.5 Regulatory and Planning Context	5
2.0 Project Description	7
2.1 Construction and Commissioning	10
2.1.1 Dredging and Dewatering	10
2.1.2 Vessel Transportation	16
2.1.3 Construction of Confined Disposal Facilities	16
2.1.3.1 Land Reclamation	17
2.1.3.2 Dewatering	20
2.1.4 Site Preparation	20
2.1.5 Construction of Land Components	21
2.2 Project Operation	23
2.2.1 Marine Vessel Traffic	23
2.2.2 Loading and Unloading Vessels/Trains	24
2.2.3 Equipment and Material Storage	25
2.2.4 Maintenance/Repairs to Terminal	25
2.2.5 Maintenance Dredging	25
2.3 Decommissioning	25
2.4 Project Schedule	26
2.5 Effluent Discharges and Waste Management	26
2.5.1 Dewatering and Sediment Resuspension	26
2.5.2 Stormwater	27
2.5.3 Sanitary Sewer	27
2.5.4 Solid and Hazardous Waste	27
2.6 Hazardous Materials	28
2.7 Noise	28
2.8 Light Emissions	28
2.9 Air Emissions	29
2.10 Accidental Events/Contingency Planning	30
2.11 Project Costs and Employment	30
2.11.1 Expenditures	30
2.11.2 Employment	31
2.12 Environmental Management Design and Features	31
2.12.1 Key Environmental Design Features	31
2.12.2 Environmental Management Planning	32
3.0 Public Engagement Program	34
3.1 Overview of Consultation/Engagement Plan	34
3.2 Summary of Public Engagement Activities	34
3.2.1 Public Consultation	34
3.2.2 Stakeholder Consultation	37
3.2.3 Aboriginal Engagement	38



3.3	Summary of Key Issues	39
3.4	Ongoing Engagement Activities	40
4.0	Overview of the Environment	41
4.1	Topography and Structural Geology	41
4.1.1	Physiographic.....	41
4.1.2	Surficial Geology	41
4.1.3	Bedrock Geology.....	43
4.1.4	Acid Rock Drainage Potential	43
4.2	Hydrogeology	44
4.2.1	Peat.....	46
4.2.2	Glacial Till.....	46
4.2.3	Mabou Group (undivided)	46
4.2.4	Windsor Group	46
4.2.5	Freshwater Resources	47
4.2.6	Water Supply.....	47
4.3	Climate	48
4.3.1	Temperature Normals and Extremes	49
4.3.2	Precipitation Normals and Extremes.....	49
4.3.3	Adverse Weather	50
4.4	Ambient Air Quality	51
4.5	Acoustic Environment	53
4.6	Physical Oceanographic	54
4.6.1	Oceanographic Overview	54
4.6.2	Data Sources	55
4.6.3	Bathymetry	55
4.6.4	Hydrography and Freshwater Inflows	55
4.6.5	Water Levels	56
4.6.6	Currents	56
4.6.7	Winds	57
4.6.8	Waves	57
4.6.9	Sediments	57
4.7	Benthic Communities and Sediment Quality	58
4.7.1	Geophysical Qualities of Sydney Harbour Sediment	59
4.7.2	Chemical Qualities of Sydney Harbour Sediment	60
4.7.3	Biology of Sydney Harbour Sediments	62
4.7.4	Summary of Sydney Harbour Benthic Community and Sediment Quality	65
4.8	Marine Fish and Water Quality Existing Conditions	65
4.8.1	Marine Fish	65
4.8.2	Marine Water Quality	69
4.9	Terrestrial Habitats and Wildlife	70
4.9.1	Terrestrial Habitats.....	70
4.9.2	Wetlands	71
4.9.3	Vegetation	76
4.9.4	Wildlife.....	77
4.10	Archeological and Heritage Resources	78
4.11	Vessel Navigation	79
4.12	Commercial Fisheries	84
4.13	Land Use.....	87
4.13.1	Project Site Description.....	87



