**William G. Milliken State Park & Harbor, Phase 2 Lowland Park – Detroit, MI**
**Methodology for Landscape Performance Benefits**
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## Environmental

### Filters an anticipated 100% of surface runoff totaling 4.5 million gallons annually from 12.5 acres of future developed properties adjacent to the park.

The total estimated annual discharge is 604,395 cubic feet (4,521,189 gallons) of water from 12.5 acres of adjacent land that is to be developed into 8 acres of multifamily residential and 4.5 acres of open urban land.

The table below shows the annual runoff volumes before and after the adjacent parcels are developed.

**Pre-Construction Entire Study Area (12.5 acres of Industrial Land ) before Park**

| Landuse | Area (acres) | % Impervious | Runoff (in) | Annual Runoff (cf) | Annual TSS (lbs) | Annual TP (lbs) | Annual TKN (lbs) | Annual TN (lbs) | Annual Pb (lbs) | Annual Cu (lbs) | Annual Zn (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Industrial* | 12.5 | 76 | 23 | 1,043,625 | 9,624 | 20.67 | 134.3 | 189.2 | 4,650.4 | 3,746.2 | 43,339.2 |
| Total Discharge | 12.5 | 76 | 23 | 1,043,625 | 9,624 | 20.67 | 134.3 | 189.2 | 4,650.4 | 3,746.2 | 43,339.2 |

**Post-Construction Entire Study Area (8 acres Multifamily Residential and 4.5 acres of Open Urban Land)**

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Multifamily** | 8.0 | 60 | 18 | 522,720 | 3,323 | 13.29 | 73.1 | 100.0 | 1,362.3 | 1,096.5 | 7,243.5 |
| Open Urban Land* | 4.5 | 11 | 5 | 81,675 | 241 | 0.52 | 4.4 | 6.2 | 66.1 | 0.0 | 188.8 |
| Total Discharge | 12.5 | 71 | 23 | 604,395 | 3,563.0 | 13.8 | 77.5 | 106.2 | 1,428.40 | 1'096.5 | 7,432.30 |
| Pounds/Year Reduced from Land Use Change | | | | **-439,203** | **-6061** | **-6.87** | **-56.8** | **-83** | **-3,222** | **-2649.7** | **-35,906.9** |

Source
SmithGroupJJR design documents

### Removes an anticipated 99% of sediment, 91% of phosphorus, 74% of nitrogen, 97% of lead, 91% copper and 87% of zinc from surface runoff from this and surrounding parcels.

Anticipated water quality values after the surrounding 12.5 acres have been developed for multifamily housing and open urban land are shown in the Treatment Train for Water Quality Improvements table below. The treatment train works by piping the runoff first through a swirl concentrator to remove the majority of suspended solids, oil and grease. Then the water is pumped into a 4 feet deep sediment forebay then free flows through a 3 feet deep wetland and continues through a braided stream and over a weir outlet before entering the Detroit River. The high water elevation of the river is below the outlet so the river water will not back up into the wetland.

## Treatment Train for Water Quality Improvements

**Post-Construction (8 acres Multifamily Residential and 4.5 acres of Open Urban Land)**

| Total | 0 | 0 | 0 | 0 | 0 | 0 | 3,563.0 | 13.8 | 106.2 | 1428.4 | 1096.5 | 7432.3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BMP** | **TSS Removal (%)** | **TP Removal (%)** | **TN Removal (%)** | **Pb Removal (%)** | **Cu Removal (%)** | **Zn Removal (%)** | **Annual TSS Removed (lbs)** | **Annual TP Removed (lbs)** | **Annual TN Removed (lbs)** | **Annual Pb Removed (lbs)** | **Annual Cu Removed (lbs)** | **Annual Zn Removed (lbs)** |
| Baffle Tank | 83% | 30% | 0% | 45% | 21% | 39% | -2,958.0 | -4.14 | 0.0 | -642.8 | -230.3 | -2,896.6 |
| Wet Detention Pond | 90% | 65% | 48% | 70% | 80% | 60% | -544.5 | -6.28 | -51.0 | -549.9 | -692.9 | -2,721.2 |
| Constructed Wetland | 90% | 65% | 50% | 80% | 45% | 45% | -54.5 | -2.20 | -27.6 | -188.6 | -77.9 | -816.4 |
| Total Discharged Pounds/Year | | | | | | | **6.0** | **1.18** | **27.6** | **47.1** | **95.4** | **997.8** |
| Percent removed | | | | | | | **99.0%** | **91.0%** | **74.0%** | **96.7%** | **91.3%** | **86.6%** |

