



Kingsbury Bay-Grassy Point Habitat Restoration: A Health Impact Assessment

Final Community Meeting

March 6, 2018



WELCOME

Introductions
Meeting Objectives
Meeting Agenda



Introductions

This meeting is being sponsored by the Kingsbury Bay-Grassy Point HIA Leadership Team:

- Rosita Clarke, EPA Region 5 Brownfields Program
- Joel Hoffman, EPA Office of Research and Development
- Bill Majewski, Morgan Park Community Club & St. Louis River Alliance
- Justicia Rhodus, Pegasus Technical Services, contractor to EPA
- Katie Williams, EPA Office of Research and Development

Also in attendance to help present are several members of the HIA Research Team: Alex Lan, Kate Preiner, and Samantha Shattuck



Introductions

You have been invited to this meeting because you:

- Are a member of the community impacted by the Kingsbury Bay-Grassy Point Restoration Project
- Have a voice regarding this project and the future of Kingsbury Bay and Grassy Point Park



Meeting Objectives

- Build awareness about the Kingsbury Bay-Grassy Point Restoration Project and associated activities
- Develop an understanding of what HIA is and the steps involved in the HIA process
- Present the findings and preliminary recommendations of the HIA, including the potential for the proposed activities to impact health
- Gather community input on the HIA findings and recommendations



Meeting Agenda

6:30 PM	Welcome <ul style="list-style-type: none">- Introductions- Meeting Objectives- Meeting Agenda
6:35 PM	What's the Connection to Health? <ul style="list-style-type: none">- Projects in Your Community and Health- Health Impact Assessment (HIA)
	The Kingsbury Bay-Grassy Point Habitat Restoration Project HIA <ul style="list-style-type: none">- Kingsbury Bay-Grassy Point Habitat Restoration and Park Improvements- The HIA Process
6:45 PM	Poster Presentations – Findings and Potential Impacts to Health
7:35 PM	Poster Presentations – Preliminary Recommendations
8:15 PM	General Discussion
8:30 PM	Next Steps and Meeting Wrap-up



WHAT'S THE CONNECTION TO HEALTH?

*Projects in Your Community and Health
Health Impact Assessment (HIA)*



Projects in Your Community and Health

Programs, policies, plans, and projects can have unintended health consequences, especially if discussions in the decision-making process are limited to a particular set of issues



Health

“A state of complete physical, mental, and social well-being; not merely the absence of disease and infirmity.”

- Preamble to the Constitution of the World Health Organization

Projects in Your Community and Health

The factors known to directly or indirectly impact human health are referred to as **determinants of health**





Health Impact Assessment (HIA)

Health Impact Assessment

“A systematic process that uses an array of data sources and analytic methods and **considers input from stakeholders** to determine the **potential effects** of a proposed policy, plan, program, or project **on the health of a population** and the distribution of those effects within the population. HIA **provides recommendations** on monitoring and managing those effects.”

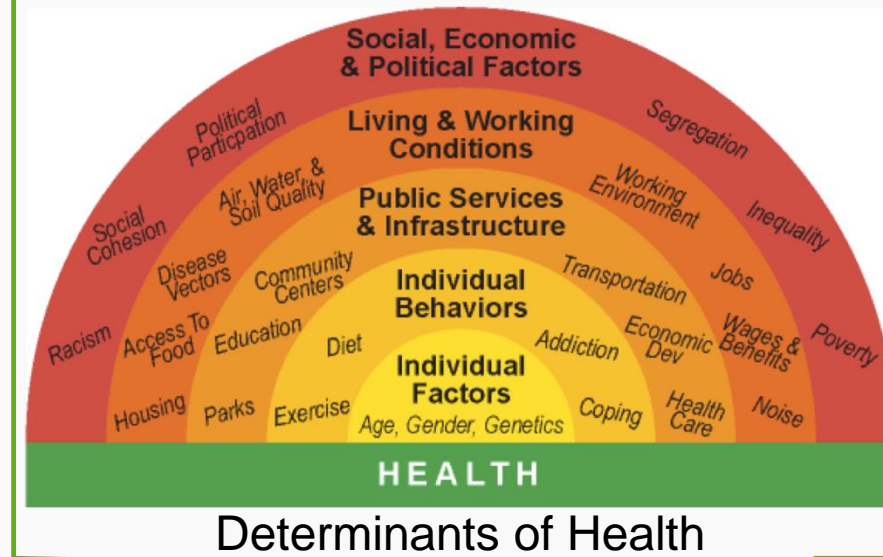
- National Research Council. 2011. *Improving Health in the United States: The Role of Health Impact Assessment*.



Health Impact Assessment (HIA)

How does the proposed project, plan, policy, program

affect



lead to health outcomes

provide recommendations



Health Impact Assessment (HIA)

HIA Guidance Documents

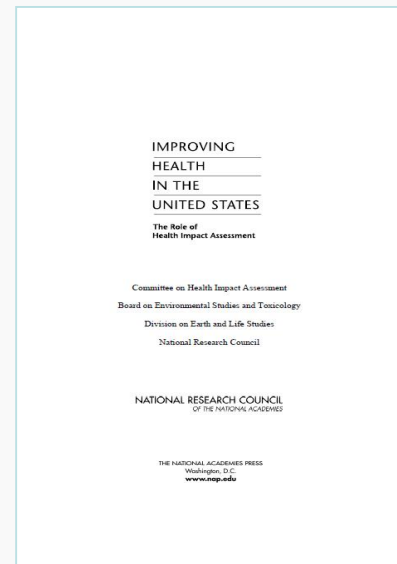
A number of guides and handbooks have been developed to inform and direct the HIA practice in the U.S.

Two of those are highlighted below:



Available at:

<https://sophia.wildapricot.org/resources/Documents/HIA-Practice-Standards-September-2014.pdf>



Available at:

<https://www.nap.edu/catalog/13229/improving-health-in-the-united-states-the-role-of-health>



KINGSBURY BAY-GRASSY POINT RESTORATION PROJECT HIA

*Kingsbury Bay-Grassy Point Habitat Restoration and Park Improvements
The HIA Process*



Kingsbury Bay-Grassy Point Habitat Restoration

Kingsbury Bay

- Too much sediment has washed down the creek to the bay, creating a delta at the creek's mouth
- Vegetation dominated by narrow-leaf cattail (invasive) & tag alder
- Approximately 170,000 cubic yards of sediment will be removed and placed at other projects in St Louis Bay, including Grassy Point
- Result will improve flow, create open water habitat, and enhance the diversity of aquatic vegetation at Kingsbury and other locations

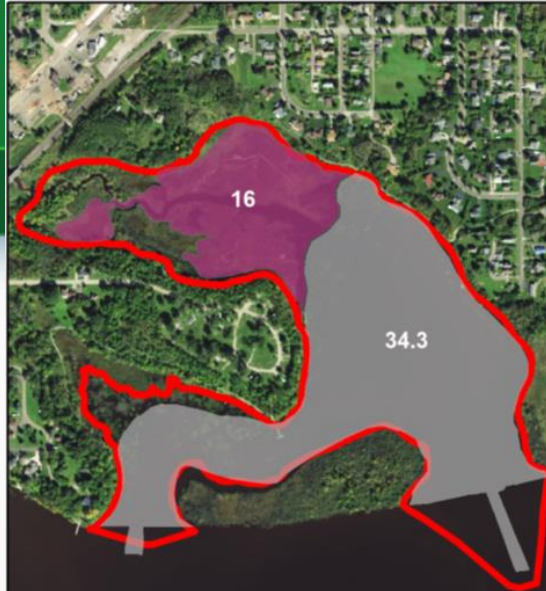


Kingsbury Bay-Grassy Point Habitat Restoration

Grassy Point

- Two sawmills built over the water deposited wood waste for years
- Legacy wood waste limits natural diversity and flow; the wood waste will be removed and re-used in some of the site's new features
- Restoration will create a shallow sheltered bay and island, open water habitat, wetland complex, and improve the Keene Creek channel

Kingsbury Bay



0 0.1 0.2 0.4 Miles

Associated RSUs	Site	Acres				Description
		Wetland Created	Wetland Converted	Wetland Removed	No Wetland Type Impact	
1	Kingsbury Bay		16.0			Exotic monoculture wetland to open water wetland
4,5	Kingsbury Bay				34.3	Open water wetland - restored bathymetry
8	Grassy Point		7.7			Exotic monoculture wetland to open water wetland
2	Grassy Point			1.4		Exotic monoculture wetland to upland
2	Grassy Point			8.6		Wood waste wetland to upland
3	Grassy Point				8.2	Open water to upland
6,7,13	Grassy Point	22.3				Open water to wetland
7,9	Grassy Point		10.4			Wood impaired wetland to open water wetland
Total		22.3	34.1	10	42.5	

