City of Kingston Environmental Assessment For A Third Crossing of the Cataraqui River – Stage 2 Terrestrial Ecological Assessment and Analysis

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1.0 GENERAL INTRODUCTION

The City of Kingston has initiated an Environmental Assessment (EA) to assess the need for and feasibility of implementing additional transportation capacity across the Cataraqui River. The EA is proceeding as a Schedule 'C' Class EA as per the Ontario Municipal Class EA process. It must also address the federal EA framework as per the Canadian Environmental Assessment Act. The EA process is being undertaken in two stages. Stage 1 focused on the needs assessment and a number of river crossing options. Stage 1 recommended a bridge crossing at John Counter Boulevard and Gore Road as the preferred option (Figure 1).

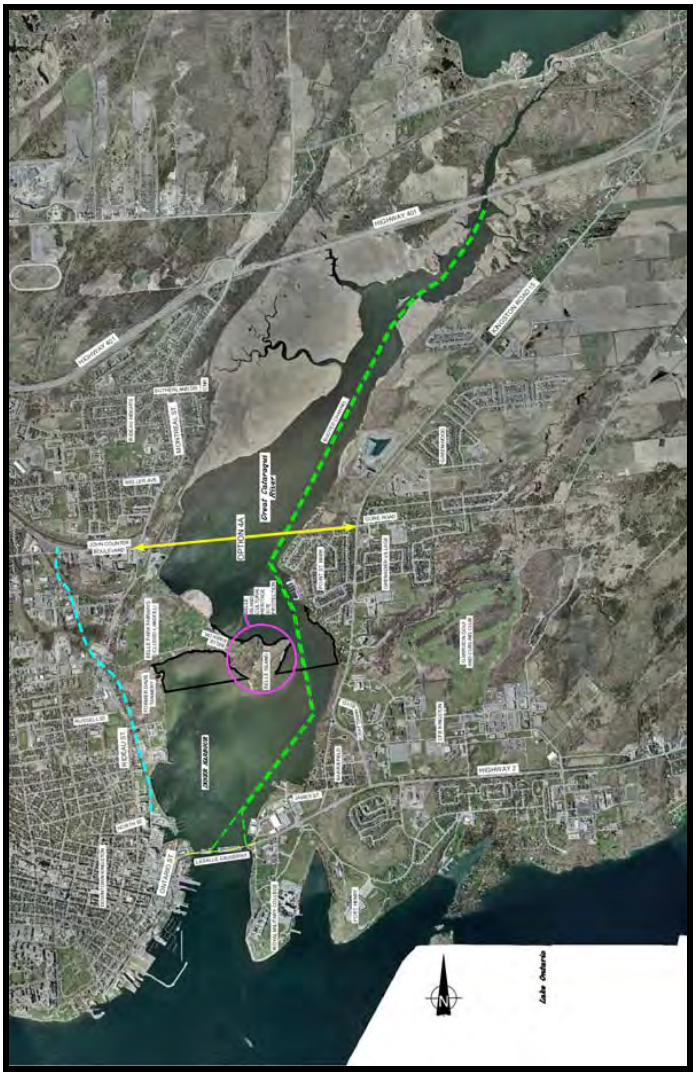

Figure 1: Preferred Corridor (Source: J.L. Richards & Associates)

In May 2010, the City of Kingston authorized that Stage 2 of the EA proceed, which will complete the EA. Stage 2 will examine the potential impact of a crossing within the preferred corridor in more detail.

This report provides details of the terrestrial ecological fieldwork undertaken by Ecological Services within the preferred corridor (the marine ecological fieldwork is being addressed in a report by others). It is divided into the following four sections:

1. Section 2 deals with the Ecological Land Classifications for the east and west side lands.

2. Section 3 discusses the faunal inventory findings.

3. Section 4 deals with the Greater Cataraqui Marsh wetland vegetation.

4. Section 5 assesses in-water bridge construction options and their potential impacts.

2.0 ECOLOGICAL LAND CLASSIFICATIONS

2.1 Methodology

Ecological Land Classification (or ELC) is an integrated approach to surveying and classifying land and resources. The goal of such classification is to reduce complex natural variation to a reasonable number of meaningful ecosystem units. Many jurisdictions have developed ecological classification schemes. The ELC system developed for southern Ontario by Lee *et al.* (1998) was used for this report.

Development of the ELC mapping for this report involved a number of site visits (June 14, 2008; May 26 and June 11, 2009; and July 25, July 28, August 27 and September 3, 2010) to the two terrestrial shoreland areas within the preferred corridor. Ecological

Services also undertook an aerial reconnaissance of the preferred corridor on August 24, 2010 in order to have the most up-to-date base imagery.

2.2 Observations

2.2.1 West Side Lands

As shown on Figure 2, the west side lands extend from the Cataraqui River shoreline west along John Counter Boulevard to Montreal Street. There are no ELC community types in this area, as defined by Lee *et al.* (1998). The land is dominated by cultural influences, including a public boat launch, the Music Marina, single dwellings, light industries, the River Park townhouse development and the Village On The River apartments.

Figure 2: West Side Lands (Source: Ecological Services)

Manitoba Maple is the main tree species present, growing along the road edges and on the residential properties. Ornamental garden plants are also present on some of the residential lots. European Buckthorn is the main shrub in the area. The bulk of the ground cover plants are weedy species typically found along road edges such as Ragweed, Burdock, Sow Thistle, and Mullein.

2.2.2 East Side Lands

As shown on Figure 3, the east side lands extend from the Cataraqui River east along the Gore Road right-of-way to Kingston Road 15. The area is bound by the Pittsburgh Branch of the Kingston Frontenac Public Library (Gore Road Library) to the north and the Point St. Mark neighborhood to the south.

