National Capital Commission

ENVIRONMENTAL EFFECTS ANALYSIS

RICHMOND LANDING SHORELINE ACCESS PROJECT

MAY 2016

WSP

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RICHMOND LANDING SHORELINE ACCESS PROJECT
OTTAWA, ONTARIO

National Capital Commission

Report (Pre-final Version)

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1 INTRODUCTION

1.1 IDENTIFICATION OF FEDERAL AUTHORITIES AND THEIR REPRESENTATIVE

Information on the federal authorities and their representative are presented in table 1.

Table 1 Information on the client and its representative

	Federal authority	Representative
Department/Crown Corporation	National Capital Commission (NCC)	WSP Canada Inc.
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2 CONTEXT

2.1 PROJECT DESCRIPTION

The Richmond Landing Shoreline Access project involves the enhancement of the recreational pathway network and public access along the Ottawa River shoreline. There is a need to provide a more direct and universally accessible connection from the Portage-Wellington intersection to the recently completed Royal Canadian Navy Memorial as well as to the Ottawa River pathway network. The current environmental effects analysis includes components 1, 2, 4, 7 and 8 for the Richmond Landing site (see NCC Landscape architecture Master Plan of the Richmond Landing Shoreline Access - Final Design 100% (Groupe Rousseau Lefebvre, 2016) at Appendix A).

Components 1, 2, 4, 7 and 8:

1. Promontory: Natural setting that offers a reflective pause for contemplation. Integration of the Rideau trail stone as an interpretation element on site.

2. Ceremonial landing: Functional dock between the promontory and the landing with a path connecting to the upper level.

4. Richmond Landing node: Plaza with integration of the main interpretation node.

7. Pedestrian and cyclist bridges: Improve site experience and ownership of the site, thin structure incorporating a kayak pull-out on the mainland bridge abutment (south)

8. Richmond Landing lookout: Terraced structure integrating natural materials and vegetation, safe and universal access for pedestrians and cyclists with a new staircase, a universal access path and a new access to Portage bridge for the Capital Pathway, grassed lookout over Pooley's tailrace.

The goal of the project is to create linkages between Richmond Landing, the Islands, Lebreton Flats, and the shoreline in concurrence with highlighting the significance of this important industrial heritage site in the heart of the Capital. The Ottawa River shoreline, Richmond Landing and Victoria Island will be linked by pedestrian river crossings, which shall intersect at the crossing of the pathways located at the Navy Monument threshold.

2.2 ENVIRONMENTAL EFFECTS ANALYSIS SCOPE

The current environmental effects analysis scope includes site preparation, construction, operation, modification, decommissioning, abandonment or other undertaking in relation to the project components 1, 2, 4 and 6 to 8 of master plan provided in appendix A.

The study covers the following points in particular:

→ Description of the existing environment from literature review and existing reports;

→ Identification of Valued Ecosystem Components (VECs) and a rationale for their selection;

- Identification, description and evaluation of the environmental effects of the project on the identified VECs as defined in section 5 of CEAA, 2012, including the environmental effects caused by malfunctions, accidents or unplanned events that may occur in connection with the project;
- Identification of all technically and economically feasible mitigation measures to address potential significant adverse environmental effects;
- Determination of the significance of the impacts to VECs before and after mitigation measures are put in place and determination of any significant residual environmental effect that may remain after the implementation of technically and economically feasible mitigation measures;
- Prediction of cumulative effects that may result from the project in relation to past, present and planned or foreseeable future activities and projects within the Richmond Landing and Victoria Island Area;
- Identification of the effects that the environment may have on the project;
- Description of the environmental monitoring program if required;
- Description of adaptive management practices (sources of impacts other than those identified in the screening report that may be identified during the lifetime of the project, particularly during follow-up requested or when events occur or non-planned work is required);
- Provision of a completed mitigation measures form (MMF) by deliverable/project component to facilitate comprehension and integration into the project specifications;
- Incorporation in the MMF of any mitigation measures/best practices required by other relevant regulatory authorities (e.g. DFO, Ontario Ministry of Natural Resources and Forestry, Environment Canada, Transport Canada, etc.).

3 METHODOLOGY

3.1 LEGAL CONTEXT

Any project inevitably causes impacts on the environment. To ensure that the projects have the least possible adverse effect upon it, an analysis is performed to identify Valued Ecosystem Components (VEC), sources of potential impacts and mitigation measures applicable where appropriate.

For all projects carried out on federal lands as defined in section 66 of the *Canadian Environmental Assessment Act* (referred to as *The Act* throughout this report) (2012), federal authorities are required, by section 67 of the CEAA 2012, to determine the likelihood of significant adverse environmental effects that might result from the project (CEAA 2014).

Section 2 of the CEAA identifies and defines the environment as:

> **"**environment" means the components of the Earth, and includes
> (**a**) land, water and air, including all layers of the atmosphere;
> (**b**) all organic and inorganic matter and living organisms; and
> (**c**) the interacting natural systems that include components referred to in paragraphs (**a**) and (**b**).

Section 5 of the CEAA identifies and defines the environmental effects that are to be taken into account in relation to a project. They are:

> *"5. (1) For the purposes of this Act, the environmental effects that are to be taken into account in relation to an act or thing, a physical activity, a designated project or a project are:*
>
> *(a) a change that may be caused to the following components of the environment that are within the legislative authority of Parliament:*
> *(i) fish and fish habitat as defined in subsection 2(1) of the Fisheries Act,*
> *(ii) aquatic species as defined in subsection 2(1) of the Species at Risk Act,*
> *(iii) migratory birds as defined in subsection 2(1) of the Migratory Birds Convention Act, 1994, and*
> *(iv) any other component of the environment that is set out in Schedule 2;*
> *(b) a change that may be caused to the environment that would occur*
> *(i) on federal lands,*
> *(ii) in a province other than the one in which the act or thing is done or where the physical activity, the designated project or the project is being carried out, or*
> *(iii) outside Canada; and*
> *(c) with respect to Algonquin-Anishinabe peoples, an effect occurring in Canada of*
> *any change that may be caused to the environment on*
> *(i) health and socio-economic conditions,*
> *(ii) physical and cultural heritage,*

(iii) the current use of lands and resources for traditional purposes, or

(iv) any structure, site or thing that is of historical, archaeological, paleontological or architectural significance."

3.2 THE CONCEPT OF SIGNIFICANCE

To determine the likelihood of significant adverse environmental effects that might result from the project, the concept of significance must be clearly defined. In *The Act*, this concept of significance cannot be separated from the concepts of "*adverse*" and "*likely*." (FEARO, 1994). Thus, the "*significant adverse effect*" concept used in the current analysis, takes into consideration (CEAA, 2015):

- *Whether the outcomes of the project are likely to exceed thresholds established under a regional study;*
- *Whether the timing of the proposal could result in important interactions with the environment (i.e. construction or operation of a project during nesting season for migratory birds);*
- *Whether examination of environmental effects and mitigation measures of other similar projects or designated projects could be applied to the current project;*
- *Level of public concern at the local, national, and international levels;*
- *The potential for cumulative effects;*
- *Criteria such as scale, magnitude, duration, reversibility, and the ecological context of potential effects.*

Based on those considerations, an identified effect of the project on the environment is judged "*significantly adverse* ***(S)*****",** or, if not considered as such, by opposition, considered "*insignificant* ***(I)***".

3.3 METHOD USED IN THE CURRENT ANALYSIS

The current analysis is compliant with the most up to date Canadian Environmental Assessment Agency operational statements and technical guidance.

The general approach used to identify and assess the significance of environmental effects is mainly based on experiences of environmental impact studies applied to similar projects. The lessons learned from these projects provide very relevant information to determine the nature and intensity of certain recurring impacts of a project to another, as well as the actual effectiveness of certain mitigation and compensation measures. This evaluation process is based on the following two specific elements:

- General description of the project, which identifies the sources of impacts from the technical characteristics of the proposed developments and activities, methods and the construction schedule. The current analysis was performed according to the three (3) major implementation phases (site preparation, construction and use);
- Knowledge of the environment, which allows us to understand the biological and social context of the environment in which fits the project and identify key issues to be considered.

Although the environmental effects analysis considers all components of physical, biological and social integration of the identified VECs, that is to say, those susceptible to modification or to undergo significant

impact influence choices and decision making. The choice of the VECs is justified based on key environmental issues associated with the project.

The next step is then used to assess the environmental impact on each VEC:

- The description of the reference state, i.e. environmental conditions before development, with an appropriate level of detail;
- Description and evaluation of the physical change and biological or human impact. This is to anticipate future changes, negative or positive, depending on the project and the environment. This description takes into account the application of common and specific mitigation measures during the site preparation, construction and maintenance phases;
- A description of the applicable mitigation measures and, if necessary, some residual impacts.
- The analysis of any cumulative effects that may impact the VECs.
- The impact that the environment may have on the project is also assessed.

The general method used in the current analysis is based on the *Operational Policy Statement, Project on Federal Land and Outside Canada Under the Canadian Environmental Assessment Act, 2012* (CEAA, 2013) but other CEAA guides were consulted and are presented at the bibliography and sources section.