4.13.2	Municipal Planning Strategy	87
4.13.3	Land Use Bylaw	90
4.13.4	Surrounding Uses	92
4.14	Marine Mammals and Marine-Related Birds.....	94
4.14.1	Marine Mammals.....	94
4.14.2	Marine-Related Birds	97
5.0	Effects Assessment Methods	101
5.1	Scope of the Assessment	101
5.2	Issues Scoping and Selection of Valued Environmental Components.....	103
5.3	Overview of Approach.....	106
5.3.1	VEC Selection	107
5.3.2	Environmental Assessment Boundaries	107
5.3.2.1	Spatial and Temporal.....	107
5.3.2.2	Administrative and Technical	107
5.3.3	Residual Environmental Effects Evaluation Criteria.....	108
5.3.4	Potential Interactions, Issues and Concerns.....	108
5.3.5	Analysis, Mitigation and Environmental Effects Prediction.....	109
5.3.6	Follow-up and Monitoring.....	109
5.3.7	Summary of Residual Environmental Effects Prediction	109
5.4	Cumulative Effects Assessment.....	110
5.5	Assessment of Potential Accidents, Malfunctions and Unplanned Events.....	113
6.0	Environmental Effects Assessment	114
6.1	Benthic Habitat Communities and Sediment Quality	114
6.1.1	Environmental Assessment Boundaries	114
6.1.2	Residual Environmental Effects Evaluation Criteria.....	115
6.1.3	Potential Interactions, Issues and Concerns.....	115
6.1.4	Analysis, Mitigation and Residual Environmental Effects Prediction	119
6.1.4.1	Construction and Commissioning	119
6.1.4.2	Operation	125
6.1.5	Follow-up and Monitoring.....	126
6.1.6	Summary of Residual Environmental Effects Prediction.....	126
6.2	Marine Fish and Water Quality.....	127
6.2.1	Environmental Assessment Boundaries	128
6.2.2	Residual Environmental Effects Evaluation Criteria.....	129
6.2.3	Potential Interactions, Issues and Concerns.....	130
6.2.4	Analysis, Mitigation and Residual Environmental Effects Prediction	133
6.2.4.1	Construction and Commissioning	133
6.2.5	Follow-up and Monitoring.....	136
6.2.6	Summary of Residual Environmental Effects Prediction.....	136
6.3	Marine Mammals and Marine Related Birds	137
6.3.1	Environmental Assessment Boundaries	138
6.3.2	Residual Environmental Effects Evaluation Criteria.....	139
6.3.3	Potential Interactions, Issues and Concerns.....	139
6.3.3.1	Construction	141
6.3.3.2	Operation	141
6.3.4	Analysis, Mitigation and Residual Environmental Effects Prediction	142
6.3.4.1	Construction and Commissioning	142
6.3.4.2	Operation	146
6.3.4.3	Follow-up and Monitoring.....	147



6.3.5	Summary of Residual Environmental Effects Prediction	147
6.4	Terrestrial Habitats and Wildlife	148
6.4.1	Environmental Assessment Boundaries	149
6.4.2	Residual Environmental Effects Evaluation Criteria	151
6.4.3	Potential Interactions, Issues and Concerns	151
6.4.4	Analysis, Mitigation and Residual Environmental Effects Prediction	153
6.4.4.1	Construction and Commissioning	154
6.4.4.2	Operation	158
6.4.5	Follow-up and Monitoring	159
6.4.6	Summary of Residual Environmental Effects Prediction	159
6.5	Atmospheric Environment	160
6.5.1	Environmental Assessment Boundaries	161
6.5.2	Residual Environmental Effects Evaluation Criteria	165
6.5.3	Potential Interactions, Issues and Concerns	165
6.5.4	Analysis, Mitigation and Residual Environmental Effects Prediction	169
6.5.4.1	Construction and Commissioning	169
6.5.4.2	Operation	172
6.5.5	Follow-up and Monitoring	174
6.5.6	Summary of Residual Environmental Effects Prediction	175
6.6	Land Use	177
6.6.1	Environmental Assessment Boundaries	178
6.6.2	Residual Environmental Effects Evaluation Criteria	178
6.6.3	Potential Interactions, Issues and Concerns	179
6.6.4	Analysis, Mitigation and Residual Environmental Effects Prediction	181
6.6.4.1	Construction and Commissioning	181
6.6.4.2	Operation	182
6.6.5	Follow-up and Monitoring	184
6.6.6	Summary of Residual Environmental Effects Prediction	184
6.7	Commercial Fisheries	187
6.7.1	Environmental Assessment Boundaries	188
6.7.2	Residual Environmental Effects Evaluation Criteria	189
6.7.3	Potential Interactions, Issues and Concerns	189
6.7.3.1	Construction and Commissioning	190
6.7.3.2	Operation	191
6.7.4	Analysis, Mitigation and Residual Environmental Effects Prediction	191
6.7.4.1	Construction and Commissioning	191
6.7.4.2	Operation	193
6.7.5	Follow-up and Monitoring	194
6.7.6	Summary of Residual Environmental Effects Prediction	194
6.8	Archaeological and Heritage Resources	196
6.8.1	Environmental Assessment Boundaries	197
6.8.2	Residual Environmental Effects Evaluation Criteria	197
6.8.3	Potential Interactions, Issues and Concerns	198
6.8.4	Analysis, Mitigation and Residual Environmental Effects Prediction	199
6.8.4.1	Construction and Commissioning	199
6.8.4.2	Operation	199
6.8.5	Follow-up and Monitoring	200
6.8.6	Summary of Residual Environmental Effects Prediction	200
6.9	Decommission and Abandonment	201