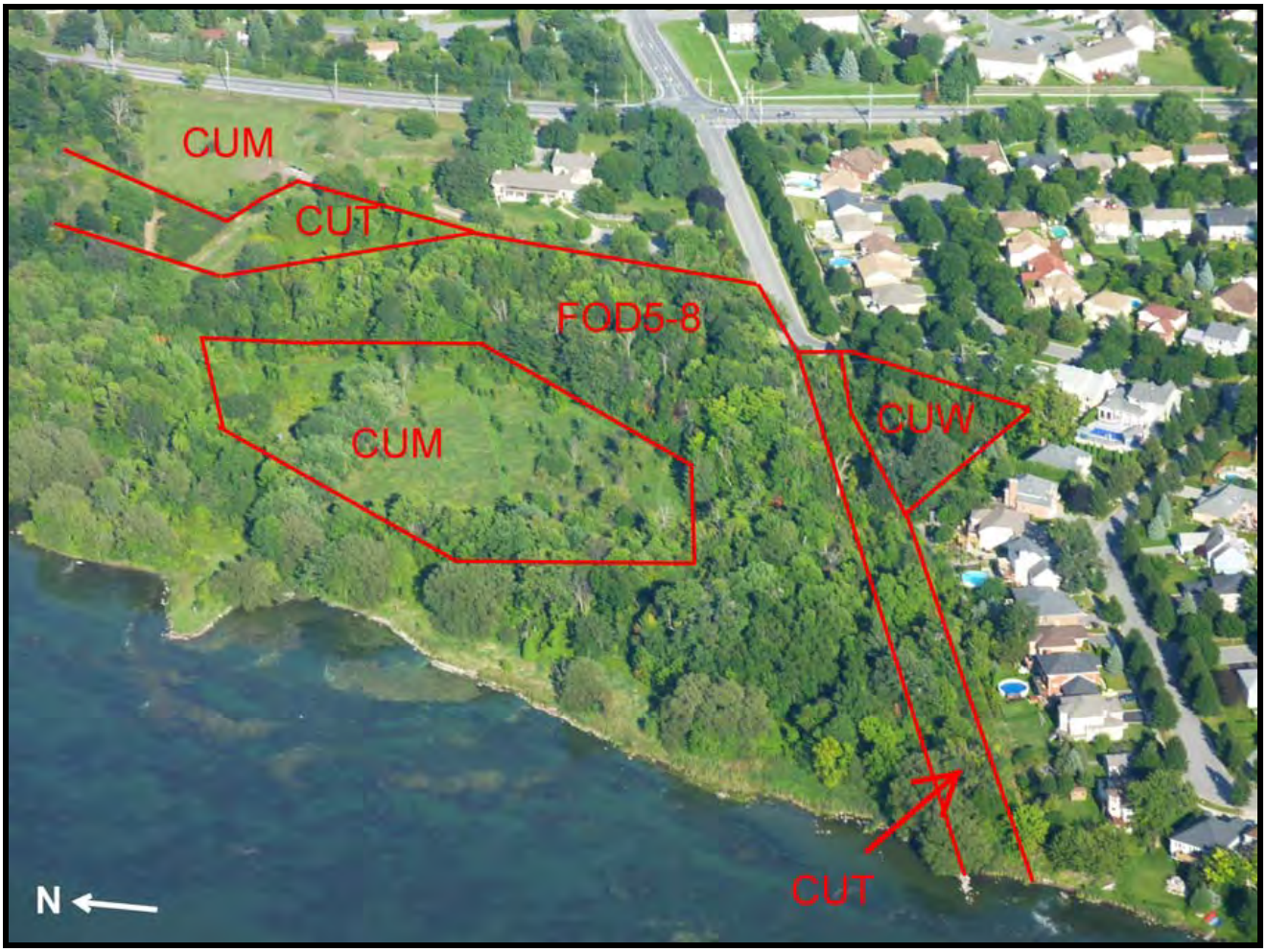

Figure 3: East Side Lands and ELC Designations (Source: Ecological Services)

There are four ELC community types found on the east side lands, as highlighted above on Figure 3 and discussed below:

1. (A) A *Cultural Thicket (CUT)* community type is found within the Gore Road right-of-way. It is characterized as having a shrub cover greater than 25 percent and a tree cover of less than 25 percent.

   There are a few large diameter Sugar Maple, Red Oak, White Oak and Bur Oak trees that are likely over 100 years old, and a number of shrub-sized White Ash and Manitoba Maple, but the overall dominant species that characterizes this area is European Buckthorn. Other shrub species include Tartarian Honeysuckle, Staghorn Sumac, and Riverbank Grape. The ground cover is mostly weedy non-native species such as Knapweed, Burdock, Trefoil, Fragrant Bedstraw (native), Thistles, Dames Rocket, Crown Vetch, and Garlic Mustard. Many of the dominant plant species present are considered Category I invasive species (Smith 2002). Category I species are those species that can dominate a site to the exclusion of all other species and remain on-site indefinitely.

   Site disturbances include an underlay of large rock fill that appears to have been relatively recently laid down, making much of the Gore Road right-of-way roughly 6 to 8 meters (m) higher in elevation than the woodlot to the north. As well, yard waste and detritus have been dumped into this area.

   The shoreline component (about the first 20 m) of the Gore Road right-of-way is dominated by tree cover, but this area is too small to be considered a separate ELC community. The main tree species along the shoreline is Crack Willow, but Manitoba Maple and European Buckthorn are also noted down to the shoreline. Off-shore, there is little wetland vegetation, possibly due to the deposited rock fill and the existing limestone pavement. A fringe of Narrow-leaved Cattails extends to the north and south.

(B) A CUT patch is also located west of the Gore Road Library, and extends into the fenced leash-free dog park. Weedy species are common. Riverbank Grape is abundant along with Buckthorn and Staghorn Sumac, though there is no clear dominant species. Manitoba Maple is the most common tree.

2. *Dry-Fresh Sugar Maple – White Ash Deciduous Forest (FOD5-8)* is found north of the Gore Road right-of-way and extends northward in fragmented segments to the Pittsburgh quarry operation. This forest type is typical of lands that have a history of disturbance.

The dominant canopy tree species is Sugar Maple, with lesser amounts of White Ash. Manitoba Maple, Ironwood, Black Cherry, Shagbark Hickory, Basswood, Red Oak and White Oak are also present. In 1945, 1953, 1962 (see Figure 4), and 1978 aerial photographs, much of the FOD5-8 forest is seen being used for agricultural purposes. This coincides with the mostly young age of the woodlot, with many of the trees in the 30-year range. There are a few older trees in the 80-100 year range that, in the historic aerial photographs, are isolated within the agricultural areas.

This woodlot has a high degree of edge due to its uneven shape, and has high fragmentation due to the numerous trails within it. Common trees in the edge include Manitoba Maple and White Ash, but European Buckthorn dominates, with Garlic Mustard as a common understory plant. Overall, the Buckthorn-dominated edge areas are almost greater in size than the area dominated by Sugar Maple.

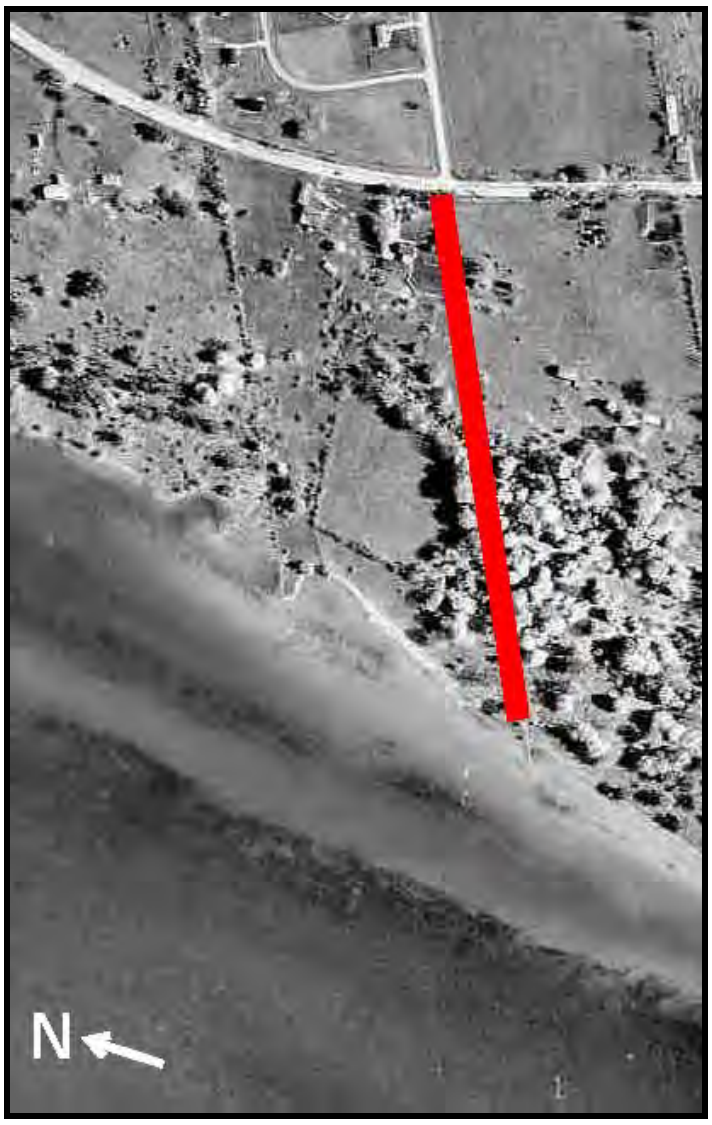

Figure 4: 1962 Aerial Photograph – East Side Lands (Base Image: 1962 aerial photograph)

As shown on Figure 5, the woodlot contains two drainage routes that collect groundwater from the Point St. Mark neighborhood and direct it to the Cataraqui River. During the numerous site visits in 2009 and 2010, the drainage routes were seen to be dry only once, but they do not provide fish habitat. The more easterly drainage route discharges at the base of the rock fill, near the current Gore Road-Point St. Mark Drive intersection.