Finally, the plan used to analyze the current environmental effects is the NCC Landscape architecture Master Plan - Final Design 100% (Appendix A), issued in March, 2016 and prepared by Groupe Rousseau Lefebvre.

4 DESCRIPTION OF THE EXISTING ENVIRONMENT

Many local studies were completed on the Richmond Landing site. The major environmental components relevant to the current analysis are presented in the following sections as an abstract of the available studies.

4.1 PHYSICAL ENVIRONMENT

4.1.1 TOPOGRAPHY

According to the Natural Resources Canada's atlas, the site is generally flat and at 50 meters above the sea level (NRCAN, 2015). In times of low water level, the exposed shores are sloping toward the river, at some places very steeply. The majority of the site is now heavily landscaped and maintained with recreational paths.

4.1.2 SITE SOIL STRATIGRAPHY

SPL Consultants Limited (SPL) completed a geotechnical study for this project. The sub-surface conditions encountered at the site generally consists of a variable thickness of fill material overlying rock.

The fill material is a heterogeneous mix of silt, sand and gravel with cobbles and boulders as well as fragments of metal, brick, concrete, slag, glass, etc. Layers of clay and organic soil were also encountered at some locations. Angular rip rap/rock fill was encountered at one location. A relatively thick layer of wood and timber was encountered at some locations near the interface between the fill and underlying rock on Richmond Landing.

Native soils, consisting of sand and gravel, silty sand and silty clay may have been encountered in small quantities at selected. The majority of the boreholes, however, encountered rock (or auger refusal) immediately below the fill. While it is possible that other localized zones of natural soils are present, it is anticipated that the majority of the soils present on site are fill. (SPL, 2016)

4.1.3 SOIL STABILITY

As the study area is located within the Rideau Valley Conservation Authority (RVCA) Regulation Limit, they have been consulted regarding the potential effects of the project on potential unstable soils and slope. Following a site visit with the RVCA inspector on December 14, 2011, the RVCA suggested that the NCC should perform a soil stability study to verify that the new infrastructures will not affect the slope stability.

4.1.4 SOIL AND GROUNDWATER QUALITY

4.1.4.1 SOIL QUALITY

Geofirma was retained by the NCC to complete environmental site assessment, including a Screening Level Risk Assessment (SLRA) of the Richmond Landing (Geofirma, 2013).

The objectives of the work were to evaluate, at a screening level, the potential risk to human health and the environment posed by contaminants of concern (COCs) remaining in subsurface soil and groundwater at the site.

A detailed location of those COCs is provided in the report based on the samples location. In summary, the following are identified as potential COCs in soil at Richmond Landing:

- VOCs: benzene, chlorobenzene, ethylbenzene and total xylenes;
- Metals: antimony, barium, copper, lead, mercury, molybdenum, silver and zinc;
- PAH: acenaphthylene, anthracene, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, chrysene, dibenzo[a,h]anthracene, indeno[1,2,3-cd]pyrene, fluoranthene, and 2- methylnaphthalene, naphthalene and B[a]P TPE;
- PHC: PHC F1, F2, F3 and F4.

Following completion of a screening-level human health and ecological risk assessment for Richmond Landing, the following generalized conclusions were provided:

- No potential risk was identified to site visitors, based on exposure to surficial soils;
- Potential risk to site workers digging in the soil, through exposure to lead and PAHs in subsurface soils was low, and could easily be managed through the use of personal protective equipment;
- The potential risk to off-site human health based on VOCs in the subsurface soil was negligible;
- Potential risk to ecological receptors exposed to metals and PHCs in the subsurface soils at the site was low, and the likely impacted receptors were plants and soil invertebrates;
- Potential risk to ecological receptors exposed to PAHs in subsurface soils was low to moderate. Terrestrial plants, soil invertebrates, and avian/mammalian receptors may be impacted;
- Assessment of off-site risk posed by site soil becoming sediment in the Ottawa River indicated a low to negligible risk posed by metals and PAH in site soil.

4.1.4.2 WATER QUALITY

GROUNDWATER QUALITY

In 2014, Geofirma completed the first annual groundwater and surface water monitoring program (Geofirma, 2014) at the site. Results indicated that PAH and PHC parameters in excess of federal guidelines and provincial standards for the site are still present in groundwater at the site. A low concentration PAH and PHC plume remained along the northwest portion of the Richmond Landing site, however concentrations of PAH and PHC parameters measured in site groundwater in 2014 were much lower than those measured in 2013 and 2010. Furthermore, results from the assessment of natural attenuation processes occurring on the site suggested that the assimilative capacity of the groundwater system was sufficient to continue naturally biodegrading remnant PAH and PHC contamination.

The highest concentration of PHCs (F2 fraction) measured in 2014 was 0.58 mg/L. Based on that concentration and the assessment of assimilative capacity, concentration of contaminants present in the sub-surface are likely to continue to biodegrade naturally following the chemical oxidant injection program completed by Geofirma in 2011and subsequent partial contaminated soil excavation at the site in 2012. assuming contaminant source volumes and locations have been well characterized and delineated during historical investigations. (Geofirma, 2014)

Analytical results for all five surface water samples collected in 2014 reported no detectable concentrations of PAH parameters in surface water proximate to the site. However, since surface water sampling took place near the peak of the spring freshet, the elevation of surface water may be such that PAH parameters were absent at the time of sampling due to a potential reversal in groundwater flow. The Ottawa River was measured to be 1 cm greater than the groundwater elevation along the north portion of the site during the time of sampling, furthermore the Ottawa River water level peaked on May 21, 2014 indicating that the surface water of the Ottawa River was likely recharging the groundwater of the site during the time of sampling. (Geofirma, 2014)

Following completion of a screening-level human health and ecological risk assessment for Richmond Landing in regards to groundwater, the following conclusion was provided:

- Assessment of off-site risk posed by site groundwater discharging to the surface water of the Ottawa River indicated negligible risk by way of metals, VOCs and PHCs, and low risk by way of PAH parameters.

4.2 BIOLOGICAL ENVIRONMENT

A complete natural environment characterization of the study area was conducted during the summer of 2014 and the spring of 2015 by WSP Canada Inc. (WSP, 2015a). The sections below present the major conclusions of this study.

4.2.1 TERRESTRIAL VEGETATION

A large proportion of the study area is developed or can be considered an urban park with planted vegetation. One terrestrial natural vegetation community was identified during the 2014 survey on the Richmond Landing site: a Manitoba-maple shrub thicket. Wetlands are absent from the study area and no plant species at risk were observed. Numerous exotic invasive plant species are present. Invasive buckthorns and honeysuckles form a dense shrub layer in all vegetation patches.

Standard mitigation measures will need to be implemented to minimize the spread of invasive species outside the study area, including equipment cleaning, effective management of soils and vegetation cuttings, and adequate revegetation after soil disturbance.

4.2.2 WILDLIFE AND ITS HABITAT

4.2.2.1 TERRESTRIAL WILDLIFE

Wildlife surveys have shown that the study area hosts species typical of urban and peri-urban environments.

Furthermore, Canada goose and American Cliff Swallow nest in the study area. Cliff Swallow nests are found on the structure of Portage Bridge. Sixteen (16) bird species were observed during inventories on Richmond Landing and a total of thirty-one (31) species were observed in the study area of the environmental characterization (including Bronson Pulp Mill Ruins, Amelia Island and Victoria Island).

4.2.2.2 AQUATIC WILDLIFE

An aquatic habitat assessment was conducted within a study area composed of Richmond Landing, Bronson Pulp Mill Ruins, Amelia Island and the southern portion of Victoria Island. No fish community sampling was conducted as part of the assessment, but complete lists of potential fish species using this section of the Ottawa River were obtained from the OMNR. In this part of the Ottawa River, 76 fish species may be encountered, six of which have a special status at both provincial and federal levels (addressed in Section 4.2.2.4 of this report).

4.2.2.3 AQUATIC HABITAT

The field assessment revealed that the available aquatic habitat is uniform in terms of bank composition and substrate type. At the scale of the study area, the water velocity is relatively homogenous; faster flowing waters are characteristics of the two channels located between the islands while slower water velocity is observed in backeddies, located in the downstream portion of the study area. It does not specifically match the critical habitat requirements of special status species potentially present. Habitat functions are more likely limited to feeding/growth and nursery for generalist species commonly present in the Ottawa River. Spawning may occur to some extent for these species. Aquatic habitats found within the study area have been historically affected by human activity and are fairly common along this portion of the Ottawa River.

Shores were also included in the availability study of fish habitat. The shorelines of the Ottawa River within the study area have been significantly altered by human activities and are considered stable or slightly vulnerable and no signs of extensive erosion were noted.

4.2.2.4 SPECIES AT RISK

SPECIES OBSERVED DURING ENVIRONMENTAL CHARACTERIZATION

A Northern map turtle, a listed wildlife species under Schedule 1 of the *Species at Risk Ac*t was observed basking on a log close to Victoria Island shores during the 2014 field surveys. Further surveys were conducted in the spring of 2015 to assess the possibility of this turtle nesting on the site, but no nesting activities were noted. Under section 79(2) of the *Species at Risk Act*, federal authorities "*must identify the adverse effects of the project on the listed wildlife species and its critical habitat and, if the project is carried out, must ensure that measures are taken to avoid or lessen those effects and to monitor them. The measures must be taken in a way that is consistent with any applicable recovery strategy and action plans".*

No other species at risk was observed during the 2014 and 2015 field surveys.

