



**ELK RAPIDS HYDROELECTIC PROJECT
FERC PROJECT NUMBER 3030**

**BEFORE THE FEDERAL ENERGY REGULATORY COMMISSION
APPLICATION FOR LICENSE FOR A
MINOR (1.5 MEGAWATTS OR LESS) WATER POWER PROJECT**

**VOLUME I of II
PUBLIC MATERIAL**

**ANTRIM COUNTY
BELLAIRE, MICHIGAN**

December 21, 2012

VERIFICATION

This License Application is executed in the:

State of Michigan

County of Antrim

by: Mark Stone, Antrim County Operator of Dams
Antrim County Building
P.O. Box 520
Bellaire, Michigan 49615

being duly sworn, deposes and says that the contents of this License Application are true to the best of his knowledge or belief. The undersigned applicant has signed the License Application this _____ day of _____, 2012.

By: _____

Subscribed and sworn before me, a Notary Public of the State of Michigan this day of _____, 2012.

Seal:

Notary Public

TABLE OF CONTENTS

TABLE OF CONTENTS	i
LIST OF FIGURES.....	v
LIST OF TABLES.....	vii
LIST OF PHOTOS	ix
LIST OF APPENDICES	x
ACRONYMS, ABBREVIATIONS AND DEFINED TERMS.....	xi
DOCUMENT ORGANIZATION	1
INITIAL STATEMENT	2
GENERAL CONTENT REQUIREMENTS (18 CFR §4.32(A))	4
1. PROJECT BOUNDARY	4
2. NAMES AND MAILING ADDRESSES OF POTENTIALLY AFFECTED ENTITIES.....	7
EXHIBIT A - DESCRIPTION OF THE PROJECT AND PROPOSED MODE OF OPERATION (18 CFR §4.61(C)(1))	A1
1. PROJECT DESCRIPTION	A4
1.1 Location and Lands	A4
1.2 Project Facilities	A7
1.2.1 Physical Composition of Structures Included in Project.....	A7
1.2.2 Impoundment	A12
1.2.3 Hydraulic and Installed Capacity	A14
1.2.4 Transmission Line Connections	A19
2. PROPOSED MODE OF OPERATION	A19
3. PURPOSE OF PROJECT	A19
4. ESTIMATED COST TO DEVELOP THE LICENSE APPLICATION	A20
5. ON-PEAK AND OFF-PEAK VALUES OF PROJECT POWER.....	A20
6. ANNUAL OPERATION AND MAINTENANCE EXPENSES (INCLUDING INSURANCE, ADMINISTRATIVE AND GENERAL COSTS).....	A20
7. ESTIMATED ANNUAL INCREASE OR DECREASE IN PROJECT GENERATION AND ESTIMATED ANNUAL INCREASE OR DECREASE OF THE VALUE OF THE PROJECT POWER DUE TO CHANGES IN PROJECT OPERATIONS FOR AN APPLICATION FOR A NEW LICENSE.....	A20
8. REMAINING UNDERPRECIATED NET INVESTMENT OR BOOK VALUE OF PROJECT	A20
9. DETAILED SINGLE LINE ELECTRICAL DIAGRAM.....	A20
10. MEASURES TAKEN OR PLANNED TO ENSURE SAFE MANAGEMENT, OPERATION, AND MAINTENANCE OF THE PROJECT	A21
EXHIBIT E - ENVIRONMENTAL REPORT (18 CFR §4.38 AND 4.61)	E1
1. DESCRIPTION OF ENVIRONMENTAL SETTING IN THE VICINITY OF THE FACILITY (18 CFR §4.62(D)(2)).....	E1
1.1. General Description of the Project Vicinity.....	E1
1.2. Area of the Project Vicinity and Length of Stream Reaches	E3
1.3. Major Land and Water Uses in the Project Area	E3
1.4. Dams and Diversion Structures Within the Project Vicinity	E7