Figure 5: East Side Lands Drainage Routes [Shown by Circles] (Source: Ecological Services)

As shown on Figure 6, the second drainage route discharges within the FOD5-8 area, roughly 50 m west and 20 m north of the first discharge point at the base of the rock fill.

Figure 6: East Side Lands Drainage Route Discharge Point in FOD5-8 (Source: Ecological Services)

The shoreline component of the FOD5-8 area has an approximate 15 m wide verge of wetland vegetation that is too small to be considered a separate ELC community type.

3. The *Cultural Woodland (CUW)* area is found in the southwest quadrant of the Gore Road-Point St. Mark Drive intersection. This area also may be too small (i.e., less than 0.5 hectares) to be considered a separate ELC type, but it is noted here. Like the nearby FOD5-8 woodland, Sugar Maple and White Ash are common, but numerous other tree species are also present, many of which were likely planted. The ground cover and shrub layers are mostly weedy non-native species.

4. The two *Cultural Meadow (CUM)* patches, like most cultural meadows within urban settings, are dominated by weedy species and both have a history of

disturbance. The more easterly CUM area adjacent to Kingston Road 15 is part of the fenced leash-free dog park.

2.3 Discussion

2.3.1 West Side Lands

The west side lands demonstrate a high degree of anthropogenic-based disturbance and alteration, and are predominantly a cultural landscape. No trees that are listed in either the provincial *Endangered Species Act* or the federal *Species at Risk Act* (SARA) are present. It should be noted that as per Sections 3.9 and 3.10 of the City of Kingston (City) Official Plan, an area extending 30 m along the Cataraqui River shoreline measured from the river's high water mark is designated as an 'Environmental Protection Area'. Its intent is to encourage the protection of a 'ribbon of life' along the waterfront and, within the EA study area in particular, delineate Parks Canada's administrative role regarding shoreland areas along the Rideau Canal. Landscaping as well as passive trail/open space development may be permitted in affected designated areas, subject to review and approval by the City, Parks Canada and the Cataraqui Region Conservation Authority (CRCA).

From an ELC standpoint, the west side lands are of low ecological value. There is little ecological impediment to preparing Stage 2 EA conceptual and preferred bridge and related road, landscape and public realm designs on the west side lands, to support future detail designs and project implementation. This represents an opportunity for a degree of ecological restoration by creating a more naturalized landscape that mitigates the extensive environmental disturbance and alteration in this area. This in turn could further serve to enhance both the 'ribbon of life' along the shoreline in this area and visitor experience of the Rideau Canal.

2.3.2 East Side Lands

There are three ecological considerations regarding the natural habitats on the east side lands. First, the CRCA, in its 2006 Natural Heritage Study, identified the woodlands on the east side as 'significant'. This broad study of the City of Kingston and Loyalist Township was based on literature reviews, remote sensing data and limited ground-truthing. Still, the woodlands identified therein have subsequently been brought forward into the Official Plan as part of the City's natural heritage system of 'Provincially Significant Woodlands' and 'Contributory Woodlands'. In general, proposed developments in areas identified as such will not be permitted unless an environmental impact assessment confirms their significance (or lack thereof) through fieldwork and demonstrates that there will be no negative impacts.

The woodlands affecting the east side lands (FOD5-8 and particularly CUW) also demonstrate anthropogenic disturbances, including: historic agricultural land uses; yard waste and detritus dumping; trails on the Gore Road Library property, which have fragmented this forest block; non-native (some invasive) plant species; and surrounding urban land uses to the south (Point St. Mark neighborhood) and east (Gore Road Library, fenced leash-free dog park, Kingston Road 15), as well as a prospective residential development and the existing Pittsburgh quarry operation to the north. As a result, and despite there being some aerial extent, the forest block is largely isolated, such that linkages to other forested lands are significantly affected. Moreover, none of the trees observed are listed in either the provincial *Endangered Species Act* or the federal SARA. Though there are some very large mature trees, the east side lands are generally lacking the key characteristics of an old-growth forest. Overall, the woodlands on the east side lands should not be considered 'significant'.

Second, the two drainage routes that collect groundwater from the Point St. Mark neighborhood and direct it to the Cataraqui River should be considered to be watercourses. As stated earlier, during the numerous site visits in 2009 and 2010, these channels were seen to be dry only once, but they do not provide fish habitat.

Finally, like on the west side lands, an 'Environmental Protection Area' extends 30 m along the Cataraqui River shoreline measured from the river's high water mark. Again, its intent is to encourage the protection of a 'ribbon of life' along the waterfront and, within the EA study area in particular, delineate Parks Canada's administrative responsibility regarding shoreland areas along the Rideau Canal.

From an ELC standpoint, the east side lands are of greater ecological value than the west. Still, its value should be considered moderate, and as such, there is little impediment to preparing Stage 2 EA conceptual and preferred bridge and related road, landscape and public realm designs, to facilitate future detail design and project implementation. Having stated this, the following should be considered as part of this process:

1. The feasibility of minimizing the removal of mature trees as part of site preparation and bridge construction activities should be determined. This could represent an opportunity for the continuance of existing ecosystem features and functions. If this is not an option, reforestation and landscape design provisions could represent an opportunity for ecological compensation in this area by creating a more naturalized landscape. This in turn could further serve to improve both the 'ribbon of life' along the shoreline in this area and visitor experience of the Rideau Canal.

2. It is possible that bridge construction activities could alter or disrupt the two drainage channels that collect groundwater from the Point St. Mark neighborhood. Though these watercourses do not provide fish habitat, any alteration would require prior approval from the CRCA. The feasibility of incorporating the watercourses into the landscape and public realm designs should also be determined.

3.0 FAUNAL SPECIES INVENTORY

The fieldwork on faunal species was conducted during 2010 concurrent with the ELC fieldwork on the terrestrial portions of the preferred corridor and surrounding areas.

3.1 Methodology

3.1.1 Turtle Trapping

Turtle trapping was undertaken at the preferred corridor and surrounding areas. Hoop traps and basking traps were used. The hoop traps were baited with sardines and set such that a portion of the enclosure was above water, thereby allowing any trapped turtles to surface for air. The basking traps are more passive in that they provide a basking surface for the turtles. Turtles that slipped off this surface went into the interior of the trap, from where they were able to surface for air, but not to escape.

Traps were placed in a site and their locations marked, as shown on Figure 7 (note Figure 7 shows locations where both hoop and basking traps were placed in proximity to each other). Site visits were then carried out from July to September, 2010 (i.e., July 7, 8, 15, 16, 26, 27; August 6, 7, 13, 14, 18, 19, 25; and September 2, 3, 19, 20). Parks Canada resource management personnel were advised of site visit dates in order to coordinate fieldwork activities. Weather forecasts were also checked to determine days that would have the highest probability for trapping the turtles. The traps were inspected late in the day, then left overnight and re-visited and removed the following day. In this way, no turtle remained in a trap for over 24 hours. Information sought on the trapped turtles included date of inspection, species, weight, sex, length, location and photographic documentation.