Source
SmithGroupJJR design documents

**Creates native habitat for 62 confirmed species of migratory and resident birds, which were not present on the previous brownfield. Species on-site include birds sensitive to loss of wetlands such as Virginia rails, red-winged blackbirds, swamp sparrows and marsh wrens, as well as species of reptiles and amphibians such as bullfrogs, green frogs and painted turtles.**

The list of bird species is provided by the state park staff. Park staff also indicates that several species of reptiles and amphibians reside in the park including bullfrogs, green frogs and painted turtles but a species list is not available. Preconstruction wildlife survey data was not available for comparison. The following species list is from 2012-2013 site observations.

| Summer – | Summer continued – |
|---|---|
| Rough-winged Swallow | American Crow |
| Barn Swallow | Ruby-throated Hummingbird |
| Cliff Swallow | Downy Woodpecker |
| Chimney Swift | Red-tailed Hawk |
| Warbling Vireo | Black-capped Chickadee |
| Yellow Warbler | Northern Cardinal |
| Baltimore Oriole | |
| Common Grackle | |
| European Starling | |
| Brown-headed Cowbird | |
| Red-winged Blackbird | Spring – |
| Belted Kingfisher | Bufflehead |
| Mallard | Brown Creeper |
| Canada Goose | Golden-crowned Kinglet |
| Ring-necked Pheasant | Field Sparrow |
| House Sparrow | Magnolia Warbler |
| Song Sparrow | Common Yellowthroat |
| Savanna Sparrow | Swainson's Thrush |
| Swamp Sparrow | Forster's Tern |
| Ring-billed Gull | White-crowned Sparrow |
| Common Tern | Black-crowned Night Heron |
| Rock Pigeon | Common Loon |
| American Robin | |
| Cedar Waxwing | Fall – |
| Killdeer | Black-and-white Warbler |

| | |
|---|---|
| Goldfinch | Northern Flicker |
| Spotted Sandpiper | Yellow-rumped Warbler |
| Eastern Kingbird | Black-throated Green Warbler |
| Marsh Wren | Palm Warbler |
| Mute Swan | Chestnut-sided Warbler |
| Great Blue Heron | |
| American Kestrel | Winter – |
| Peregrine Falcon | Common Merganser |
| Virginia Rail | Hooded Merganser |
| Blue Jay | Common Goldeneye |
| Cooper's Hawk | |

*Before comparison: Looking east over Atwater Street, at the site that will become Lowland Park. Behind the aggregate stockpiles and silos is the arbor (not seen). The site offered no or minimal species diversity. Source: Detroit Riverfront Conservancy.*

## Sequesters 3 tons of carbon per year in the over 450 tree and shrubs on the site.

SmithGroupJJR construction documents show over 450 woody plants were installed including 11 species of trees and 11 species of shrubs. Carbon sequestration and annual benefits were estimated using the National Tree Benefits Calculator. Shrubs were assumed to have a 0.5" diameter for calculation. Species were matched with the software choices otherwise "unknown" tree was used as a default to compute conservative value. Actual species survey is not available.