SPECIES POTENTIALLY USING THE SITE

According to the species at risk preferred habitats availability analysis conducted on the Richmond Landing site, bird, fish, mammal, amphibian and reptile species at risk have a low potential to use the site. The dam and turbines located upstream of the study area probably limit upstream migration of young eels. Nevertheless, several juvenile eels were captured by the OMNR within the study area, specifically in the channel (Pooley's Tailrace) located south of Richmond Landing (GENIVAR, 2012). At the time, no migration ladders where in place. The OMNR (2015) explained that some of the eels that may be encountered in the vicinity of the study area might have migrated upstream to that point through the collaborative efforts between the Ontario Ministry of Natural Resources (OMNR) and Hydro-Québec (HQ). Each year, HQ captures young eels at the Beauharnois fish ladder and releases them upstream of the Carillon dam. In 2015, 800 young eels have been released through this program. Nevertheless, due to the difficulty of migrating upstream, some juvenile eels most likely spend part of the summer downstream of the

hydroelectric installations. In this circumstance, the required shallow waters over soft substrate where they can burrow themselves, is absent from the study area. The same assessment can be made for lampreys.

The Northern Brook Lamprey of the upper St. Lawrence population is protected under the *Canadian Species at Risk Public Registry* (SARA) Schedule 1 (species of Special Concern). A recovery strategy specific to the American eel has been published by the OMNR in 2013. Federal response statement for American Eel has been published and consultation is underway for adding the American Eel to Schedule 1 of the SARA.

Also, the Canadian Wildlife Federation is conducting a trap and release annual program. Assisted migration of American eels from the St. Lawrence to the Ottawa River is a successful and viable method of increasing the number of juvenile eels resident in the Ottawa River system (CWF, 2016).

4.3 HUMAN ENVIRONMENT

A complete archaeological assessment was performed by WSP (2015) for the Richmond Landing site. This study involved a review of documents pertaining to the property including historic maps, aerial photographs and local history. The major conclusions are presented in the sections below.

4.3.1 SITE HISTORY

A complete Richmond Landing area specific history research was performed by WSP. As a summary, Algonquin-Anishinabe populations have a deep, rich history within the region spanning over 8,000 years following deglaciation, to the time of contact. Post-contact Euro-canadian occupation of the Ottawa-Gatineau area began in 1800 when Philemon Wright settled in what is now the Hull Sector of Gatineau, Quebec. Soon after, the first settler (Jehiel Collins) arrived in the Richmond Landing area. Structures associated with the early occupation of Richmond Landing were repurposed for lumber storage during the late 1800's as the industrial importance of the Chaudière Falls area increased. Mapping available for the late 1800's to early 1900's indicates that the shorelines of the Richmond Landing area were heavily modified in association to industrial growth. In 1929, the Imperial Oil Company constructed a series of oil storage tanks near the landing. These were later removed and the portage bridge was constructed in 1973. Today, Richmond Landing is home to the Royal Canadian Navy Monument and contains a number of gardens and walkways. (WSP, 2015b).

The Algonquin-Anishinabe people concerns must be addressed in the current analysis and under the CEAA 2012. At the time of publishing the present analysis, consultations had been engaged with the Algonquin-Anishinabe (Kitigan Zibi Ansishinabeg, Pikwakanagan and Algonquins of Ontario *AOO) but have not yet resulted in any decisions as a result of the project. Algonquin-Anishinabe identified some factors to take into account. The Algonquin-Anishinabe still use Victoria Island and the area surrounding Richmond Landing as a cultural gathering site for various activities.

4.3.2 ARCHAEOLOGY

In the September 2015 WSP Richmond Landing Archaeological Assessment report (WSP, 2015b), the archaeological potential (see Appendix B) of Richmond Landing, including the depth of archaeological resources, was determined by Past Recovery, "Stage 1 Archaeological Assessment and Borehole Monitoring of Richmond Landing, Part Lot 40, Concession A, Ottawa Front, Geographic Township of Nepean, City of Ottawa" (2009a) and "Stage 1 Archaeological Assessment and Borehole Monitoring of Portage Park, Part Lot 40, Concession A, Ottawa Front, Geographic Township of Nepean, City of Ottawa" (2009b). WSP was engaged by the NCC to undertake the borehole monitoring based on the recommendations provided in these 2 reports. The 2015 monitoring results confirmed the archaeological potential and depth of archaeological deposits determined by the earlier assessments. The archaeological

potential has been mapped according to the presence or archaeologically significant deposits at varying depths. Additional archaeological assessments are recommended for areas where disturbance will exceed 2 and 5 meters in depth but no further pre-construction archaeological assessment is required for the present project.

5 IDENTIFICATION OF VALUED ECOSYSTEM COMPONENTS (VECS)

This section exposes the chosen VECs and provides a rationale for their selection. Their selection is a result of the analysis of the environmental components discussed in the above sections that are likely to undergo a change, adverse or positive, as a result of the project activities. Here is the list of all the chosen VECs.

Table 2 List of Valued Ecosystem Components identified in the Richmond Landing Shoreline Access Project

	VEC #	VEC
1.Physical environment	1.1	Soil and groundwater quality
	1.2	Soil stability
	1.3	Air quality and noise
2.Biological environment	2.1	Terrestrial vegetation
	2.2	Birds and their habitat
	2.3	Fish and its habitat
	2.4	Species at risk : Northern map turtle
	2.5	Common urban fauna
3.Human environment	3.1	Site history and cultural heritage
	3.2	Archaeological resources
	3.3	Socio-economic conditions
	3.4	Current area users

5.1 PHYSICAL ENVIRONMENT

5.1.1 SOIL AND GROUNDWATER QUALITY

Based on a review of past and current studies, soil and groundwater with identified contamination is present at the Richmond Landing site. Therefore, these elements were retained as VECs.

The planned work involving contaminated soil and groundwater disturbance including off-site removal must be supervised and managed according to Federal and Provincial Acts and Regulations There is a potential risk associated with the interaction between contaminated soils and groundwater and the environment during the works, including human health of workers. (Geofirma, 2013)

The major conclusions on the potential risks associated with the contamination at the Richmond Landing's site were noted in section 4.1.4 of this report.

5.1.2 AIR QUALITY AND NOISE

Although no baseline air quality assessments have been conducted on the Richmond Landing study site, the planned work could potentially affect the air quality during the preparation and the construction phases, considering the presence of contaminated soils and groundwater. Some volatile organic compounds (VOC), benzene and ethylbenzene detected in the soil and groundwater of the study are volatile. Since those volatile compounds pose a risk to human health as a result of indoor accumulation, there is a need to further assess this situation if a building is to be built on site. In terms of human health, all contaminants identified on site must be considered. Human health risks may be associated with inhalation or ingestion of contaminated soil via airborne dust.

The machinery used for construction might emit pollutant gas and contribute to an increased dust level on site and cause air quality issues if not properly maintained. The noise caused by the works must also be considered as a potential effect on the local surroundings.

Noise levels during construction may exceed current levels. Increased noise could create a temporary disturbance to wildlife and / or residents in the local surroundings.

5.1.3 SOIL STABILITY

The Rideau Valley Conservation Authority (RVCA) identified the project site as having a potentially unstable slope (where toe of slope is less than 15 m from the water's edge).

The planned works include the full dismantlement of the current staircase adjacent to the Portage Bridge and the addition of a universally accessible recreational path network. Since this induces the removal of important volumes of concrete and disturbance of soil, the soil stability aspect has to be taken into account.

Considering there is a risk of erosion and an alteration of stability during the implementation of the project, soil stability has been considered as a VEC.

5.2 BIOLOGICAL ENVIRONMENT

5.2.1 TERRESTRIAL VEGETATION

The project site is completely landscaped and includes a formal lawn as well as trees (Hackberry, Maple and Elm) and bushes. The planned work will decidedly have an impact on the vegetation currently in place. Removal of vegetation may have an impact on birds and their nesting activity, as identified in the environmental characterization done on site (WSP, 2015a).

The abundance of exotic invasive species such as Garlic mustard (*Alliaria petiolata*), Pale swallowwort (*Cynanchum rossicum*), Siberian elm (*Ulmus pumila*), Periwinkle (*Vinca minor*), Reed canary grass (Phalaris arundinacea) and Purple Loosestrife (Lythrum salicaria) on site is also an important consideration of the project implementation. It is crucial to limit the spread of such species within the study area and the surrounding properties.