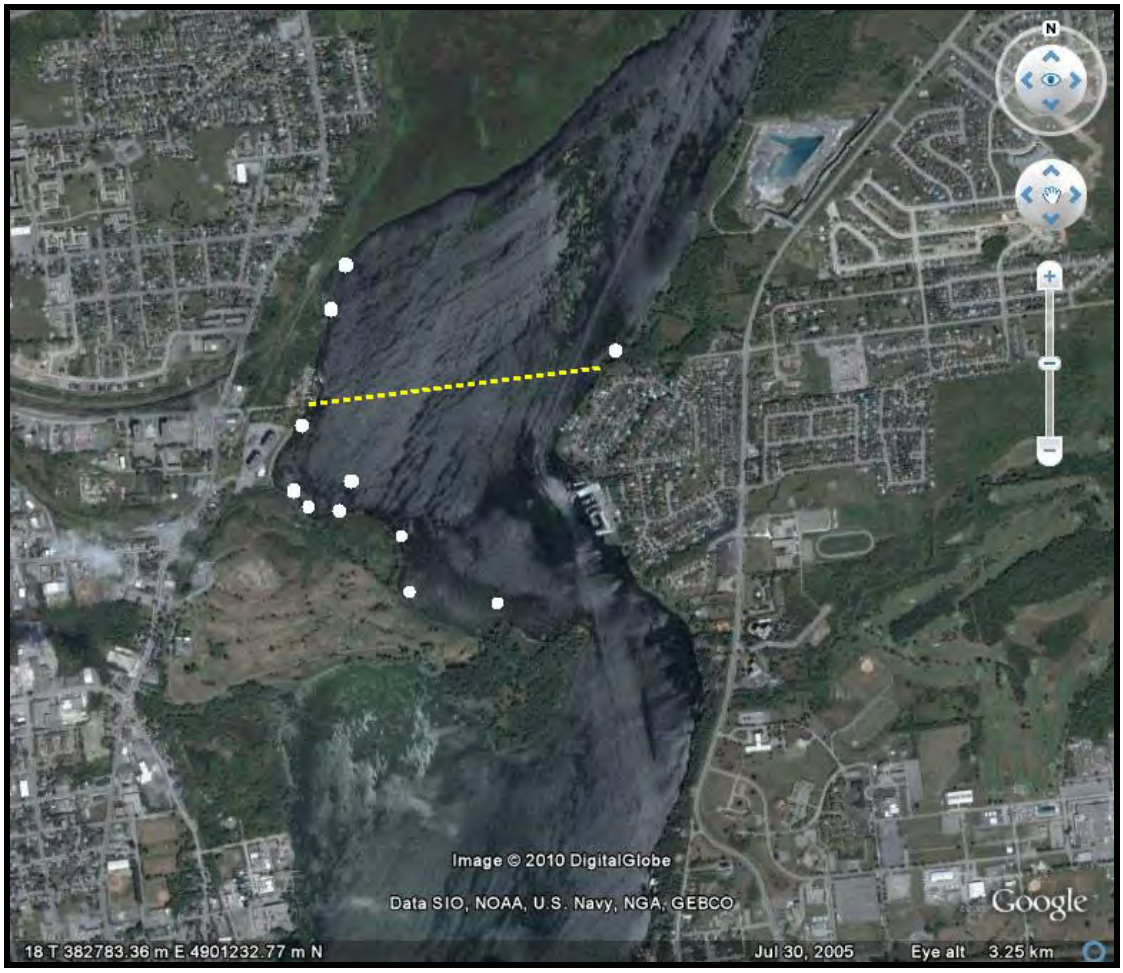

Figure 7: Turtle Trapping Locations (White) and Preferred Corridor (Yellow) (Base Image: Google Earth)

3.1.2 Birds

Birds were surveyed by Ecological Services in 2008, 2009 and 2010. Most identifications were made by sight and/or call, but recorded calls were also used to lure certain target species, particularly species at risk and/or species with historical but no recent records of sightings.

3.1.3 Other Fauna

Other animal species were not surveyed specifically, but any observations made were recorded during the site visits. Anecdotal reports from area residents were also noted.

3.2 Observations

3.2.1 Turtles

Very few turtles were observed or caught during the 2010 fieldwork. Anecdotally, area residents commented that there were usually more turtles observed, but that numbers were low for that year. The fieldwork results are summarized in Table 1 below.

Table 1
Summary of 2010 Fieldwork Observations: Turtles

Date	Trap Type	Species	Weight (g)	Sex	Length (cm)	Location
07-26-10	Observed	Snapping	n/a	n/a	n/a	n/a
08-13-10	Basking	Painted	300	Male	13	N44° 15.712' W076° 28.654'
08-13-10	Basking	Painted	200	Female	11	N44° 15.712' W076° 28.654'
08-25-10	Observed	Painted	n/a	n/a	n/a	n/a

3.2.2 Birds

Bird species observed during the 2008-2010 fieldwork are summarized in Table 2 below.

Table 2
Summary of 2008 – 2010 Fieldwork Observations: Birds[1]

Species Name	Common Name	S-Rank	COSEWIC	MNR	Track	Family
Agelaius phoeniceus	Red-winged Blackbird	S5B			N	ICTERIDAE
Aix sponsa	Wood Duck	S5B			N	ANATIDAE
Anas americana	American Wigeon	S4B				ANATIDAE
Anas platyrhynchos	Mallard	S5B			N	ANATIDAE
Anas rubripes	American Black Duck	S4B			N	ANATIDAE
Anas strepera	Gadwall	S4B			N	ANATIDAE
Ardea herodias	Great Blue Heron	S5B			N	ARDEIDAE
Aythya affinis	Lesser Scaup	S4B			N	ANATIDAE
Aythya collaris	Ring-necked Duck	S5B			N	ANATIDAE
Aythya marila	Greater Scaup	S4B			N	ANATIDAE
Bombycilla cedrorum	Cedar Waxwing	S5B			N	BOMBYCILLIDAE
Branta canadensis	Canada Goose	S5B			N	ANATIDAE
Bucephala albeola	Bufflehead	S4B			Y	ANATIDAE
Bucephala clangula	Common Goldeneye	S5B			N	ANATIDAE

[1] Data presentation and rarity information modified from the Natural Heritage Information Center (NHIC) website: < http://nhic.mnr.gov.on.ca/ >. The S-rank designates rarity in Ontario as follows: *S3* (Vulnerable – Vulnerable in the nation or state/province due to a restricted range, relatively few populations [often 80 or fewer]), recent and widespread declines, or other factors making it vulnerable to extirpation); *S4* (Apparently Secure – Uncommon but not rare; some cause for long-term concern due to declines or other factors); *S5* (Secure – Common, widespread and abundant in the nation or state/province); and *SNA* (Not Applicable – A conservation status rank is not applicable because the species is not a suitable target for conservation activities). *B* refers to breeding status; *SC* is a species of Special Concern; and *NAR* is a species that has been evaluated, but is considered Not at Risk.

Table 2
Summary of 2008 – 2010 Fieldwork Observations: Birds (contd.)

Species Name	Common Name	S-Rank	COSEWIC	MNR	Track	Family
Butorides virescens	Green Heron	S4B			N	ARDEIDAE
Cardinalis cardinalis	Northern Cardinal	S5			N	CARDINALIDAE
Carduelis tristis	American Goldfinch	S5B			N	FRINGILLIDAE
Charadrius vociferus	Killdeer	S5B			N	CHARADRIIDAE
Chlidonias niger	Black Tern	S3B	NAR	SC	Y	LARIDAE
Cistothorus palustris	Marsh Wren	S5B			N	TROGLODYTIDAE
Colaptes auratus	Northern Flicker	S4B			N	PICIDAE
Corvus brachyrhynchos	American Crow	S5B			N	CORVIDAE
Cygnus columbianus	Tundra Swan	S4B			N	ANATIDAE
Dendroica petechia	Yellow Warbler	S5B			N	PARULIDAE
Dryocopus pileatus	Pileated Woodpecker	S5			N	PICIDAE
Dumetella carolinensis	Gray Catbird	S5B			N	MIMIDAE
Fulica americana	American Coot	S4B	NAR	NAR	N	RALLIDAE
Gallinula chloropus	Common Moorhen	S4B			N	RALLIDAE
Geothlypis trichas	Common Yellowthroat	S5B			N	PARULIDAE
Hirundo rustica	Barn Swallow	S5B			N	HIRUNDINIDAE
Hydroprogne caspia	Caspian Tern	S3B	NAR	NAR	Y	LARIDAE
Icterus galbula	Baltimore Oriole	S4B			N	ICTERIDAE
Larus argentatus	Herring Gull	S5B			N	LARIDAE

Table 2
Summary of 2008 – 2010 Fieldwork Observations: Birds (contd.)