1.5.	Potentially Affected Tributary Rivers and Streams	E8
2.	WATER QUALITY AND QUANTITY.....	E8
2.1.	Drainage Area.....	E8
2.1.1	Skegemog Lake.....	E8
2.1.2	Elk Lake	E10
2.1.3	Tributaries	E10
2.2.	Flows at the Intake.....	E10
2.2.1	Monthly Flow Duration Curve.....	E13
2.3.	Summary of Project Generation and Outflow Records	E13
2.4.	Existing and Proposed Uses of Project Waters.....	E13
2.4.1	Existing Uses.....	E13
2.5.	Existing Instream Flow Uses and Water Rights	E13
2.5.1	Existing Municipal Uses	E15
2.5.2	Existing Residential Uses.....	E15
2.5.3	Existing Agricultural, Industrial and Commercial Uses.....	E15
2.6.	Water Quality Standards.....	E15
2.7.	NPDES Permits Within the Project Vicinity	E17
2.8.	Water Quality Monitoring Programs	E17
2.8.1	Federal Programs.....	E17
2.8.2	State Programs.....	E18
2.8.3	Local Programs	E18
2.9.	Water Quality.....	E19
2.9.1	Summary	E19
2.9.2	Seasonal Variations in the Lakes.....	E20
2.9.3	Recent Water Quality Data.....	E21
2.9.4	Fish Consumption Advisories	E21
3.	FISH AND AQUATIC RESOURCES	E21
3.1.	Overview	E21
3.2.	Fish Community Types Within the Project Vicinity.....	E28
3.2.1	Warmwater Fisheries.....	E28
3.2.2	Coolwater Fisheries.....	E29
3.2.3	Coldwater Fisheries.....	E29
3.3.	Fish Species Within the Project Vicinity	E29
3.3.1	Native Fish Species	E29
3.3.2	Introduced Species	E29
3.3.3	Sport Fishing	E34
3.3.4	Invasive Fish Species	E34
3.4.	Spatial and Temporal Distribution of Fish within the Project Vicinity	E35
3.4.1	Standing Crop and Spatial Distribution	E35
3.4.2	Elk Lake	E36
3.4.3	Skegemog Lake.....	E36
3.4.4	Both Lakes.....	E36
3.4.5	Life Stage Composition/Age and Growth Data	E36
3.5.	Fish Spawning	E37
3.6.	Aquatic Habitats	E37

3.6.1	“Essential Fish Habitat”	E40
3.6.2	Key Habitat Types	E40
3.6.3	Description of Aquatic Habitats within the Project Vicinity	E40
3.7.	Fish Mortality	E44
3.7.1	Risk of Entrainment	E44
3.7.2	Risk of Mortality	E45
3.8.	Macroinvertebrates	E46
4.	WILDLIFE AND BOTANICAL RESOURCES	E50
4.1.	Upland Habitats	E50
4.1.1	Mesic Northern Forest (67%).....	E52
4.1.2	Dry Northern Forest (26%)	E52
4.1.3	Dry-Mesic Northern Forest (7%)	E55
4.1.4	Habitat Quality	E55
4.2.	Wildlife	E57
4.2.1	Data Challenges.....	E57
4.2.2	Mammals	E57
4.2.3	Birds	E58
4.2.4	At the Project Site	E62
4.2.5	Reptiles and Amphibians.....	E62
4.3.	Game Species	E62
4.3.1	Small Game Species.....	E66
4.3.2	Upland Game Bird Species	E66
4.3.3	Furbearer Species	E66
4.3.4	Big Game Species	E66
4.4.	Invasive Species	E67
4.4.1	Invasive Plants	E67
4.4.2	Invasive Wildlife	E68
5.	WETLANDS, RIPARIAN AND LITTORAL HABITAT	E69
5.1	Wetlands	E69
5.1.1	Extent	E69
5.1.2	Quality	E71
5.1.3	Plant Communities	E71
5.1.4	Animal Species.....	E78
5.2	Riparian Habitat.....	E78
5.2.1	Extent	E78
5.2.2	Riparian Plant Species.....	E87
5.2.3	Riparian Animal Species	E87
5.3	Littoral Habitat	E90
5.3.1	Extent	E90
5.3.2	Quality.....	E92
5.3.3	Plant Species	E92
5.3.4	Animal Species.....	E93
5.4	Invasive Species	E94
5.4.1	Plants	E94
5.4.2	Animals	E95