Grassy Point



0 0.075 0.15 0.3 Miles

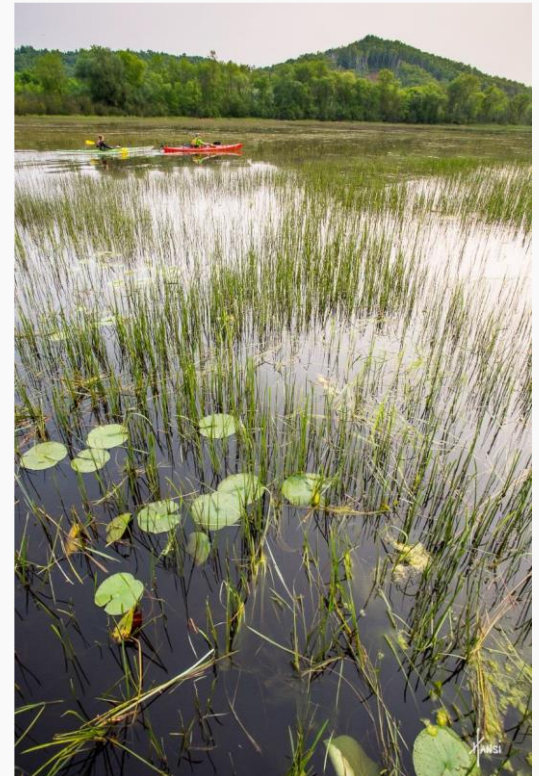
Legend

- Exotic monoculture wetland to open water wetland
- Exotic monoculture wetland to upland
- Open water to upland
- Open water to wetland
- Wood impaired wetland to open water wetland
- Wood waste wetland to upland
- Open water wetland - restored bathymetry
- Restoration Project boundary



Kingsbury Bay-Grassy Point Park Improvement Projects

- Following the restoration work by the MN DNR, the City of Duluth will undertake park improvement projects at these sites
- The park planning process is targeted for 2018, but Concept Plans have been created for both Kingsbury Bay and Grassy Point showing potential amenities at these locations











Legend

- | | |
|---|--|
|  Parking |  Picnic Area |
|  Fishing Pier |  Informational or Educational Signage |
|  Bird Observation Platform |  Irving Connector Trail |
|  Canoe and Kayak Access |  ADA Boardwalk Trail |
| |  Small Boat Channel |

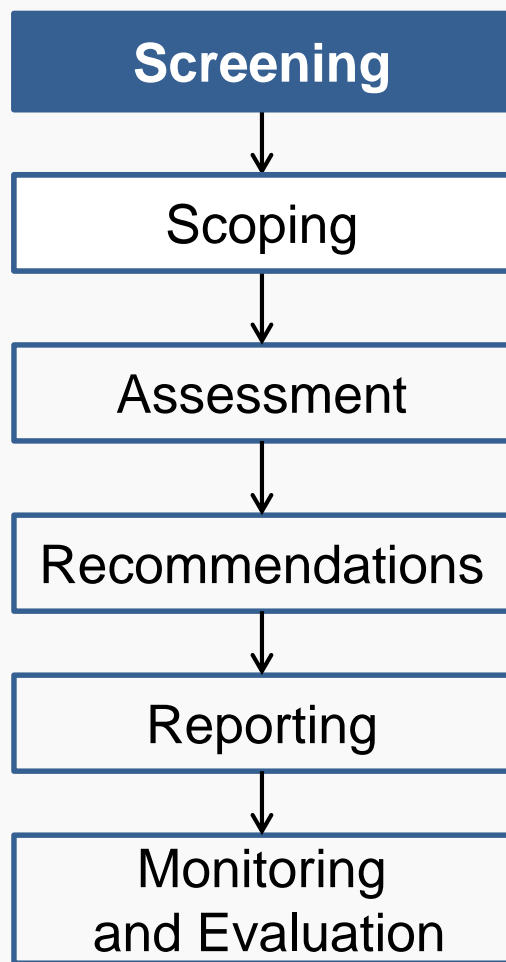
-  Proposed Island Footprint
-  Open Water Conversion
-  Green Infrastructure
-  Project Boundary

0 0.15 0.3 0.6 Miles

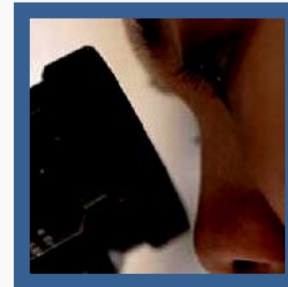




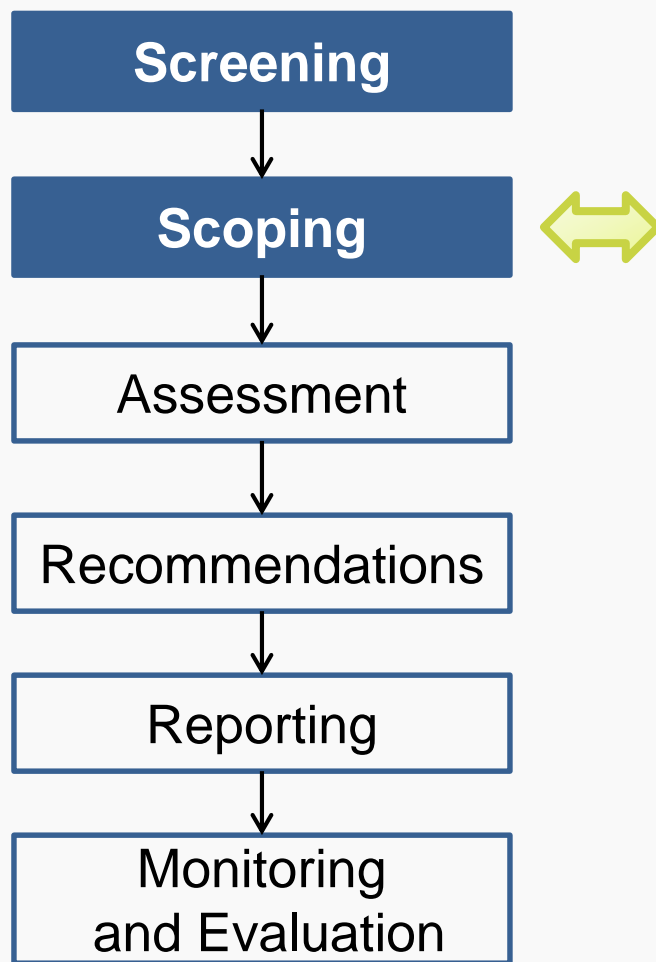
The HIA Process



EPA, with input from the Minnesota Department of Natural Resources (MN DNR), City of Duluth, and other key stakeholders, determined that an HIA was feasible, timely, and would add value to the decision-making process

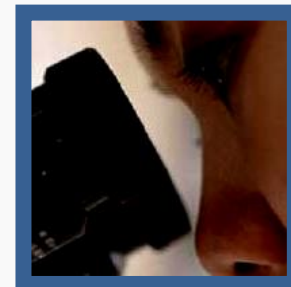


The HIA Process

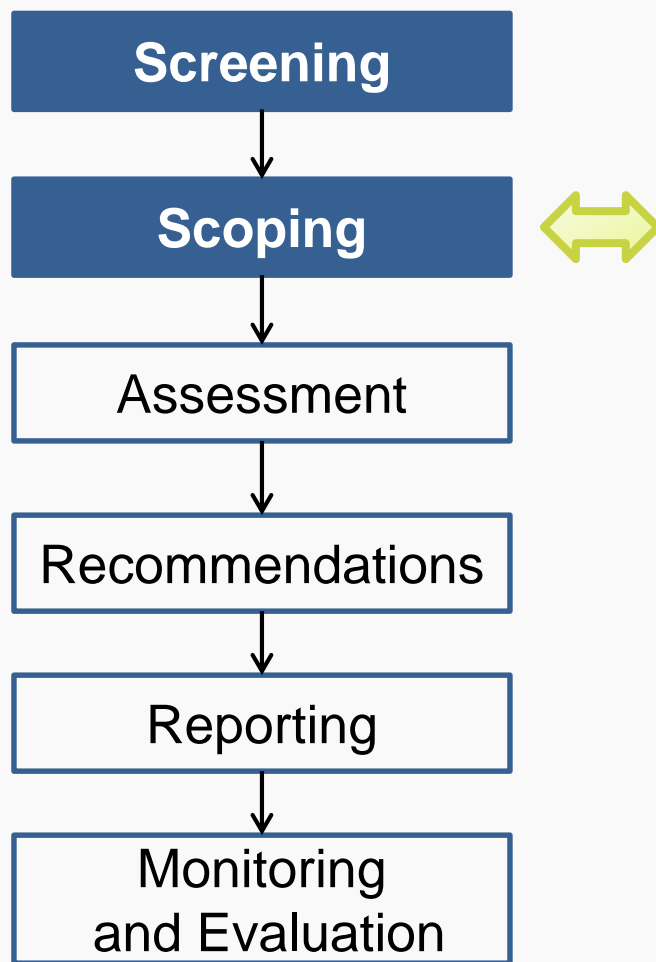


HIA Goals:

- Inform the MN DNR and City of Duluth's decisions regarding the habitat restoration and subsequent park improvement projects at Kingsbury Bay and Grassy Point.
- Develop a set of evidence-based recommendations to elevate considerations of health in the decisions.
- Increase transparency, local accountability, and community empowerment through meaningful stakeholder engagement.
- Raise awareness of HIA as a decision-support tool.

