NIAGARA POWER PROJECT

RELICENSING

EFFECTS OF LAND MANAGEMENT PRACTICES ON AQUATIC AND TERRESTRIAL HABITATS

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EXECUTIVE SUMMARY

The New York Power Authority (NYPA) is currently engaged in the relicensing of the Niagara Power Project (Project) in the Town of Lewiston, Niagara County, New York. The present operating license of the plant expires in August 2007. In preparation for the relicensing of the Project, NYPA is developing information related to the ecological, engineering, recreational, cultural, and socioeconomic aspects of the Project.

The objectives of this investigation are to (1) determine if land management practices associated with Project lands and NYPA-owned non-Project lands in Niagara and Erie Counties have the potential to affect terrestrial and aquatic habitats and (2) identify potential protection and enhancement measures. These lands, referred to as the investigation area for this report, encompass approximately 1,744 acres in the Village of Lewiston, Town of Lewiston, the Town of Niagara, and the City of Niagara Falls. NYPA manages the majority of these lands, with the remainder being managed by the City of Niagara Falls, the Village of Lewiston, New York State Office of Parks, Recreation, and Historical Preservation (NYSOPRHP), New York State Department of Transportation (NYSDOT), Niagara Mohawk Power Corporation (NMPC), New York State Electric and Gas Corporation (NYSEG), and various other entities.

Land management practices for the investigation area were identified and described so that the potential effects of these practices on terrestrial and adjacent aquatic habitats could be qualitatively assessed. A literature search was conducted to gather information regarding land management practices and their potential environmental effects. Literature pertinent to NYPA land use practices and potential effects on habitat was selected for comparison.

A number of aquatic and terrestrial habitats were identified. Four habitat systems occur in the investigation area: riverine, lacustrine, palustrine, and terrestrial. Within these four systems, eight subsystems and 19 communities were recognized. The subsystems that occur in the investigation area include natural stream, riverine cultural, lacustrine cultural, forested mineral soil wetland, barrens and woodland, forested upland, open upland, and terrestrial cultural habitats.

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In addition, the investigation area and contiguous lands were surveyed for communities of noxious and invasive plant species. This was done to help determine if NYPA land management practices have the potential to encourage the growth and spread of these species. A list of invasive species from the Invasive Plant Council of New York State was utilized to identify species of concern for this survey (IPCNY 2003). This list of invasive species was used because it includes the most invasive species in New York State.

The majority of land management in the investigation area is related to public use. Management of public lands in the investigation area is performed by NYSOPRHP, NYSDOT, the City of Niagara Falls, the Village of Lewiston, and NYPA. Otherwise land management by NYPA in the investigation area is mostly related to Project operations and electrical transmission. Project-related land management practices are performed under the direction of Federal Energy Regulatory Commission (FERC) requirements for maintaining Project operation safety and security, the National Electric Safety Code, and NYPA's needs for operational efficiency, structural integrity, and aesthetics. Primary categories of management activities are vegetation management, road maintenance, and nuisance wildlife control.

Direct effects on habitats may result from vegetation management, which includes mowing, cutting of woody vegetation and herbicide application. Indirect effects on habitats may result from non-point source pollutant runoff from road and parking lot runoff and herbicide applications. Direct effects on wildlife species may include mortality from mowing and removal of nuisance wildlife. Indirect effects on wildlife species may include changes in habitat from vegetation management practices.

Vegetation management has both negative and positive effects on habitats and wildlife. For example, grasslands may be more diverse if not mowed, and mowing interrupts natural succession. Maintenance of open field and shrub habitat however, sustains a habitat type that would otherwise succeed to forested habitat. Maintaining these open habitats is beneficial for many species of wildlife. Agricultural practices can also be beneficial as it also maintains open habitats and may provide a food source for several species of wildlife.

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Road maintenance may have negative effects on habitats that result from stormwater runoff from these impervious areas. In general, the presence of impervious areas increases runoff volume and velocity. Pollutants found on the road surfaces may be carried by the runoff. Road runoff has the potential to affect any habitat found nearby. There is no evidence that land management practices associated with the operation of the Project are encouraging the growth and spread of invasive species on a large scale.

ABBREVIATIONS

Agencies

FERC	Federal Energy Regulatory Commission
NESC	National Electric Safety Code
NYNHP	New York Natural Heritage Program
NYSDEC	New York State Department of Environmental Conservation
NYSDOS	New York State Department of State
NYSDOT	New York State Department of Transportation
NYSOPRHP	New York State Office of Parks, Recreation, and Historic Preservation

Environmental

EAV	emergent aquatic vegetation
SAV	submerged aquatic vegetation

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Miscellaneous

LUNR	Land Use and Natural Resources Inventory
NMPC	Niagara Mohawk Power Corporation
NYSEG	New York State Electric and Gas

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1.0 INTRODUCTION

The New York Power Authority (NYPA) is engaged in the relicensing of the Niagara Power Project (Project) in the Towns of Lewiston and Niagara and the City of Niagara Falls, Niagara County, New York. The present operating license of the plant expires in August 2007. In preparation for the relicensing of the Project, NYPA is developing information related to the ecological, engineering, recreational, cultural, and socioeconomic aspects of the Project. The objectives of this investigation are to (1) determine if land management practices associated with Project lands and NYPA-owned non-Project lands in Niagara and Erie Counties (the investigation area for this study) have the potential to affect terrestrial and aquatic habitats and (2) identify potential protection and enhancement measures. In order to assess the potential effects of land management practices on habitats, habitats and land uses within the investigation area were mapped. Land management practices for these lands were identified so that the potential effects of these practices on terrestrial and adjacent aquatic habitats could be qualitatively evaluated.

The scope and design of this investigation was prepared by the Niagara Project Relicensing Team, which consists of technical and relicensing staff from NYPA; URS Corporation (URS); Gomez and Sullivan Engineers, P.C.; E/PRO Engineering and Environmental Consulting, LLC (E/PRO); and Aquatic Science Associates, Inc.

1.1 Background

The 1,880-MW (firm capacity) Niagara Power Project is one of the largest non-federal hydroelectric facilities in North America. The Project was licensed to the Power Authority of the State of New York (alternatively, the New York Power Authority) in 1957. Construction of the Project began in 1958, and electricity was first produced in 1961.

The Project has several components. Twin intakes are located approximately 2.6 miles above Niagara Falls. Water entering these intakes is routed around the Falls via two large low-head conduits to

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a 1.8-billion-gallon forebay, lying on an east-west axis about 4 miles downstream of the Falls. The forebay is located on the east bank of the Niagara River. At the west end of the forebay, between the forebay itself and the river, is the Robert Moses Niagara Power Plant, NYPA's main generating plant at Niagara. This plant has 13 turbines that generate electricity from water stored in the forebay. Head is approximately 300 feet. At the east end of the forebay is the Lewiston Pump Generating Plant. Under non-peak-usage conditions (i.e., at night and on weekends), water is pumped from the forebay via the plant's 12 pumps into the 22-billion-gallon Lewiston Reservoir, which lies east of the plant. During peak usage conditions (i.e., daytime Monday through Friday), the pumps are reversed for use as generators, and water is allowed to flow back through the plant, producing electricity. The forebay therefore serves as headwater for the Robert Moses plant and tailwater from the Lewiston Plant. South of the forebay is a switchyard, which serves as the electrical interface between the Project and its service area.

1.2 Investigation Area

Approximately 3,713 acres of lands are owned by or fall under the jurisdiction of NYPA (including the reservoir and forebay) in the Towns of Lewiston, and Niagara, City of Niagara Falls, and the Village of Lewiston. Some of these lands occur within the FERC Project Boundary and are hereafter referred to as "Project lands". Some of these lands are not within the FERC Project Boundary and are hereafter called "non-Project lands". The upland area owned by NYPA in this area (minus the water area of the reservoir and forebay) is approximately 1,588 acres. Another 123 acres within the Project Boundary are owned by the City of Niagara Falls with NYPA holding an easement for operation and maintenance of water transmission conduits for almost all of this acreage. Approximately 33 acres of land within the Project Boundary are not owned by NYPA. These 1,744 acres comprise the "investigation area" for this report (Figure 1.2-1).

NYPA manages the majority of these lands, with the remainder managed by the City of Niagara Falls, NYSOPRHP, NYSDOT, NMPC, NYSEG, local governments, and other entities. Lands owned and managed by NYPA include parcels associated with project operations, lands formerly used for construction purposes, a portion of the gorge, a 30-acre parcel of land that contains a NYPA warehouse, and several areas adjacent to the Robert Moses Parkway. Lands managed by NYPA in the investigation

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area total approximately 565 acres. Areas subject to land management in the investigation area are summarized in Table 1.2-1. It should be noted that there are some lands in the investigation area that are not actively managed. These include small parcels along the rim of the gorge (primarily along the Robert Moses Parkway) that are classified as terrestrial cultural (human influenced) habitat and one relatively large parcel that was used during Project construction for conduit spoil storage which is currently open upland/successional old field habitat (Porter Road Property). This habitat will likely become hardwood forest through natural succession if not mowed or cut.

Facilities on Project lands include all structures and facilities that are related to Project operations which are managed by NYPA, several public areas which are managed by NYPA (Reservoir fishing access, Robert Moses fishing pier, and Visitor Center), and several park, ROW, and transportation areas that are managed by other entities. These facilities include (managing entities are identified parenthetically) the Upper River Trail (City of Niagara Falls), the Hyde Park Golf Course (City of Niagara Falls, which also owns this land), Reservoir State Park (NYSOPRHP), Discovery Center (NYSOPRHP), portions of the Great Gorge Railroad ROW (NYSOPRHP), various electric transmission ROW (NYPA, NMPC, NYSEG), portions of the Robert Moses Parkway (NYSOPRHP & NYSDOT), the Upper Niagara River Observation site (NYSDOT), and portions of other state and local roads (NYSDOT and local governments).

NYPA manages some non-Project lands, which include a portion of the gorge and a couple of small parcels on Whirlpool Street. In addition, NYPA owns and manages a parcel about 30 acres in size. This parcel is located to the southeast of Niagara University and contains a warehouse.

The majority of non-Project lands are not managed by NYPA and are subject to management by other entities. These facilities (managing entities are identified parenthetically) include portions of Devils Hole State Park (NYSOPRHP), portions of the Upper River Trail (City of Niagara Falls), portions of the Great Gorge Railroad ROW (NYSOPRHP), Artpark (NYSOPRHP), the Plateau (The Village of Lewiston), various electric transmission ROW (NMPC), and agricultural lands (permitted farmers).

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1.3 Objective and Tasks

The objectives of this investigation were (1) to determine if land management practices utilized by NYPA and other entities within the investigation area have the potential to affect aquatic and terrestrial habitats and (2) identify potential protection and enhancement measures. The second objective will be addressed during the preparation of management plans and final designs of the approved Habitat Improvement Projects (HIPs) and in the Project land management/vegetation management plan.

In order to address the first objective, the following tasks were conducted:

1. Identify and describe NYPA's and other entities' land management practices occurring within the investigation area.
2. Identify, using available information, aquatic and terrestrial habitats that occur in the investigation area.
3. Discuss, on a qualitative basis, how NYPA's and other entities' land management practices may affect aquatic and terrestrial habitats and species that may utilize these habitats.