Species Name	Common Name	S-Rank	COSEWIC	MNR	Track	Family
Larus delawarensis	Ring-billed Gull	S5B			N	LARIDAE
Lophodytes cucullatus	Hooded Merganser	S5B			N	ANATIDAE
Melospiza georgiana	Swamp Sparrow	S5B			N	EMBERIZIDAE
Melospiza melodia	Song Sparrow	S5B			N	EMBERIZIDAE
Mergus merganser	Common Merganser	S5B			N	ANATIDAE
Molothrus ater	Brown-headed Cowbird	S5B			N	ICTERIDAE
Myiarchus crinitus	Great Crested Flycatcher	S4B			N	TYRANNIDAE
Pandion haliaetus	Osprey	S4B			N	ACCIPITRIDAE
Passer domesticus	House Sparrow	SNA			N	PASSERIDAE
Phalacrocorax auritus	Double-crested Cormorant	S4B	NAR	NAR	N	PHALACROCORACIDAE
Picoides pubescens	Downy Woodpecker	S5			N	PICIDAE
Picoides villosus	Hairy Woodpecker	S5			N	PICIDAE
Podilymbus podiceps	Pied-billed Grebe	S4B			N	PODICIPEDIDAE
Poecile atricapillus	Black-capped Chickadee	S5			N	PARIDAE
Progne subis	Purple Martin	S4B			N	HIRUNDINIDAE
Quiscalus quiscula	Common Grackle	S5B			N	ICTERIDAE
Spizella passerina	Chipping Sparrow	S5B			N	EMBERIZIDAE
Stelgidopteryx serripennis	Northern Rough-winged Swallow	S5B			N	HIRUNDINIDAE

Table 2
Summary of 2008 – 2010 Fieldwork Observations: Birds (contd.)

Species Name	Common Name	S-Rank	COSEWIC	MNR	Track	Family
Sterna hirundo	Common Tern	S4B	NAR	NAR	N	LARIDAE
Sturnus vulgaris	European Starling	SNA			N	STURNIDAE
Tachycineta bicolor	Tree Swallow	S5B			N	HIRUNDINIDAE
Thryothorus ludovicianus	Carolina Wren	S4			N	TROGLODYTIDAE
Troglodytes aedon	House Wren	S5B			N	TROGLODYTIDAE
Turdus migratorius	American Robin	S5B			N	TURDIDAE
Vireo gilvus	Warbling Vireo	S5B			N	VIREONIDAE
Zenaida macroura	Mourning Dove	S5B			N	COLUMBIDAE

3.2.3 Other Fauna

Other fauna species present are those normally found in a near urban site and are mostly considered habitat generalists. There is some species movement, including Red Fox that may hunt in the adjacent residential areas.

There are unconfirmed reports that Eastern Milk Snake also use this area for over-wintering (i.e., a hibernaculum). Ecological Services did not observe Eastern Milk Snake during the fieldwork, but a hibernaculum is conceivable due to the many crevices provided by the rock fill near the current Gore Road-Point St. Mark Drive intersection in the east side lands area (on a related note, Milk Snakes have been observed on nearby properties). The adjacent FOD5-8 area to the north is not ideal Milk Snake habitat, but the CUM area further north, as well as the land around the Gore Road Library and the adjacent rear yard lawns in the Point St. Mark neighborhood would provide suitable habitat.

3.3 Discussion

3.3.1 Turtles

Only Painted Turtles were caught during the 2010 fieldwork by Ecological Services., but it is recognized that other turtles are present in the area. Ecological Services personnel have observed both Snapping Turtles and Map Turtles in this area in previous years. Parks Canada resource management personnel conducted turtle trapping in this area during 2008 and 2010 (Mayberry, personal communication). In 2008, Parks Canada reported Painted Turtles (60), Stinkpot Turtles (1), Snapping Turtles (1), Map Turtles (2), and a Red-eared Slider (1), the latter of which is a non-native species and was likely a pet release or escape. In 2010, Parks Canada reported Painted Turtles (22), Snapping Turtles (4) and Map Turtles (3), as well as basking Map Turtles observed across from the emergent cattail marsh portion of the Greater Cataraqui Marsh wetland to the north of the preferred corridor. Pauline Quesnelle, a graduate student at Carleton University, also conducted specific surveys for Stinkpot Turtles in 2010. As part of this fieldwork, three Stinkpot Turtles were found between the LaSalle Causeway and Highway 401.

In general, the area of the Greater Cataraqui Marsh is known to support turtles. In 1984, Blancher reported all of the above-noted turtle species, plus two Blanding's Turtles that were killed along Highway 401, suggesting their presence in the area as well. All turtle species with the exception of the Painted Turtle are at some level of risk: all are S3 or vulnerable, except for the Painted Turtle (S5) and the Red-eared Slider (SNA). Moreover, the Stinkpot Turtle and Blanding's Turtle are considered to be Threatened, whereas the Map Turtle and Snapping Turtle are species of Special Concern.

The most abundant turtle in the system is clearly the Painted Turtle, based on all the sampling done in 2010 and previous years. The presence of at risk turtle species is not prohibitory to constructing a bridge, but will require that mitigation measures be

implemented to minimize the risk to these species. It is recommended that planning proceed on the assumption that turtles are present in the preferred corridor. Mitigation measures associated with the future detail design and project implementation phase should involve:

1. scheduling site preparation and construction activities so as to avoid over-wintering periods between early August and late September, unless advance inspections and exclusion areas have ensured that turtles will not be impacted;

2. conducting advance inspections, prior to the hibernation period, in areas slated for site preparation and construction activities in order to assess for the presence of turtles, remove any turtles present, and to subsequently restrict turtle access to such areas so as to avoid mortalities;

3. incorporating bridge and shoreland area design features that reduce turtle mortalities and enhance natural habitat areas, such as:
   (a) avoiding excess artificial lighting, which can potentially attract turtles to the bridge landing points; and
   (b) providing basking areas for turtles in exposed sunlit areas that are inaccessible to natural predators, humans and boat traffic.

3.3.2 Birds

There has been a considerable amount of previous work done on birds in the Greater Cataraqui Marsh, including: Helen Quilliam and the Kingston Field Naturalists; Blancher (1984) listed 206 species observed in the area; Weir (2008) mentioned the area as one of special interest for birds; area residents provided information; and the NHIC has compiled a list of reports going back over a century. Parks Canada also compiles lists of bird species of interest in this area, and did some specific searches for Least Bitterns in 2010.

In general, the emergent cattail marsh north of the preferred corridor is the area of greatest value to birds in the area, providing nesting habitat for bitterns, waterfowl, moorhens, rails and Black Terns, as well as roosting habitat for large numbers of migratory swallows (Weir 2008). The open waters are important to migratory waterfowl in both spring and fall (Blancher 1984). Weir (personal communication) concurred with this assessment, noting that waterfowl are present during all ice-free periods. Weir also noted the importance of the western shoreline of the Cataraqui River, particularly within 100 m of shore, to both resident/breeding and migratory waterfowl. The shallow waters of the Cataraqui River provide rich feeding sections for waterfowl. Thousands of birds, representing over a dozen species, congregate in the area in both spring and fall.