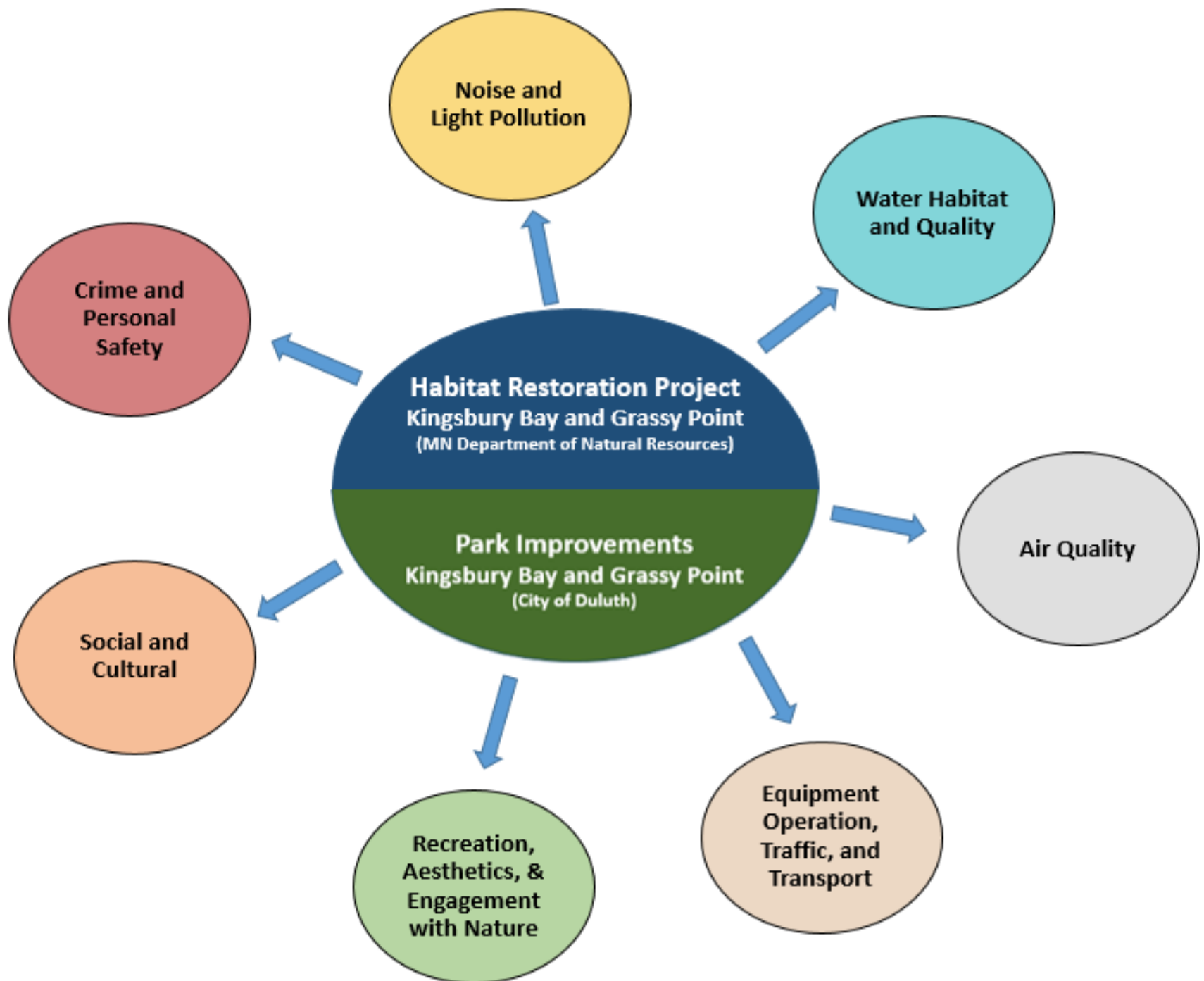


The HIA Process



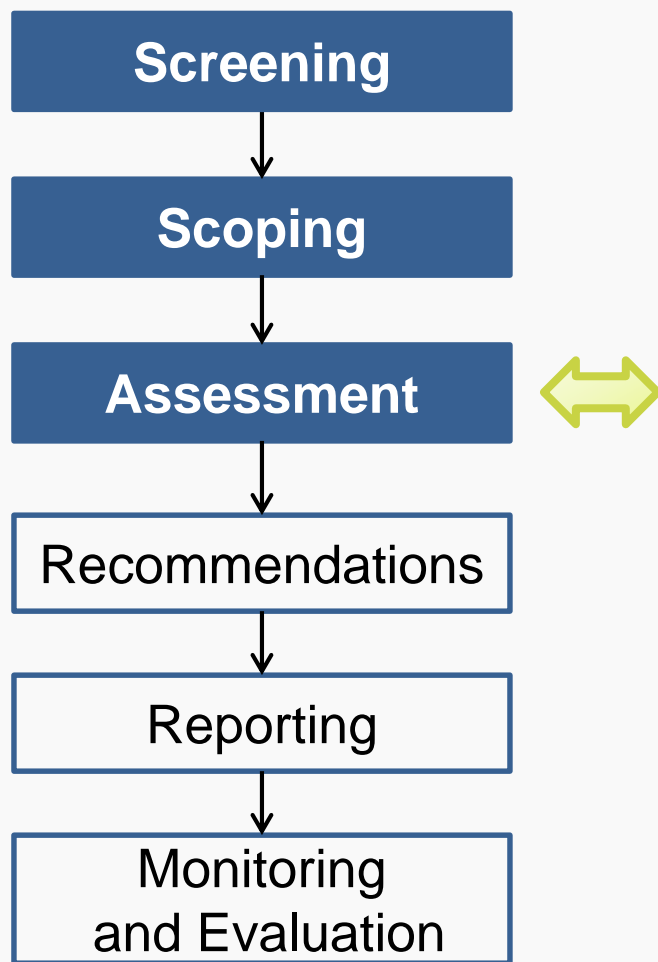
Late February 2017 - August 2017

- Held community and stakeholder meetings to kickoff the HIA
- Established HIA Research Team and HIA Advisory Committee
- Established the health topics/pathways to be included in the HIA and the populations potentially affected by the projects
 - Shared preliminary pathways with the community and stakeholders for input
- Established the HIA Assessment Work Plan (data and methods to be used in the assessment)





The HIA Process



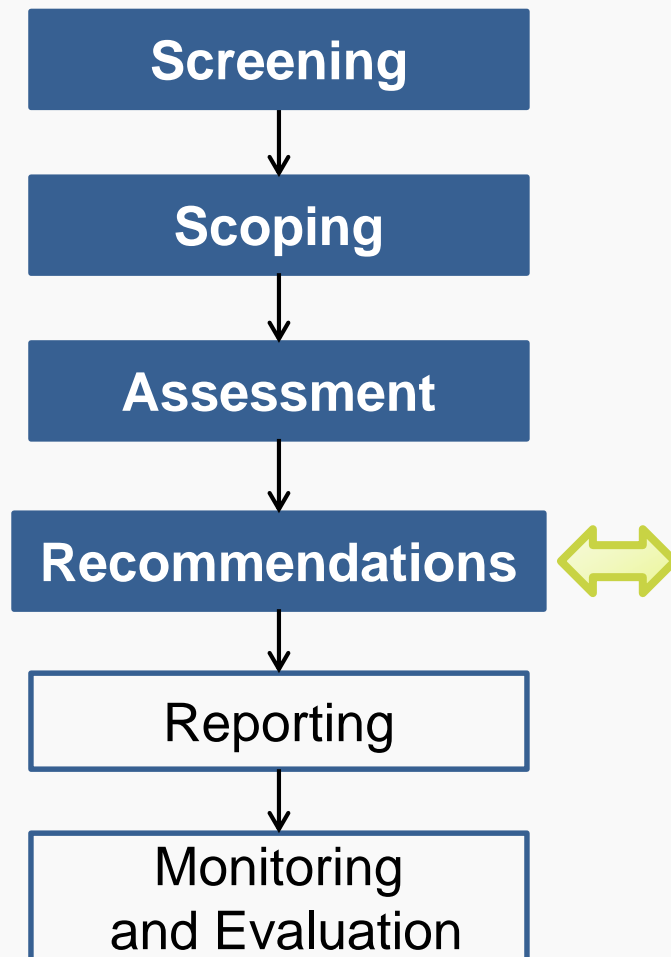
September 2017 - present

Based on outputs from Scoping, the HIA Research Team gathered best-available data and evidence (qualitative and quantitative) to:

- **Profile** the current conditions
- **Verify** the pathways between the decision, health determinants, and health outcomes (literature review)
- **Characterize** the potential impact of the projects on health determinants and health outcomes



The HIA Process



September-present

Based on the Assessment results, the HIA Research Team developed evidence-based recommendations to:

- Address any **disproportionate health impacts**
- Mitigate potential **adverse health impacts**
- Promote potential **health benefits** of the projects



Habitat Restoration Timeline

- **Spring – Winter 2017:** Design, environmental review, permitting, public meetings
 - Timeline extended due to the need to examine habitat restoration design alternatives as part of the permitting process; in the process of examining alternatives, MN DNR incorporated input from the HIA and made some modifications to the original design*
- *These design changes were evaluated in the HIA
- **March – May 2018:** Approvals, bid, award contract
 - MN DNR has requested that the HIA Team provide tech support during the contracting phase of the project, as many of the recommendations would be addressed in that phase
 - **July 2018:** Construction begins
 - **December 2019:** Habitat Restoration complete



Key Habitat Restoration Design Changes

- At the mouth of Kingsbury Creek, they will be preserving the cold-water habitat by raising the streambed and not excavating
- The adjacent wetland will also be made deeper, increasing the storage capacity. The cuts made will avoid impacts to the existing high quality submerged aquatic vegetation beds at Kingsbury Bay. In return, the channel along the shore will be deepened to accommodate recreational boat traffic and access to present/future docks
- At Grassy Point, an area of low environmental quality between the Reiss dock and Big Island was identified. Sediment dioxin concentrations are sufficiently high to represent a risk to fish and wildlife. DNR is proposing to put clean, carbon-rich sediment over that entire area, essentially serving as a cap
- The wood waste excavated at Grassy Point will be re-used at the site to raise the elevation of Big Island



POSTER PRESENTATIONS

HIA Findings and Potential Impacts to Health
Preliminary HIA Recommendations
Priority Recommendations
General Discussion



HIA Findings and Potential Impacts to Health Posters

As you review these posters, consider:

- *What are your thoughts on the findings? Did anything “stand out” to you?*
- *Was there anything that was presented that you had not seen or heard before?*
- *Do you agree with what the findings showed?*
- *Do you have any concerns or issues with what was presented?*



**TELL US WHAT
YOU THINK**

Post-its notes and pens are available in the poster area. Please provide your comments and input via the post-it notes.



Preliminary HIA Recommendations Posters

As you review these posters, consider:

- *Do you agree with the recommendations made?*
- *Do you think the recommendations are feasible/practical?*
- *Is there anything that we may have missed or did not include in the recommendations that should be included?*



**TELL US WHAT
YOU THINK**

Post-its notes and pens are available in the poster area. Please provide your comments and input via the post-it notes.

We would also like you to identify which five HIA recommendations are most important to you, using the colorful post-it flags.



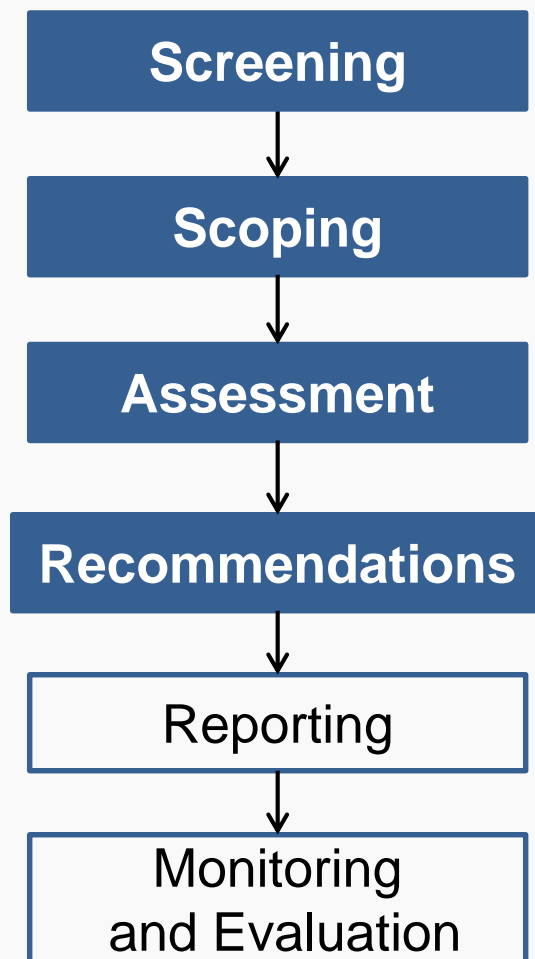
General Discussion

We have some time left and would like to hear your thoughts on the HIA and the results that were presented tonight.





Next Steps



The HIA Project Team will:

- Document the discussions from the community and stakeholder meetings and incorporate the input into the HIA findings and recommendations.
- Complete the last two steps of the HIA process - Reporting and Monitoring and Evaluation.
 - Report final HIA findings and recommendations to MN DNR, the City of Duluth, and stakeholders (briefings, HIA report*, fact sheets, etc.)
 - Evaluate the HIA process and impact of the HIA on the decision-making processes. Develop plans for monitoring the implementation of HIA recommendations and the impact of the Habitat Restoration and Park Improvement projects on health.

*The final HIA report will be available on EPA's HIA website: www.epa.gov/healthresearch/health-impact-assessments



Thank You

It is our *hope* that you've

- Gained valuable information about the Kingsbury Bay-Grassy Point Restoration Project and associated Park Improvements and their potential to impact health
- Gained a better understanding of what HIA is and the steps involved in the HIA process
- Enjoyed participating in this part of the HIA

thank you! 33

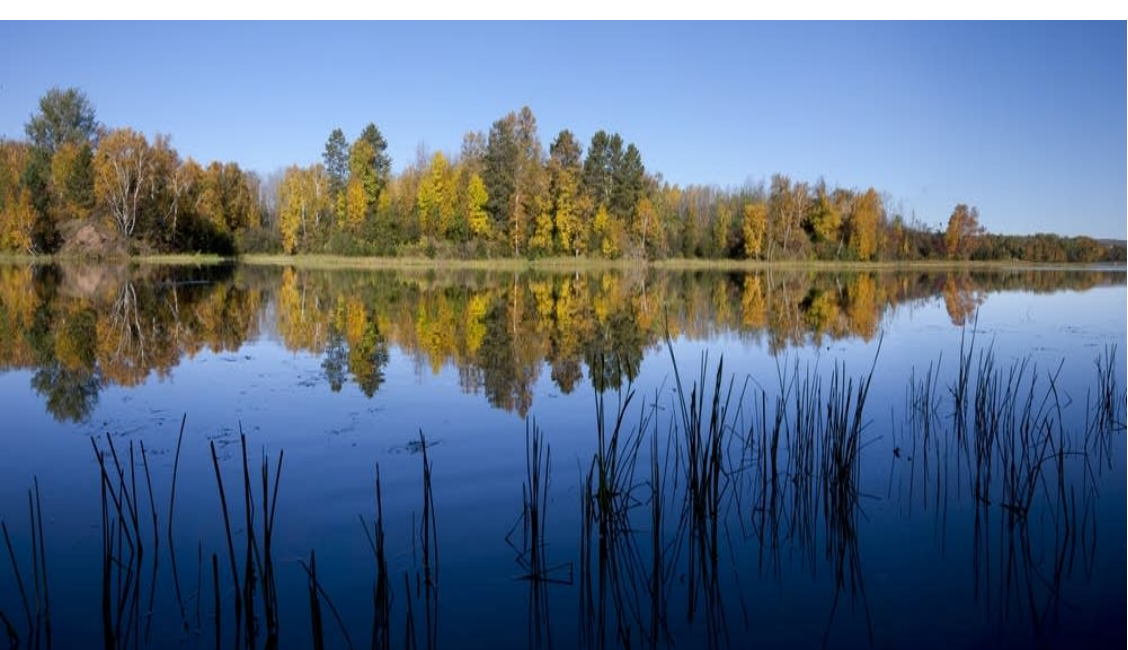


For more information on the HIA, please contact:

- **Rosita Clarke**, EPA Region 5 Brownfields Program
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- **Bill Majewski**, Morgan Park Community Club & St. Louis River Alliance
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- **Justicia Rhodus**, Pegasus Technical Services
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- **Katie Williams**, EPA Office of Research and Development
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WATER HABITAT AND QUALITY: HIA FINDINGS



What's the connection to health?