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TABLE 1.2-1

APPROXIMATE ACREAGE OF AREAS SUBJECT TO LAND MANAGEMENT PRACTICES IN THE INVESTIGATION AREA

Areas Subject to Management	Area (acres)	Percent of Total Area
Land open for public recreation	548	31
Project operations	411	24
Mowed areas	317	18
Parking lots and roads	250	14
No maintenance	186	11
Buildings	19	1
Totals	1,744	100.0

These values do not include the acreage of the reservoir, forebay or ice boom areas. Land open for public recreation includes Hyde Park golf course area not owned in fee simple by NYPA but is within the Project boundary. NYPA holds an easement on this land for management of the conduits.

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Section: Effects of Land Management Practices on Aquatic and Terrestrial Habitats

FIGURE 1.2-1

INVESTIGATION AREA

[NIP – General Location Maps]

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2.0 METHODS

In order to identify NYPA's and other entities' land management practices within the investigation area, URS Corporation (URS) compiled land use and ownership data. These data were collected utilizing existing property tax maps, NYPA data, interviews with NYPA staff, field observations, and maps from NYPA Real Estate and General Maintenance departments. URS then developed Geographic Information System (GIS) coverage of NYPA-owned lands and investigated land management activities occurring on those lands.

In order to identify aquatic and terrestrial habitats that occur in the investigation area, the report *Wildlife Resource Inventory and Description* (Beak 2002) addressing wildlife resources and an associated GIS mapping of ecological communities in the Erie and Niagara County area were reviewed. Beak and URS developed the GIS habitat mapping by interpreting vegetation characteristics from available aerial photographs. These data were supplemented with other GIS layers such as existing USFWS National Wetland Inventory (NWI) maps and New York State Department of Environmental Conservation (NYSDEC) Freshwater Wetlands maps. These habitat delineations were ground-truthed by Beak at field sample plots and other representative areas.

Habitats that could be affected by land management practices were identified by comparing the mapped ecological communities with the NYPA-owned and non-Project lands and land management GIS map layers.

In order to conduct an assessment of how NYPA and other land management practices may affect aquatic and terrestrial habitats within the investigation area, a literature review was performed for information regarding land management activities and their potential environmental effects. Literature pertinent to NYPA land use practices and habitat was targeted for comparison.

In addition, the investigation area and adjacent lands were surveyed for communities of noxious and invasive plant species. This was done to help determine if NYPA land management practices have

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the potential to encourage the growth and spread of these species. A list of invasive species from the Invasive Plant Council of New York State was utilized to identify species of concern for this survey (IPCNY 2003). This list of invasive species was used because it includes the most invasive species in New York State.

Information about wildlife and fish species was reviewed for the purpose of determining if land management practices in the investigation area are affecting aquatic and terrestrial habitats. Species that were observed or are known to occur in these habitats are discussed in Section 3.0 of this report.

Based on the results of GIS analysis, literature review, and analysis of species utilization of habitats in the investigation area, this report provides the following: 1) information on aquatic and terrestrial habitats that occur in the investigation area and may potentially be affected by land management practices; 2) a description of NYPA's and other entities' land management practices which occur within the investigation area; and 3) a qualitative assessment of how NYPA's and other entities' land management practices may affect aquatic and terrestrial habitats within the investigation area. This report also includes GIS maps of delineated communities of noxious and invasive plants within the investigation area.

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3.0 DESCRIPTION OF AQUATIC AND TERRESTRIAL HABITATS

Habitats in and around the Project Boundary were described and mapped by Beak (2002) in *Wildlife Resource Inventory and Description*, as part of baseline studies associated with the relicensing of the Niagara Power Project. A portion of these descriptions and maps are used in this report. The various habitats were delineated and classified by aerial photography interpretation and field investigations. The basis for the habitat classifications and descriptions include: Reschke (1990) *Ecological Communities of New York State*, Cowardin et al. (1979) *Classification of Wetlands and Deepwater Habitats of the United* States, and Cornell University's (1970) *Land Use and Natural Resources (LUNR) Classification Manual.* Reschke (1990) is the publication that is the basis for the hierarchy habitat classification and has provided the descriptions for most of the habitat types found in the investigation area. Cowardin et al. (1979) is the publication that has been used primarily to describe wetland habitat. The LUNR was used to classify and describe land uses found within the Reschke (1990) Terrestrial Cultural subsystem, because it provides better descriptions of the culturally influenced habitats in the investigation area.

Four ecological community systems were identified as a result of Beak's (2002) investigation: riverine; lacustrine; palustrine; and terrestrial. In the investigation area, a total of eight subsystems have been identified. Within these subsystems, there were 19 ecological communities or habitats identified within and adjacent to the investigation area (which includes 15 palustrine and terrestrial communities) (Table 3.0-1). The habitats were mapped at the subsystem and community level and were utilized along with other GIS map layers to establish relationships between habitats and land management practices (Figure 3.0-1 thru 3.0-11). Communities of invasive plants were also mapped (Figure 3.0-12).

This section is a description of the ecological community systems and subsystems found in the investigation area, and the communities, physical features, associated plant, wildlife, fish, and invasive plant species found in these habitats.

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3.1 Riverine System

The riverine system consists of the aquatic communities associated with flowing, non-tidal waters that lack persistent emergent vegetation, but that may include areas with submerged or floating-leaved aquatic vegetation (Reschke 1990). The riverine habitats within the investigation area include areas that are classified as Natural Stream subsystem and Riverine Cultural subsystem (man-made).

3.1.1 Natural Stream Subsystem

The Natural Stream subsystem includes streams as to which the stream flow, morphometry, and water chemistry have not been substantially modified by human activities or native biota are dominant (Reschke 1990).

The Niagara River is the predominant Natural Stream habitat adjacent to the investigation area, and is classified as a main channel stream community. The Niagara River does not completely freeze during the winter months, so it provides a large expanse of open water throughout the year. Average flow in the Niagara River is 212,300 cfs. From its source at Lake Erie to its mouth at Lake Ontario, the river drops approximately 326 feet in elevation. The river ranges in width from approximately 330 feet in the lower River to >6,000 feet in the upper River. The upper River is mostly 10-30 feet deep, whereas the lower River reaches a depth of nearly 200 feet in the Niagara Gorge. Downstream of Lewiston, the lower River is mostly 20-60 feet deep. The riverine habitats are quite varied, including large lake-like areas, exposed boulder beds, rapids, falls, whirlpools, and segments with swift laminar flow (Bird Studies Canada 2001). Field studies have identified wild celery (*Vallisneria americana*) as the primary submerged aquatic plant (SAV) species found in the Niagara River (Stantec et al. 2005). There are no extensive areas of emergent aquatic plants (EAV).

There are portions of two tributaries (Gill Creek and Fish Creek) to the Niagara River which occur within the investigation area. These streams range in width from <3 feet to about 20 feet and are mostly 1-6 feet deep. Substrates are typically dominated by silt. They are mostly slow-flowing streams that are best classified as midreach stream and intermittent stream communities (Reschke 1990). Water

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chemistry in all of these Niagara River tributaries has been modified considerably by industrial and other contaminants, though not to the degree that warrants classification under the Riverine Cultural subsystem (e.g., industrial effluent stream community). Common submerged aquatic plant species found in tributaries to the Niagara River include common waterweed (*Elodea* spp.), various pondweeds (*Potomogeton* spp.), and milfoils (*Myriophyllum* spp.). Common emergent aquatic plants include smartweed (*Polygonum* spp.), arrowhead (*Sagittaria* spp.), burreed (*Sparganium* spp.), water-plantain (*Alisma* spp.) and cattail (*Typha* spp.).

Invasive aquatic plant species found in the Niagara River and tributaries include Eurasian milfoil (*Myriophyllum spicatum*) and curly-leaved pond weed (*Potamogeton crispus*).

Wildlife species found in the Niagara River include crayfish (*Cambarus* spp.), mussels (*Pyganodon grandis*), mayfly (*Hexagenia* spp.), mudpuppy (*Necturus maculosus*), snapping turtle (*Chelydra serpentina*), muskrat (*Ondatra zibethica*), beaver (*Castor canadensis*), and mink (*Mustela vison*). The River also provides a major habitat for migrant and wintering waterfowl and gulls. Breeding birds that utilize the Niagara River include common tern (*Sterna hirundo*), herring gull (*Larus argentatus*), ring-billed gull (*Larus delawarensis*), great blue heron (*Ardea herodias*), great egret (*Casmerodius albus*), black-crowned night heron (*Nycticorax nycticorax*), belted kingfisher (*Ceryle alcyon*), tree swallow (*Tachycineta bicolor*), and purple martin (*Progne subis*) (Beak 2002).

Common fish species in the upper Niagara River include bluntnose minnow (*Pimephales notatus*), brown bullhead (*Ameiurus nebulosus*), emerald shiner (*Notropis atherinoides*), greater redhorse sucker (Moxostoma valenciennesi), lake trout (*Salvelinus namaycush*), largemouth bass (*Micropterus salmoides*), muskellunge (*Esox masquinongy*), northern pike (*Esox lucius*), smallmouth bass (*Micropterus dolomieui*), walleye (*Stizostedion vitreum*), white sucker (*Catostomus commersoni*), and yellow perch (*Perca flavescens*).

Common fish species found in the lower Niagara River include bluntnose minnow, Chinook Salmon (*Oncorhynchus tshawytscha*), emerald shiner, lake trout, largemouth bass, muskellunge, northern pike, rainbow smelt (*Osmerus mordax*), smallmouth bass, walleye, white sucker, and yellow perch.

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Tributaries to the Niagara River provide habitat for green frog (*Rana clamitans*), midland painted turtle (*Chrysemys picta marginata*), and beaver. Crayfish, northern water snake (*Nerodia sipedon*), and snapping turtles are also common in these habitats. Spotted sandpiper (*Actitis macularia*), green heron (*Butorides virescens*), swallow species, eastern phoebe (*Sayornis phoebe*), and silver-haired bat (*Lasionycteris noctivagans*) are all found around these streams during the breeding season (Beak 2002).

Common fish species found in tributaries to the Niagara River include minnows (family Cyprinidae), common carp (*Carpinus carpio*), white sucker, and yellow perch.

3.1.2 Riverine Cultural Subsystem

The Riverine Cultural subsystem includes communities that are either created and maintained by human activities, or that are modified by human influence to such a degree that stream flow, morphometry, water chemistry, or the biological composition of the resident community are substantially different from the character of the stream community as it existed prior to human influence (Reschke 1990).

Three distinctly different Riverine Cultural habitats are found in the investigation area: 1) the Niagara Power Project forebay and forebay canal, best classified in the canal community; 2) relocated stream channels (e.g., sections of Gill and Fish Creek) are best classified in the canal community; and 3) numerous small ditches located throughout the Project area are best classified in the ditch/artificial intermittent stream community. No plant species have been documented in the forebay and forebay canal, though surveys of these areas have been limited due to safety and logistical reasons. In the relocated stream channels and ditches, common submerged aquatic plant species include pondweeds, naiad (*Naja* spp.), and milfoil. Typical emergent aquatic plants found in the relocated stream channels and ditches in the investigation area include cattail, burreed, water plantain, and arrowhead.

