

**Environmental Assessment  
Water Resources Technical Memorandum  
Appendix F**

Federal Actions In and Adjacent to Jackson Park:  
Urban Park and Recreation Recovery Amendment and Transportation  
Improvements  
Jackson Park, City of Chicago, Illinois

August 2020

National Park Service  
Federal Highway Administration

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## 1.0 Introduction

This technical memorandum documents the applicable regulations, existing conditions and potential impacts associated with water resources and drainage as part of the Environmental Assessment (EA) for Federal Actions in and Adjacent to Jackson Park (Federal Actions). Water resources evaluated include Lake Michigan, the North and South lagoons, one pond, and four wetlands.

## 2.0 Applicable Regulations

Surface water resources in the study area include Lake Michigan, the North and South Lagoons, one pond, and four wetlands. Two federal statutes are potentially relevant to impacts on water resources within or adjacent to Jackson Park and Midway Plaisance: Section 404 of the Clean Water Act (CWA) and the Rivers and Harbors Act (RHA). The RHA regulates obstructions to the navigable capacity of any “navigable water of the United States” (33 U.S.C. § 403). The CWA makes “the discharge of a pollutant by any person [into the waters of the United States (WOTUS)] ... unlawful” unless such discharge is permitted, in relevant part, under Section 404 of the Act (33 U.S.C. §§ 1311, 1362, 1344.).

The U.S. Army Corps of Engineers (USACE) administers the Section 404 program to regulate the discharge of dredged and fill material. USACE is a cooperating agency in this Environmental Assessment, and will base any necessary permit or other decisions on its own review under the applicable regulatory authorities. The CWA protects more waters, including some wetlands, ponds, and streams, than the waters that are jurisdictional under the RHA. USACE can make a decision called a “jurisdictional determination” to determine whether water resources are regulated under the CWA and/or RHA. This determination involves the application of regulatory standards set forth in Title 33, Code of Federal Regulations, Part 328 and 329. Surface waters subject to regulation under the CWA will be referred to as “WOTUS” in this EA. Waters subject to RHA jurisdiction will be referred to as “navigable waters of the U.S.”

USACE may issue permits under the RHA and Section 404 of the CWA in various forms, including: standard permits, nationwide permits, regional general permits, or letters of permission. The latter categories may be used for specific types of activities with minimal environmental adverse effects. Under another provision of the CWA, any applicant seeking an individual or nationwide permit for an activity that may result in a discharge into a WOTUS must seek a Water Quality Certification issued under Section 401 from the state (33 U.S.C. § 1341(a)(1)). The purpose of the certification is to verify compliance with applicable state water quality standards. A programmatic Section 401 Water Quality Certification may be applicable to some regulated discharges. Floodplains are addressed in Executive Order (EO) 11988: Floodplain Management. EO 11988 necessitates Federal agencies to avoid to the maximum extent possible the adverse impacts associated with altering or modifying floodplains. Title 44 CFR Part 9 is a regulation that provides the basis for the policies, procedures, and responsibilities necessary to implement and enforce EO 11988.

State laws also may apply to actions undertaken by state, municipal, or private entities. The Illinois Interagency Wetland Policy Act of 1989 (IWPA) established a wetland regulatory program separate from

the federal Section 404 permitting program under the CWA. (20 Ill. Comp. Stats. 830). It applies to any state actions. The IWPA requires state agencies to follow a multi-step process to avoid and minimize adverse wetland impacts, with the goal of achieving no net loss of existing wetland acres or their functional value due to state supported activities (Interagency Wetland Policy, Sec. 1-4, 3-4). Additional guidance and requirements are detailed in the Illinois Department of Transportation (IDOT) “Wetlands Action Plan” (IDOT 1998).

In addition, work in and along lakes, rivers, streams and waterways considered to be public waters is regulated by the Illinois Department of Natural Resources – Office of Water Resources (IDNR-OWR) pursuant to the Illinois Rivers, Lakes, and Streams Act (615 Ill. Comp. Stats. 5). As a result, construction activities that either (a) are on Lake Michigan; (b) could result in restricted public access or enjoyment of Lake Michigan; or (c) are located along the Lake Michigan shoreline below the ordinary high water mark (OHWM), which is defined as elevation 581.5 feet above mean sea level (AMSL), require a permit issued by the IDNR-OWR to demonstrate compliance with the State and Federal rules (*Id.* § 3704.30(a)-(c)).