- Improving water, sediment, and habitat quality can improve nutrition and decrease disease incidence in anglers, as well as decrease illness and skin and eye ailments in swimmers. Racial and ethnic minorities, as well as infants and children, are most vulnerable to health impacts from consuming contaminated fish.
- Improving water and habitat quality can reduce stress, as well as improve social capital and recreational opportunities.
- Park improvements can contribute to health by providing amenities such as boat launches, fishing piers, boardwalks, and swimming beaches to encourage safe access to and use of the river by the community.

Water Quality

Risk of waterborne pathogens is indicated by *E. coli* counts exceeding health criteria. From 2012-2016, there were beach closures at Clyde Ave and Boy Scout landings. In two years, there were no exceedances; in two years, there were 1-2 days exceeding health criteria; and in one year there were about 4 weeks exceeding health criteria.

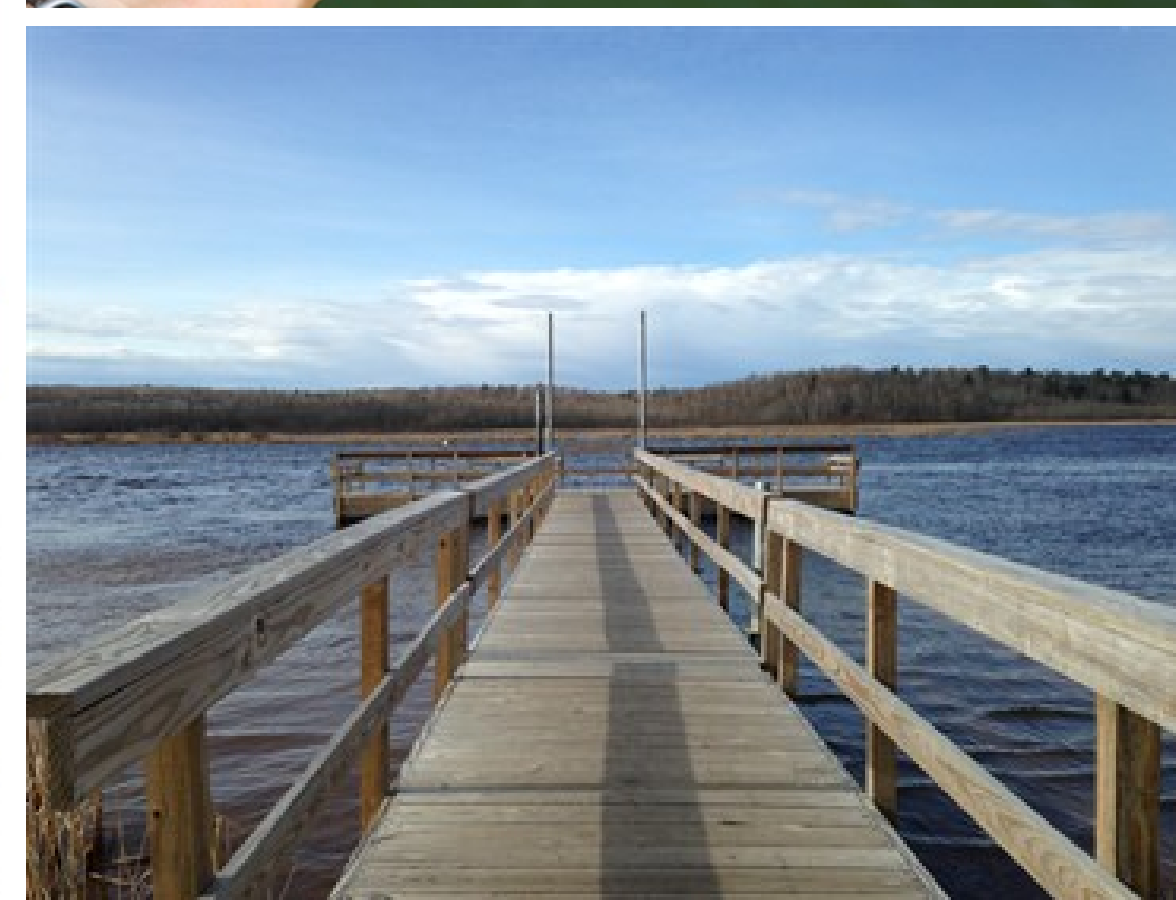
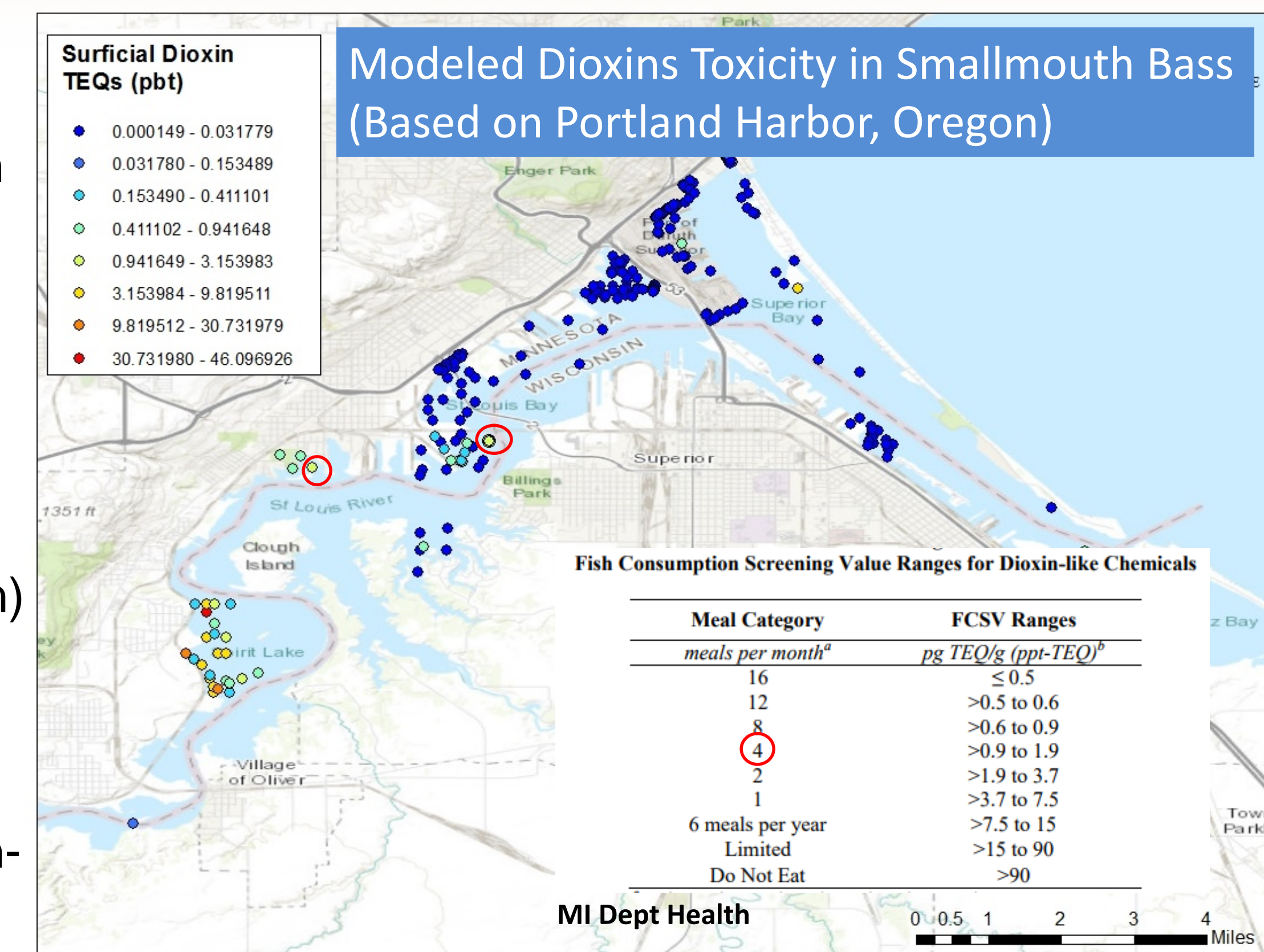
Sediment Quality

Sediment contamination by mercury, polychlorinated biphenyls (PCBs), and dioxins (PCDDs) occurs at the site. Concentrations are not high enough to pose a risk to physical contact. However, these contaminants accumulate in food webs and can present a major health concern when consumed in fish. At the site, PCBs (carcinogen) present a very low health risk, PCDDs (carcinogen) present a low health risk, and mercury (neurotoxin) presents a moderate health risk.

Habitat Quality

The aquatic habitat is primarily degraded by woody debris, excess sediment, and non-native plants. This has caused the loss of aquatic habitat, reduced aquatic vegetation coverage and diversity, and in some areas impaired aquatic organisms.