Invasive aquatic plant species found in Riverine Cultural habitats include Eurasian milfoil and curly pondweed.

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The forebay and forebay canal provide habitat for ring-billed and herring gulls and double-crested cormorants (*Phalacrocorax auritus*), while rough-winged swallows (*Stelgidopteryx serripennis*) forage above these waters and nest along the manmade cliffs along the forebay (Beak 2002). The wildlife species found in the relocated stream channels and ditches in the investigation area are similar to those found in the smaller natural streams.

The forebay and forebay canal have not been surveyed for fish, however, it is expected that the same species found in the Lewiston Reservoir (Section 3.2.1) are also present in this area.

3.2 Lacustrine System

The Lacustrine system consists of waters situated in topographic depressions or dammed river channels, lacking persistent emergent vegetation, but including areas with submerged or floating-leaved aquatic vegetation (Reschke 1990). No natural lakes are found within the investigation area. The only Lacustrine habitats within the investigation area are manmade (i.e., Lacustrine Cultural subsystem), as described below.

3.2.1 Lacustrine Cultural Subsystem

The Lacustrine Cultural subsystem includes communities that are either created and maintained by human activities, or that are modified by human influence to such a degree that the trophic state, morphometry, water chemistry, or biological composition of the resident community are substantially different from the character of the lake community as it existed prior to human influence (Reschke 1990). The only Lacustrine community in the investigation area is the Lewiston Reservoir, an approximately 1,885-acre impoundment located about one mile east of the Robert Moses Niagara Power Plant, and is classified in the reservoir/artificial impoundment community. Operation of the Niagara Power Project can result in water level fluctuations in the Lewiston Reservoir of 3-18 feet per day, and approximately 11-36 feet per week depending on the season and river flows. The reservoir is impounded by a 6.5-mile long rock-filled dike, creating a shoreline dominated by large rock (riprap). The reservoir supports no

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emergent and limited submerged aquatic vegetation. Submerged aquatic plant species present include wild-celery, sago pondweed (*Potomogeton pectinatus*) and common waterweed (Stantec et al. 2005).

Invasive plant species found in Lewiston Reservoir during the Stantec et al. (2005) surveys include one species: Eurasian milfoil.

The Lewiston Reservoir provides nearly 3 square miles of open-water habitat containing fish and macroinvertebrates. Wildlife use of the reservoir is mostly by migrant and over-wintering waterfowl, especially diving ducks such as the greater scaup (*Aythya marila*) and lesser scaup (*Aythya affinis*). Mallards (*Anas platyrhynchos*), double-crested cormorants, and gulls (*Larus* spp.) are frequently found foraging and resting there as well (Beak 2002).

Common fish species found in the Lewiston Reservoir include emerald shiner, rock bass (*Ambloplites rupestris*), smallmouth bass, and yellow perch.

3.3 Palustrine System

The Palustrine system consists of non-tidal, perennial wetlands characterized by trees, shrubs, and persistent emergent vegetation. The system includes wetlands that are permanently saturated by seepage, permanently flooded wetlands, and wetlands that are seasonally or intermittently flooded if the vegetative cover is predominantly hydrophytic and soils are hydric (Reschke 1990). One palustrine habitat was identified in the investigation area through examination of the wetland mapping; it is classified in the Forested Mineral Soil Wetlands subsystem and is best characterized as a forested wetland (Cowardin et al. 1992).

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3.3.1 Forested Mineral Soil Wetlands Subsystem

The Forested Mineral Soil Wetlands subsystem includes seasonally flooded forests and permanently flooded or saturated swamps. These forests and swamps typically have at least 50% canopy cover of trees reaching a mature height of at least 16 feet (Reschke 1990).

The Forested Mineral Soil Wetland found in the investigation area is a seasonally flooded deciduous woodland habitat that is best classified as a forested wetland community (Cowardin et al. 1992). It is located along Gill Creek, adjacent to the conduit and Niagara Falls Golf Course. Approximately 5 acres (0.3% of the investigation area) of this habitat is found within the investigation area. The dominant plant species at this location include green ash (*Fraxinus pennsylvanica*), northern red oak (*Quercus rubra*), basswood (*Tilia americana*), hawthorn (*Crataegus* spp.), hop hornbeam (*Ostryea virginiania*), and gray dogwood (*Cornus racemosa*).

Invasive plants found in the area of this wetland include garlic mustard (*Alliaria petiolata*), tartarian honeysuckle (*Lonicera tatarica*), and common buckthorn.

Wildlife observed in forested mineral soil wetland habitat includes blue-spotted salamander (*Ambystoma laterale*), western chorus frog (*Pseudacris triseriata*), American toad (*Bufo americanus*), mallard, downy woodpecker (*Picoides pubescens*) and gray squirrel (*Sciurus carolinensis*) (Beak 2002).

3.4 Terrestrial System

The Terrestrial system consists of upland habitats having well-drained soils that are dry to mesic (never hydric) and vegetative cover that is never predominantly hydrophytic, even if the soil surface is occasionally or seasonally flooded or saturated (Reschke 1990). These habitats, as they exist in the investigation area, are further classified into the Open Uplands, Barrens and Woodlands, Forested Uplands, and Terrestrial Cultural subsystems.

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3.4.1 Open Uplands Subsystem

The Open Uplands subsystem includes upland communities with less than 25% canopy cover of trees. Approximately 478 acres (27% of investigation area) of this subsystem type are found within the investigation area. Shrubs, herbs, or cryptogammic plants such as mosses and lichens are dominant in these communities. Three distinctive physiognomic types are included in this subsystem: 1) grasslands dominated by grasses and sedges; 2) meadows in which forbs, grasses, sedges, and shrubs are co-dominant; and 3) shrublands dominated by shrubs (Reschke 1990). Exposed limestone and dolomite cliffs within the Niagara Gorge are included in the third category and support a calcareous cliff community with sparse vegetative cover. The calcareous cliff community in the investigation area is considered a significant occurrence of this community type by the NYNHP (Evans et al. 2001).

Successional old fields and successional shrublands are the predominant Open Uplands communities found throughout the investigation area. Successional old field community is found on sites that have been cleared or plowed (for farming or development) and subsequently abandoned (Reschke 1990). Successional old fields make up approximately 261 acres (15%) of area in the investigation area. They are typically relatively short-lived communities that succeed to shrubland, woodland, or forest community if they are not subjected to periodic disturbance. Successional shrubland also occurs on sites that have been cleared or otherwise disturbed, and typically follow the successional old field community in succession. Successional shrublands cover approximately 181 acres (10%) of the investigation area. In the investigation area these communities are found mostly around the margins of Project lands at the Lewiston Reservoir, along the Niagara Gorge rim, and along utility and transportation right-of-ways. Many areas of these habitats have been maintained by periodic mowing. Dominant plant species observed within successional old field habitats that were visited during field investigations were Kentucky bluegrass (*Poa pretensis*), redtop (*Agrostis gigantea*), and flat-topped goldenrod (*Euthamia graminifolia*). Dominant plant species observed in successional shrubland habitat were gray dogwood, hawthorn species, staghorn sumac (*Rhus typhina*), tall goldenrod (*Solidago altissima*), and Kentucky bluegrass.

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Invasive species documented in both the successional old field and successional shrubland communities included spotted knapweed, common buckthorn, glossy buckthorn (*Rhamnus frangula*), multiflora rose (*Rosa multiflora*), Norway maple (*Acer platanoides*), common reed, olives (*Elaeagnus* spp.), and purple loosestrife (*Lythrum salicaria*).

Wildlife species found in successional old field communities include aerial foraging species such as the tree swallow, barn swallow (*Hirundo rustica*), and eastern kingbird (*Tyrannus tyrannus*). Songbird species that prefer this habitat include the American goldfinch (*Cardelis tristis*), savannah sparrow (*Passerculus sandwichensis*), and eastern meadowlark (*Sturnella magna*). Mammals such as woodchuck (*Marmota monax*) and meadow vole (*Microtus pennsylvanicus*) are common in this habitat. Red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), red fox (*Vulpes vulpes*), and coyote (*Canis latrans*) are also found in successional old field habitat (Beak 2002).

Wildlife species sign observed in successional shrubland communities in the investigation area include sign from white-tailed deer (*Odocoileus virginianus*), eastern cottontail (*Sylvilagus floridanus*), and coyote. Songbirds observed in this habitat include common yellowthroat (*Geothlypis trichas*), yellow warbler (*Dendroica petechia*), gray catbird (*Dumetella carolinensis*), eastern towhee (*Pipilo erythrophthalmus*), and song sparrow (*Melospiza melodia*) (Beak 2002).

Another Open Upland community found in the investigation area is the calcareous cliff community. This habitat is found along the Niagara Gorge and is made up of vertical exposures of calcareous bedrock. The calcareous cliff community covers approximately 36 acres (2%) of the investigation area. Field investigations (Beak 2002) noted that there were no dominant plants in this habitat. Rescke (1990) lists characteristic species, which include purple cliff brake (*Pellaea atropurperea*), bulblet fern (*Cystopteris bulbifera*), early saxifrage (*Saxifraga virginiensis*), eastern red cedar (*Juniperus virginiana*), and northern white cedar (*Thuja occidentalis*). Vegetation is typically sparse in this community because of steepness and the fact that soil development is usually minimal.

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Wildlife species found in calcareous cliff communities include the northern rough winged swallow, American crow (*Corvus brachyorhyncus*), blue jay (*Cyanocitta cristata*), and turkey vulture (*Cathartes aura*) (Beak 2002).

3.4.2 Barrens and Woodlands Subsystem

The Barrens and Woodlands subsystem includes upland communities that are structurally intermediate between forests and open canopy uplands. Woodlands classified into this subsystem include communities with a canopy of stunted or dwarf trees and wooded communities occurring on shallow soils over bedrock with numerous rock outcrops (Reschke 1990). The latter most accurately describes the Barrens and Woodlands habitats present within the investigation area. Approximately 114 acres (7%) of the investigation area is Barrens and Woodlands habitat.

Two ecological communities, limestone woodland and calcareous talus slope woodland, occur in areas of shallow soils over dolomite and limestone. They are found along the Niagara Escarpment, throughout the Niagara Gorge (from the falls downstream to Artpark), and on Goat Island. NYNHP considers the calcareous talus slope woodland community in the investigation area a significant occurrence of this habitat type (Evans et al. 2001).

An example of the limestone woodland community in the investigation area is found at Artpark. Limestone woodland makes up approximately 11 acres (0.6%) of the investigation area. Dominant plant species in this community include sugar maple (*Acer saccharum*), white ash (*Fraxinus americana*), chokecherry (*Prunus virginiana*), Eastern hop-hornbeam (*Ostrya virginiana*), dogwood species (*Cornus* spp.), tartarian honeysuckle (*Loniceria tatarica*), aster species (*Aster* spp.), and bluegrass species (*Poa* spp.).

Invasive plant species found in the Artpark area limestone woodland community include common buckthorn, spotted knapweed, common reed, and black locust (*Robinia psuedoacacia*).