7.0	Assessment of Malfunctions and Accidents Events	204
7.1	Potential Effects and Proposed Mitigation	204
7.1.1	Fires	205
7.1.2	Marine Vessels Traffic Accidents	206
7.1.3	Hazardous Materials Spills.....	207
7.1.4	Summary.....	208
8.0	Cumulative Effects.....	209
8.1	Benthic Habitats and Sediment Quality; Marine Fish and Water Quality	210
8.1.1	Marine Mammals and Marine Related Birds	212
8.1.2	Commercial Fisheries	212
8.1.3	Land Use.....	213
8.1.4	Summary.....	213
9.0	Effects of the Environment on the Project.....	214
9.1	Extreme Weather	214
9.1.1	Sea Ice.....	215
9.1.2	Climate Change and Sea Level Rise	215
9.1.3	Summary.....	216
10.0	Summary and Conclusions.....	217
10.1	Mitigation, Follow-Up and Monitoring Summary.....	218
10.2	Residual Effects Summary	221
10.3	Conclusions.....	223
11.0	References.....	224

List of Tables

TABLE 2.1	Estimated Time for One Dredge Cycle.....	15
TABLE 3.1	Summary Media Coverage.....	35
TABLE 3.2	Public Concerns	39
TABLE 4.1	Summary of Well Water Pumping Test Information, Mabou Group (Formerly included Canso)	47
TABLE 4.2	Temperature Normals and Extremes for Sydney Airport (1971-2000)	49
TABLE 4.3	Precipitation Normals and Extremes for Sydney Airport (1971 - 2000).....	50
TABLE 4.4	Adverse Weather Events at Sydney Airport - Monthly Averages (1961–1991).....	50
TABLE 4.5	Ambient Air Quality Monitoring Results for Sydney, NS.....	52
TABLE 4.6	2005 Greenhouse Gas Emission Summary for Nova Scotia.....	52
TABLE 4.7	2005 Greenhouse Gas Emission Estimates for each Province and Territory in Canada.....	53
TABLE 4.8	Measured 1-Hour Baseline Sound Pressure Levels.....	54
TABLE 4.9	Tidal Heights, Extremes and Mean Water Level in North Sydney.....	56
TABLE 4.10	Fish Catch Results, Barachois Brook and Unnamed Brook (Syd-1), September 30-October 1, 2008.....	69
TABLE 4.11	Pilotage assignments for Sydney Harbour	82
TABLE 4.12	Navigation in Sydney Harbour.....	82
TABLE 4.13	Vessel Traffic in Sydney Harbour – Annual Vessel Calls by Type	83
TABLE 4.14	Lobster and Rock Crab Landings for Ports in Sydney Harbour	84
TABLE 4.15	Commercial Fishing Licenses and Active Fishing Seasons in Sydney Harbour.....	86
TABLE 4.16	Shorebird Species Recorded at South Bar in Sydney Harbour, 1980 to 2006	99
TABLE 5.1	VEC Scoping	104