Literature-Based Evidence and Existing Conditions



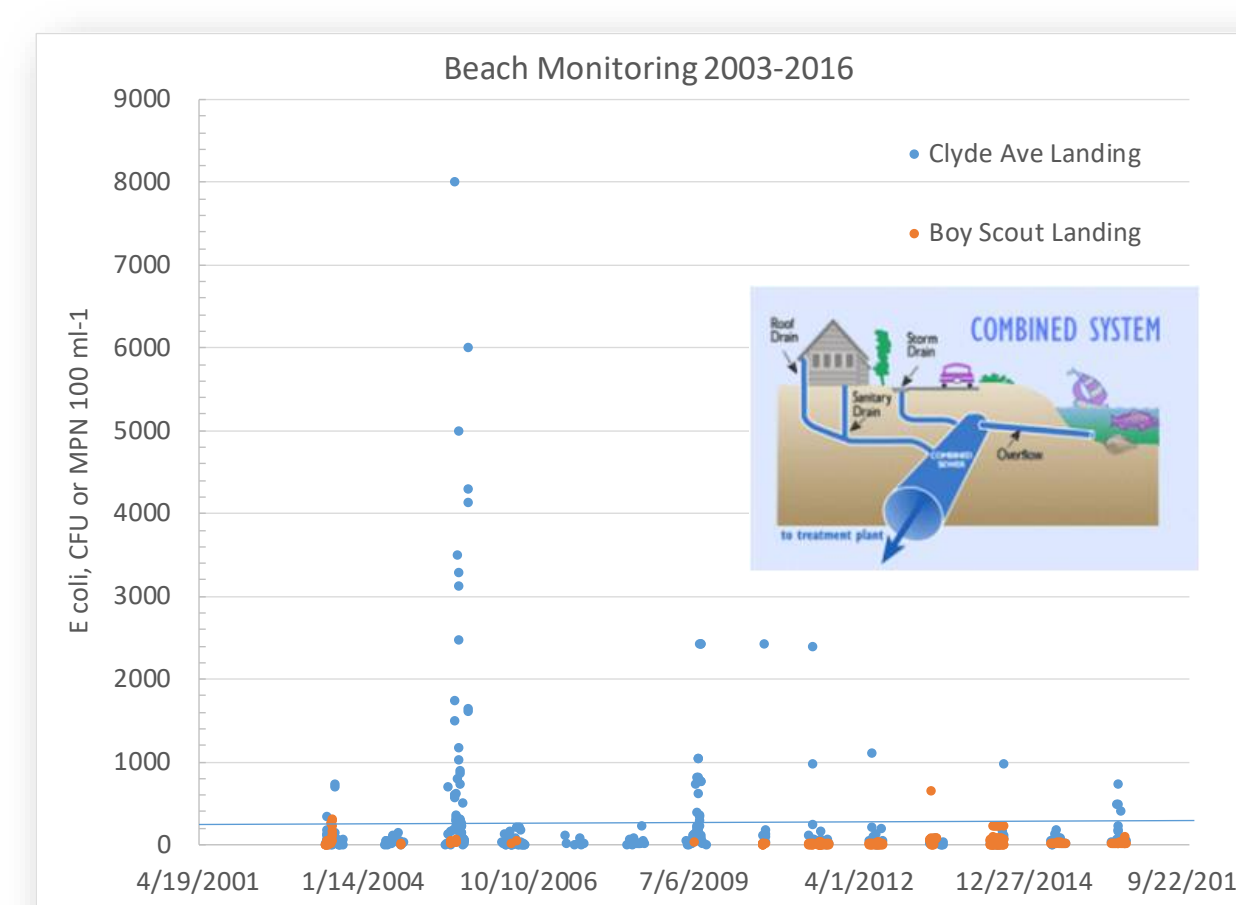
Major Findings

- There is limited evidence that the project will improve water quality and reduce the abundance of waterborne pathogens. The construction of a swimming beach will provide numerous health benefits (see Recreation, Aesthetics and Engagement with Nature pathway), but also present a limited risk of exposure to waterborne pathogens.
- The project is likely to improve sediment quality, which over years would likely result in a moderate reduction in the concentrations of dioxins and PCBs in the tissue of resident fish, such as yellow perch and sunfish. This would have a modest health benefit, especially for vulnerable populations, as well as subsistence anglers.
- The project is highly likely to substantially improve the wetland and aquatic habitat quality, which will produce recreational, spiritual, and cultural health benefits.

Habitat Restoration

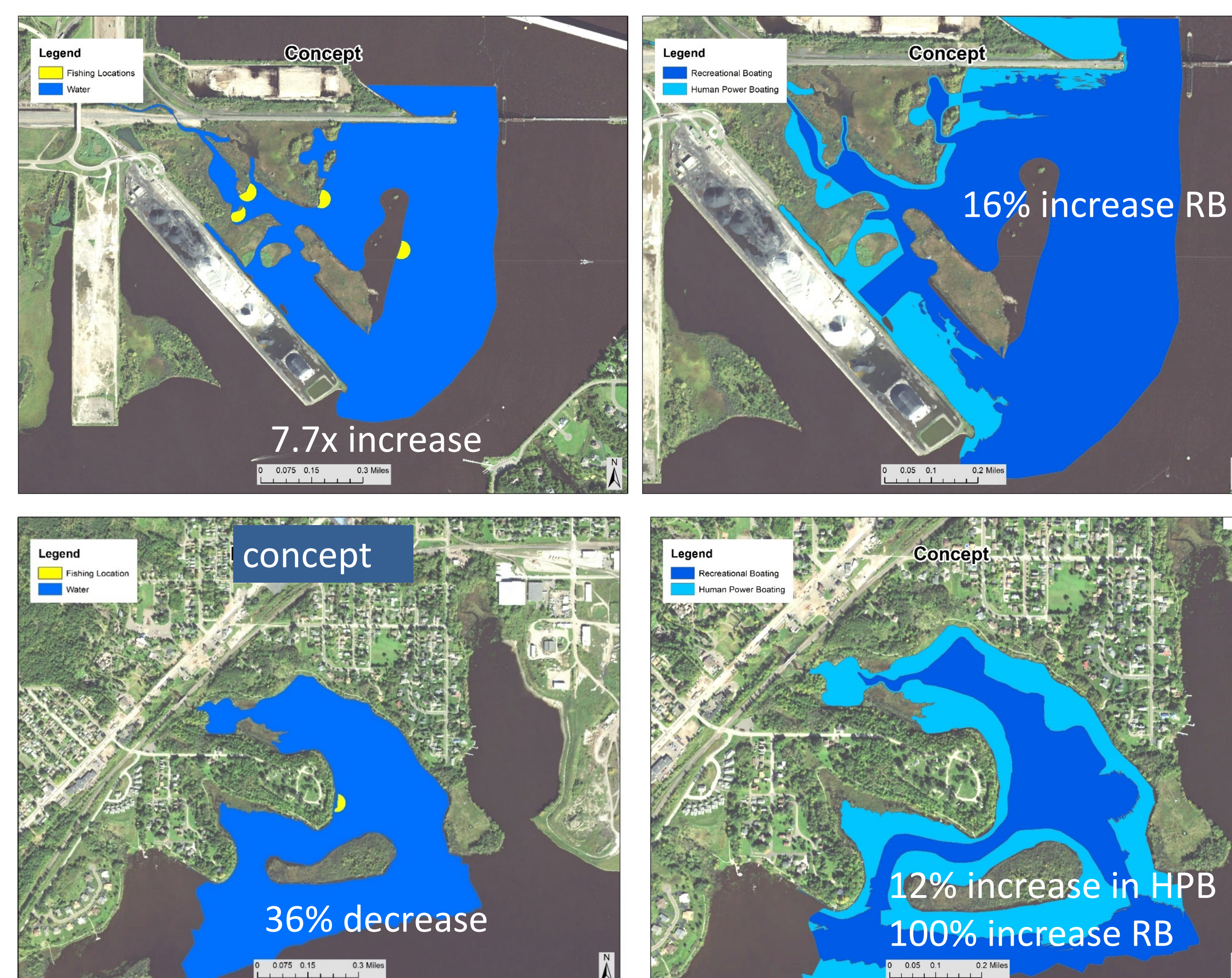
Water Quality

Overall, the project will improve regional water quality because the project restores wetlands, which filter excess nutrients and sediments, as well as pollutants. However, the project will not affect the regional storm water system, and wetlands are only known to reduce the occurrence of waterborne illness when they are designed to directly intercept storm water.



Sediment Quality

The project will potentially decrease sediment concentrations of PCBs and dioxins by adding clean sediment from the Kingsbury Bay delta. The project will likely decrease the bioavailability of PCBs and dioxins by increasing wetlands, which will also mitigate risk associated with moving Kingsbury Bay sediment to Grassy Point. The future change in mercury bioavailability is not known. The greatest contamination lies just outside the project area.