The IDNR – OWR considers the Illinois Environmental Protection Agency (IEPA) determination on federal actions subject to Section 39 of the Illinois Environmental Protection Act prior to permit issuance. Section 39 of the Illinois Environmental Protection Act dictates that the IEPA will make the necessary determinations and issue permits such that federal actions do not violate the Act.

### 3.0 Existing Conditions

An investigation was completed to identify water resources, ditches, and streams from approximately 56<sup>th</sup> Street to 67<sup>th</sup> Street and from Dorchester Avenue to the limits of Lake Michigan. The efforts of this investigation are documented in a *Wetland and Water Resources Delineation Report*, which can be found under separate cover (GSGC 2017).

#### 3.1 Surface Water Resources

Based on a field investigation and review of related resource materials, the *Wetland and Water Resources Delineation Report* identified Lake Michigan and its associated north and south lagoons as a WOTUS and navigable water of the U.S. (GSGC 2017). The report identifies Pond 1 to be a jurisdictional water that drains into a culvert on the south side of Marquette Drive that then ultimately drains into Lake Michigan. There were no streams identified in the project study area. See Attachment F-1. These resources are described in Section 3.2 of the *Wetland and Water Resources Delineation Report* (GSGC 2017).

##### Streams

There were no jurisdictional or non-jurisdictional streams identified in the project study area.

##### Lake Michigan and associated Lagoons

Lake Michigan, a deep water Laurentian great lake, extends along the eastern edge of the project study area. Two lagoons, north and south, are located within the project study area, providing recreational and commercial boat access from marinas in each lagoon to the open lake. The water elevation in the lagoons is directly connected to the water level in Lake Michigan, that is, the water elevations in the lagoons and

the water level in the lake rise and fall together. However, note that the water levels in the North Lagoon are generally maintained by a concrete weir control structure located in the northeast corner. When Lake Michigan is low the concrete weir structure maintains the water level in the North Lagoon. The shoreline of Lake Michigan is primarily armored with stone, or seawall. Two recreational sandy beaches exist within the project study area. The shoreline of the lagoons varies from seawall, hardened stone, steep vegetated bank, to shallow bank with a narrow band of hydrophytic vegetation.

### **Pond 1**

Pond 1 is located south of Marquette Drive, within the existing Jackson Park Golf Course. The pond is a deep-water pond with steep banks that are maintained to its edge through the golf course. Pond 1 drains into a culvert on the south side of Marquette Drive which then drains into the Lake Michigan south lagoon, north of Marquette Drive.

*Table 1: Surface Water Resources in the Project Study Area*

<b>Resource ID</b>	<b>Size (acres)</b>	<b>Jurisdictional Status</b>	<b>Comments</b>
Lake Michigan and associated Lagoons	N/A	Jurisdictional	Navigable Water of the U.S.
Pond 1	1.62	Jurisdictional	Drains to Lake Michigan

## **3.2 Groundwater Resources**

Groundwater resources are not a consideration for this project because groundwater is not the primary source of potable water in the area, the project does not occur within an area of karst topography or within a watershed that has been designated by the IEPA as vital for a particularly sensitive ecological system. The project does not impact a Wellhead Protection Area, occur within an area where potable water supply wells are present, contribute to degradation of the area's groundwater quality or occur within an area designated as a special resources groundwater. Additionally, there are no Sole Source Aquifers, as designated under Section 1424(e) of the Safe Drinking Water Act (42 USC 300 et seq.), within the project area. This topic is not carried through for a full analysis in this document.

## **3.3 Wetlands**

The *Wetland and Water Resources Delineation Report* identified three wetlands (Wetland 2, Wetland 3, and Wetland 4) below the Lake Michigan OHWM (581.5 feet Above Mean Sea Level(AMSL)), comprising 0.68 acres existing within the Jackson Park portion of the project study area (GSGC 2017). The *Wetland and Water Resources Delineation Report* identified one wetland (Wetland 1) comprising 0.436 acres on the Midway Plaisance portion of the study area. The City received a Jurisdictional Determination from USACE dated May 18, 2020 stating this wetland is not subject to federal jurisdiction. This jurisdictional determination is included as Attachment F-2. Activities affecting the wetlands in Jackson Park will require a permit from the USACE. These resources are described below and summarized in Table 2. Project

coordination with the USACE regarding the required permitting has been initiated. See Attachment F-3 for meeting minutes.