6.	RARE, THREATENED AND ENDANGERED SPECIES	E96
6.1.	Overview of Protection Regime	E96
6.1.1	Federal.....	E96
6.1.2	State.....	E96
6.2.	Limitations on Data	E96
6.3.	Listed Status	E97
6.4.	Habitat Requirements	E98
6.5.	Status Reports and Recovery Plans	E100
6.5.1	Bald Eagle	E100
6.5.2	Common Loon.....	E100
6.5.3	Eastern Massasauga Rattlesnake.....	E100
6.5.4	Lake Sturgeon.....	E100
6.5.5	Other Species.....	E101
6.6.	Extent of Habitat for Listed Species in the Project Area.....	E101
6.7.	Distribution of Listed Species within the Project Vicinity	E101
6.7.1	Bald Eagle	E102
6.7.2	Common Loon.....	E102
6.7.3	Eastern Massasauga Rattlesnake.....	E102
6.7.4	Lake Sturgeon.....	E102
7.	RECREATION AND LAND USE.....	E103
7.1.	Overview of Recreation Population and Planning	E103
7.2.	Existing Water Access Points	E103
7.3.	Current and Future Recreation Needs Identified in Local, State, or Regional Conservation and Recreation Plans	E108
7.4.	Adjacency to Designated River Segments.....	E111
7.5.	National Trails System and Wilderness Areas.....	E111
7.6.	Regionally or Nationally Important Recreation Areas in the Project Vicinity	E111
7.7.	Non-Recreational Land Use and Management within the Project Boundary	E111
7.8.	Recreational and Non-Recreational Land Use and Management Adjacent to the Project Boundary	E111
8.	AESTHETIC RESOURCES	E112
9.	CULTURAL RESOURCES	E112
9.1.	Project Powerhouse	E112
9.2.	Other Historic Structures Near the Project.....	E115
9.2.1	Island House.....	E115
9.2.2	Township Hall	E115
9.3.	Existing Discovery Measures for Historic and Archaeological Resources	E115
9.4.	Identification of Indian Tribes That May Attach Significance to Historic Properties within the Project Boundary or in the Project Vicinity	E115
10.	SOCIO-ECONOMIC RESOURCES.....	E115
10.1.	General Land Use Patterns Around the Powerhouse.....	E115
10.1.1	Conservation/Recreation	E117
10.1.2	Conservation/Residential	E117

10.1.3	Mixed Residential	E117
10.1.4	Village Commercial.....	E117
10.2.	Population Patterns in the Project Vicinity	E117
10.3.	Sources of Employment in the Project Vicinity	E120
10.4.	Value of the Project to the Local Economy and Culture	E122
11.	TRIBAL RESOURCES	E124
12.	GEOLOGICAL FEATURES AND SURFICIAL GEOLOGY	E125
12.1.	Bedrock Geology	E125
12.2.	Surficial Geology	E125
12.3.	Soils	E127
12.4.	Shorelines and Topography	E139
13.	DESCRIPTION OF EXPECTED ENVIRONMENTAL IMPACTS (18 CFR §4.61(D)(2)).....	E139
13.1.	Water Resources	E150
13.2.	Fish and Aquatic Resources.....	E150
13.2.1	Community Composition	E150
13.2.2	Fish Migration	E150
13.2.3	Fish Mortality	E152
13.2.4	Large Woody Debris.....	E152
13.3.	Wildlife and Botanical Resources	E152
13.4.	Wetlands, Riparian and Littoral Habitat	E152
13.5.	Rare, Threatened and Endangered Species.....	E153
13.6.	Recreation and Land Use.....	E153
13.7.	Aesthetic Resources.....	E153
13.8.	Cultural Resources.....	E153
13.9.	Socio-Economic Resources	E153
13.10.	Tribal Resources	E153
13.11.	Geology and Soils.....	E153
13.12.	Relevant Comprehensive Waterway Plans	E153
13.13.	Relevant Resource Management Plans.....	E154

REFERENCES	E156
-------------------------	------

EXHIBIT F - SET OF DRAWINGS SHOWING THE STRUCTURES AND EQUIPMENT OF THE PROJECT (18 CFR §4.41(G)).....	F1
---	-----------