5.2.2 WILDLIFE AND ITS HABITAT

5.2.2.1 BIRDS AND THEIR HABITAT

Considering the Canada goose and American Cliff Swallow nests were observed in the study area and that the checklist compiled by the Ottawa Field-Naturalists' Club Birds Committee include 90 bird species breeding or suspected to have bred in the Ottawa-Gatineau District (within a 50-km (30-mile) radius of the Peace Tower on Parliament Hill in Ottawa, Ontario), birds and their habitat was retained as a VEC. Birds are susceptible to use the vegetation present in the project area to nest, feed and rest. Also, the majority of the species are protected in Canada under the *Migratory Birds Convention Act* and its regulations. The *Migratory Birds Regulations* specifies that:

> ***5. No person shall:***
> ***(a) disturb, destroy or take a nest, egg, nest shelter, eider duck shelter or duck box of a migratory bird, or***
> ***(b) have in his possession a live migratory bird, or a carcass, skin, nest or egg of a migratory bird.***

Birds usually perceive humans as potential predators and may leave their nests in response to being approached, or abort nesting because of stressful situations. In general, there is a negative relationship between the type and magnitude of disturbance experienced by a nesting bird or colony and its breeding success. Migratory birds, the nests of migratory birds and/or their eggs can be inadvertently harmed or disturbed as a result of many activities–including but not limited to clearing trees and other vegetation. This inadvertent harming, killing, disturbance or destruction of migratory birds, nests and eggs is known as incidental take. Incidental take, in addition to harming individual birds, nests or eggs, can have long-term consequences for migratory bird populations in Canada, especially through the cumulative effects of many different incidents. (Environment and Climate Change Canada, 2015).

5.2.2.2 FISH AND ITS HABITAT

The Richmond Landing site is adjacent to the Ottawa River. Based on a literature review, the waters in this reach are very turbid as a result of high sediment content. These sediments consist mostly of fine clay particles. This reach of the Ottawa River supports a relatively diverse coolwater/warmwater fish community comprised of at least 76 different fish species.

Explosives may be needed if rock is encountered during the construction of the bridge abutments. The use of explosives in or near water produces shock waves that can damage a fish swim bladder and rupture internal organs. Blasting vibrations may also kill or damage fish eggs or larvae.

Since some of the components of the projects include work on the shores of the river, excavation, blasting or other type of work that could release sediments in the water, there is a potential impact on fish communities and fish habitat. Therefore, fish and its habitat is considered a VEC.

5.2.2.3 SPECIES AT RISK: NORTHERN MAP TURTLE

Given the sighting of a Northern map turtle on site during the 2014 field survey, this specie was retained as a VEC. Shoreline development and increased human recreational activity pose real threats to Northern Map Turtle populations (SARA, 2015). Map turtles will often bask at the surface of the water under floating vegetation mats with nothing but their head or nose visible from the surface. This behaviour puts map turtles at significant risk of mortality from motorboats (Government of Ontario, 2015).

After leaving hibernacula in early spring, females move toward basking sites along nesting beaches where they remain for approximately 6 weeks until post-nesting.

The Northern Map Turtle is protected from hunting, trapping, captivity and trade under *Ontario's Fish and Wildlife Conservation Act* (1997) and its habitat receives a degree of protection under the *Provincial Policy Statement of the Ontario Planning Act* (R.S.O. 1990, c.P.13).

The turtle is also protected under section 79 of the *Species at Risk Act* which stipulates that the NCC must, without delay, notify the competent minister or ministers in writing of the project if it is likely to affect a listed wildlife species or its critical habitat. Also, the NCC must identify the adverse effects of the project on the listed wildlife species and its critical habitat and, if the project is carried out, must ensure that measures are taken to avoid or lessen those effects and to monitor them. The measures must be taken in a way that is consistent with any applicable recovery strategy and action plans. At the time of publishing this report, no recovery strategy or action plans were targeting the Northern Map Turtle.

5.2.2.4 COMMON URBAN FAUNA

The site hosts common urban and peri-urban mammals, amphibians and reptiles. Thus, the work could disturb their activities. Some of them might use the site for shelter, resting, feeding or reproduction. Since there is a high possibility for the workers and users to encounter common urban fauna, this wildlife group is considered as a VEC.

Also, the lighting and infrastructure design that will be selected may affect the behavior of locas fauna. A bright lighting might attract more insects and insect-eating animals. Material used for the bridge railings may also pose a risk for bird collisions.

5.3 HUMAN ENVIRONMENT

5.3.1 SITE HISTORY AND CULTURAL HERITAGE

Richmond Landing area was used by pre-contact populations and the Chaudière general area was of sacred significance to the Algonquin-Anishinabe. Since the project will cause land disturbance and transformation of the Richmond Landing site landscape, the site history and cultural heritage is considered as a VEC.

5.3.2 ARCHAEOLOGICAL RESOURCES

Past Recovery's 2009 Stage 1 archaeological assessments of Richmond Landing and Portage Park identified portions of the study area as having moderate to high archaeological potential (see appendix B). Given the important archaeological potential of certain areas of the site, archaeological resources were included as a VEC to assess.

5.3.3 SOCIO-ECONOMIC CONDITIONS

The Algonquin-Anishinabe currently use the site for cultural activities. Some of these activities may be open to public (i.e. traditional fairs, ceremonies, etc.) and be a part of their economic activities. The Richmond Landing Shoreline Access project is planning to link the Ottawa shoreline to Victoria island via Richmond Landing. This will make the area accessible to a higher number of people. The new ease of access resulting in increased traffic could have an effect on those economical activities.

Also, companies in the National capital region could offer their services to the newly accessible and improved site resulting in a change of the local socio-economic conditions. Thus, socio-economic conditions are considered as a VEC as part of this assessment.

5.3.4 CURRENT AREA USERS

Richmond Landing is currently being used by commuters, tourists and general public. The planned work could affect their daily habits. The current area users are therefore considered as a VEC.

6 PROPOSED WORK

The general work and infrastructures proposed are presented in the Richmond Landing Shoreline Access - Final Design 100% (Groupe Rousseau and Lefebvre, 2016). The schedule proposed by the NCC to complete the work will be phased over three (3) years. The five (5) components included in the current environmental effects analysis are presented below and illustrated on the Master plan in the Preliminary Design document:

Components 1, 2, 4, 7 and 8 of the Master plan:

1. Promontory: Natural setting that offers a reflective pause for contemplation. Integration of the Rideau trail stone as an interpretation element on site.

2. Ceremonial landing: Functional dock between the promontory and the landing with a path connecting to the upper level.

4. Richmond Landing node: Plaza with integration of the main interpretation node.

7. Pedestrian and cyclist bridges: Improve site experience and ownership of the site, thin structure incorporating a kayak pull-out on the mainland bridge abutment (south).

8. Richmond Landing lookout: Terraced structure integrating natural materials and vegetation, safe and universal access for pedestrians and cyclists with a new staircase, a universal access path and a new access to Portage bridge for the Capital Pathway, grassed lookout over Pooley's tailrace.

Three (3) major phases are planned for each component: site preparation, construction and maintenance/operation.

Generally, the work includes:

- The demolition or removal of some existing structures (concrete stairways, curbs, landings, handrails, walls, surface, garbage cans);
- The removal of invasive plant species
- Bank stabilization and rehabilitation of wild, natural and cultivated landscape;
- The relocation of granite curbs and pilaster;
- The removal of lamp-posts, asphalt, sod and shrubs;
- Asphalt repairs;
- Installation of new structures (bridges, dock, pier, gangway, pathways, benches, stairways, curbs, landing, handrails, guardrails, sidewalks, interpretive elements and lamp-posts);
- Management of contaminated soils and groundwater (if applicable);
- Landscaping (planting and paving);
- Excavation for the bridge abutments, pier, wake and other infrastructures;
- Work under the high water mark and in the water for shores rehabilitation and stabilization, bridge abutments, pier construction, gangway, floating dock and kayak pull-out;

- Compaction of engineered soil and change in top soil material.

The works as planned in the current project are not expected to excavate soil in a way that could alter the retention capacity of the floodplain area on site. If such a change should happen, the Ontario Ministry of Natural Resources should be consulted.

7 IDENTIFICATION OF ENVIRONMENTAL EFFECTS, MITIGATION MEASURES AND MONITORING REQUIREMENTS

An environmental effects analysis was conducted and identified some elements that may directly or indirectly affect the quality or the preservation of ecological functions currently available on the study site. The results of this analysis are presented in table 3. The majority of these environmental risks are mainly related to the use of machinery and the reshaping of surface soils.

When analysing the receiving environment, vegetation and fish habitat are the two elements most likely to be affected by the project. Table 3 describes the various potential effects that the project may have upon the components of the natural and human environment, as well as the mitigation measures and the monitoring requirements.