| Common Name | Size | Quantity |
|---|---|---|
| Trees | | |
| Red Maple | 3" diameter | 4 |
| Sugar Maple | 3" diameter | 7 |
| Tuliptree | 3" diameter | 5 |
| Black Gum | 3" diameter | 5 |
| American Sycamore | 3" diameter | 4 |
| Red Oak | 3" diameter | 6 |
| Swamp White Oak | 3" diameter | 3 |
| Serviceberry | 8' tall | 14 |

| | | |
|---|---|---|
| Ironwood | 8’ tall | 6 |
| Redwood | 2.5” diameter | 6 |
| American Hophornbeam | 2.5” diameter | 2 |
| Shrubs | | |
| Black Chokeberry | 30” tall | 43 |
| New Jersey Tea | 18” tall | 64 |
| Buttonbrush | 36” tall | 13 |
| Island Dogwood | 36” tall | 30 |
| Jim Dandy Winterberry | 30” tall | 6 |
| Shaver Winterberry | 30” tall | 39 |
| Nicks Compact Juniper | 24” spread | 48 |
| Summerwine Ninebark | 36” tall | 22 |
| Fragrant Sumac | 30” tall | 29 |
| Pink Knockout Shrub Rose | 18” spread | 44 |
| Swamp Rose | 18” spread | 41 |

Sources
National Tree Benefits Calculator, http://www.treebenefits.com/calculator/
SmithGroupJJR construction document plant list

## Social

### Provides a space for outdoor recreation, exercise and relaxation for a projected one million visitors per year, also catering to the 11,000 professionals working within a ¼ mile of the site at the Renaissance Center.

Designers expect the state park will draw one million visitors annually upon addition of an outdoor adventure and discovery center located across the street in the Globe building (complete with a climbing wall, zip line and classroom space). This is one third of the 3 million total annual attendance of the riverfront the Detroit Riverfront Conservancy (DRFC) has approximated in their 2013 economic impact study. Since the main riverfront walk passes through the Lowland Park it is reasonable to expect visitors will enjoy the park and its many features. An example of overlapping and supportive programing is in the DRFC website events calendar that lists such events as *Yoga on the River* which takes place in the park (in front of the Peter Stroh memorial) as shown in the following photo.

Visitors to the park practice yoga in front of the Peter Stroh memorial.

Sources
7/18/2013 interview with Paul Evanoff of SmithGroupJJR.
The Detroit Riverfront Conservancy website regarding the Globe building, accessed 7/20/2013, http://www.detroitriverfront.org/east/tricentennialpark/globe.asp
The Detroit Riverfront Conservancy website regarding events, accessed 7/27/2013, http://www.detroitriverfront.org/events/page/?_c=D9710CF5-D5CD-4EDB-B35E-5F3B5F874DA0

**Provides educational opportunities for more than 1,641 visitors through the Department of Natural Resources (DNR) Explorer Program in 2012. Growth in the Explorer Program attendance has been over 300% since the program began in 2010.**

The Michigan DNR Explore program's annual reports show an upward trend in attendance. At current staffing levels, 24 programs are offered each month through the summer season which can accommodate 460 visitors. The season lasts for 5 months for a total of 2,300 participants (460 * 5 = 2,300). In 2012 the program attracted 1,641 participants or 71% of capacity ((1,641 / 2,300) * 100 = 71%).

Growth in attendance since opening in 2010 has increased 478% in 2011 and 151% or an average of 314%. ((478% + 151%) / 2 = 314%). The graph below shows the trend in program attendance.

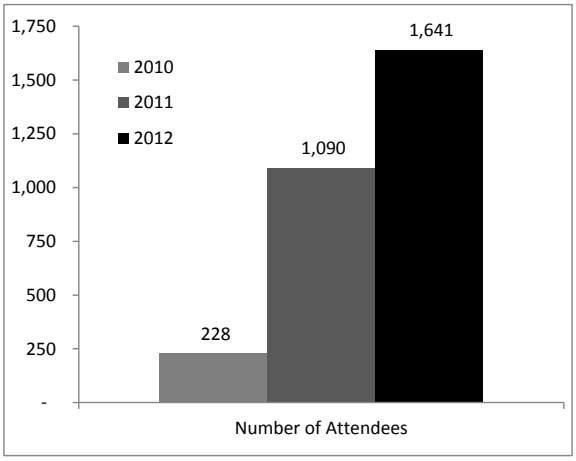


**Figure 1. Chart shows the annual number of attendees for the years 2010, 2011 and 2012.**

Source
State Park Explorer Guides Seasonal Program Report 2011-2012 and 2010 park attendance records.