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Wildlife species observed in the limestone woodland community include red-backed salamander (*Plethodon cinereus*), black-capped chickadee (*Parus atricapillus*), red-eyed vireo (*Vireo olivaceus*), yellow-rumped warbler (*Dendroica coronata*), yellow-bellied sapsucker (*Sphyrapicus varius*), and Baltimore oriole (*Icterus galbula*) (Beak 2002).

The calcareous talus slope woodland community is found in the investigation area in the Niagara Gorge, namely near the Robert Moses Power Plant, the Great Gorge Railroad right-of-way, and the Whirlpool/Devil's Hole state park managed land. This community makes up approximately 103 acres (6%) of the investigation area. Dominant plant species found in this community include Norway maple, sugar maple, ash species (*Fraxinus* spp.), oak species (*Quercus* spp.), gray dogwood, red osier dogwood (*Cornus sericea*), grass species, and grape species (*Vitis* spp.).

Invasive species documented in the calcareous talus slope woodland communities of the investigation area include Norway maple, common buckthorn, black locust, and common reed.

Wildlife species observed in the calcareous talus slope woodland community include red-backed salamander, blue-spotted salamander, eastern garter snake (*Thamnophis sirtalis*), blue jay, red-eyed vireo, ovenbird (*Seiurus aurocapillus*), Baltimore oriole, eastern chipmunk (*Tamias striatus*), and gray squirrel (Beak 2002).

3.4.3 Forested Uplands Subsystem

The Forested Uplands subsystem includes upland communities with more than 60% tree cover; these communities occur on substrates with less than 50% rock outcrop or shallow soil over bedrock (Reschke 1990). The principal forest community found in the investigation area is successional northern hardwoods forest. Forested Uplands make up approximately 56 acres (3%) of the investigation area.

The successional northern hardwood forest is the only Forested Uplands community in the investigation area and is found adjacent to the north and south sides of the Lewiston Reservoir. These

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forests typically develop on sites that have been cleared (for farming, logging, etc.) or otherwise disturbed (Reschke 1990). The dominant plants found by Beak (2002) include American elm (*Ulmus americana*), red maple (*Acer rubrum*), northern red oak, hawthorn species, garlic mustard, wild grape (*Vitis* spp.), and poison ivy (*Toxicodendron radicans*).

Invasive plant species found in these areas include common buckthorn, smooth buckthorn, spotted knapweed, and multiflora rose.

Wildlife species observed in the successional northern hardwood forests community include hairy woodpecker (*Picoides villosus*), hermit thrush (*Catharus guttatus*), red-eyed vireo, American crow, and gray squirrel (Beak 2002).

3.4.4 Terrestrial Cultural Subsystem

The Terrestrial Cultural Subsystem includes communities that are either created and maintained by human activities or are modified by human influence to such a degree that the physical condition of the substrate or the biological composition of the resident community is substantially different from the character of the substrate or community as it existed prior to human influence (Reschke 1990). Terrestrial Cultural habitats make up approximately 1091 acres (63%) of the investigation area. These communities are found throughout the investigation area, and represent the largest group of habitats found in the investigation area. This is a very broadly described subsystem that includes a wide variety of habitat communities, ranging from heavily disturbed (e.g., residential, commercial, active agriculture) to somewhat natural (e.g., pine plantation, orchard) habitats. The LUNR (1970) provides categories that fit within the Terrestrial Cultural subsystem and were used to classify and describe the communities in the terrestrial cultural subsystem. Terrestrial Cultural subsystem LUNR communities found in the investigation area include (with acreage and percent of investigation area in parentheses) transportation (139 acres/8%), mowed grass (149 acres/9%), outdoor recreation (313 acres/18%), active agriculture (93 acres/5%), industrial (105 acres/6 %), commercial (25 acres/1.4%), residential (17 acres/1%), and public use (community) areas (250 acres/14%). The communities are similar in that they are all either created and maintained by human activities or are modified by human activities to such a degree that the physical

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characteristics of the habitat is substantially different than as it existed prior to human disturbance (Reschke 1990). The dominant plants found in these areas are mowed grasses (*Poa* spp., *Festuca* spp., etc.), ornamental plantings, and various other herbaceous plants and shrubs.

Most of the invasive plant species in the investigation area are found in Terrestrial Cultural habitats. Terrestrial Cultural habitats are subject to frequent and rather intense disturbance, which often encourages establishment and growth of invasive plants. Species observed include spotted knapweed, buckthorn species, purple loosestrife, olive species, garlic mustard, and common reed. Most of these were found in outdoor recreation, industrial, transportation, and commercial areas.

Wildlife species observed in Terrestrial Cultural habitats include eastern garter snake, ring-billed gull, Canada goose (*Branta canadensis*), European starling *(Sturnus vulgaris*), blue jay, American robin *(Turdus migratorius*), red-winged blackbird (*Agelaius phoeniceus*), and raccoon (*Procyon lotor*). Sign from white-tailed deer, red fox, and meadow vole were also observed (Beak 2002).

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TABLE 3.0-1

HABITATS SUBJECT TO LAND MANAGEMENT IN THE INVESTIGATION AREA

System	Subsystem	Area (acres)	Percent of Total Area	Communities	Area (acres)	Percent of Total Area
Palustrine	Forested Mineral Soil Wetlands	5	0.3%	Forested Wetland	5	0.3%
Terrestrial	Open Uplands	478	27%	Calcareous Cliff	36	2%
				Successional Old Field	261	15%
				Successional Shrubland	181	10%
	Barrens and Woodlands	114	7%	Calcareous Talus Slope Woodland	103	6%
				Limestone Woodland	11	0.6%
	Forested Uplands	56	3%	Successional Northern Hardwoods	56	3%
	Terrestrial Cultural	1091	63%	Active Agriculture	93	5%
				Commercial	25	1.4%
				Community	250	14%
				Industrial	105	6%
				Mowed Grass	149	8%
				Outdoor Recreation	313	18%
				Residential	17	1%
				Transportation	139	8%
TOTAL					**1744**	

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FIGURE 3.0-1

INDEX FOR AQUATIC AND TERRESTRIAL HABITATS IN THE INVESTIGATION AREA

[NIP – General Location Maps]

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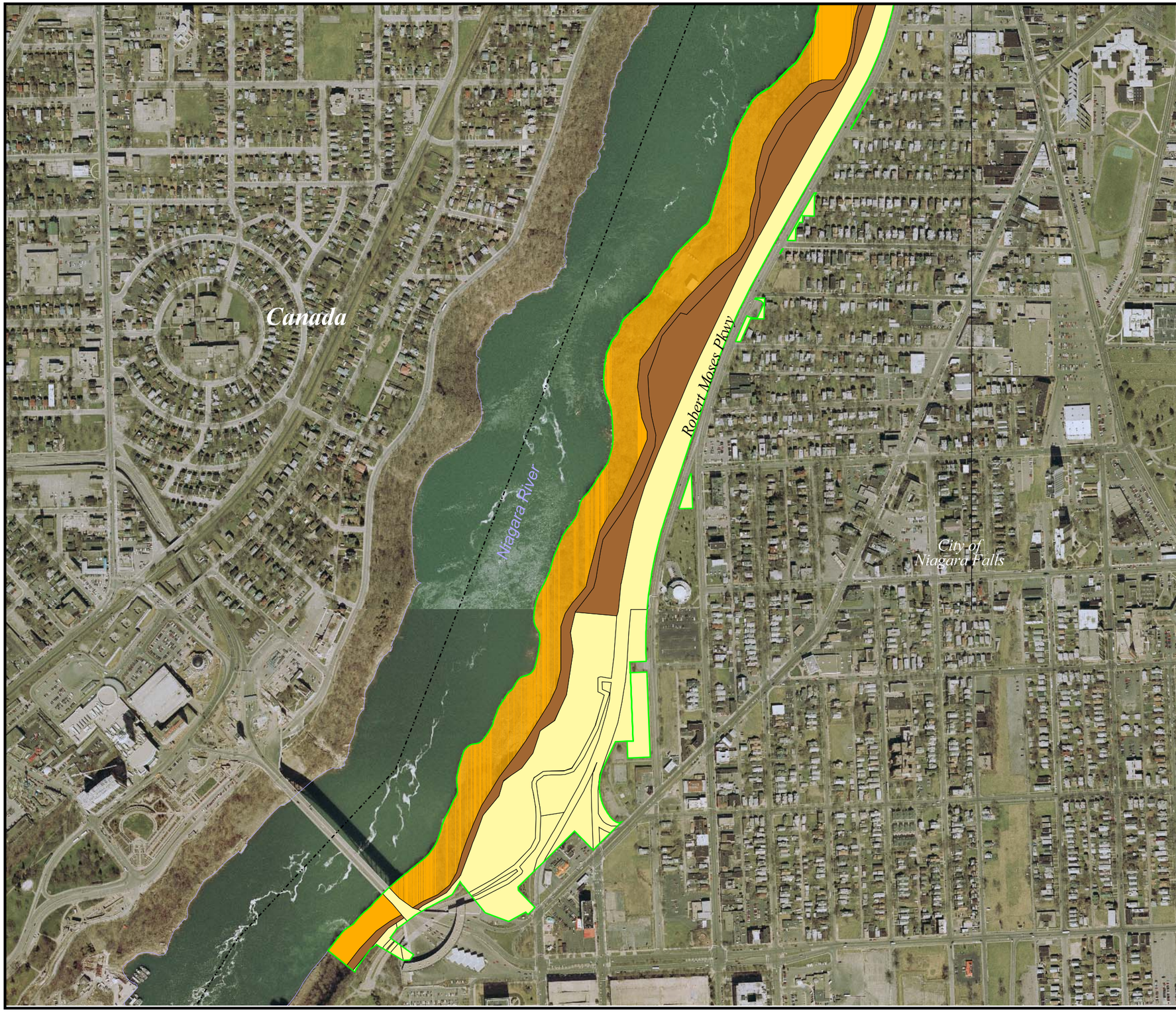
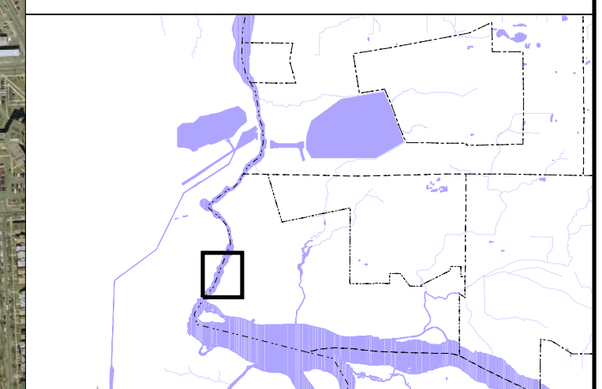
NIAGARA POWER PROJECT (FERC NO. 2216)
EFFECTS OF LAND MANAGEMENT PRACTICES ON AQUATIC AND TERRESTRIAL HABITATS

Aquatic and Terrestrial Habitats in the Investigation Area



LEGEND

- Investigation Area
- Barrens and Woodlands
- Forested Mineral Soil Wetlands
- Forested Uplands
- Lacustrine Cultural
- Natural Stream
- Open Uplands
- Riverine Cultural
- Terrestrial Cultural
- Roads
- Streams
- Water Bodies
- Municipal Boundary