Table 3 Potential environmental effects, mitigation measures and monitoring requirements

VEC	Project phase affected			Potential environmental effects	Potentially adverse effect (S)[1]	Mitigation Measures Required	Significance of Residual Effects[1]	Monitoring Program
	Site preparation	Construction	Operation					
1. Physical Environment								
1.1 Soil and groundwater quality	X	X		Interaction between contaminated soils/groundwater and the environment (including human health)	S	**<u>Site preparation and construction phases</u>** Protective equipment including long sleeves, long pants, and gloves is recommended for any workers that might be in contact with the surface and/or subsurface soils at Richmond Landing. Health and safety measures must be applied by all workers accessing the site. The Contractor is responsible for providing an Occupational Health and Safety Plan to the NCC for review and approval a minimum of 2 weeks prior to the start of construction on NCC lands. Schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation. All contaminated soil excavated for the bridge abutments or other structures shall be disposed off-site. Placement of a clean soil cap (at least 0.3 m) over any disturbed area of contaminated soil is required. If the material is temporarily stockpiled, it must be placed on impermeable material and covered with plastic sheeting overnight to prevent generation of dust and run-off from rainfall. If debris (wood, glass, steel, etc.) is encountered during excavation, it must be segregated from the backfill material and disposed of as waste to a licensed landfill. Any excavated subsurface soil must be identified as contaminated, with appropriate handling (including not mixing with or placing contaminated soil on the clean surficial soil) and off-site disposal at an authorized facility. Construction debris and litter will be cleaned up at the end of each work day. Garbage receptacles shall be kept onsite in order to minimize unnecessary litter entering nearby streams and natural areas. The Contractor is responsible of providing an Accidental Release Management Plan (including hardware, instructions for use and telephone numbers of people to contact in case of a spill). This Management Plan must be in place and ready to be applied in case of spillage. A copy of the Plan shall be present on-site at all times. The Contractor shall ensure that all workers, including sub-contractors, are aware of the importance of the Plan and are informed of the consequences of the failure to comply with the requirements of the Plan and all Regulatory Agencies. The Contractor shall plan activities near water such that materials such as paint, primers, blasting abrasives, rust solvents, degreasers, grout, or other chemicals do not enter the watercourse. The Contractor will take all necessary precautions to prevent the accumulation of litter and construction debris or further contamination.	I	

VEC	Project phase affected: Site preparation	Project phase affected: Construction	Project phase affected: Operation	Potential environmental effects	Potentially adverse effect (S)[1]	Mitigation Measures Required	Significance of Residual Effects[1]	Monitoring Program
1. Physical Environment								
						If substantially deep excavation below the water table or the level of the river is required and dewatering is needed (more than 50,000 litres of water in a day), the requirements for a Permit to Take Water from the Ministry pf the Environment should be reviewed during design as per article 34 of the *Ontario Water Resources Act* (1990). Water treatment may be required prior to water discharge with monitoring at the discharge point. An approval from the Ministry of Environment may be needed to discharge water to a receiving water body of to the subsurface. Depending on the scope of the project (and the volume of soil and/or groundwater to be managed), a Soil and Groundwater Management Plan must be developed and submitted to the NCC for review and approval OR, contaminated soil / groundwater management procedures must be written into the specs.		
1.2 Soil stability	X	X		Erosion and siltation into the Ottawa River due to a change in soil stability	S	**<u>Prior to construction</u>** Prior to construction work, the Contractor shall submit an Erosion and Sediment Control Plan for NCC approval. The plan shall indicate how the Contractor intends to provide for securing the site against erosion and siltation problems for the full duration of the construction period, i.e. before work and until disturbed soils are stabilized permanently, suspended sediments are deposited on the bed of the watercourse and that runoff water is clear. The Contractor shall not proceed with excavation in or near waterways, drainage channels or wetland areas until approval of the erosion and sediment control plan is received from the NCC. A copy of the Erosion and Sediment Control Plan shall be present on-site at all times. The Contractor shall ensure that all workers, including sub-contractors, are aware of the importance of the erosion and sediment control measures and are informed of the consequences of the failure to comply with the requirements of all Regulatory Agencies. This plan should address the following items : → The establishment before starting work, of effective measures to control erosion and sediment such as the installation of silt fences or other sediment control and erosion prevention means, in specific and strategic locations to prevent sediment from work areas to reach the river; → Water runoff management; → Containment and waste stabilization measures (p. Eg., Waste and building materials, accumulated debris, etc.) to prevent waste ending up in the river; → The regular inspection and maintenance of erosion control measures during construction so that they are functional and safe and, if necessary, make corrections such as replacement and cleaning; → Removal of erosion control materials and non-biodegradable sediment when the site is stabilized. Many technical planning and design recommendations were provided for the Belvedere foundation and for the bridge abutments in order for those structures to not affect the stability of the soil and to protect the infrastructure itself. (SPL, 2016) Most of the staircase adjacent to the Portage Bridge currently in place will be dismantled and remodeled as per the 100 % final design. But this component was not included in the SPL mandate at the time. This should be submitted to them prior to the work to assure that the work will not affect the soil stability.	I	Monitoring of the new infrastructures is going to be integrated into the NCC lifecycle management program.

VEC	Project phase affected: Site preparation	Project phase affected: Construction	Project phase affected: Operation	Potential environmental effects	Potentially adverse effect (S)[1]	Mitigation Measures Required	Significance of Residual Effects[1]	Monitoring Program
1. Physical Environment								
						<u>Site preparation and construction</u> All excavations should be carried out in accordance with the most recent Occupational Health and Safety Act (OHSA). Works must be performed by limiting interventions on soils that are erodible, fragile or somewhat unstable. Ensure the weight of the construction machinery and equipment will be suitable for the bearing capacity of the soil. The proposed works include bank stabilization for the deteriorated sections to prevent mineralization and sediment release into the river. If replacement rock for reinforcement/armouring is required to stabilize eroding or exposed areas, ensure that appropriately-sized, clean rock is used; and that rock is installed at a similar slope to maintain a uniform bank/shoreline and natural stream/shoreline alignment. Stockpiling of soil beside the excavations should be avoided; the weight of the stockpiled soil could lead to basal instability of braced excavations or slope instability of unsupported excavations; Deep excavations in weathered, heavily jointed or previously disturbed rock may require temporary support to ensure stability and worker safety. All rock faces should be reviewed by a qualified person as excavated.		
1.3 Air quality and noise	X	X		Increased dust and noise levels for the surrounding area	S	**<u>Site preparation and construction</u>** Respect municipal regulations concerning noise. Regular inspection and maintenance of machinery during construction so that their condition is functional and safe and operating as intended and, if necessary, make any necessary corrections (replacement or cleaning) to limit pollutants emission. Minimize dust on site by limiting machinery movement to needed areas and on stable soils.	I	No monitoring required

VEC	Project phase affected: Site preparation	Project phase affected: Construction	Project phase affected: Operation	Potential environmental effects	Potentially adverse effect (S)[1]	Mitigation Measures Required	Significance of Residual Effects[1]	Monitoring Program
2. Biological Environment								
2.1 Terrestrial vegetation	X	X		Damages to root system by work and soil compaction Loss of vegetation cover Risk of spreading invasive species	S	**<u>Site preparation and construction</u>** All tree pruning activities (including root pruning) must be conducted under the supervision of a certified arborist. All roots are to be cut flush to edges of excavations and cut roots cannot be left exposed for more than 4 hours. If roots larger than 30mm are encountered, excavation works must be stopped immediately and the NCC shall be notified. Ensure that machinery and equipment are clean and free of invasive species and noxious weeds by washing, drying and disinfecting equipment and machinery before arriving at the site. The residues of pruning, branches or tree parts that present signs of disease or pest infestation must be disposed of properly in accordance with all federal, provincial and local regulations to minimize the spread of disease (the Dutch elm disease, emerald ash borer, etc.). Clearing must be limited to the minimum necessary area for conducting the works properly. All trees (DBH> 10 cm) that can potentially be damaged by construction work must be protected prior to construction by the installation of a temporary protective fence at the boundary of the vertical projection of the tree crown to the ground. This area corresponds to the sensitive area of the roots of the tree. The temporary protective fence for trees and woodlands will only be removed once the work is completed. In the event that there is not enough time before the end of the vegetation growing season, for seeds to sprout, the site must be stabilized by other methods (e.g. cover exposed areas with biodegradable geotextile to keep the soil in place,) and stabilize permanently in following Spring. If non-biodegradable erosion control blankets or other non-biodegradable materials are used, they must be removed at the time of revegetation of denuded surfaces. All final vegetation choices will respect the landscaping plan and promote native species.	I	Elaborate a vegetation monitoring program over a period of 2 years after vegetation is implemented as proposed in the landscaping plan to ensure an adequate survival rate. A mortality rate of 10 % each year is acceptable. Replace dead trees, shrubs or plant as needed. Ensure that disturbed lands are not colonized by exotic invasive species.

VEC	Project phase affected: Site preparation	Project phase affected: Construction	Project phase affected: Operation	Potential environmental effects	Potentially adverse effect (S)[1]	Mitigation Measures Required	Significance of Residual Effects[1]	Monitoring Program
2. Biological Environment								
2.2 Birds and their habitat	X	X	X	Disturbance of migratory birds nests by clearing (trees and shrubs), pruning activities and increased noise Disturbance of some species by new traffic increase and newly accessible areas	S	**<u>Site preparation and construction</u>** If construction takes place over more than one year, access to any nesting structure must be prevented for the following year (i.e. net installation). No activities that can disturb or destroy the nest of a migratory bird (e.g. clearing or pruning) must take place during the regional nesting core period (April 15th to August 15th). If possible, construction activities should be planned from the end of August to the end of March to mitigate impacts on nesting bird species. If the proponent must work during the core nesting period, a nest survey must be conducted in the proposed construction area by a qualified avian biologist immediately prior to commencement of the work to identify and locate active nests of species covered by the *Migratory Bird Convention Act*. If any breeding birds are observed, a mitigation plan (which may include establishing appropriate buffers around active nests) must then be developed to address any potential impacts to migratory birds or their active nests. This must be carried out in consultation with the Canadian Wildlife Services. Conserve a minimal setback distance of 25 m from swallow colonies (Environment Canada 2014). To avoid bird collisions with bridge infrastructures, it if preferable to use regular bar systems instead of wire or glass for the railings. **<u>Site preparation, construction and operation</u>** *Migratory Bird Regulation :* (6) *No person shall:* (a) *disturb, destroy or take a nest, egg, nest shelter, eider duck shelter or duck box of a migratory bird, or* (b) *have in his possession a live migratory bird, or a carcass, skin, nest or egg of a migratory bird).*	I	No monitoring required