Habitat Restoration

Habitat Quality

- Net gain of 130 acres of aquatic habitat (-8 acres at Grassy Point, +138 acres at Kingsbury Bay)
- Increased habitat for migratory waterfowl via increased aquatic habitat; nesting bird habitat quality will depend on the riparian vegetation post-restoration
- Decreased area dominated by invasive species; net removal of 25.1 acres of invasive species
- Increased suitable wild rice habitat; net gain of 13 acres at Kingsbury Bay
- Increased recreation access; net gain of 12 acres of kayak and canoe access, and 46 acres of recreational boating access

Park Improvements

Construction

- A new swimming beach will be built at Kingsbury Bay.
- The project will increase access for both shore fishing and boat fishing, providing greater opportunity to catch both resident and migratory fish species. Four new shore fishing locations added at Grassy Point, and the existing pier at Kingsbury Bay will be moved to the inside of the bay.
- The project will likely increase consumption of fish capture at the project sites, but many anglers do not heed consumption advisories; St. Louis River anglers target black crappie, yellow perch, sunfish, northern pike, and walleye for consumption.



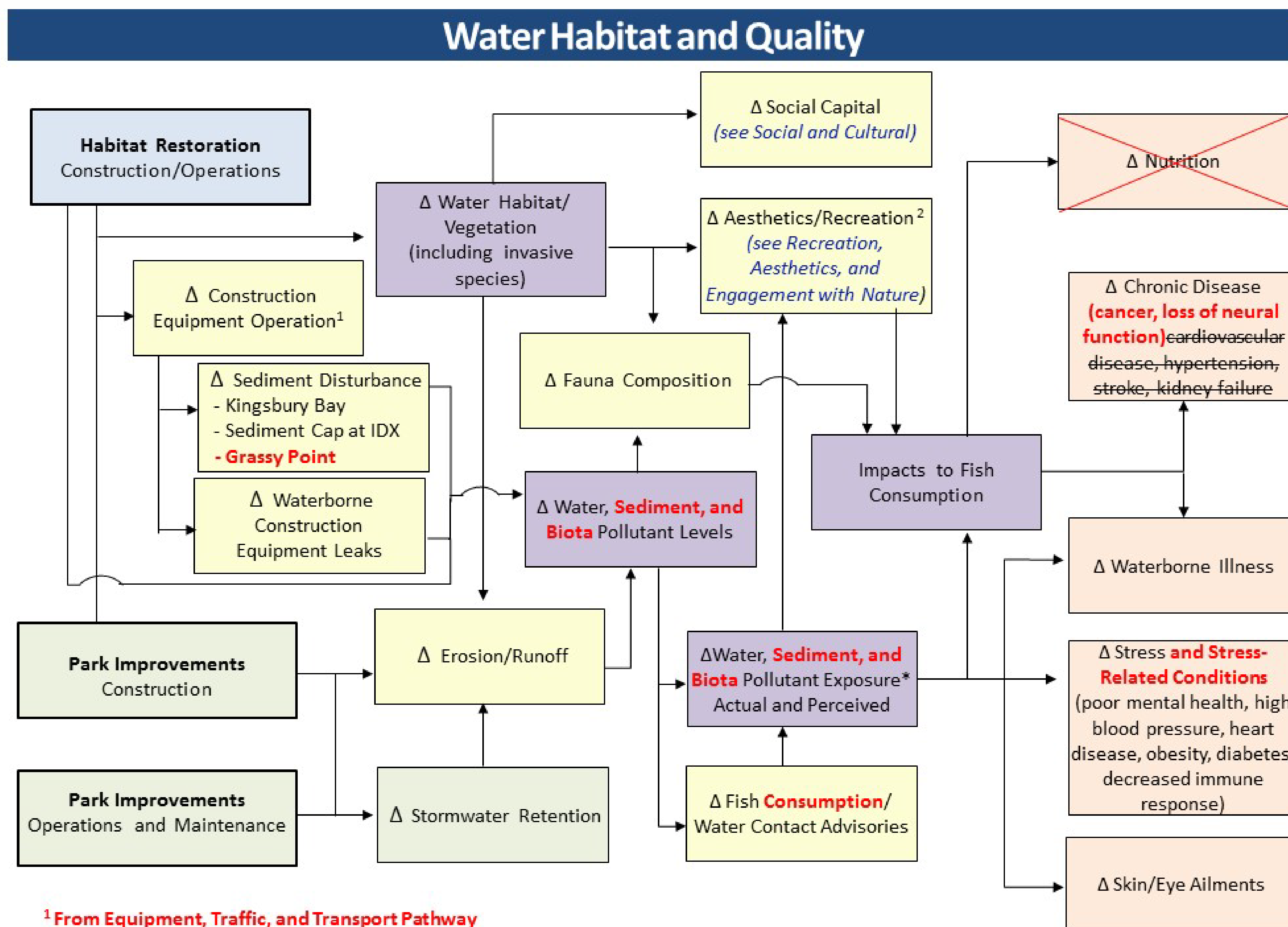
WATER HABITAT AND QUALITY: POTENTIAL IMPACTS TO HEALTH



What's the connection to health?

- Improving water, sediment, and habitat quality can improve nutrition and decrease disease incidence in anglers, as well as decrease illness and skin and eye ailments in swimmers. Racial and ethnic minorities, as well as infants and children, are most vulnerable to health impacts from consuming contaminated fish.
- Improving water and habitat quality can reduce stress, as well as improve social capital and recreational opportunities.
- Park improvements can contribute to health by providing amenities such as boat launches, fishing piers, boardwalks, and swimming beaches to encourage safe access to and use of the river by the community.

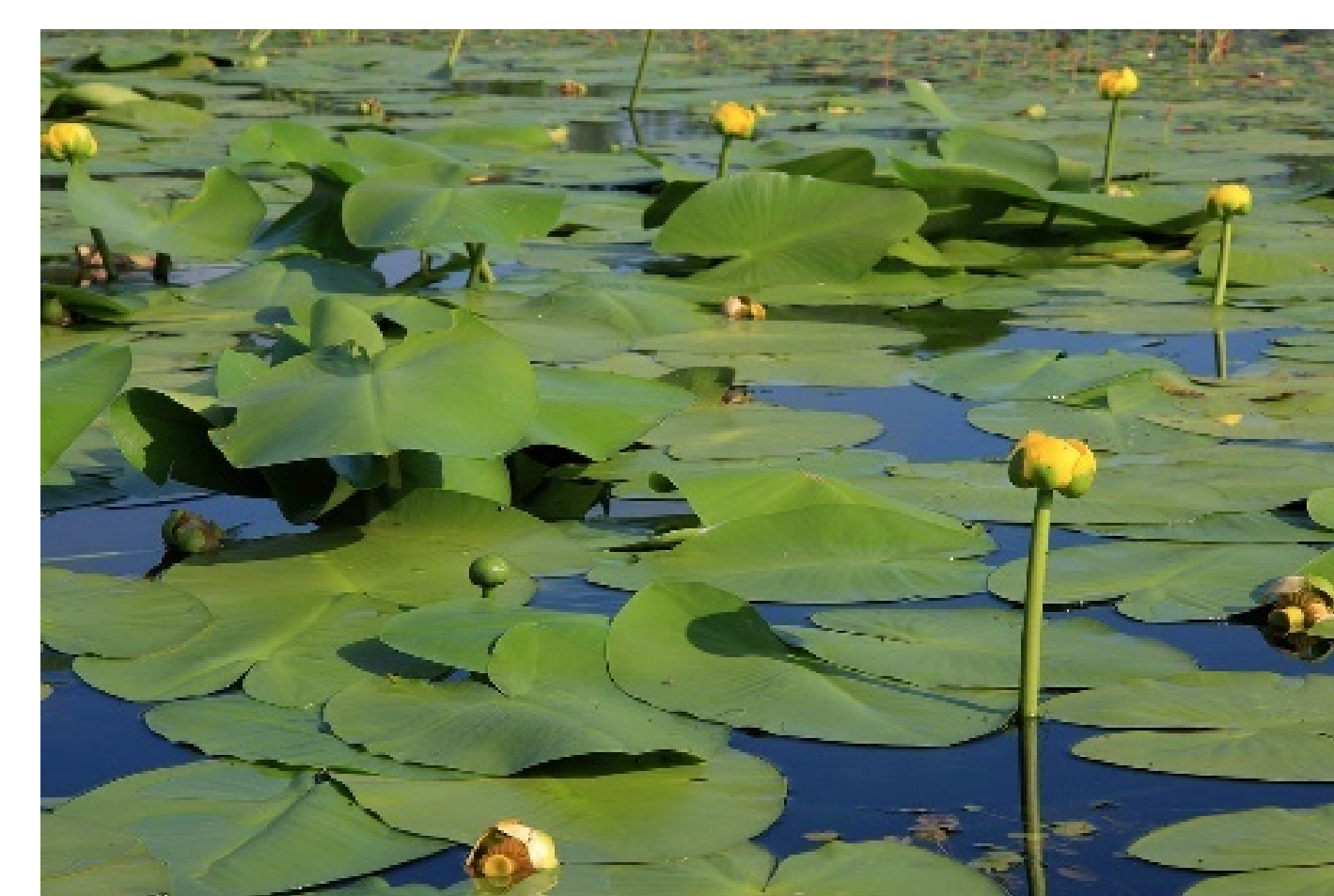
Pathways Through Which Health Could Be Impacted