EXHIBIT G - MAP OF THE PROJECT BOUNDARY (18 CFR §4.41(H)).....	G1
---	-----------

ATTACHMENT 1 - CONSULTATION, STUDY REQUESTS AND LETTERS OF SUPPORT	ATT1
---	-------------

LIST OF FIGURES

Figure 1	Project Boundary	5
Figure 2	Project Boundary, cont'd	6
Figure A.1	Project Boundary	A2
Figure A.2	Project Location	A5
Figure A.3	Project Boundary	A6
Figure A.4	Lake Michigan Huron Water Levels 1860-2009.....	A12
Figure A.5	Flood Insurance Rate Map #2606370015B	A16
Figure A.6	Flood Insurance Rate Map #260699000B	A17
Figure A.7	Flood Insurance Rate Map #2606370020B	A18
Figure E.1.1	Project Vicinity	E2
Figure E.1.2	Project Vicinity Direction of Flows	E4
Figure E.1.3	Project Vicinity Major Tributaries	E5
Figure E.1.4	Project Vicinity Land Cover/Land Use.....	E6
Figure E.1.5	Village of Elk Rapids Land Cover/Land Use	E8
Figure E.2.1	Skegemog Lake.....	E9
Figure E.2.2	Elk Lake	E11
Figure E.2.3	Monthly Flows at the Project Intake.....	E12
Figure E.2.4	Monthly Flow Duration Curves	E14
Figure E.3.5	Relationship of Peripheral Runner Velocity to Mortality Francis Turbines.....	E47
Figure E.4.1	Forest Cover within the Project Vicinity.....	E51
Figure E.4.2	Wildlife Corridors within the Project Vicinity.....	E59
Figure E.4.3	Natural Areas/Nature Preserves below the Ballaire Dam.....	E60
Figure E.5.1	Approximate Wetlands, Riparian and Littoral Habitat within the Project Vicinity	E70
Figure E.5.2	National Wetland Inventory Delineation for the Project Vicinity.....	E72
Figure E.5.3	Wetlands Along the Elk River.....	E73
Figure E.5.4	Estimated Riparian Zone within the Project Vicinity	E83
Figure E.5.5	Estimated Location of Littoral Habitat in Elk and Skegemog Lakes ...	E91
Figure E.7.1	Public Access Sites Around the Impoundment	E104
Figure E.7.2	Village of Elk Rapids Public Access Sites.....	E105
Figure E.7.3	Paved Boat Access Sites Upstream of the Impoundment	E110
Figure E.10.1	Future Land Use Map	E118
Figure E.12.1	Project Vicinity Bedrock Geology	E126
Figure E.12.2	Project Vicinity Surficial Geology	E128
Figure E.12.3	Soils Near the Project.....	E129
Figure E.12.4	Soils within the Village of Elk Rapids.....	E134
Figure E.12.5	Location of Soil Boring Tests TH-1 to TH-3	E135
Figure E.12.6	Soil Boring Results	E136
Figure E.12.7	Soil Boring Results	E137
Figure E.12.8	Soil Boring Results	E138
Figure E.12.9	Soil Borings	E140
Figure E.12.10	Soil Borings	E142

Figure E.12.11 Soil Boring Results Composite..... E143
Figure E.12.12 Project Vicinity Topography E144
Figure E.12.13 Skegemog Lake Slopes E145
Figure E.12.14 Lower Elk Lake Slopes E146
Figure E.12.15 Upper Elk Lake Slopes E147
Figure E.12.16 Topography Near the Project Site E148