Definitions for common terms used throughout this document pertaining to wetlands are included here. An emergent wetland is a wetland characterized by vegetation that is present for most of the growing season and is usually dominated by perennial plants (FWS 1979). The C-value of a wetland is a range from 0 to 10 that indicates how likely a plant species may be found on an undisturbed site in a natural plant community. Plant species with low C-values are typically more common and will likely tolerate a high degree of disturbance, whereas plant species with high C-values are typically less common and cannot tolerate disturbance. The Floristic Quality Index (FQI) is a function of the C-value and provides a measure of the floristic integrity or level of site disturbance. A low FQI indicates low floristic quality.

### **Wetland 1**

Wetland 1 is located on the west side of Stony Island Avenue between 59th Street and 60th Street, also referred to as the east end of the Midway Plaisance. The 0.436 acre mown emergent wetland is located west of the Stony Island Avenue roadway right-of-way within the Midway Plaisance. The mean C-value is 3.25, and FQI is 6.50 indicating low floristic quality (both mean C and FQI are used as an indication of native vegetative quality). Wetland 1 has been determined by the USACE to not be subject to federal jurisdiction.

### **Wetland 2**

Wetland 2 is located on the west side of the 63rd Street Beach at the northeast corner of Hayes Drive and Lake Shore Drive. This 0.50-acre emergent wetland is located on the coastal dune shoreline. The mean C-value is 5.00 and FQI is 16.58, indicating a potential High Quality Aquatic Resource (HQAR). This wetland is within the OHWM of Lake Michigan, a WOTUS and a navigable water of the U.S. and, as such, is subject to both the CWA and the RHA.

### **Wetland 3**

Wetland 3 is located on the west bank of the south lagoon connected to Lake Michigan near the northeast corner of Marquette Drive and Richards Drive. This 0.14-acre emergent/shrub scrub wetland is located along the lagoon shoreline. The mean C-value is 2.14, and FQI is 5.67, indicating low floristic quality. This wetland is directly connected to, and within the OHWM of Lake Michigan, a WOTUS and a navigable water of the U.S. and, as such, is subject to both the CWA and the RHA.

### **Wetland 4**

Wetland 4 is a 0.03-acre emergent wetland located on the northeast bank of the Wooded Island located in the North Lagoon. The mean C-value is 3.20, and FQI is 10.12, indicating low floristic quality. The wetland is directly connected to, and within the OHWM of Lake Michigan, a WOTUS and a navigable water of the U.S. and, as such, is subject to both the CWA and the RHA.

Table 2: Wetlands in the Project Study Area

Wetland ID	Size (acres)	Mean C Value	FQI	Presumed Jurisdictional Status	Comments
Wetland 1	0.436	3.25	6.50	Non-jurisdictional	Mown Lawn in Park
Wetland 2	0.50	5.00	16.58	Jurisdictional	Shoreline Wetland; HQAR
Wetland 3	0.14	2.14	5.67	Jurisdictional	Wetland Bay in Lake Michigan Lagoon
Wetland 4	0.03	3.20	10.12	Jurisdictional	Wetland Bay in Lake Michigan Lagoon

### 3.4 Floodplains

Lake Michigan is a mapped Federal Emergency Management Agency (FEMA) floodplain adjacent to the project study area that is located directly east of Lake Shore Drive. Mapped floodplains for the Jackson Park Outer Harbor as well as the South Lagoon/Jackson Park Inner Harbor are located to the west of Lake Shore Drive and south of Hayes Drive and are directly connected to Lake Michigan. In addition, mapped floodplains for the North Lagoon are located east of Cornell Drive, north of Hayes Drive, and west of Lake Shore Drive. The North Lagoon is directly connected to Lake Michigan by the Lake Shore Drive 59th Street Inlet Bridge Structure. This structure spans the connecting channel between Lake Michigan and the North Lagoon and provides access for small watercraft to the 59th Street Harbor. There is no record of flow through this structure and the only upstream tributary drainage area is the North Lagoon.

The existing floodplain for the South Lagoon extends across Hayes Drive, through an existing bridge just east of the intersection of Hayes Drive and Richards Drive. The mapped floodplain extends north along a historical connection to the North Lagoon (there is no existing connection). There is no conveyance through the bridge, as the South Lagoon is directly connected to Lake Michigan.