VEC	Project phase affected: Site preparation	Project phase affected: Construction	Project phase affected: Operation	Potential environmental effects	Potentially adverse effect (S)[1]	Mitigation Measures Required	Significance of Residual Effects[1]	Monitoring Program
2. Biological Environment								
2.3 Fish and its Habitat	X	X	X	Alteration of fish habitat and disturbance of fish communities Risk of contamination of surface water and groundwater Pollution and disturbance by the increase water traffic at the dock	S	**<u>Prior to construction</u>** Prior to construction, the Contractor shall submit an Erosion and Sediment Control Plan. The plan shall indicate how the Contractor intends to secure the site against erosion and siltation for the full duration of the construction period, i.e. from start of construction to final completion. The Contractor shall not proceed with excavation in or near waterways, drainage channels or wetland areas until approval of the Erosion and Sediment Control Plan is received from the NCC. A copy of the Erosion and Sediment Control Plan shall be present on-site at all times. The Contractor shall ensure that all workers, including sub-contractors, are aware of the importance of the erosion and sediment control measures and are informed of the consequences of the failure to comply with the requirements of all Regulatory Agencies. **<u>Site preparation and construction</u>** As a requirement to protect spawning species, construction work within aquatic habitats are forbidden between March 15th and July 15th. Conduct instream work during periods of low flow to further reduce the risk to fish and their habitat or to allow work in water to be isolated from flows. Ensure that all in-water activities, or associated in-water structures, do not interfere with fish passage, constrict the channel width, or reduce flows. Ensure that building material used in a watercourse has been handled and treated in a manner to prevent the release or leaching of substances into the water that may be deleterious to fish. Wash-down of wheel barrows, paving tools, concrete mixers or other equipment used for mixing concrete must not be carried out within 30 meters of the Ottawa River and shall be prevented from discharging into the Ottawa River or catch basins . All concrete trucks must collect their wash water and recycle it back into their trucks for disposal off site at a location meeting all regulatory requirements. Any excess concrete must not be disposed of on-site but at an authorized site. All equipment or associated materials will be operated, stored and maintained (e.g., re-fuel, lubricate) in a designated paved location in a manner that prevents the entry of any deleterious substance to the Ottawa River.	I	The settlement of aquatic invasive species should be monitored within and around the dock area.

VEC	Project phase affected: Site preparation	Project phase affected: Construction	Project phase affected: Operation	Potential environmental effects	Potentially adverse effect (S)[1]	Mitigation Measures Required	Significance of Residual Effects[1]	Monitoring Program
2. Biological Environment								
						Any part of equipment operating on the bank must be free of fluid leaks and externally cleaned and degreased. Monitor the surface water visually during the site preparation and construction phases. If high turbidity or high sediments content is noticed in the proximity of the site, locate the source and implement adequate measures to stop and contain the contamination. Use vegetable oil in equipment that will be used to work near water for a long period of time. No debris, concrete or wet mortar residue can be released into the aquatic environment. All debris accidentally introduced into the aquatic environment must be removed as soon as possible. Sediment control methods and erosion prevention methods need to be in place at all times during the works in order to catch and filter any run-off coming from the worksite before it reaches the watercourse. The sediment control measures shall stay in place until the construction site is stabilized. The concrete pier should be built in dried conditions when the water level is low or at its lowest. The extent of the work area shall be limited to the structure and the minimum area required for machinery manoeuvrability. If dried conditions are not possible, silt curtains must be installed around the work area in order to prevent siltation into the Ottawa River. Whenever possible, operate machinery on land above the high water mark or from a floating barge in a manner that minimizes disturbance to the banks and bed of the waterbody. Screen any water intakes or outlet pipes to prevent entrainment or impingement of fish. Entrainment occurs when a fish is drawn into a water intake and cannot escape. Impingement occurs when an entrapped fish is held in contact with the intake screen and is unable to free itself. Work will be performed by limiting interventions on erodible, fragile, or somewhat unstable soils. Minimize duration of in-water work. Minimize the removal of natural woody debris, rocks, sand or other materials from the banks, the shoreline or the bed of the waterbody below the ordinary high water mark. If natural material is removed from the waterbody, set it aside and return it to the original location once construction activities are completed. Avoid using explosives in or near water. If explosives are required as part of a project, the potential for impacts to fish and fish habitat should be minimized by implementing the following measures: → Time in-water work requiring the use of explosives to prevent disruption of vulnerable fish life stages, including eggs and larvae, by adhering to appropriate fisheries timing windows. → Isolate the work site to exclude fish from within the blast area by using bubble/air curtains (i.e., a		

VEC	Project phase affected: Site preparation	Project phase affected: Construction	Project phase affected: Operation	Potential environmental effects	Potentially adverse effect (S)[1]	Mitigation Measures Required	Significance of Residual Effects[1]	Monitoring Program
2. Biological Environment								
						column of bubbled water extending from the substrate to the water surface as generated by forcing large volumes of air through a perforated pipe/hose), cofferdams or aquadams; → Remove any fish trapped within the isolated area and release unharmed beyond the blast area prior to initiating blasting; → Minimize blast charge weights used and subdivide each charge into a series of smaller charges in blast holes (i.e., decking) with a minimum 25 millisecond (1/1000 seconds) delay between charge detonations (see Figure 1). → Back-fill blast holes (stemmed) with sand or gravel to grade or to streambed/water interface to confine the blast. → Place blasting mats over top of holes to minimize scattering of blast debris around the area. → Do not use ammonium nitrate based explosives in or near water due to the production of toxic by-products. → Remove all blasting debris and other associated equipment/products from the blast area Ensure the weight of the construction machinery and equipment will be suitable for the bearing capacity of the soil.		
2.4 Specie at risk : Northern map turtle	X	X		Risk of mortality by motorboat Risk of site avoidance because of disturbances	S	**<u>Site preparation, construction</u>** General measures to protect listed wildlife species in the *Species at risk Act* : 32 (1) *No person shall kill, harm, harass, capture or take an individual of a wildlife species that is listed as an extirpated species, an endangered species or a threatened species*; 32 (2) *No person shall possess, collect, buy, sell or trade an individual of a wildlife species that is listed as an extirpated species, an endangered species or a threatened species, or any part or derivative of such an individual*; 32 (3) *For the purposes of subsection (2), any animal, plant or thing that is represented to be an individual, or a part or derivative of an individual, of a wildlife species that is listed as an extirpated species, an endangered species or a threatened species is deemed, in the absence of evidence to the contrary, to be such an individual or a part or derivative of such an individual*. To maximize suitable basking site, keep logs, natural debris, rocks and exposed banks that are adjacent to deep water and provide an unobstructed view. Preferred nesting sites are characterized by soft sand or soil and full sunshine (Nagle et al. 2004), and nests are typically deposited within 35 m of the water (SARA, 2015). No such nesting activity was observed at the study site. Include an informational sign at the dock and/or on the paths to educate visitors about the turtle behavior and to limit the boat mortality around the dock and around the islands area.	I	

VEC	Project phase affected: Site preparation	Project phase affected: Construction	Project phase affected: Operation	Potential environmental effects	Potentially adverse effect (S)[1]	Mitigation Measures Required	Significance of Residual Effects[1]	Monitoring Program
2. Biological Environment								
2.5 Common urban fauna	X	X	X	Disturbance by the noise and newly accessible areas may drive away most common urban fauna	S	**<u>Prior to construction</u>** Plan a direct, concentrated, covered and ground oriented lighting system for the area in order to limit the attraction of insects and insect-eating animals. Green tone lighting is preferable to white light. Use lighting where it is only necessary, and favor vertical light axes instead of horizontal ones. To avoid bird collisions with bridge infrastructures, it if preferable to use regular bar systems instead of wire or glass for the railings. **<u>Site preparation, construction</u>** Workers must be formally informed that it is forbidden to harm wildlife. If animals are encountered, workers must allow the animal to leave the premises on its own by walking slowly towards the animal. All work will be completed within a reasonable time in order to minimize the impact on wildlife. The circulation of vehicles outside storage areas, work and access roads is prohibited. Workers must maintain the site in a clean condition and avoid leaving trash or food scraps that could attract wildlife. It is prohibited to feed animals. **<u>Operation</u>** As the site will support increase traffic, permanent signage may be required in strategic places to inform the public of the animal feeding and harassing prohibition.	I	No monitoring required