0 600 1200 Feet

1" = 600'

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FIGURE 3.0-2

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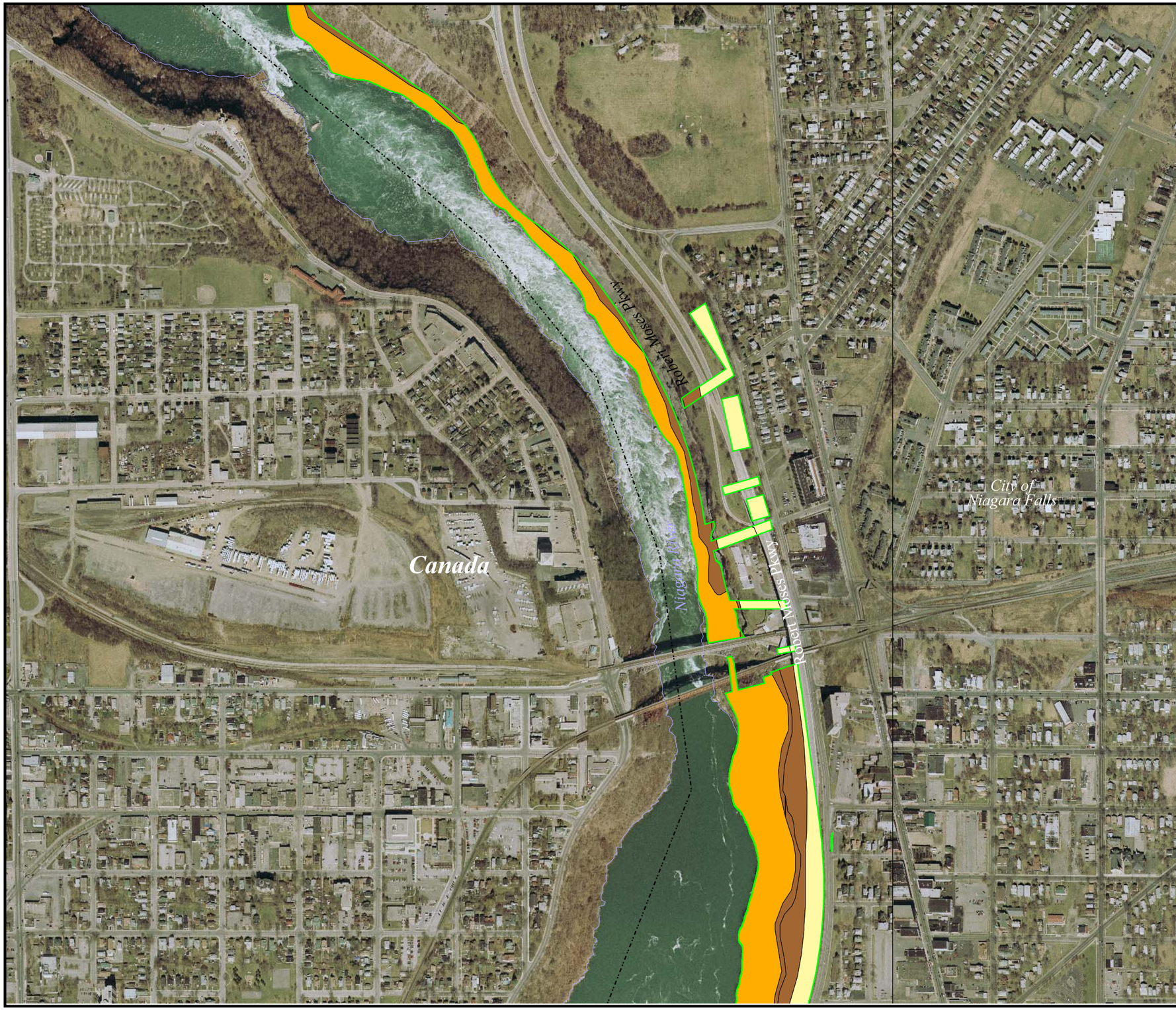
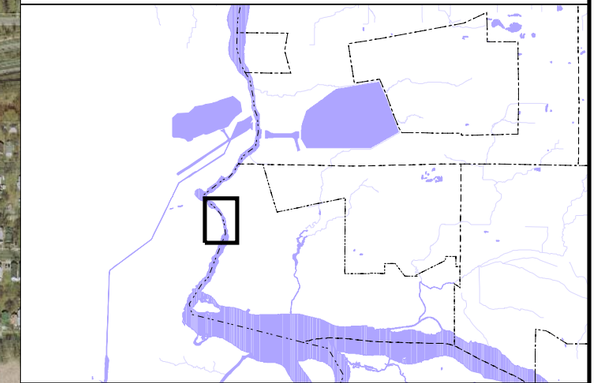
EFFECTS OF LAND MANAGEMENT PRACTICES ON AQUATIC AND TERRESTRIAL HABITATS

Aquatic and Terrestrial Habitats in the Investigation Area



LEGEND

- Investigation Area
- Barrens and Woodlands
- Forested Mineral Soil Wetlands
- Forested Uplands
- Lacustrine Cultural
- Natural Stream
- Open Uplands
- Riverine Cultural
- Terrestrial Cultural
- Roads
- Streams
- Water Bodies
- Municipal Boundary



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1" = 600

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FIGURE 3.0-3

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Aquatic and Terrestrial Habitats in the Investigation Area

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- Open Uplands
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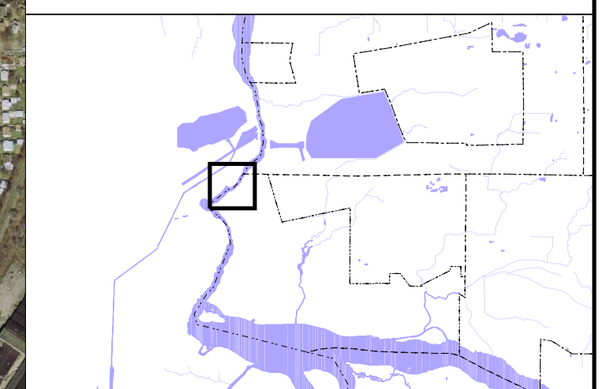

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1" = 600

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FIGURE 3.0-4

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FIGURE 3.0-5

AQUATIC AND TERRESTRIAL HABITATS IN THE INVESTIGATION AREA

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FIGURE 3.0-6

AQUATIC AND TERRESTRIAL HABITATS IN THE INVESTIGATION AREA

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FIGURE 3.0-7

AQUATIC AND TERRESTRIAL HABITATS IN THE INVESTIGATION AREA

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FIGURE 3.0-8

AQUATIC AND TERRESTRIAL HABITATS IN THE INVESTIGATION AREA

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FIGURE 3.0-9

AQUATIC AND TERRESTRIAL HABITATS IN THE INVESTIGATION AREA

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Aquatic and Terrestrial Habitats in the Investigation Area

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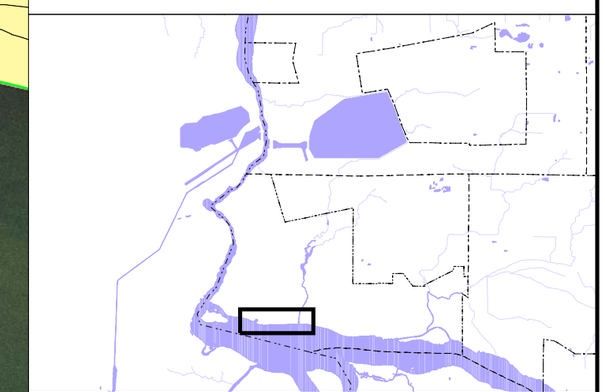

0 850 1700 Feet

1" = 850

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FIGURE 3.0-10

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FIGURE 3.0-11

AQUATIC AND TERRESTRIAL HABITATS IN THE INVESTIGATION AREA

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FIGURE 3.0-12

INVASIVE PLANT COMMUNITIES IN THE INVESTIGATION AREA

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4.0 DESCRIPTION OF LAND MANAGEMENT PRACTICES

Land management practices performed within the investigation area are carried out for a variety of reasons. Infrastructure, which has an inherent need of ongoing maintenance, is the foremost reason for land management in the investigation area. The majority of land management is related to public use within the investigation area. Land management in these areas is performed by NYSOPRHP, NYSDOT, and NYPA. Most other land management in the investigation area is directly related to Project operations and electrical transmission or other industrial uses. Project-related land management practices are performed under the direction of Federal Energy Regulatory Commission (FERC) requirements for maintaining Project operation safety and security and the National Electric Safety Code (NESC) and reflect NYPA's need for operational efficiency, structural integrity, and aesthetics. Primary categories of management activities are vegetation management, road maintenance, building and structure maintenance, and nuisance wildlife control (see Figure 4.0-1). Vegetation management is necessary to maintain rights-of-way (ROW), roads, lawns, open areas, and Project structures. Road maintenance is necessary to keep roads, walkways, and parking areas in good condition. Building grounds and structure maintenance is required to preserve structural integrity and aesthetics. Nuisance wildlife species must be controlled because they may degrade the structural integrity of the Lewiston Reservoir dike. This section describes these major forms of management practices, explains why they are conducted, and identifies existing protection and enhancement measures currently utilized by NYPA within the investigation area.

4.1 Vegetation Management

Vegetation management is performed on lawns, ROW, recreation facilities, farmed fields, and areas adjacent to buildings and structures. Primary techniques used within the investigation area include mowing, herbicides, hand and mechanical removal, standard agricultural practices, and landscaping and planting. This section will discuss these techniques and the purposes for which they are applied. Their potential effects will be discussed in Section 5.0.

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4.1.1 Mowing

Mowed areas range from areas adjacent to buildings and parking lots to the areas on road and power line ROW. Mowing frequency varies from more than once per month to less than once per year, depending on the land use. For example, in areas near buildings, lawn mowing may occur more than once per month. Some ROW areas may be mowed at a frequency from once per month to once per year, and other ROW areas may be mowed only as needed or on a schedule of greater than once per year.

Mowing on Project lands is done in a variety of contexts: Project operations, roads, recreation, agriculture, and electric transmission ROW areas. Mowing for Project operations occurs around Project structures (such as the exterior wall of the Lewiston Reservoir and monitoring wells), buildings, parking areas, and road ROW (used for Project access around the Lewiston Reservoir and Lewiston Pump Generating Plant, switch yard, warehouse and Robert Moses Power Plant). Mowing in these areas is to maintain visibility for security purposes, safety, and aesthetics.