The fieldwork by Ecological Services between 2008 and 2010 found similar species and usage, indicating a continuing importance to birds. There were specific efforts made to detect some of the avian species at risk identified in the NHIC information (Ecological Services, 2009). With the EA study area now focused on the preferred corridor and surrounding area, there were only three at risk bird species listed in the NHIC information, namely:

1. The Northern Bobwhite, which is from an 1856 record. Weir (2008) noted that this species never established in the Kingston area, and that none have been present since 1859.

2. The King Rail, which is from a 1956 record. Weir (2008) also reported an earlier 1899 record from the Greater Cataraqui Marsh, but concluded that it should be considered a very rare irregular spring and summer resident.

3. The Least Bittern, which Blancher also similarly reported along marsh streams or at the river edge of the cattails. Weir (2008) considered it to be an uncommon regular summer resident, noting the Greater Cataraqui Marsh as one of the traditional habitat areas. Ecological Services made specific attempts to find the Least Bittern in the field in 2010, but had no success. As noted earlier, Parks

Canada resource personnel conducted surveys for Least Bitterns in June and July of 2010, also without success. For the purposes of this EA, however, it is recommended that planning proceed on the assumption that Least Bitterns may, at least periodically, be present in the area. This is a species that is closely associated with emergent vegetation. This should not present a direct conflict to the project, given that the emergent cattail marsh is north of the preferred corridor.

This report should not be considered as providing an exhaustive list of all the bird species present. The work of other researchers indicates that many more species have been observed and are likely still present. For example, Blancher (1984), Weir (2008 and personal communication) and Parks Canada (Mayberry, personal communication) all reported the occurrence of Black-crowned Night Herons (ranked as S3B, but not listed as an at-risk species) in the Greater Cataraqui Marsh area. Still, the presence of birds is not prohibitory to constructing a bridge, but will require that mitigation measures be implemented to minimize the risks to these species. It is recommended that planning and bridge design selection proceed in recognition of the importance of the area to birds. Some potential impacts of a crossing on bird species will require investigation of design features that can reduce excess lighting that can attract or miscue birds, potentially attracting them to the bridge. The Least Bittern, in particular, migrates at night (Weir 2008), so bridge lighting should be an important design consideration. Other mitigation measures could include timing of various aspects of site preparation and bridge construction activities, which should be undertaken during the detail design stage.

3.3.3 Other Fauna

As noted earlier, other species present during the fieldwork by Ecological Services are those normally found in a near urban site, and are mostly considered habitat generalists. The work of other researchers indicates that many more species have been observed and are likely still present. For example, Blancher (1984) provided an

extensive list of mammals, reptiles, amphibians and plants and benthic invertebrates known from the Greater Cataraqui Marsh. Still, with suitable design and mitigation measures in place, significant impact to this habitat and the species it supports can be avoided, including:

1. avoiding excessive bridge lighting;

2. confirming during the detail design stage the timing of site preparation and construction activities in order to restrict such activities in sensitive areas, unless advance inspection and exclusion has ensured that there will be no species impacts; and

3. employing stabilization and rehabilitation of the shoreline shallows after construction to prevent siltation and to encourage habitat compensation.

Further in this regard, it is acknowledged that the Eastern Milk Snake is relatively common in the Kingston area, but it is rare in Ontario (species of Special Concern) and across Canada (COSEWIC species of Special Concern). It is in Part 4 (species of Special Concern) of Schedule 1 of the federal SARA. SARA prohibitions do not apply to species of special concern (such as the Milk Snake), but this species is protected by provincial law, under the *Fish and Wildlife Conservation Act*, where it is forbidden to hunt, trap, kill, trade, or hold in captivity these snakes without a permit.

The Eastern Milk Snake is often associated with farming areas; they are commonly found around barns and farm houses and are not sensitive to the presence of humans. They are in decline because agricultural land in Ontario has been either lost to development or converted back into forest. Mortality from vehicle traffic and farm machinery is common, and the tendency of these snakes to live near human structures, combined with their similar appearance to venomous snakes, means that some are also killed out of fear.

It is possible that bridge construction activities could inadvertently kill Eastern Milk Snakes, thereby contravening Ontario's *Fish and Wildlife Conservation Act*. As such, the following options are provided:

1. Continue to monitor for the snakes.

2. Live trap the snakes and transport them to a hospitable environment north of Highway 401, or construct suitable hibernacula on the Gore Road library property.

3. If live trapping is not an option, restrict site preparation and construction activities to the period of May to late September. Once heavy construction is taking place, it is unlikely that the snakes will return to the site. These snakes will have some ability to avoid construction activities during this time, but will be vulnerable in the Fall-Winter months when they are in their hibernacula.

4. Assess opportunities to create compensating habitat.

4.0 GREATER CATARAQUI MARSH WETLAND

The Greater Cataraqui Marsh is a provincially significant wetland (PSW), originally evaluated in 1990 by Muldal and Krannitz for Ecological Services (then TNK Consultants). The wetland was also the focus of an extensive study by Blancher (1984), who identified a broad array of plant and animal species, as well as by Ecological Services (2009) as part of Stage 1 of this EA study. Ecological Services was requested to provide a desk-top update of the wetland map of the Greater Cataraqui Marsh PSW relating to Stage 2 of this EA.

The wetland is extensive, extending from south of Belle Island in the Inner Harbor to just north of Highway 401, and affects the preferred corridor. The navigable boat channel is excluded from the wetland, as are a couple of minor deviations from the channel, and a

route on the west side that represents a dredged access route from the Rideau Canal navigation corridor to the Music Marina near the foot of John Counter Boulevard.

Although the Greater Cataraqui Marsh is considered a riverine wetland system, it is also considered to be a coastal wetland, as its water levels are largely controlled by Lake Ontario. Environment Canada notes that over two-thirds of southern Ontario's original wetland area has been lost over the past two centuries. Wetlands in coastal areas of the Great Lakes are especially at risk, however, due to high development pressure in urban areas, and stresses such as lake-wide water level regulation. The 2005 Provincial Policy Statement defines coastal wetlands to include wetlands on any tributary to a Great Lake where the wetland is within the floodplain of the lake. This includes the Greater Cataraqui Marsh.

4.1 Methodology

Mapping for the Greater Cataraqui Marsh PSW is provided in Figure 8. The area covered is based on the 2011 Bowfin Environmental Consulting (Bowfin) report on marine ecological fieldwork, also prepared as part of Stage 2 of this EA, the original 1990 wetland mapping prepared by Ecological Services, and current aerial images. The mapping illustrates the vegetation communities in a manner generally consistent with that of the wetland evaluation and the Ontario Wetland Evaluation System (OWES). It should be recognized that the mapping in Figure 8 does not cover the entire wetland, which extends both north and south.

4.2 Observations

In comparing the 2011 mapping by Bowfin to the 1990 mapping by Ecological Services, it is clear that there has been little change to the Greater Cataraqui Marsh PSW or its dominant vegetation in the intervening twenty years. Bowfin's mapping was prepared for other purposes, not using the OWES criteria specifically; as a result, some of the vegetation patches mapped in Figure 8 fall below the minimum size threshold, and

would not normally be included in wetland or ELC mapping. They are included here for consistency.

Figure 8: Vegetation Communities (White) in the Greater Cataraqui Marsh PSW and Preferred Corridor (Yellow) (Base Image: Google Earth)

1. *suW1* and *OW*: The majority of the preferred corridor passes over only one vegetation type (suW1), and the balance over open water areas (OW). The *suW1* community is a vegetation community with only one vegetation form (submerged vegetation), dominated in 1990 by Milfoil. This is consistent with the observations of Bowfin (2011), although a greater diversity of submergent species, including Eel Grass, several Pondweeds, and Canada Waterweed, was also reported. The *OW* areas are non-vegetated areas, which in this area is due to the maintenance of dredged channels for watercraft. These areas are not part of the Greater Cataraqui Marsh PSW.