LIST OF TABLES

Table E.1.1	Project Vicinity Political Jurisdictions	E1
Table E.1.2	Length of Major Tributaries in the Project Vicinity.....	E3
Table E.1.3	Project Vicinity Land Cover/Land Use	E7
Table E.1.4	Village of Elk Rapids Land Cover/Land Use	E7
Table E.2.1	Monthly Flows at the Project Intake	E12
Table E.2.2	Project Annual Power Generation.....	E13
Table E.2.3	Summary of State Water Quality Standards	E16
Table E.2.4	NPDES Permits within the Project Vicinity	E17
Table E.2.5	Overview of Water Quality within the Project Vicinity.....	E20
Table E.2.6	Recent State Water Quality Data - Elk Lake.....	E22-E23
Table E.2.7	Recent State Water Quality Data - Skegemog Lake	E24-E26
Table E.2.8	Recent Local Water Quality Data - Elk and Skegemog Lakes	E27
Table E.2.9	Phosphorus in Tributaries to Elk and Skegemog Lakes.....	E27
Table E.2.10	Fish Consumption Advisories within the Project Vicinity.....	E28
Table E.3.1	ERCOL Warmwater Fishery Species	E30
Table E.3.2	ERCOL Coolwater Fishery Species.....	E30
Table E.3.3	ERCOL Coldwater Fishery Species	E30
Table E.3.4	Fish Species Found Below the Bellaire Dam	E31-E33
Table E.3.5	Major Sport Fish in the Project Vicinity	E35
Table E.3.6	Summary of Creel Census 2008-2009	E38
Table E.3.7	Average Age for Selected Species within the Project Vicinity	E38
Table E.3.8	Spawning Times and Habitats for Selected Fish Species	E39
Table E.3.9	Key Fish Habitat	E41-E42
Table E.3.10	Aquatic Insect Species Reported below the Bellaire Dam	E49
Table E.4.1	Mesic Northern Forest Community Composition.....	E53
Table E.4.2	Dry Northern Forest Community Composition	E54
Table E.4.3	Dry-Mesic Northern Forest Community Composition	E56
Table E.4.4	Natural Areas/Nature Preserves within the Project Vicinity or Upstream below the Bellaire	E58
Table E.4.5	Mammals Observed below the Bellaire Dam	E61
Table E.4.6	Mammals Observed along the Elk River	E62
Table E.4.7	Birds Observed below the Bellaire Dam	E63-E64
Table E.4.8	Amphibians and Reptiles Observed below the Bellaire Dam.....	E65
Table E.5.1	Estimated Wetland, Riparian and Littoral Habitat within the Project Vicinity	E69
Table E.5.2	Wetland Plant Communities within the Project Vicinity	E71
Table E.5.3	Wetland Plant Species in the Project Vicinity.....	E74-E77
Table E.5.4	Wetland Mammal Species Observed below the Bellaire Dam	E79
Table E.5.5	Wetland Bird Species Observed below the Bellaire Dam.....	E79-E81
Table E.5.6	Wetland Amphibian and Reptile Species Observed below the Bellaire Dam	E81
Table E.5.7	Riparian Mammal Species Observed below the Bellaire Dam.....	E87

Table E.5.8	Riparian Bird Species Observed below the Bellaire Dam.....	E88
Table E.5.9	Riparian Amphibian and Reptile Species Observed below the Bellaire Dam	E89
Table E.5.10	Littoral Habitat Overview	E90
Table E.5.11	Littoral Plants Observed in the Project Vicinity	E92
Table E.5.12	Littoral Animals Observed below the Bellaire Dam.....	E93
Table E.6.1	Federal and State Listed Species in the Project Vicinity	E97
Table E.6.2	Additional State Listed Species Observed in the Project Vicinity.....	E98
Table E.6.3	Habitats within the Project Vicinity that Support Listed Species	E98
Table E.10.1	Past, Current and Projected Populations Around the Impoundment....	E119
Table E.10.2	Employment by Economic Sector, Antrim County	E121
Table E.10.3	Economic Value by Sector, Antrim County	E122
Table E.10.4	Property Value Contributed by Shoreline Location on Elk Lake.....	E123
Table E.12.1	Soils within the Project Vicinity	E130-E133