VEC	Project phase affected: Site preparation	Project phase affected: Construction	Project phase affected: Operation	Potential environmental effects	Potentially adverse effect (S)[1]	Mitigation Measures Required	Significance of Residual Effects[1]	Monitoring Program
3. Social Environment								
3.1 Site history and cultural heritage	X	X	X	Alteration of the history of the site Detrimental change in the current use of lands and resources for traditional purposes by the First Nation people Transformation of natural landscape	S	**<u>Prior to construction</u>** Consult First Nation and the public to assess their concerns about the project. Take into account the community knowledge and Algonquin-Anishinabe traditional knowledge. Include the Algonquin-Anishinabe recommendations in the elaboration of the final landscaping plan to ensure that the plants they currently use for traditional purposes are protected or planted. Suggestion: Plan a gate or temporary barriers on Victoria Island to Richmond Landing bridge to limit the public access to Victoria Island in case Algonquin-Anishinabe people want to hold a private event, gathering or activity.	I	No monitoring required
3.2 Archaeological resources	X	X		Disturbance or destruction of archaeological resources	I	**<u>Site preparation and construction</u>** Undertake the recommendations provided in WSP (2015) according to the archaeological potential zones indicated Map 3 of that report. If any archaeological resources or human remains are discovered during construction work, all work at the location concerned must be halted immediately and Ian Badgley, Archaeologist, NCC Heritage Program (613-239-5678, Ext. 5751, ian.badgley@ncc-ccn.ca) must be notified forthwith. Work shall not be resumed at that location until measures for the protection of those resources or remains have been put in place.	I	No monitoring required
3.3 Socio-economic conditions	X	X	X	Job creation for local contractors during site preparation and construction Increase in the traffic to the site and interference with current Algonquin-Anishinabe activities. Increase in tourists and visitors to area	P	**<u>Prior to construction</u>** Suggestion: Plan a gate or temporary barriers on Victoria Island to Richmond Landing bridge to limit the public access to Victoria Island in case Algonquin-Anishinabe people want to hold a private event, gathering or activity. **<u>Operation</u>** The NCC will need to manage the requests for new activities on Richmond Landing site if applicable. Ensure that commercial boats landing at the public dock respect all municipal, provincial and federal regulations.	I	No monitoring required

VEC	Project phase affected			Potential environmental effects	Potentially adverse effect (S)[1]	Mitigation Measures Required	Significance of Residual Effects[1]	Monitoring Program
	Site preparation	Construction	Operation					
3.4 Current users	X	X		Interference with current users daily habits	I	**Site preparation and construction** Provide a well identified detour route for commuters.	I	No monitoring required

1. Refer to the definition of the significance concept in section 3 of the current report.

8 CUMULATIVE EFFECTS ANALYSIS

The adjacent *Bronson Pulp Mill Ruins project*, which is planned to be implemented in the coming years, will eventually interact with the *Richmond Landing Shoreline Access project*. Landscaping and trail construction is planned at Victoria Island and the Bronson Pulp Mill Ruins site which is located upstream from Richmond Landing. The reason for this adjacent project is to create a more useable and inviting space for pedestrians and cyclists, while minimizing presence of cars and delivery vehicles and promoting the industrial heritage of the sector. Both of these projects are integrated into a broader plan to offer public access and new connections to discover the shorelines and waterways which have been affected by past industrial activities and therefore, not easily accessible for the public.

Although various tree clearing and shoreline landscaping activities will also be taking place within the Bronson Pulp Mill Ruins project, it will also be subject to a complete environmental effects analysis from which appropriate mitigation measures will be proposed to limit the potential adverse environmental effects of these activities. As it is the case for the Richmond Landing Shoreline Access project, we can expect the overall outcome of the Bronson Pulp Mill Ruins project to be positive on the environmental and social components of the area.

Another project that could interact spatially or temporally with the *Richmond Landing Shoreline Access project*, is the pedestrian crosswalks at the Portage/Wellington intersection that has been built recently. This project included new pedestrian crosswalks at the Portage/Wellington intersection with an associated reconstruction of the traffic islands and medians, and relocations or adjustments of street hardware, street lighting and traffic signals (traffic signal hardware installations by the City of Ottawa). Work also included the construction of cycling facilities on Wellington Street between Portage Bridge and Bay Street resulting in the relocation of the centre median on Wellington and associated modifications at the Wellington/Bay intersection. This project involved the cutting of some street trees on Wellington Street.

From what we know of these two adjacent projects, we can expect the potential adverse effects to be minimized by the implementation of effective mitigation measures. The overall outcome of these three projects within the Richmond Landing area will benefit the local population as well as visitors of the National Capital Region by creating universal accesses to the shoreline of the River and promoting the cultural and historical heritage and pre-contact heritage of the sites. The works planned at Richmond Landing will also help stabilize the banks of the river and removing invasive plant species by the implementation of the new landscaping plan.

9 RESIDUAL EFFECTS

As presented in Table 3 of this report, the potential adverse environmental effects are mostly if not completely mitigated in some cases by implementing effective mitigation measures throughout the project phases.

Although there will be a minimized loss of vegetation resulting from the planned amenities such as the paths, the kayak pull-out, the bridge abutments, the wake, pier, landing, sitting area and the stairs; it will be fully compensated by the removal and replacement of invasive species by native species along the banks and by the decommissioning of some existing paths. The net gain in total vegetation cover and quality of the site will have a positive outcome on many of the identified valued ecosystem components.

The aquatic habitat within the study area is not considered critical habitat for species at risk and the proposed project would have limited effects on its functions. There will be a minimal loss of fish habitat where the concrete pier will be constructed, but the type of habitat being relatively homogenous throughout the study area; it is not expected to have a significant adverse residual effect on the aquatic ecosystem.

Finally, as described, the project should have positive residual effects on the social components of the environment. Promotion of the cultural and historical heritage of the area combined with adequately designed public spaces and a setting for creating new economic activities are all considered as being potentially positive. That being said, it will be crucial for the federal authorities to take into consideration the recommendations of the stakeholders including the public and Algonquin-Anishinabe groups using part of Victoria Island before approving the final plans and designs and implementing the project.

10 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

Section 2(1) of CEAA defines effects of the environment as "*any change to the project that may be caused by the environment […] whether any such change of effect occurs within or outside Canada*". Typically, potential effects of the environment on any project are a function of the project design in light of the risks posed by natural hazards and influences of nature. These effects may result from the local physical conditions and site characteristics which may impact some part of the project such as the schedule and/or costs that could be substantively and adversely changed.

Although it is possible for this area of Ottawa to experience extreme weather conditions, such conditions will have little to no effect on this project other than potential project delays. This is not considered to be a significant issue. Potential effects of the environment on the project from flooding, such as either extreme rainfall events (fluvial flooding) or abnormally high water levels resulting from storms such as hurricanes, are not likely to occur. There is also normal changes to water levels occuring due to dam management upstream of the study site.

Thus, the infrastructures to be built are made with materials that are adequate for the Ottawa region weather conditions such as concrete, wood and metal. The floating dock is designed to sustain normal changes in water levels. It is connected to the pier via a ramp with a 35° pivotal anchor and attached to concrete anchors via adjustable chains which allow water level variations (Shore pier details drawing, Richmond Landing Shoreline Access – Final Design 90% (Groupe Rousseau Lefebvre, 2016a).

The issue of potential landslide raised by the RVCA is going to be addressed through the normal monitoring of the NCC structures (NCC Lifecycle Management Program).

11 ACCIDENTS, MALFUNCTIONS OR SPILLS

The Contractor is responsible of providing an accidental release management plan (including hardware, instructions for use and telephone numbers of people to contact in case of a spill) that must be in place and ready to be applied in case of spillage.

This plan should at least consider the following elements:

- Containment and waste stabilization measures (p. Eg., Waste and building materials, accumulated debris, etc.) to prevent waste ending up in the river;
- The regular inspection and maintenance of machinery condition during construction so that they are functional and safe and, if necessary, make any necessary corrections (replacement, cleaning);
- Management of any waste materials from the demolition of existing structures (broken asphalt pavement, crushed concrete, old culvert, etc.) recycled or disposed at sites authorized in accordance with Regulation on solid waste under the *Environmental Protection Act;*
- Work schedule during episodes of intense rainfall or during floods (around mid-March to June 1st);
- Supply of absorbent materials and sealed containers intended to receive petroleum products and waste;
- The handling of fuel, oil, petroleum products or other contaminants including transfilling must be done under constant supervision to avoid spills;
- Protection of soil during machinery refueling or repair;
- All hazardous materials found on NCC properties must be stored in accordance with the regulations, standards and guidelines. Flammable materials must be stored in accordance with the National Fire Code of Canada Fire;
- Spills should be contained and cleaned in accordance with applicable regulatory requirements;
- If soil contamination signs are visible, a sampling of the subject land will be made by applying characterization techniques consistent with Federal and Provincial guidelines and standards;
- If the levels of contamination are above those established by the Canadian Council of Ministers of Environment (CCME) and/or the Ontario Ministry of the Environment Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the *Environmental Protection Act*, soil must be transported off-site and disposed of in a MOE approved landfill;
- Hydrocarbons and contaminated soil must be recovered by a firm specializing in this area once the spill has been contained.

Everyone working on the site must know where and how to use the recovery kit. If a spill occurs, the Contractor must immediately apply the accidental release management plan in effect and immediately report the situation to stakeholders. Notify immediately the:

NCC Emergency Service (613-239-5353)

Ontario Spills Action Centre (1-800-268-6060 (toll-free))

12 CONCLUSION

In light of the current environmental effects analysis including consideration of cumulative and residual effects, no significant adverse effects are expected from the implementation of the project.

All the effects of the project on the VECs are effectively managed with proven mitigation measures that are economically and realistically feasible.