TABLE 6.1	Potential Interactions, Issues and Concerns for Benthic Habitat Communities and Sediment Quality	116
TABLE 6.2	Measureable Parameters for Benthic Communities and Sediment Quality.....	117
TABLE 6.3	HADD Compensation Summary Table.....	124
TABLE 6.4	Environmental Effects Assessment Matrix: Benthic Habitat Communities and Sediment Quality	126
TABLE 6.5	Potential Interaction, Issues and Concerns for Marine Fish and Water Quality	130
TABLE 6.6	Measurable Parameters for Marine Fish and Water Quality	131
TABLE 6.7	Environmental Effects Assessment Matrix: Marine Fish and Water Quality.....	136
TABLE 6.8	Potential Interaction, Issues and Concerns for Marine Mammals and Marine-related Birds	140
TABLE 6.9	Measurable Parameters for Marine Mammals and Marine-related Birds	140
TABLE 6.10	Environmental Effects Assessment Matrix: Marine Mammals and Marine-related Birds	147
TABLE 6.11	Potential Project Environmental Effects to Terrestrial Habitats and Wildlife	152
TABLE 6.12	Measureable Parameters for Terrestrial Habitats and Wildlife	152
TABLE 6.13	Environmental Effects Assessment Matrix: Terrestrial Habitats and Wildlife.....	160
TABLE 6.14	Nova Scotia Air Quality Regulations (Environment Act) and Canadian Environmental Protection Act Ambient Air Quality Objectives.....	163
TABLE 6.15	Potential Interaction, Issues and Concerns for the Atmospheric Environment	166
TABLE 6.16	Measureable Parameters for Atmospheric Environment	167
TABLE 6.17	Equipment and Sound Power Levels - Construction	170
TABLE 6.18	Predicted Sound Pressure Levels for Construction - Dredging and Construction of the CDF	171
TABLE 6.19	Predicted Sound Pressure Levels for Construction - Land Based Components	172
TABLE 6.20	Emissions of CO2 to carry one ton of cargo one kilometer.....	173
TABLE 6.21	Equipment and Sound Power Levels - Operation.....	174
TABLE 6.22	Total Predicted Sound Pressure Levels for Operation.....	174
TABLE 6.23	Environmental Effects Assessment Matrix: Atmospheric Environment.....	175
TABLE 6.24	Potential Interactions, Issues and Concerns for Land Use	179
TABLE 6.25	Measureable Parameters for Land Use	180
TABLE 6.26	Environmental Effects Assessment Matrix: Land Use	185
TABLE 6.27	Potential Interactions, Issues and Concerns for Commercial Fisheries.....	189
TABLE 6.28	Measureable Parameters for Commercial Fisheries.....	190
TABLE 6.29	Environmental Effects Assessment Matrix: Commercial Fisheries	195
TABLE 6.30	Potential Project Environmental Effects to Archaeological and Heritage Resources	198
TABLE 6.31	Measureable Parameters for Archaeological and Heritage Resources	198
TABLE 6.32	Environmental Effects Assessment Matrix: Archeological and Heritage Resources	200
TABLE 7.1	Potential Interaction of Accidental Events with Valued Environmental Components	204
TABLE 7.2	Types of Incidents or Accidents Within the Vicinity of Sydney Harbour between 1998 and 2007	207
TABLE 8.1	Likely Future Projects and Potential Cumulative Interactions	210
TABLE 10.1	Summary of Project Environmental Design Features	219
TABLE 10.2	Summary of Mitigation, Follow-up and Monitoring.....	220
TABLE 10.3	Summaries of Residual Environmental Effects.....	222



List of Figures

FIGURE 1.1	Site Location	2
FIGURE 2.1	Site Plan	9
FIGURE 2.2	Sydney Harbour Bathymetry.....	11
FIGURE 2.3	Channel Centerline and Surfical and Sub-Surface Grain Sizes.....	12
FIGURE 2.4	Typical Trailing Suction Hopper Dredge	13
FIGURE 2.5	Typical Draghead and Hopperwell Containing Dredge Materials	13
FIGURE 2.6	Typical Overflow Funnel	14
FIGURE 2.7	Unloading Dredge Materials - Typical Operation.....	15
FIGURE 2.8	Cross Section of Containment Berm	18
FIGURE 2.9	Secondary Confined Disposal Facility	19
FIGURE 2.10	Typical Water Boxes used for Dewatering the Reclamation Area.....	20
FIGURE 2.11	Terminal Section	22
FIGURE 4.1	Surficial Geology.....	42
FIGURE 4.2	Bedrock Geology	45
FIGURE 4.3	Sydney Bight.....	67
FIGURE 4.4	Terrestrial Habitats and Wildlife	72
FIGURE 4.5	Vessel Navigation	81
FIGURE 4.6	Commercial Fisheries	85
FIGURE 4.7	Land Use Features	89
FIGURE 4.8	CBRM Land Use Zoning.....	91

List of Appendices

APPENDIX A	Plume and Deposition Modeling
APPENDIX B	Public Consultation
APPENDIX C	Ambient Noise Quality
APPENDIX D	Physical Oceanography
APPENDIX E	Benthic Sediments and Video Reports
APPENDIX F	Vegetation and Wildlife Summaries
APPENDIX G	Mi'kmaq Ecological Knowledge Study
APPENDIX H	Atmospheric Resources
APPENDIX I	Visual Assessment Results
APPENDIX J	Archaeological Resources Impact Assessment
APPENDIX K	Government Disposition Table