LIST OF PHOTOS

Photo A.1	Front of Powerhouse and Headrace	A8
Photo A.2	Back of Powerhouse and Tailrace	A8
Photo A.3	Looking Upstream from the Headrace.....	A9
Photo A.4	Looking Downstream to Edward C. Grace Memorial Harbor.....	A9
Photo A.5	Looking Back at the Tailrace	A10
Photo A.6	Looking Down the South Channel to the Bypass Spillway Structure Inlet.....	A10
Photo A.7	Looking Upstream to the Spillway	A11
Photo A.8	Looking Downstream from the Kids' Pond.....	A11
Photo A.9	Transformer Enclosure.....	A19
Photo E.5.1	Elk Lake	E84
Photo E.5.2	Homes along Elk Lake.....	E84
Photo E.5.3	A Typical Shoreline Parcel.....	E85
Photo E.5.4	A Heavily Armored Shoreline on Torch River.....	E85
Photo E.5.5	Another Typical Shoreline Parcel	E86
Photo E.5.6	The Small Community of Torch River	E86
Photo E.7.1	Fishing Access along the Project Tailrace.....	E106
Photo E.7.2	Recreational Facilities along the Project Tailrace.....	E107
Photo E.7.3	Edward C. Grace Memorial Harbor.....	E107
Photo E.7.4	Dexter Street Boardwalk.....	E109
Photo E.7.5	Elk Rapids Upper Harbor.....	E109
Photo E.8.1	Aerial View of the Village of Elk Rapids.....	E113
Photo E.8.2	The Powerhouse in Autumn.....	E113
Photo E.8.3	Downtown Elk Rapids	E114
Photo E.8.4	Detailing on Many Signs and Buildings	E114
Photo E.8.5	Detailing on Many Signs and Buildings	E114
Photo E.9.1	Island House.....	E116
Photo E.9.2	Island House Bridge.....	E116
Photo E.12.1	Armored Shoreline at the Headrace.....	E149
Photo E.12.2	Armored Tailrace and the Shoreline Beyond.....	E149

LIST OF APPENDICES

APPENDIX A.....	A-1
Order Setting Lake Levels for Elk and Skegemog Lakes (1973)	
Order Issuing License (1981)	
Offer of Settlement (1999)	
Order Approving Settlement and Amending License (1999)	
APPENDIX B	B-1
Opinion of Counsel on Water Rights, Flow Rights and Project Boundary	
APPENDIX C	C-1
Hydraulic Calculation of Surface Level of Elk and Skegemog Lakes	C-1
Hydraulic Calculation of Surface Level Difference between Torch and Skegemog Lakes.....	C-2
APPENDIX D	D-1
Letter from Kyle Kruger, Michigan Department of Natural Resources	
APPENDIX E.....	E-1
Additional Water Quality Studies Below the Bellaire Dam	
APPENDIX F	F-1
Average Age-Growth (in inches) Relationships for Selected Michigan Fish	F-1
Species	
Population by Length and Species - Elk Lake	F-2
Population by Length and Species - Skegemog Lake	F-2
APPENDIX G	G-1
Recreation Study	
APPENDIX H	H-1
Letter from Martha MacFarlane Faes, Deputy State Historic Preservation Officer, SHPO to Lee Emery, FERC	
APPENDIX I.....	I-1
Offer of Settlement between Michigan Department of Natural Resources and Antrim County	
APPENDIX J.....	J-1
Michigan Department of Environmental Quality Certification under Section 401 of the Federal Clean Water Act	

ACRONYMS, ABBREVIATIONS AND DEFINED TERMS

cfs	cubic feet per second
CRA	Conservation Resource Alliance
County	Antrim County
ESLA	Elk-Skegemog Lakes Association
EPA	U.S. Environmental Protection Agency
ERCOL	Elk River Chain of Lakes Watershed
ERHP	Elk Rapids Hydroelectric Power, LLC
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
IGLD55	International Great Lakes Datum 1955
Impoundment	Elk River, Elk Lake, and Skegemog Lake up to the summer legally established lake level
LaMP	Lake Michigan Lake Area Management Plan
MDEQ	Michigan Department of Environmental Quality
MDNR	Michigan Department of Natural Resources
MGDL	Michigan Geographic Data Library
MIPPA	Michigan Independent Power Producers Association
MNFI	Michigan Natural Features Inventory
Narrows	The 5-foot deep, 1/4 mile wide narrows that connects Elk and Skegemog Lakes
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollution Discharge Elimination System
PAD	Pre-Application Document
PCPI	Per Capita Personal Income
Powerhouse	The Project powerhouse/dam structure
Project	Elk Rapids Hydroelectric Project, FERC Project #3030
Project Boundary	The land on which the Project's physical structures are located, plus Elk River, Elk Lake and Skegemog Lake up to the summer legally established lake level
Project Vicinity	The Elk-Skegemog subwatershed of the ERCOL
SHPO	State Historic Preservation Officer
TLA	Three Lakes Association
TLPA	Torch Lake Protection Alliance
TMDL	Total Minimum Daily Load
TOTM	Tip of the Mitt Watershed Council
TWC	The Watershed Center- Grand Traverse Bay
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
Village	Village of Elk Rapids