NYPA manages two sections of electric transmission ROW in the investigation area. In order to ensure public safety and electric system reliability, electric transmission ROW is managed to suppress the growth of tree and tall woody shrub species into the electric conductor safety zone (EEANY 2002). Mowing is also performed by NYPA at recreation areas including the Reservoir fishing access, the Upper Niagara River Observation Site, and the Visitor Center. Other entities mow land at other recreation areas on Project lands (managing entities are identified parenthetically) such as Reservoir State Park (NYSOPRHP), the Discovery Center (NYSOPRHP), a portion of Hyde Park Golf Course (City of Niagara Falls), and a portion of the Upper River Trail (City of Niagara Falls). Transmission ROW's on Project lands that are not maintained by NYPA are maintained by NMPC and NYSEG. These ROW's are maintained primarily by mowing (Kevin McLoughlin, NYPA System Forester, personal communication with Dana Valleau, E/PRO, March 3, 2004). Herbicides are not regularly used to maintain vegetation on these ROW's. Public roads are also found on Project lands. These road ROW are mowed by the NYSDOT (e.g., sections of the Robert Moses Parkway) and local governments.

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A local farmer leases a portion of Project lands for agriculture purposes. This land is managed for a rotation of crops, which includes a three to four year cycle of hay to one year of row crop cultivation. During years of hay production, the area is mowed up to several times a year.

Mowing on non-Project lands is performed by entities other than NYPA. These non-Project lands are utilized for roads, recreation, agriculture, and electric transmission ROW. Road areas include public roads such as portions of the I-190, Robert Moses Parkway and other state and local roads, and a Niagara University access road. These road ROW are mowed by the NYSDOT, local governments, and Niagara University, respectively. Recreation areas on non-Project lands that are mowed include portions of Artpark, the Plateau, and a portion of the Upper River Trail. Mowing at these locations is done by NYSOPRHP, the Village of Lewiston, and the City of Niagara Falls, respectively. Electric transmission ROW on non-Project lands are under easement to NMPC. The management of these ROW consists of periodic mowing to suppress tall woody vegetation. Agricultural lands on non-Project lands are mowed for hay.

4.1.2 Herbicides

Herbicides are applied on an as-needed basis on Project lands in areas where mowing is not possible or effective. These areas include fence lines, around building foundations, and around energy transmission-related structures (e.g., around and within the switchyard). Vegetation in these areas is maintained so as not to interfere with Project structures and for security, visibility and monitoring purposes.

The rip-rap lined interior side of the Lewiston Reservoir Dike is maintained by an annual application of an EPA and NYSDEC Registered herbicide formulation to control weed and woody plant growth (Bill Bergeron, NYPA Maintenance, personal communication with Dana Valleau, February 10, 2004). This is applied according to label directions only on areas above the high water line when the weather is warm and dry. This methodology is based on DEC approved methods for herbicide use around water bodies. Any plants that are not removed by this application of herbicide are removed by hand.

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Herbicides are applied only as-needed on electric transmission ROW on Project lands (Kevin McLoughlin, NYPA System Forester, personal communication with Dana Valleau, E/PRO, March 3, 2004). Herbicide application on electric transmission ROW is governed by an Integrated Vegetation Management (IVM) strategy (EEANY 2002); (McLoughlin 2002). The IVM approach is an existing protection and enhancement measure utilized by the members of the Environmental Energy Alliance of New York (EEANY), which includes NYPA, NMPC, and NYSEG. All three of these entities are signatories to an IVM position paper describing the application of this strategy to utility ROW vegetation management (EEANY 2002); (Kevin McLoughlin, NYPA System Forester, personal communication with Dana Valleau, E/PRO, May 26, 2004); (Tom E. Sullivan, NMPC, personal communication with Dana Valleau, E/PRO, May 26, 2004). This approach, modeled on the Integrated Pest Management (IPM) process, utilizes cultural (mechanical and manual methods that physically remove tree stems), biological (encouraging low growing plant species and herbivory), and chemical (herbicides) controls. Under this approach, herbicides use is minimized, and herbicides are used only to treat individual tree stems or groups of target trees. No aerial or indiscriminate ground broadcast applications are used (EEANY 2002). Mowing is the primary means of controlling vegetation on ROW in the investigation area.

Application of herbicide on Project lands is done by NYPA personnel and contractors that are registered pesticide applicators licensed by the New York State Department of Environmental Conservation (NYSDEC) Division of Solid & Hazardous Materials, pursuant 6 NYCRR Part 325. Continuing education is required in order for NYPA staff to maintain their pesticide applicator certification, and these staff personnel take training courses annually (Sue Kosikowski, NYPA Environmental Supervisor, personal communication with Dana Valleau, E/PRO, February 10, 2004). .

NYPA utilizes DEC registered and EPA registered herbicides which are primarily various formulations of the herbicide glyphosate. Herbicides are applied using backpack, hand pressurized, non-motorized equipment. All pressures are kept as low as operationally possible to prevent overspray onto non-target species and locations. Herbicide applications around water follow DEC approved methods and use products registered by DEC for use in wetland areas but not in direct contact with standing water (Bill Bergeron, NYPA Maintenance, personal communication with Dana Valleau, E/PRO, February 10, 2004).

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NYPA maintains files of pesticide use on Project land as required by State law. NYPA also files annual reports with the DEC Bureau of Pesticide Management regarding the type and quantity of pesticides applied by NYPA during the previous year.

Although herbicides may be applied on non-Project lands by other entities, NYPA does not control these activities. Any entity applying herbicides is required to follow NYSDEC regulations governing pesticide use. The agricultural land in wheat production is sprayed with an herbicide (2,4-D) to control broad-leaved weeds.

4.1.3 Hand and Mechanical Removal

Hand and mechanical removal is used for vegetation management in situations or areas where mowing and herbicides are not effective or practical in controlling vegetation. This includes removal of hazardous trees, tall woody vegetation, and vegetation that was not controlled by herbicide application. This type of vegetation management may take place on any of the lands in the investigation area where vegetation management is conducted.

4.1.4 Landscaping and Planting

Landscaping activities in the investigation area include removal and maintenance of existing vegetation and planting of seasonal flower and potted plant beds. Landscaping by NYPA on Project lands is limited to areas adjacent to buildings and Project structures. The majority of these activities are performed in response to changes in security (e.g., changes in vegetation type from shrub to grass for visibility, changes of an access traffic pattern, etc.), screening of NYPA facilities at the request of adjacent landowners, and for beautification of public sites (Bill Bergeron, NYPA Maintenance, personal communication with Dana Valleau, E/PRO, February 10, 2004). These areas are typically seeded, fertilized, and irrigated to stabilize bare soils and establish turf. Stabilizing and encouraging vegetative growth on bare soils is a protection and enhancement measure utilized by NYPA.

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The area around the Visitor Center is seasonally planted to make this public area attractive and presentable to the general public. The Discovery Center State Park is also landscaped (by NYSOPRHP) for public presentation. A protection and enhancement measure that is proposed by NYSOPRHP includes planting only native species of vegetation along the Robert Moses Parkway (NYSOPRHP 2003).

Landscaping on non-Project lands is limited to maintaining existing vegetation and seasonal plantings at public facilities, such as Artpark.

4.1.5 Agricultural Activities

NYPA permits farming on several parcels in the investigation area. Agricultural fields are located in two general areas: near the southeast corner of Lewiston Reservoir, which is in the Project Boundary; and northeast of Lockport and Military Roads, which is non-Project land. Agricultural land represents a relatively small portion of the investigation area and is categorized as mowed area in the land management GIS maps (Figure 4.0-1).

The land near the southeast corner of the Lewiston Reservoir is managed for a rotation of crops, which includes a three to four year cycle of hay to one year of row crop cultivation (oats, corn, and wheat). During years of hay production, the area is mowed up to several times a year. During years when the land is cultivated for row crops, fertilizer, lime, and an herbicide are applied to the land and crops. The herbicide, (specifically 2,4-D) is applied to wheat crops to control broad-leaved weeds. No fertilizer or herbicides are applied to the land during times when the land is in hay production.

The land near Lockport and Military Roads is used for hay production. No fertilizers or pesticides are applied to this land. It is mowed up to several times a year to harvest the hay.

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4.2 Road Maintenance

This section considers the management of roads as well as parking lots and walkways within the investigation area. Roads need to be maintained for access and safety. Road maintenance techniques employed in the investigation area include vegetation management, winter maintenance, and infrastructure maintenance. All of these activities are done only as needed. Vegetation management is required along road ROW, and is discussed in Section 4.1. The remaining techniques associated with road maintenance are discussed below.

4.2.1 Winter Maintenance

Given the cold winter climate of the Niagara region, snow plowing, salting, and sanding of roadways and parking areas are the most regular winter maintenance activities performed on roads in the investigation area. These activities are done by NYPA on Project lands only on those roads and parking areas that are related to Project operations. Other roads that are on Project lands are plowed, salted, and sanded by the NYSDOT, local governments, or Niagara University. Roads on non-Project lands are maintained by NYSDOT and local governments.

4.2.2 Road Infrastructure Maintenance

Road infrastructure maintenance includes repaving or resealing roads and parking lot surfaces, painting of lane and parking space lines, and maintenance of curbing, signs, and guide rails. These activities are done by NYPA on Project lands only on those roads and parking areas that are related to Project operations. The NYSDOT, local governments, or Niagara University maintain other roads that are on Project lands. NYSDOT and local governments maintain roads on non-Project lands.

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4.3 Building and Structure Maintenance

Building and structure maintenance occurs on both Project and non-Project lands. Buildings in the investigation area are primarily those that are related to Project operations and recreation facilities. Structures include electric generation and transmission related structures, industrial structures, and recreation facilities. Building and structure maintenance by NYPA on Project lands takes place at the NYPA buildings at the Lewiston Pump Generating Plant (LPGP), the maintenance/equipment warehouse near the forebay, the switchyard, administration offices, the Visitor Center, and at the Robert Moses Power Plant. Building and structure maintenance by other entities on Project lands takes place at the Reservoir Park (NYSOPRHP), Discovery Center (NYSOPRHP) and the Hyde Park Golf Course (City of Niagara Falls). Building and structure maintenance on non-Project lands is performed by other entities including NYSOPRHP, NYSDOT, and the City of Niagara Falls. Maintenance on buildings and structures is only done on an as needed basis and is not necessarily part of a regular land management program. Included in building and Project structure maintenance is control of vegetation as discussed in Section 4.1. Maintenance activities that take place at recreation facilities include vegetation management (see Section 4.1), road and parking lot maintenance (see Section 4.2), and trail maintenance. Trail maintenance is only done as needed and typically includes trimming woody vegetation and keeping trails free of debris.

4.4 Nuisance Wildlife Management

The Power Authority has one area where nuisance wildlife is managed: the Lewiston Reservoir Dike. The animal species that is considered a nuisance is the woodchuck (*Marmota monax*). Woodchucks construct burrows that can damage the structural integrity of the earthen dike structure. Any woodchuck or woodchuck sign (e.g., burrows) seen during the periodic inspections of the dike are reported to facilities maintenance personnel. NYPA personnel contact USDA animal damage control officials who then visit the site and remove the woodchucks (Bill Bergeron, NYPA Maintenance, personal communication with Dana Valleau, February 10, 2004).