All of the floodplains within and adjacent to the project study limits including Lake Michigan, as well as the South and North Lagoon are mapped as Zone AE with an elevation of 585.0 feet. There is no designated floodway. There are no existing floodplain elevations that overtop or encroach onto the existing roadway pavement.

These areas are depicted on the Flood Insurance Rate Map (FIRM) included as Attachment F-4 (NFIP 2008).

### 3.5 Drainage Patterns

The existing drainage within the project study limits includes a large City of Chicago, 13-foot diameter combined sewer that flows to the north under Stony Island Avenue. In general, most of the roadway storm sewers within the project study limits are ultimately tributary to this sewer. There is a control structure located on Hayes Drive just east of Stony Island Avenue that acts as a backflow preventer (to prevent combined sewer flows from backing into the storm sewer) as well as a restrictor to limit discharge to the

combined sewer to the 1-year flow. Flows that exceed the 1-year design flow would overflow to the existing Lagoons in Jackson Park through a series of weirs within the existing storm sewer system.

Stony Island Avenue is drained entirely by combined sewers. There are local sewers that drain the roadway and surrounding areas that ultimately connect to the large 13-foot diameter interceptor sewer that runs down the center of Stony Island. The sewer is under Chicago Department of Water Management (DWM) jurisdiction.

In existing conditions, there are also areas from Jackson Park that drain directly into the lagoons. Cornell Drive, north of Hayes Drive, discharges directly to the North Lagoon (western portion) via an existing storm sewer. The water levels in the North Lagoon are generally maintained by a control structure located to the west of the 59th Street inlet. When Lake Michigan is low the weir/control structure maintains the levels in the North Lagoon.

The details of all the existing drainage are shown on the existing drainage plan, which is included in the Location Drainage Study. The Location Drainage Study will be made available on the project website: <http://www.tinyURL.com/JPIImprovements>.

## **4.0 Impacts Analysis**

The following sections present the impact analysis for potential impacts on water resources for the three alternatives considered.

Potential impacts can be direct, indirect, or cumulative. Direct impacts occur as a result of the proposed action, at the same time and place of implementation. Indirect impacts occur as a result of the proposed action, but later in time or farther in distance from the action. Cumulative impacts result from the “incremental impact of the action when added to other past, present, or reasonably foreseeable future actions, regardless of what agency (federal or nonfederal) or person undertakes such other actions” (40 CFR 1508.7).

The cumulative impacts analysis will assess the synergistic effect of combining the impacts of the Federal Actions, any indirect impacts following the Federal Actions, and the impacts of the following past, present, or reasonably foreseeable actions that are unrelated to the Federal Actions. Section 5.2.1 of the EA considers certain other past, present, or reasonably foreseeable projects, unrelated to the OPC project, that potentially impact the same resources. The Osaka Garden and other improvements on the Wooded Island and the Jackson Park Harbor Navigation Improvement projects have the potential to impact water resources.

Detailed descriptions of the alternatives are provided in Section 4.0 of the Environmental Assessment (EA) and referenced in this technical memorandum.

### **4.1 Alternative A: No Action**

Alternative A assumes that there is no UPARR boundary conversion, the OPC is not constructed, and no roads are closed.

#### **4.1.1 Direct Impacts**

As no construction filling activities occur under this alternative, there are no anticipated impacts to surface water resources, groundwater resources, drainage, wetlands, or floodplains associated with Alternative A.

#### **4.1.2 Indirect Impacts - City Actions**

There are no indirect impacts or activities associated with Alternative A.

#### **4.1.3 Cumulative Impacts**

As discussed in Section 5.2.1 of the EA, the Osaka Garden and other improvements on the Wooded Island and the Jackson Park Harbor Navigation Improvement projects have the potential to cause impacts to water resources. Any impacts that result from the Jackson Park Harbor Navigation Improvement Project would be evaluated and permitted separately by USACE. The projects may result in short-term impacts during construction, but ultimately provide long-term benefits to water resources. Alternative A would not contribute to any cumulative impacts, as no additional federal action occurs under this alternative.

### **4.2 Alternative B: NPS Action (FHWA No Build)**

Alternative B includes National Park Service (NPS) approval of the partial conversion of recreation due to the construction of Obama Presidential Center (OPC) and replacement of recreation opportunities on the east end of the Midway Plaisance.

#### **4.2.1 Direct Impacts**

##### Surface Water Impacts

There are no anticipated direct impacts to non-wetland WOTUS, other waterways, or drainage associated with the NPS Urban Park and Recreation Recovery (UPARR) conversion or replacement areas.