2. *suW2*: The *suW2* community is found north and south of the preferred corridor along the west shoreline. It consists of two vegetation forms(submerged vegetation and floating-leaved plants), dominated in 1990 by Milfoil and Waterlilies. This is consistent with the observations in the Bowfin report (Lavictoire, personal communication). It is noted that the *suW2* areas appear to be slightly more extensive in 2011 than in 1990, and aerial extent has increased both north and south of the preferred corridor.

3. *reM3*: The *reM3* community is made up of two vegetation forms (robust emergents and narrow-leaved emergents), dominated in 1990 by cattails and grasses. This is consistent with the observations in the Bowfin report, in that cattails and Reed Canary Grass were reported. It is noted that the *reM3* areas may be slightly more extensive in 2011 than in 1990, but the patches mapped on the east side of the Cataraqui River may not meet the minimum size criteria for mapping purposes of the OWES.

4. *reM6*: The *reM6* community consists of two vegetation forms (robust emergents and ground cover), dominated in 1990 by cattails and Purple Loosestrife. The Bowfin report did not map this area of the Greater Cataraqui Marsh PSW, which is associated with Belle Island to the south of the preferred corridor.

4.3 Discussion

The majority of the preferred corridor passes over only one vegetation type (suW1) and over open water areas (OW). In the OWES, vegetation communities are valued for their diversity, and single form communities such as the *suW1* community have a lower value because they will, in general, support a lower diversity of other wetland species. The preferred corridor also avoids the more sensitive portions of the Greater Cataraqui Marsh PSW, most notably the extensive areas of emergent cattail marsh that lie to the north. From an ecological standpoint, there is little impediment to preparing Stage 2 EA conceptual and preferred bridge designs in this portion of the Greater Cataraqui Marsh PSW to facilitate future detail designs and project implementation.

5.0 IN-WATER BRIDGE CONSTRUCTION OPTIONS

As part of Stage 2 of the EA, it is recognized that access to each bridge pier location and to install the bridge spans will be required for construction. The 1.1 kilometer (km) shore-to-shore distance at the preferred corridor means that one of the following three in-water bridge construction options could be used: a temporary earth berm; dredging; or a temporary work bridge. Each of these options is highlighted below and considered in relation to the features and functions of the upland terrestrial areas assessed and, particularly, the Greater Cataraqui Marsh PSW.

5.1 Alternative Bridge Construction Methods

5.1.1 Temporary Earth Berm

The temporary earth berm would involve infilling an area with earth material and capping it with gravel to provide a temporary roadway. It is anticipated that a 5 m to 10 m depth of fill would be required (Paetkau, personal communication). The berm would be 10 m at the top and have a 40 m x 25 m area around each pier for a total impact area of 6.2 hectares. It would take two to three months to construct during the mid-

summer / early fall and would span from both riverbanks up to the navigable channel (the navigable channel would remain open). The berm would be in place for two construction seasons and would be removed after the bridge is built.

5.1.2 Dredging

Dredging would involve excavating a channel below the existing river mudline. It would be done from and for construction barges which need about 3 m of draft for water access (or 1.4 m to 1.8 m below the existing river mudline) (Paetkau, personal communication). The dredged area would have 15 m of bottom width plus a 45 m x 25 m area around each pier for a total impact area of 4.3 hectares. Dredging would occur once over two to three months during the mid-summer / early fall. Once the bridge is built, the dredged channel could either be back-filled or left in place.

5.1.3 Temporary Work Bridge

The temporary work bridge would be built adjacent to the permanent bridge. It would have 15 m spans with 600 mm pile supports for each span (Paetkau, personal communication). Two hundred temporary piles would be installed during the mid-summer / early fall and be in place for two construction seasons. The total impact area from the work bridge would be about 2 hectares. Once the bridge is built, the work bridge would be removed. The temporary piles would either be removed or cut below the top of the riverbed and left in place.

5.2 Discussion

It is inevitable that ecological impacts to wetland features (fish, waterfowl, rarities and habitat) and function (hydrology) will occur during bridge construction and each of the in-water bridge construction options has their own benefits and costs. Two significant questions to ask in this regard are:

1. Which option causes the least impact during site preparation and bridge construction activities?

2. Which option will have the least long-term impact?

Temporary impacts and measures to mitigate impacts during construction would focus on:

1. *Loss of Habitat*:

   (a) Temporary Earth Berm: Habitat loss for fish, herpetofauna and waterfowl would occur over the 6.2 hectare impact area during berm installation, particularly as it is anticipated that a 5 m to 10 m depth of fill would be required. Deposition materials would most likely be inadvertently left behind during berm removal as well, and some parent material would also likely be removed. The use of silt curtains would be critical to mitigate effects from berm installation and removal on habitat areas beyond the directly affected impact area.

   (b) Dredging: Habitat loss would occur over the 4.3 hectare impact area, which is less extensive in comparison to the berm option. Also, the dredging depth requirements, at 1.4 m to 1.8 m below the existing river mudline), would only impact the top vegetative and peat layers of the riverbed. The use of silt curtains would be critical to mitigate effects from both dredging and the possible backfill of dredgeate after the bridge is built.

   (c) Temporary Work Bridge: Though the risk of habitat loss is not as apparent with the temporary work bridge option, the ecological impacts of shading on habitat areas that are underneath the temporary work bridge deck should be considered. As well, the removal of the temporary work

bridge piles after the bridge is built could result in sediment disturbances, which could in turn impact adjacent habitat, so silt curtains would also be needed.

2. *Species Mortality*:

(a) Temporary Earth Berm: Most species will avoid the impact area if active disturbances are taking place. Therefore, the installation and future removal of the berm would need to be timed so as to minimize loss of species that are unable to avoid the impact area, such as spawning fish and hibernating turtles. The lowest risk period to avoid spawning fish and hibernating turtles is suggested to occur between early August and late September.

From a review of the literature (e.g., Belleau 2008), it is unlikely that most turtles, including Stinkpots (Threatened), would hibernate within the preferred corridor, with the possible exception of the shoreline areas. However, Map Turtles (Special Concern) and Snapping Turtles (Special Concern) could be found hibernating in the sediments of the open water areas of the preferred corridor.

(b) Dredging: Most species will avoid the impact area if active disturbances are taking place. Therefore, the implementation of dredging and the possible future backfill of the dredgeate would need to be timed so as to minimize loss of species that are unable to avoid the impact area, such as spawning fish and hibernating turtles. The lowest risk period to avoid spawning fish and hibernating turtles is suggested to occur between early August and late September.

From a review of the literature (e.g., Belleau 2008), it is unlikely that most turtles, including Stinkpots (Threatened), would hibernate within the

preferred corridor, with the possible exception of the shoreline areas. However, Map Turtles (Special Concern) and Snapping Turtles (Special Concern) could be found hibernating in the sediments of the open water areas of the preferred corridor.

The impacts from installing the earth berm would be similarly repeated by the subsequent replacement of the dredged material following bridge construction. To further mitigate impacts, the potential added long-term benefit of not back-filling the dredged channel and allowing it to fill in naturally should be considered. As noted earlier, the open water areas of the Greater Cataraqui Marsh, particularly at the preferred corridor, are dominated by littoral habitat and represent only a single habitat type. Dredging creates lentic habitat. This could increase biodiversity in the wetland and is a common benefit of dredging operations.