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This material is contained in:
Volume 2
Section: Effects of Land Management Practices on Aquatic and Terrestrial Habitats

FIGURE 4.0-1

LAND MANAGEMENT AND MAINTENANCE PRACTICES IN THE INVESTIGATION AREA

[NIP – General Location Maps]

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5.0 DISCUSSION OF POTENTIAL EFFECTS OF LAND MANAGEMENT PRACTICES

This section discusses the potential effects of each type of land management practice on aquatic and terrestrial habitats. Direct effects on habitats may result from vegetation management, which includes mowing, herbicide application, agricultural practices, and the introduction and spread of non-native plants through landscaping practices. Indirect effects on habitats may result from non-point source pollutant runoff from roads, including sand and salt and herbicide applications. These are presented in Table 5.1-1. Direct effects on wildlife species may include mortality from mowing and removal of nuisance wildlife. Indirect effects on wildlife species may include changes in habitat from vegetation management practices.

5.1 Vegetation Management

Vegetation management directly affects habitats through plant removal by mowing or herbicide application. Landscaping-related planting may also directly affect habitats by introducing non-native species.

A field mapping effort was conducted in the investigation area to determine if land management practices are encouraging the growth of invasive plant species. Figure 3.0-12 depicts those portions of the investigation area that were dominated by invasive plant species. Similar to many other urban landscapes, invasive plants are found throughout the Investigation area. Most of the invasive plants found in the study area are early invaders of open or recently disturbed areas. They generally have the ability to quickly colonize bare and recently disturbed soils. Many have seeds that are broadly distributed. There are some common traits shared by many invasive species (Ehrlich 1989; Lodge 1993; Meffe and Carroll 1994; Hobbs 1989). In general, invasive plants are “pioneer species” with short generation times and high rates of reproduction. They often have high dispersal rates and can sometimes spread vegetatively. Invasive plants often have broad environmental tolerances. Many studies have pointed out the importance of human-induced disturbances in creating opportunities for invasive species to colonize terrestrial and aquatic systems (Hobbs 1989). Given the broad distribution of invasive species in the

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study area, and the rapid growth and colonization abilities demonstrated by these plants, it is likely that a single land management entity may have only an incremental effect on the distribution of these undesirable plants.

Crown vetch is one species of plant that some consider invasive. This species was planted by NYPA in order to stabilize soils on the Lewiston Reservoir Dike. Crown vetch is found on portions of the dike, and its presence is directly related to land management and project operations by NYPA. This practice is discussed further in Section 5.1.4.

There is no evidence that other land management practices associated with the operation of the Project are encouraging the growth and spread of invasive species on a large scale. Some land management practices may provide the opportunity for growth of shade-intolerant invasive plant species (e.g., removing tall woody vegetation from ROW, disturbing soil during construction). However, other management practices, such as repetitive mowing and herbicide application may in fact discourage growth of invasive plant species. Studies performed on ROW in the State of New York indicate that ROW areas are more susceptible to non-native colonization (Abrahamson et al. 1998; EPRI 2001). Greater numbers of non-native species were found on ROW uplands as opposed to adjacent unmanaged lands. Human disturbance on ROW from line construction, ROW maintenance, and recreational activity is the probable reason for the difference between the ROW and the adjacent stands. The overall coverage of non-native species on ROW is relatively small, however, and their occurrence should be of limited concern (Abrahamson et al. 1998). The relatively low number of non-native plants in adjacent stands suggests that spread of these species from established ROW areas is not a major issue (EPRI 2001).

Indirect effects on habitat may occur from erosion of disturbed soil, runoff of fertilizers or herbicides, and by changing plant community composition and altering vegetative cover types. Alteration of vegetation can have both detrimental and beneficial effects on habitats and wildlife utilizing those habitats. For example, habitats such as grasslands may be more diverse if they are not mowed frequently. Management of grasslands also discourages the natural process of succession of these habitats to shrub and eventually forested habitats. However, a benefit of vegetation management is the long-term

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maintenance of open field and shrub habitats, which are important habitat types for many wildlife species. These habitats are limited by natural succession that leads to a forested habitat in most situations.

5.1.1 Mowing

Mowed lawn and mowed road ROW areas are categorized within the Terrestrial Cultural habitat subsystem. Mowed lawn areas are found around buildings and other structures and at outdoor recreation facilities. Other mowed areas, such as electric transmission ROW, are classified in the Open Uplands habitat subsystems. These habitats are typically successional old field or shrubland maintained by periodic mowing on a schedule that permits the establishment of shrubs.

Direct effects on habitats may result from mowing. Mowing removes some plants and may encourage the more aggressive growth of others. The result is that frequently mowed areas generally have reduced plant diversity and vegetative structure because mowing prevents the development of other strata (i.e., shrubs and trees) and encourages the growth of herbaceous vegetation. Vegetation management that discourages tree growth in these areas for operational purposes benefits certain habitats and wildlife species by maintaining an open habitat that would otherwise revert to trees.

Direct effects on wildlife in mowed areas may include mortality from contact with mowing equipment and inadvertent harassment while the mowing work is being conducted. Indirect effects on wildlife from mowing may result from changes or maintenance of habitat types that support different types of wildlife. Lawn areas also provide habitat for fewer wildlife species than other open upland habitats, but they do provide habitat for species that prefer short grass areas. Species found in mowed lawn areas include eastern garter snake, ring-billed gull, Canada goose, European starling, blue jay, and American robin (Beak 2002).

Habitats in electric transmission ROW are influenced by vegetation management practices that discourage the growth of tall woody vegetation species that can interfere with electric transmission lines. Removal of tall woody plants discourages natural succession toward forested habitat. Habitats found on

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ROW in the investigation were classified in the Open Uplands subsystem and include the successional old field and successional shrubland communities. ROW management is intended to sustain open upland herbaceous and scrub-shrub type habitats that require little management. Literature suggests that maintenance of these habitats is generally beneficial to species that prefer open habitats but may be detrimental to other species that benefit from natural succession (Marshall et al. 2002). Wildlife species that are found in old field habitats include swallow species, eastern kingbird, American goldfinch, savannah sparrow, eastern meadowlark, red-tailed hawk, American kestrel, woodchuck, meadow vole, red fox, and coyote. Species that are found in shrubland habitats include white-tailed deer, eastern cottontail, coyote, common yellowthroat, yellow warbler, gray catbird, eastern towhee, and song sparrow (Beak 2002).

5.1.2 Herbicides

EPA Registered herbicides are applied on Project lands only as needed, and are limited to areas where mowing or hand and mechanical cutting are not effective in controlling vegetation. The primary herbicides used are various formulations of glyphosate. The formulation depends on the application purpose. For example, certain formulations are designed for use in wetlands and near water, while others are formulated for specific vegetation type applications. Glyphosate is a very effective herbicide and may affect non-target plants it contacts. Herbicides are applied using backpack, hand pressurized, non-motorized equipment, and all pressures are kept as low as operationally possible to avoid overspray and coverage of non-target vegetation (Bill Bergeron, NYPA Maintenance, personal communication with Dana Valleau, E/PRO, February 10, 2004).

Vegetation management on electric transmission ROW's includes the use of herbicides. NYPA utilizes an Integrated Vegetation Management (IVM) strategy that allows the use of herbicide only in those situations where it is effective and necessary (EEANY 2002); (McLoughlin 2002).

Glyphosate is considered essentially non-toxic to mammals and birds (Carlisle and Trevors 1987). This herbicide also strongly adsorbs (holds) to soil and is not expected to move below the topsoil

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layer; residues are expected to be immobile in soil. The Environmental Protection Agency (EPA) states that "Based on current data, EPA has determined that the effects of glyphosate on birds, mammals, fish, and invertebrates are minimal" (USEPA 1993). Further, environmental studies indicate that glyphosate has little indirect effect on animal communities, though its effects on vegetation can influence bird population densities, in both negative and positive ways, depending on the bird species preferred habitat and application prescription (Harrison 1985; Bentsen et al. 1989; Norris 1991; Confer 2000;).

Herbicide application occurs in the Terrestrial Cultural and Open Uplands habitat subsystems. Habitats that may be subjected to herbicide use include any of the aquatic or terrestrial habitats found in the investigation area that are adjacent to areas where herbicide is applied. Direct effects result from direct application of herbicide to vegetation. Indirect effects may result from runoff of excess residual herbicide. However, the literature suggests that the use of herbicides by NYPA on Project lands may have a minimal effect on aquatic and terrestrial habitats in the investigation area. Although the use and manner of herbicide use within the investigation area by others is not fully known by NYPA, the literature suggests that the application of herbicides by others would likely have similar minimal effects on aquatic and terrestrial habitats in the investigation area.

5.1.3 Hand and Mechanical Removal

Hand and mechanical removal is used for vegetation management in situations or areas where mowing and herbicides are not effective in controlling the vegetation. This technique of vegetation management is employed on a very limited basis and has limited effect on habitats in the investigation area. It may occur in any of the habitat subsystems found in the investigation area.

5.1.4 Landscaping and Planting

Landscaping and planting in the investigation area is limited to areas adjacent to buildings, recreation facilities, Project structures, and to some extent along roadways. Any effects resulting from this activity are generally restricted to the immediate area of the activity. Other activities associated with

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landscaping include mowing and trimming vegetation. Preparing an area for new or redesigned planting creates the potential for erosion of soil from these areas. Fertilizer and herbicide residues may also be removed from sites by surface runoff during rain events.

The greatest potential effect from this activity results directly from planting non-native vegetation. Some species of plants used for landscaping may be non-native and some of these species may be considered invasive and detrimental to native plants and natural habitats. Once established in landscaped areas, these plants have the potential to spread seeds beyond these areas into more natural, undisturbed habitats. This is a recognized situation in the vicinity of the Niagara gorge (Evans et al. 2001); (Eckel 2003). Examples of common landscaping species of plants that are considered invasive and are found in the investigation area include Norway maple, Russian and autumn olive, barberry species, and black locust (Eckel 2003). A potential protection and enhancement measure specific to the reestablishment of native vegetation is being examined under a separate study (Issue #20, Habitat Improvement Projects).

Another area where non-native vegetation has been planted in the past is the Lewiston Reservoir Dike. Specifically, crown vetch (*Coronilla* spp.) was planted on the steep side slopes of the dike to prevent soil erosion, aid soil nitrification, and provide a stable ground cover that required little maintenance. Though still considered a good plant for these purposes, a number of land managers and botanical groups consider crown vetch to be potentially invasive to highly invasive, depending on the setting. For example, in a forest management setting, crown vetch is considered highly invasive as it suppresses the establishment and growth of tree seedlings, preventing forest regeneration. Likewise, in a grassland setting, crown vetch will also suppress the growth of native grasses. On the Lewiston Reservoir Dike this characteristic is desirable. Crown vetch is found in patches on the north, east, and south side of the Lewiston Reservoir Dike, interspersed with other vegetation such as goldenrod (*Solidago* spp.) and various grass species.

Areas that are landscaped occur within the Terrestrial Cultural subsystem. Common species found in these habitats can include American robin, European starling, and gray squirrel. Landscaping activities may also affect adjacent habitats by increasing the opportunity for the spread of non-native plant

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seeds into those areas. Habitats that are of particular interest because they are mapped natural communities described by Reschke (1990) and have non-native plants growing in them include the calcareous cliff, calcareous talus slope woodland, and limestone woodland communities.

Landscaping within the investigation area is performed in a limited area. Landscaping in the heavily urbanized Niagara region is widespread.