##### Wetland Impacts

Alternative B includes NPS approval of the partial conversion of recreation due to the construction of OPC and replacement of recreation opportunities on the Midway. The City proposes to use the east end of the Midway to provide replacement recreation opportunities under UPARR. Based on community input, the east end of the Midway Plaisance is currently used for passive recreation and pick-up games; however, the available space for recreation is inhibited by standing water retained within the wetland. The City proposes regrading within Wetland 1, as well as the placement of a proposed drainage structure to provide positive drainage to allow for enhanced recreational use of the east end of the Midway Plaisance. No remaining permanent standing water and wetland is proposed to remain in the Wetland 1 area, resulting in a 0.436-acre permanent impact. While the conceptual replacement recreation opportunities are still under review by the NPS, the City plans to engage with the community to finalize the recreational opportunities to be developed at the east end of the Midway Plaisance.

If the City's plan for replacement recreation on the Midway Plaisance is approved, the wetland impacts will be mitigated to meet the requirements of the Illinois Interagency Wetland Policy Act. The impacted wetland acreage would be replaced at the Cedar Creek A1 wetland bank site at a mitigation ratio of 1.5 to 1.0. Wetland credits would be purchased prior to construction. Impacts are depicted in Attachment F-5.

#### Floodplain Impacts

There are no anticipated direct impacts to floodplains associated with the NPS UPARR conversion or replacement areas.

#### Drainage Impacts

A proposed drainage structure within the Wetland 1 area would provide positive drainage. Additionally, stormwater runoff is proposed to be minimized by the limiting of new impervious area and new landscaping. Impacts are depicted in Attachment F-5.

### **4.2.2 Indirect Impacts – City Actions**

#### 4.2.2.1 Proposed Roadway Closures

##### Surface Water Impacts

There are no anticipated adverse indirect effects to surface water associated with the roadway closures.

The closure of Cornell Drive would eliminate roadway stormwater runoff that is a direct tributary to the north lagoon (and therefore Lake Michigan). This would provide a water quality benefit.

##### Wetland Impacts

There are no anticipated adverse indirect effects to wetlands associated with the roadway closures.

##### Floodplain Impacts

There are no anticipated adverse indirect effects to floodplains associated with the roadway closures.

##### Drainage Impacts

In general the proposed improvements would maintain the existing drainage patterns such that there would be no indirect hydrologic impacts (i.e. redirection of a drainage area tributary to a surface water).

#### 4.2.2.2 OPC Site Development

There are no adverse indirect impacts to surface water resources, groundwater resources, drainage, wetlands, or floodplains as a result of the OPC site development.

#### 4.2.2.3 Track and Field Relocation

There are no adverse indirect impacts to surface water resources, groundwater resources, drainage, wetlands, or floodplains as a result of relocating the track and field.

### **4.2.3 Cumulative Impacts**

Alternative B would result in neutral impacts to wetlands and beneficial impacts to water quality upon implementation. As evaluated in Alternative A, the reasonably foreseeable projects contribute long-term,

beneficial impacts. The actions in Alternative B in addition to those by reasonably foreseeable projects would collectively contribute to an overall beneficial cumulative impact.

### 4.3 Alternative C: NPS + FHWA Action (Preferred Alternative)

This alternative incorporates impacts associated with Alternative B, in addition to those encountered by improving roadways and bicyclist/pedestrian facilities and additional changes to the UPARR boundary. The analysis of impacts in this section will only discuss the additional impacts associated with Alternative C.

#### 4.3.1 Direct Impacts

##### Surface Water Impacts

The transportation improvements include an additional southbound lane on Lake Shore Drive with proposed widening occurring on the western side of Lake Shore Drive which runs adjacent to Lake Michigan, and the additional southbound lane on Lake Shore Drive with proposed widening occurring on the western side of Lake Shore Drive. Note that there are no proposed improvements on the eastern side of Lake Shore Drive, immediately adjacent to the lakefront trail. The structure widening would maintain the waterway opening of the existing bridge structure but would encroach into the WOTUS and navigable water of the U.S. with 0.04 acres of permanent impact. There are also anticipated 0.04 acres of temporary impacts required to construct the proposed bridge widening. As the waterway opening is maintained, there is no additional obstruction of the use of Lake Michigan (navigable waterway). A letter received from the U.S. Coast Guard on December 6, 2018 indicates that the improvements associated with the proposed transportation improvements would not alter the permitted existing vertical and horizontal navigation clearances. Therefore, a Coast Guard Bridge Permit would not be required. This letter has been included in Attachment F-6. Additionally, there would be minor repairs to a bridge on Hayes Drive over the South Lagoon. The minor repairs would require a temporary impact of 0.20 acres due to the installation of cofferdams during construction as well as area needed for access during the course of repairs. These impacts are depicted in Attachment F-5.