The open water areas of the wetland are dominated by littoral habitat, and dredging creates lentic habitat. This could increase biodiversity in the wetland and is a common benefit of dredging operations. For example an Environment Canada public information website states the following:

"…in some instances, dredging is beneficial to the environment . . . and provides more habitat opportunities and greater biological diversity within targeted geographic area."

During the wetland evaluation process, points are awarded in four main categories: Biological Component, Social Component, Hydrological Component, and Special Features. Biodiversity is scored within the Biological Component in several ways including interspersion. An area with just one habitat type would have low interspersion and therefore receive a low biodiversity score. The open water littoral areas of the wetland only represent a single habitat type. Adding lentic habitat would

increase the interspersion, thereby increasing the wetland evaluation score, and thus increasing the quantitative value of the wetland.

Interspersion can also be increased by adding greater edge complexity. For example, a complex polygon has greater interspersion than a circle. Likewise the large zone of submergent vegetation in the Cataraqui River would have greater interspersion if there were a swath (dredge route) cut through it. Greater interspersion means a higher wetland score, and in this way the dredging operation can be considered a benefit.

The final component of the wetland scoring is Special Features, which includes a section for fish habitat. Dredging could result in an increase in fish habitat diversity, via lentic habitat, within the existing wetland and therefore an increase in the wetland score.

Although we do not recommend re-sedimentation of the dredged area, we do suggest consideration of possible habitat interspersion enhancements in the form of small gravel-type islands or platforms associated with some of the final bridge piers for fish spawning, turtle nesting, and waterfowl nesting and/or loafing.

(c) Temporary Work Bridge: Most species will avoid the impact area if active disturbances are taking place. Therefore, the installation and future removal of work bridge piles would need to be timed so as to minimize loss of species that are unable to avoid the impact area, such as spawning fish and hibernating turtles. The lowest risk period to avoid spawning fish and hibernating turtles is suggested to occur between early August and late September.

From a review of the literature (e.g., Belleau 2008), it is unlikely that most turtles, including Stinkpots (Threatened), would hibernate within the

preferred corridor, with the possible exception of the shoreline areas. However, Map Turtles (Special Concern) and Snapping Turtles (Special Concern) could be found hibernating in the sediments of the open water areas of the preferred corridor.

3. *Contaminated Sediments*:

(a) Temporary Earth Berm: Chemical analyses of the fill in advance of berm installation and future removal should be undertaken as part of the detail design stage to determine sediment contaminant levels. High levels of sediment contaminants are known from the area, and the placement and removal of earth fill has the potential to disturb and release those contaminants, with consequential impact to the environment.

(b) Dredging: Chemical analyses of the fill in advance of removal or the possible future backfill of the dredgeate from dredging should be undertaken as part of the detail design stage to determine sediment contaminant levels. High levels of sediment contaminants are known from the area, and the placement and removal of earth fill has the potential to disturb and release those contaminants, with consequential impact to the environment.

(c) Temporary Work Bridge: Chemical analyses of the fill in advance of driving or removing piles for the temporary work bridge should be undertaken as part of the detail design stage to determine sediment contaminant levels. High levels of sediment contaminants are known from the area, and the disturbance of the sediments has the potential to release those contaminants, with consequential impact to the environment.

4. *Species Movement*:

(a) Temporary Earth Berm: The berm option in particular has the potential to have a significant effect on species movement, since the berm would span from both riverbanks up to the navigable channel (the navigable channel would remain open) and in effect, provide a temporary roadway and a barrier to species movement; a series of culverts would need to be installed as a minimum mitigation measure to allow for some movement of aquatic species.

(b) Dredging: This option has the potential to impact species movement primarily during the period of active dredging and its short-term aftermath. Sediments in the water would constitute a deleterious substance to many aquatic species, however, so ensuring that disturbed sediments are contained will require a sediment curtain (double site curtain line is suggested below) that may have some impact on species movement. The sediment curtain should be installed prior to scheduled in-water works activities and remain in place until the sediments within the affected area have settled.

(c) Temporary Work Bridge: This option has relatively low potential to impact species movement. As above, the potential to impact species movement would be primarily during the period of active construction of the bridge and its short-term aftermath. Sediments in the water would constitute a deleterious substance to many aquatic species, however, so ensuring that disturbed sediments are contained will require a sediment curtain (double site curtain line is suggested below) that may have some impact on species movement. The sediment curtain should be installed prior to scheduled in-water works activities and remain in place until the sediments within the affected area have settled.

5. *Alteration of River Hydrology*:

(a) Temporary Earth Berm: Culverts or openings would need to be put in place to maintain hydrology. The number needed is not known. Also, while in place, the berm could have an adverse effect on ice movement on the river.

(b) Dredging: This option is unlikely to have significant impacts on river hydrology or ice movement as flows should not be significantly impeded.

(c) Temporary Work Bridge: This option is unlikely to have significant impacts on river hydrology as the flow of water should not be significantly impeded. However, while in place, the temporary work bridge could have an adverse effect on ice movement on the river.

As noted above, it is anticipated that additional mitigation could be required with the temporary earth berm than with either dredging or the temporary work bridge options to maintain river hydrology. It is also anticipated that the potential for adverse effects on ice movement on the river is higher with the temporary earth berm and temporary work bridge options. Further river hydrological analysis as part of Stage 2 of the EA study is to be addressed in a report prepared by others.

6. *Contamination from Sedimentation*:

(a) Temporary Earth Berm: Silt curtains would be a critical need as fine sediments on the river bottom are disturbed both during the placement of fill and its eventual removal. Given the value of the associated habitats, a double site curtain line might be considered. The sediment curtain should be installed prior to scheduled in-water works activities and remain in place until the sediments within the affected area have settled.

(b) Dredging: Silt curtains would be a critical need as fine sediments are disturbed and brought to the surface. Given the value of the associated habitats, a double site curtain line might be considered.

(c) Temporary Work Bridge: Silt curtains would be a critical need as pilings were driven for the temporary bridge. Given the value of the associated habitats, a double site curtain line might be considered.

5.3 Conclusions

Two significant questions were raised at the outset of the discussion:

1. Which option causes the least impact during site preparation and bridge construction activities?

2. Which option will have the least long-term impact?

Based on the above, all three in-water bridge construction options would have similar types of temporary impacts to wetland features, all of which can be mitigated if done with due diligence and best management practices. Regarding long-term impacts, it is assumed that sediments and any associated contaminants would eventually settle out and that disturbed areas would re-vegetate with submergent vegetation. As such, there will also likely be little measurable difference in long term negative impacts from the three options (assuming site restoration occurs after the bridge is built and mitigation measures, such as those cited in this report, are implemented).

Regarding the temporary earth berm, this approach would result in impacts before, during, and after construction, and its area of impact is the largest in comparison to the other options. The potential for some berm materials to be left behind may also be a problem, depending upon the amount.

Regarding the dredging option, the temporary impacts can be mitigated. The dredging option (with natural re-sedimentation) has a smaller impact area (about half as wide) than the berm option, and its potential impacts are more clearly understood. There is also a potential benefit to habitat diversity if the dredgeate is not replaced after the bridge is built.

Finally, regarding the temporary working bridge option, this option has similar potential impacts as the previous two, but it appears to have the smallest impact area in comparison to the other options. Still, the timing restrictions recommended for the berm and dredging would also apply to the working bridge as the temporary piles could be driven down onto hibernating species at risk, or disturb spawning fish.

With respect to the long-term impacts of the bridge structure itself, the potential impacts to waterfowl remain the largest unknown. Anecdotal information suggests that waterfowl continue their normal activities around bridges, but is inconclusive. The scientific literature is lacking on the subject, and we can offer no recommendations at this time. This, however, should not impede the preparation of Stage 2 EA conceptual and preferred bridge and related road, landscape and public realm designs, to facilitate future detail design and project implementation. Rather, additional investigations should be undertaken during the detail design stage.

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