**Connects 3.5 miles of the Detroit Riverwalk to the eastern trailhead of the 1.4 mile long Dequindre Cut (a former railroad bed) trail that extends from the river westward to the popular Eastern Market and Midtown residential districts enhancing non-motorized circulation (pedestrian and cyclist) and providing linkages to other existing and proposed trail networks in the city.**

Source
Detroit Riverfront Conservancy map accessed 7/27/2013, http://www.detroitriverfront.org/pdf/DRFC_Our-Map-Parking.pdf
Google Earth was used to verify trail lengths.

## Economic

### Generates a projected $5.82 million annually in economic activity from visitors' spending.

The Detroit Riverfront 2013 Conservancy Economic Impact Study reports that visitors to the Riverfront spend an average of $5.82 daily. Therefore, the one million annual visitors to the park that are anticipated after the Globe building is renovated will generate $5.82 million.

Source
Detroit Riverfront 2013 Conservancy Economic Impact Study, Pg22,
http://www.detroitriverfront.org/cm/attach/1762AD10-3196-432A-ABE4-D548A4561C01/DRFC_EconomicImpactStudy_fin_lores.pdf

### Catalyzes a projected $152.3 million in multifamily residential development within the site's watershed.

Milliken Park is designed to manage stormwater from 8 adjacent acres, and catalyze development on these sites. Runoff from 12.5 acres (8.0 acres for multifamily residential and for 4.5 acres open urban space) of property adjacent to the park is incorporated in the park's stormwater system, lessening the stormwater management burden on those properties.

Designers anticipate the housing density in this area of Detroit would be 40 units per acre. Therefore, the 8.0 acres within the site's watershed, designed at 40 units/acre comes to 320 whole units. Real estate expert, Austin Black II broker and president of City Living Detroit, estimates the average price of new residential development near the park at $225 to $250 sq.ft ($238 average) and a 98% occupancy rate can be expected in the current and future market.

Assuming a conservative 2,000 sq.ft. per residential unit the economic impact of new development adjacent to the park could be (320 units * 2,000 sq.ft/unit * $238/sq.ft.) = **$152.3 million.**

New development adjacent to the park is already underway, including a $55 million mixed use development, according to the business news and information website *Crain's Detroit Business*. McCormack Baron Salazar Development Inc. has secured initial funding and hopes to begin construction of the first phase of this project in 2014.


Sources
SmithGroupJJR design documents
7/19/2013 interview Austin Black II broker and president of City Living Detroit, http://citylivingdetroit.com/
Crain's Detroit Business website accessed 7/25/2013,
http://www.crainsdetroit.com/article/20130723/NEWS/130729957/-55-million-rivertown-development-to-include-housing-retail

## Cost Comparison Methodology

**The creation of Lowland Park topped 25,813 cubic yards of contaminated soils in-place compared to complete soil removal and remediation thus saving $256,740 in removal costs or about 17.6% of the project cost.**

Surface area of the wetland covers 174,240 square feet. From the boring logs, it is estimated that contaminated soils extend 4 feet deep. The volume of soil is 174,240 square feet * 4 feet thick / 27 cubic feet per cubic yard = 25,813 cubic yards. The cost of removing the soils would have been; 25,813 cubic yards * $30 per yard (typical removal cost associated with similar projects in the Detroit region) = **$774,390.** Total project cost is $4.4M therefore the percent of project cost is $774,390 / $4,400,000) * 100 = **17.60%.**

Sources
SmithGroupJJR design document and cost estimate values
Mactec soil and groundwater contaminant distribution document