*Table 3: Water Resources Impacts Associated with Alternative C*

Resource ID	Size (acres)	Comments	Permanent Impact Area (acres)	Temporary Impact Area (acres)
Lake Michigan and associated Lagoons	N/A	Navigable Water of the U.S.	0.04	0.24
Pond 1	1.62	Drains to Lake Michigan	0.0	0.0

As per USACE requirements under the Regional Permit Program Part 3: Transportation Projects, no mitigation is necessary for projects that do not exceed a permanent impact to WOTUS of 0.10 acre. The

transportation improvements result in a permanent impact of 0.04 acre, therefore, no additional mitigation beyond that discussed for Alternative B is expected to be required by USACE.

The proposed impacts to the WOTUS are authorized under a CWA General Permit issued by USACE and coordination is ongoing with that agency. Coordination for the proposed improvements has been initiated with the USACE and meetings with the USACE have indicated that the project can likely be authorized under the Regional Permit Program. The permit would be obtained during the final design process for the transportation improvements.

#### Wetland Impacts

Alternative C would not require any additional fill of any wetlands as described in Section 3.3.

#### Floodplain Impacts

The 59th Street Inlet Bridge widening would require a transverse encroachment of approximately 0.03 acre feet of fill within the 100-year floodplain. Attachment F-7 shows the location of the proposed floodplain fill. The minor floodplain fill would not impact the adjacent areas by increasing floodplain elevations and would therefore not increase the risk of flooding.

Widening of the bridge structure to accommodate an additional southbound lane on the western side of Lake Shore Drive and reestablishment of the existing trail connection has been minimized to reduce impacts to floodplain fill. The FHWA alternatives analysis determined the FHWA purpose and need is not met when an alternative excludes the proposed additional southbound travel lane along Lake Shore Drive; therefore, there are no practicable alternatives to further reduce the impact at this location, while also accommodating the additional southbound travel lane. See Appendix L for the FHWA alternatives analysis. The existing bridge and roadway meet freeboard and clearance criteria. The fill would not result in increased floodplain elevations or impact the adjacent areas and would not increase the risk of flooding. A substantial encroachment would result in the raising of existing floodplain elevations, therefore the encroachment is not substantial.

The unavoidable fill in the floodplain would require an individual permit from the IDNR-OWR Lake Michigan Section to demonstrate compliance with the rules set forth for public waters (IAC, Part 3704). The process for obtaining a permit to demonstrate compliance has been initiated and would be completed in the design phase of the project.

As part of this action, there would be no required mitigation in the form of floodplain compensatory storage. This has been coordinated with the IDNR-OWR and included in Attachment F-8. The fill in the floodplain would require an individual permit from the IDNR-OWR to demonstrate compliance with the rules set forth for public waters (IAC, Part 3704). The IDNR review is concurrent to the IEPA Lake Michigan Determination for Water Quality Section 39 review.

On November 5, 2019, the IEPA issued a Final Determination under Section 39 of the Illinois Environmental Protection Act stating that the transportation improvements may be completed without causing pollution as defined in the Illinois Environmental Policy Act. This has been included in Attachment F-9. The process for obtaining the IDNR permit to demonstrate compliance has been initiated. The process would be completed during the final design process for the transportation improvements.

### Drainage Impacts

Within the drainage area tributary to the North Lagoon the improvements on Lake Shore Drive would add approximately 0.68 acres of additional pavement area.

The proposed improvements would also include new pedestrian underpasses under Hayes Drive near the intersection with Lake Shore Drive, as well as on Hayes Drive near the Cornell Drive intersection. The underpasses would require reconfiguring the existing storm sewer systems around these areas as well as stormwater pump stations to drain the underpasses. In general, the intent of the proposed drainage improvements is to maintain the existing drainage patterns as closely as possible.