The vegetation VEC will be positively affected by the planned work as well as most of the human environmental VECs. Indeed, the site history and cultural heritage, the potential socio-economic development of the sector and the current users of the area will benefit from a better developed path network that will ease their commuting and give a place to relax, learn and enjoy the view of the National Capital emblems and beauty.

Finally, as the main objectives of the project are to develop attractions, accommodate for universal access, promote the history and natural heritage of the site, it is expected that the Richmond Landing shoreline access project will have an overall beneficial outcome on the environment.

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Appendix A

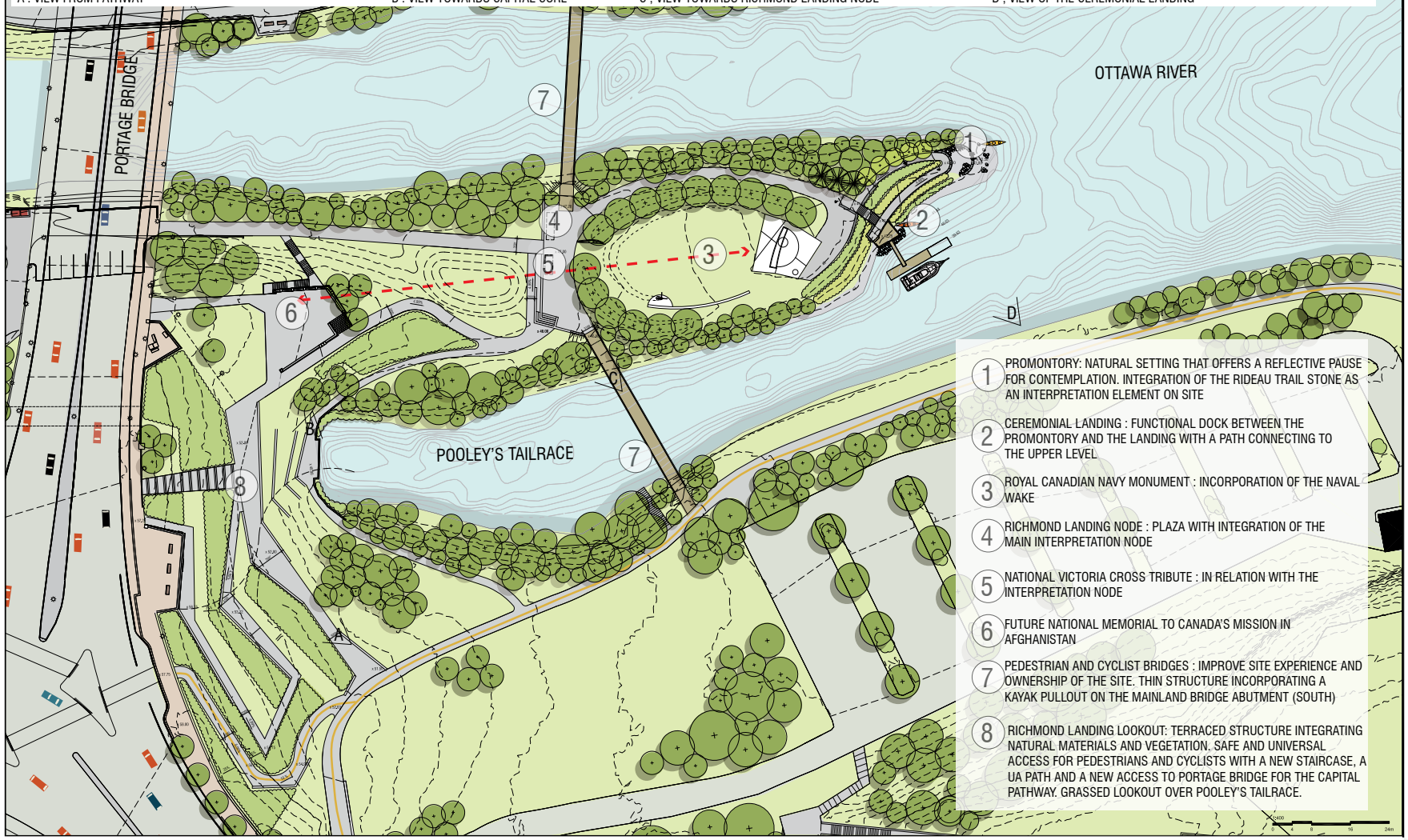
NCC LANDSCAPE ARCHITECTURE MASTER PLAN OF THE RICHMOND LANDING SHORELINE ACCESS - FINAL DESIGN 100% (GROUPE ROUSSEAU LEFEBVRE, 2016B)

A : VIEW FROM PATHWAY

B : VIEW TOWARDS CAPITAL CORE

C ; VIEW TOWARDS RICHMOND LANDING NODE

D ; VIEW OF THE CEREMONIAL LANDING



1. PROMONTORY: NATURAL SETTING THAT OFFERS A REFLECTIVE PAUSE FOR CONTEMPLATION. INTEGRATION OF THE RIDEAU TRAIL STONE AS AN INTERPRETATION ELEMENT ON SITE
2. CEREMONIAL LANDING : FUNCTIONAL DOCK BETWEEN THE PROMONTORY AND THE LANDING WITH A PATH CONNECTING TO THE UPPER LEVEL
3. ROYAL CANADIAN NAVY MONUMENT : INCORPORATION OF THE NAVAL WAKE
4. RICHMOND LANDING NODE : PLAZA WITH INTEGRATION OF THE MAIN INTERPRETATION NODE
5. NATIONAL VICTORIA CROSS TRIBUTE : IN RELATION WITH THE INTERPRETATION NODE
6. FUTURE NATIONAL MEMORIAL TO CANADA'S MISSION IN AFGHANISTAN
7. PEDESTRIAN AND CYCLIST BRIDGES : IMPROVE SITE EXPERIENCE AND OWNERSHIP OF THE SITE. THIN STRUCTURE INCORPORATING A KAYAK PULLOUT ON THE MAINLAND BRIDGE ABUTMENT (SOUTH)
8. RICHMOND LANDING LOOKOUT: TERRACED STRUCTURE INTEGRATING NATURAL MATERIALS AND VEGETATION. SAFE AND UNIVERSAL ACCESS FOR PEDESTRIANS AND CYCLISTS WITH A NEW STAIRCASE, A UA PATH AND A NEW ACCESS TO PORTAGE BRIDGE FOR THE CAPITAL PATHWAY. GRASSED LOOKOUT OVER POOLEY'S TAILRACE.

NCC CCN
Canada

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Direction de l'aménagement de la capitale et gestion de l'immobilier

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Division design et construction

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- PROPOSED TREE
- EXISTING TREE
- PROPOSED VEGETATION
- COMMEMORATION AXIS
- CAPITAL PATHWAY

Issued or revised
émis ou revisé

no.	description	date
1	100% ADVANCEMENT	2016-03-31

project
projet

RICHMOND LANDING
SHORELINE ACCESS

drawing
dessin

LANDSCAPE ARCHITECTURE
MASTER PLAN

approved by / approuvé par	M. GLORIEUX
designed by / conçu par	F. FORTIN
drawn by / dessiné par	D. BERTRAND
date	March 2016
scale / échelle	
NCC project no. / no. du projet de la CCN	DC4200-17 DC4247-02
sheet no. / no. de la feuille	

Appendix B

ARCHAEOLOGICAL POTENTIAL FROM RICHMOND LANDING ARCHAEOLOGICAL BOREHOLE MONITORING REPORT (WSP, 2015b)

WSP
1345 ROSEMOUNT AVENUE
CORNWALL, ONTARIO
CANADA K6J 3E5
PHONE: 613-933-5602 FAX: 613-936-0335
WWW.WSPGROUP.COM

CLIENT: SPL CONSULTANTS LTD.

PROJECT: NATIONAL CAPITAL COMMISSION ARCHAEOLOGICAL ASSESSMENT: RICHMOND LANDING

LEGEND

- BOREHOLE
- MODERATE TO HIGH ARCHAEOLOGICAL POTENTIAL (REQUIRES STAGE 2 TESTING)
- MODERATE TO HIGH ARCHAEOLOGICAL POTENTIAL (REQUIRES STAGE 2 TESTING IF PLANNED DEPTH EXCEEDS 5 M)
- MODERATE TO HIGH ARCHAEOLOGICAL POTENTIAL (REQUIRES STAGE 2 TESTING IF PLANNED DEPTH EXCEEDS 2 M)
- LOW ARCHAEOLOGICAL POTENTIAL (DOES NOT REQUIRE STAGE 2 TESTING
- MODERATE ARCHAEOLOGICAL POTENTIAL (MONITORING RECOMMENDED IF PLANNED DEPTH EXCEEDS 4 M)

DATA SOURCE: GOOGLE EARTH, PAST RECOVERY 2009a

PROJECT NUMBER: 151-08137-00

DATE: NOVEMBER 2015

DRAWN BY: LS

CHECKED BY: DAY

SCALE: 1:1,200

0 5 10 20 30 40 50 Meters

NAD1983 ZONE 18

TITLE: RICHMOND LANDING ARCHAEOLOGICAL POTENTIAL

FIGURE NUMBER: MAP 3