5.1.5 Agricultural Activities

The agricultural activity that occurs within the investigation area is on both Project and non-Project lands. The primary activities are hay production and row-crop cultivation. Hay production involves mowing several times a growing season. Lands in hay production in the investigation area are not fertilized and no pesticides are applied to them. Row-crop cultivation requires intensive use of machinery on the land to till, manage, and harvest the crops. In the investigation area, row-crops are planted every three to four years on a rotation with hay. Fertilizers, lime, and pesticides are utilized during the row-crop rotation. Effects from row-crop agriculture may include reduction of habitat diversity, an increased potential for soil erosion, reduction in soil nutrients, and nutrient and pollutant loading of water bodies (USDA 1992). Benefits of agriculture include providing and maintaining open habitat and food source for several species of wildlife including white-tailed deer, American crow, and Canada goose. Agricultural activities in the investigation area occur in the Terrestrial Cultural subsystem.

5.2 Road Maintenance

The presence of roads and highways has increased the amount of impervious area and has changed natural drainage patterns. This may lead to increases in runoff volume and velocity. The primary potential effects from parking lot and road maintenance result from stormwater runoff and pollutants found in runoff. Pollutants such as heavy metals, aromatic hydrocarbons, and suspended solids can accumulate on the road surface as a result of regular highway operation and maintenance activities. These pollutants include sand and salt applied to roads during the winter season and oil, grease, rust,

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hydrocarbons, rubber particles, and other solid materials (FHWA 1999). This runoff has the potential to affect any of the habitat types found in the investigation area.

The NYNHP has noted that stormwater runoff from city streets and parking lots may introduce various types of chemicals and petroleum products into the calcareous talus slope woodland community at the base of the cliff (Evans et al. 2001). Roads in the investigation area that may contribute runoff to this cliff community include the road that descends from Hyde Park Boulevard across the gorge rim down to the RMNPP tailrace north of Devil's Hole, portions of the Robert Moses Parkway, and parking and road areas adjacent to the Visitor Center and NYPA administration offices. All of the aquatic and terrestrial habitats adjacent to parking lots and roads within the investigation area are potentially subject to road runoff.

5.2.1 Winter Maintenance

Given the cold winter climate of the Niagara region, snow plowing, salting, and sanding of roadways and parking areas is the most regular winter maintenance activity performed in the investigation area. Recognized impacts from these activities include siltation of surface waters and salt accumulation in habitats that receive stormwater runoff from snow melt and from road surfaces (USEPA 1999). Road salts applied to parking lots and roadways can enter the air, soil, groundwater, and surface water from direct application or snowmelt runoff, release from surface soils, and by windborne spray (Wegner and Yaggi 2001). Road salts can inhibit soil bacteria function, injure some species of plants, encourage growth of other species of plants (especially coastal species of cattail and common reed), impact wildlife (directly by lethal doses and attracting wildlife into roadways, indirectly by degrading habitat), and may decrease diversity of aquatic benthic invertebrates (Wegner and Yaggi 2001). Therefore, winter maintenance activities have the potential to affect habitats found in the investigation area that are adjacent to parking lots or roads. These habitats include all subsystems found in the investigation area.

The Niagara region is heavily urbanized, and winter road maintenance is widespread and performed by NYSDOT, local governments, other agencies, corporations, and private individuals.

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5.2.2 Road Infrastructure Maintenance

Road infrastructure maintenance includes repaving or resealing parking lot surfaces, painting of parking space lines, maintenance of curbing, signs, and guide rails. Research performed by the Transportation Research Board of the National Research Council has found that some road construction and repair materials are potentially harmful to the environment in their pure form, but the potential decreases or disappears when the materials are mixed with other components (NCHRP 2000). These studies found little to no harm to the environment from highway materials leachate.

These activities are relatively isolated to the immediate area of their application and probably have little to no discernible effect on aquatic and terrestrial habitats in the investigation area.

5.3 Building and Structure Maintenance

Building and structure maintenance activities and their locations are described in Section 4.3. Building maintenance activities are mostly limited to areas within and around buildings and probably have little to no discernable effect on aquatic and terrestrial habitats in the investigation area. Structure maintenance is also generally limited to the immediate vicinity of the subject structure. Maintenance and use of recreation facilities however potentially has an effect on habitats in the investigation area because a large percentage (33%) of the land in the investigation area is used for recreation purposes.

5.4 Nuisance Wildlife Management

Control of nuisance wildlife on Project lands (i.e., woodchucks at Lewiston Reservoir) is done only as needed, and directly affects a small number of individual animals annually. Woodchucks are known for digging extensive burrows. These burrows have the potential to damage the structural integrity of the earthen Lewiston Reservoir Dike. Woodchucks are common in the area and animals being controlled at the Reservoir are likely surplus individuals moving into the Project from adjacent lands.

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The removal of these individuals from the population has a minimal effect on the rest of the woodchuck population, and has no effect on aquatic or terrestrial habitats.

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TABLE 5.1-1

HABITATS AND POTENTIAL EFFECTS OF LAND MANAGEMENT PRACTICES*

System	Subsystem	Community	Factors that Contribute to Potential Negative Effects	Factors that Contribute to Potential Positive Effects
Riverine	Natural Stream	Main Channel Stream	Road runoff, herbicide runoff	
	Riverine Cultural	Canal	Road runoff, herbicide runoff	
		Ditch/artificial intermittent stream	Road runoff, herbicide runoff	
Lacustrine	Lacustrine Cultural	Reservoir	Road runoff, herbicide runoff	
Palustrine	Forested Mineral Soil Wetlands	Forested Wetland	Road runoff, herbicide runoff	
Terrestrial	Open Uplands	Calcareous Cliff	Landscaping, road runoff	
		Successional Old Field	Mowing, herbicide	Mowing, herbicide
		Successional Shrubland	Mowing, herbicide	Mowing, herbicide
	Barrens and Woodlands	Calcareous Talus Slope Woodland	Landscaping, road runoff	
		Limestone Woodland	Landscaping, road runoff	
	Forested Uplands	Successional Northern Hardwoods	Road runoff	

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TABLE 5.1-1 (CONT.)

HABITATS AND POTENTIAL EFFECTS OF LAND MANAGEMENT PRACTICES

System	Subsystem	Community	Factors that Contribute to Potential Negative Effects	Factors that Contribute to Potential Positive Effects
	Terrestrial Cultural	Active Agriculture	Mowing, herbicides, landscaping, road runoff, agriculture	Mowing, herbicides, landscaping, agriculture
		Commercial		
		Community		
		Industrial		
		Mowed Grass		
		Outdoor Recreation		
		Residential		
		Transportation		

* For a description of effects, negative or positive, see text of Section 5.0.

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6.0 CONCLUSIONS

The purpose of this investigation was to assess the potential effects of land management practices on aquatic and terrestrial habitats. The investigation area for this report includes lands within the Project Boundary and other lands owned by NYPA and encompass approximately 1,744 acres in the Towns of Niagara and Lewiston, the City of Niagara Falls, and the Village of Lewiston, New York. NYPA manages approximately 565 acres (32%) of this land area. Land management practices that occur within the investigation area include vegetation management, road maintenance, building and structure maintenance, and nuisance wildlife management.

- ·A number of aquatic and terrestrial habitats were identified over the course of this investigation. Four habitat systems were identified in the investigation area. Within these four systems, eight subsystems and 19 communities were recognized.
- ·Nine different land management practice categories were identified and analyzed as part of this report. These include mowing, herbicide application, hand and mechanical removal of vegetation, landscaping and planting, agriculture, winter road maintenance, road infrastructure maintenance, building and structure maintenance, and nuisance wildlife management. Of these, those associated with vegetation management and road maintenance have the greatest potential for directly and indirectly affecting aquatic and terrestrial habitats.
- ·Road maintenance activities and the associated runoff have the potential to affect every habitat type identified in the investigation area. Vegetation management practices have the potential to affect (1) water bodies with herbicide runoff, (2) Open Uplands by mowing, herbicide application, and landscaping, (3) Barrens and Woodlands by landscaping with non-native plant species, and (4) Terrestrial Cultural habitats by mowing, herbicide application, landscaping, and agricultural practices.

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- ·The two land management practices that have the greatest potential to effect aquatic and terrestrial habitats are road and parking lot runoff and landscaping with non-native plant species. Runoff from roads and parking lots can affect water quality through introduction of heavy metals, aromatic hydrocarbons, suspended solids, and sand and salt via surface runoff. The planting of non-native vegetation can encourage the spread of these plants and the displacement of native vegetation. Roads and parking lots and planting of non-native vegetation is widespread throughout the Niagara Region and occurs both inside and outside of the investigation area.
- ·Direct effects on habitats can result from direct removal/management of vegetation and landscape alteration from mowing, herbicide use, cultivation, and landscaping. These practices can benefit habitats by providing long-term maintenance of open field and shrub habitats. Repetitive mowing and herbicide use may also provide benefits to habitats by discouraging the growth of invasive species. Direct effects to wildlife species resulting from these activities can include inadvertent harassment of individuals and accidental mortality. Direct effects on vegetation can lead to indirect effects on wildlife species through alteration of habitat types, interruption of natural succession, runoff of herbicides and fertilizers, and soil erosion.
- Invasive species as recognized by the Invasive Plants Council of New York (http://www./nysm.nysed.gov/ipcnys) were identified and mapped in the investigation area. A number of these species occurred in every habitat subsystem identified as part of this investigation. The purpose of this mapping effort was to determine if there is a link between land management practices in the investigation area and the growth and spread of these species. The only discernible connections between land management practices and growth and spread of invasive plants are 1) the planting of invasive species for landscaping purposes, 2) application and subsequent runoff of road salt that may encourage the growth of common reed, 3) removal of tall woody vegetation that may increase the opportunity for the establishment of

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invasive plants that are shade-intolerant, and 4) managing the Lewiston Dike to maintain the growth of crown vetch, a potentially invasive species.

- Current protection and enhancement measures utilized by NYPA in their management of these lands include the use of Integrated Vegetation Management (IVM) strategies for ROW management, requiring annual staff training on herbicide use, use of low-impact herbicide application practices, and stabilizing and encouraging vegetation growth on bare soils. Any additional potential protection and enhancement measures will be addressed during the preparation of management plans and final designs of the approved Habitat Improvement Projects (HIPs) and in the Land Management/Vegetation Management Plan.

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GLOSSARY

Infrastructure	The often unseen or overlooked network of services provided for the community. Infrastructure often includes roads, water, wastewater and stormwater pipes, treatment facilities, and parks.
Investigation area:	Land within the Project Boundary and NYPA-owned lands in the vicinity of the Niagara Power Project.
Management:	The act or art of managing; the manner of treating, directing, carrying on, or using, for a purpose; conduct; administration; guidance; control;
Non-Project lands:	NYPA-owned lands that are outside of the project boundary.
Project Boundary:	The perimeter of those lands needed for project-related purposes.
Project lands:	Lands found within the Project Boundary.
Project structures:	Structures related Project operations. These structures include the two Niagara River intake structures, two underground conduits and pump stations, the forebay, the Lewiston Reservoir and Lewiston Pump Generating Plant, the Robert Moses Niagara Power Plant, and the Niagara switchyard.

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