A hydrologic analysis was performed to determine the impacts the improvements would have on the lagoon water levels. The analysis concluded that there would be negligible impacts to the lagoon water surface elevations. The full detailed analysis is documented in the Location Drainage Study.

### **4.3.2 Indirect Impacts – City Actions**

The indirect impacts of Alternative C are the same as those described in Alternative B. The water resources impacts associated with Alternative C were identified as negligible and do not require further mitigation. Therefore, there are no additional indirect impacts the result from implementing Alternative C.

### **4.3.3 Cumulative Impacts**

Several other ongoing or reasonably foreseeable projects have been identified in the project study area, as described in Alternative A. The actions proposed in Alternative C would have negligible impacts. Considering the reasonably foreseeable projects and Alternative C together would result in overall beneficial cumulative impacts.

## **5.0 Summary**

Table 4 indicates the direct, indirect, and cumulative impacts to surface water, wetlands, floodplain, and drainage by alternative. The table summarizes both the incremental and the total impacts associated with Alternative C.

Table 4: Summary of Surface Water, Wetland, Floodplain, and Drainage Impacts by Alternative

Alternative	Direct Impacts	Indirect Impacts	Cumulative Impacts	Total Impacts
A	None	None	Temporary short-term construction impacts, but long-term benefits from Osaka Garden and other improvements on the Wooded Island and Jackson Park Harbor Navigation Improvement projects	Temporary short-term construction impacts, but long-term benefits from Osaka Garden and other improvements on the Wooded Island and Jackson Park Harbor Navigation Improvement projects
B	Impact to wetland (Wetland 1) of 0.436 acre  Wetland replacement at required ratio in wetland banking site	Removal of Cornell Drive and conversion of the roadway footprint to parkland would provide a water quality benefit	Temporary short-term construction impacts, but long-term benefits from Osaka Garden and other improvements on the Wooded Island and Jackson Park Harbor Navigation Improvement projects	Impact to wetland (Wetland 1) of 0.436 acre  Wetland replacement at required ratio in wetland banking site  Temporary short-term construction impacts, but long-term benefits from Osaka Garden and other improvements on the Wooded Island and Jackson Park Harbor Navigation Improvement projects

Alternative	Direct Impacts	Indirect Impacts	Cumulative Impacts	Total Impacts
<p>C (Incremental)</p>	<p>Unavoidable permanent impact of 0.04 acre to a WOTUS</p> <p>Temporary impact of 0.24 acre to a WOTUS</p> <p>Transverse encroachment of approximately 0.03 acre-feet of fill within the 100-year floodplain</p>	<p>None</p>	<p>Temporary short-term construction impacts, but long-term benefits from Osaka Garden and other improvements on the Wooded Island and Jackson Park Harbor Navigation Improvement projects</p>	<p>Unavoidable permanent impact of 0.04 acre to a WOTUS</p> <p>Temporary impact of 0.24 acre to a WOTUS</p> <p>Transverse encroachment of approximately 0.03 acre-feet of fill within the 100-year floodplain</p> <p>Temporary short-term construction impacts, but long-term benefits from Osaka Garden and other improvements on the Wooded Island and Jackson Park Harbor Navigation Improvement projects</p>

Alternative	Direct Impacts	Indirect Impacts	Cumulative Impacts	Total Impacts
B + C (Total)	<p>Impact to wetland (Wetland 1) of 0.436 acre</p> <p>Wetland replacement at required ratio in wetland banking site</p> <p>Unavoidable permanent impact of 0.04 acre to a WOTUS</p> <p>Temporary impact of 0.24 acre to a WOTUS</p> <p>Transverse encroachment of approximately 0.03 acre-feet of fill within the 100-year floodplain</p>	None	Temporary short-term construction impacts, but long-term benefits from Osaka Garden and other improvements on the Wooded Island and Jackson Park Harbor Navigation Improvement projects	<p>Impact to wetland (Wetland 1) of 0.436 acre</p> <p>Wetland replacement at required ratio in wetland banking site</p> <p>Unavoidable permanent impact of 0.04 acre to a WOTUS</p> <p>Temporary impact of 0.24 acre to a WOTUS</p> <p>Transverse encroachment of approximately 0.03 acre-feet of fill within the 100-year floodplain</p> <p>Temporary short-term construction impacts, but long-term benefits from Osaka Garden and other improvements on the Wooded Island and Jackson Park Harbor Navigation Improvement projects</p>

## 6.0 References

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