¹ From Equipment, Traffic, and Transport Pathway

² From Recreation, Aesthetics, and Engagement with Nature Pathway

* Water Pollutant Exposure includes construction crews, recreational users, and individuals fishing for consumption



Health Impact Analysis

- The project will **likely** improve water quality at both sites, but have little impact on waterborne pathogens. Adding a swimming beach to the area will provide a variety of **health benefits**, but also potentially **detract from health** by increasing exposure to waterborne illness
- Sediment contamination does not pose a health risk from physical contact, but there is a risk associated with eating contaminated fish from the site. Capping the area of greatest contamination with clean sediment or adding organic carbon to sediments is **highly likely** to reduce PCBs and dioxins concentrations in sediment. Further, improving wetland extent will **likely** reduce the bioavailability of PCBs and dioxins. These changes will **likely** cause concentrations of PCBs and dioxins in resident fish, such as yellow perch and sunfish, to decline; however, there is limited confidence in the **magnitude** of change. As a result, the associated cancer risk related to consumption of those fish will decline. Similar reductions in migratory fish such as walleye and northern pike are not anticipated. The project will have an unknown effect on mercury concentrations in resident fish
- Improving fishing access will **likely** generate more angler activity at the sites; without improvements in public communication regarding the risk of fish consumptions, some anglers will be unaware of or else ignore fish consumption advisories and consume more fish from the project areas than advised, potentially resulting in **negative health impacts**
- The project will substantially increase aquatic habitat and replace non-native aquatic plants with native aquatic plants. The project will have the greatest benefit for submerged aquatic vegetation and fish that prefer either vegetated or deep water habitat. Visible change at the site is likely to reduce stress associated with actual and perceived contamination in the project area, **benefitting health**



WATER HABITAT AND QUALITY: PRELIMINARY HIA RECOMMENDATIONS



What’s the connection to health?

- Improving water, sediment, and habitat quality can improve nutrition and decrease disease incidence in anglers, as well as decrease illness and skin and eye ailments in swimmers. Racial and ethnic minorities, as well as infants and children, are most vulnerable to health impacts from consuming contaminated fish.
- Improving water and habitat quality can reduce stress, as well as improve social capital and recreational opportunities .
- Park improvements can contribute to health by providing amenities such as boat launches, fishing piers, boardwalks, and swimming beaches to encourage safe access to and use of the river by the community.

Major Finding

The project will likely improve water quality at both sites, but have little impact on waterborne pathogens. Adding a swimming beach to the area potentially increases exposure to waterborne illness, but also will provide a variety of health benefits.

- Follow best-practices for storm water management, erosion and runoff, and equipment leaks during the construction phases and implement mitigations, as necessary
- Design the storm water pond identified in the concept plan to intercept storm water to maximize its ability to protect Kingsbury Bay water quality
- Identify regional storm water outfalls and implement additional storm water management practices to reduce potential impact of combined sewer overflows (CSOs) at the future swimming beach at Kingsbury Bay
- Implement routine beach monitoring at the future Kingsbury Bay swimming beach

Major Finding

Adding clean sediment and increasing wetland extent will likely cause the health risk of eating resident fish from the project area to improve. Improving fishing access will likely result in increased consumption of fish from the project area.

- Develop a sediment remediation target protective of human health based on surface-weighted area contaminant concentration, particularly for dioxins
- For a future project, cap or remove sediments to the east of the Grassy Point project area (currently outside the project area) to reduce bioavailability of dioxins
- Implement a fish monitoring program that includes mercury, dioxins, and PCBs, and targets both resident and migratory fish species
- Provide ethnically-appropriate communication on consumption-related risk that addresses specific-contaminant risk as well as fish species and size
- Conduct creel surveys focused on fishing within the AOC, and include information on race, ethnicity, location of residence, age, and fish consumption habits
- Should contaminant concentrations of certain fish species or sizes at the project sites meet human health guidelines, promote the consumption of local fish due to its health benefits

Major Finding

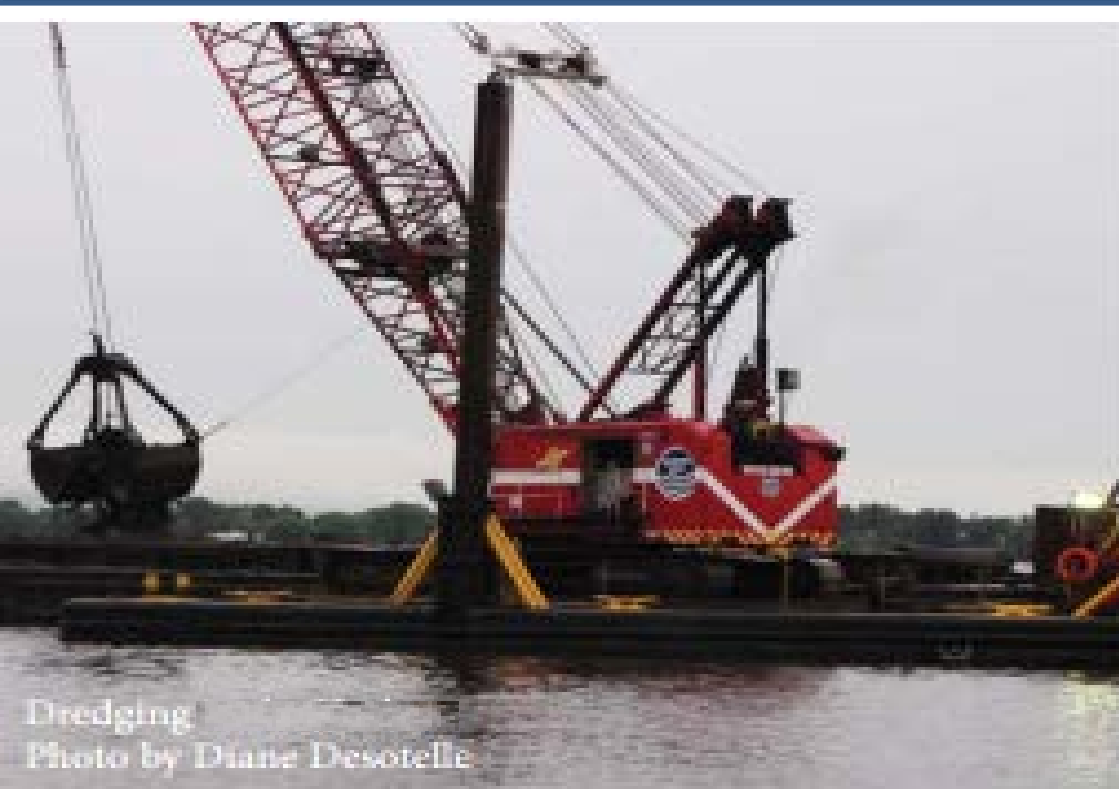
The project will substantially increase aquatic habitat, and restore native aquatic plants. The project will have the greatest benefit for submerged aquatic vegetation and fish that prefer either vegetated or deep water habitat.

- Develop a long-term, non-native species management plan for both Grassy Point and Kingsbury Bay
- To sustain the ecological integrity of the site, provide interpretative signage that provides information on wetland habitat types and the benefits each habitat provides for fish, reptiles, birds, and people
- Identify upland habitats within the site suitable for trees, and develop goals for the upland plant community that takes into account future changes in invasive species, water level, and climate
- Where compatible with project goals, protect existing high-quality aquatic plants at Kingsbury Bay
- Develop habitat plans for marsh birds, wading birds, and migratory waterfowl

Community/Stakeholder Input



EQUIPMENT OPERATION, TRAFFIC, AND TRANSPORT: HIA FINDINGS



What's the connection to health?

- Equipment, trucks, and vehicles are all sources of noise, light, and air pollution and have the potential for spills and leaks.
- Equipment operation and increased traffic present the potential for accidents, which can result in injury and even death.
- Increased truck and vehicle traffic can lead to congestion and increased time spent in traffic, and in the case of truck and heavy equipment traffic, the potential to deteriorate road conditions; all of these can be a source of stress for local residents and commuters.
- Excavation and transportation of material (sediment and wood waste) increases the risk of exposure to particulate matter and contaminants, which can cause cardiovascular and pulmonary disease, cancer, and other chronic disease.

Roads/Traffic

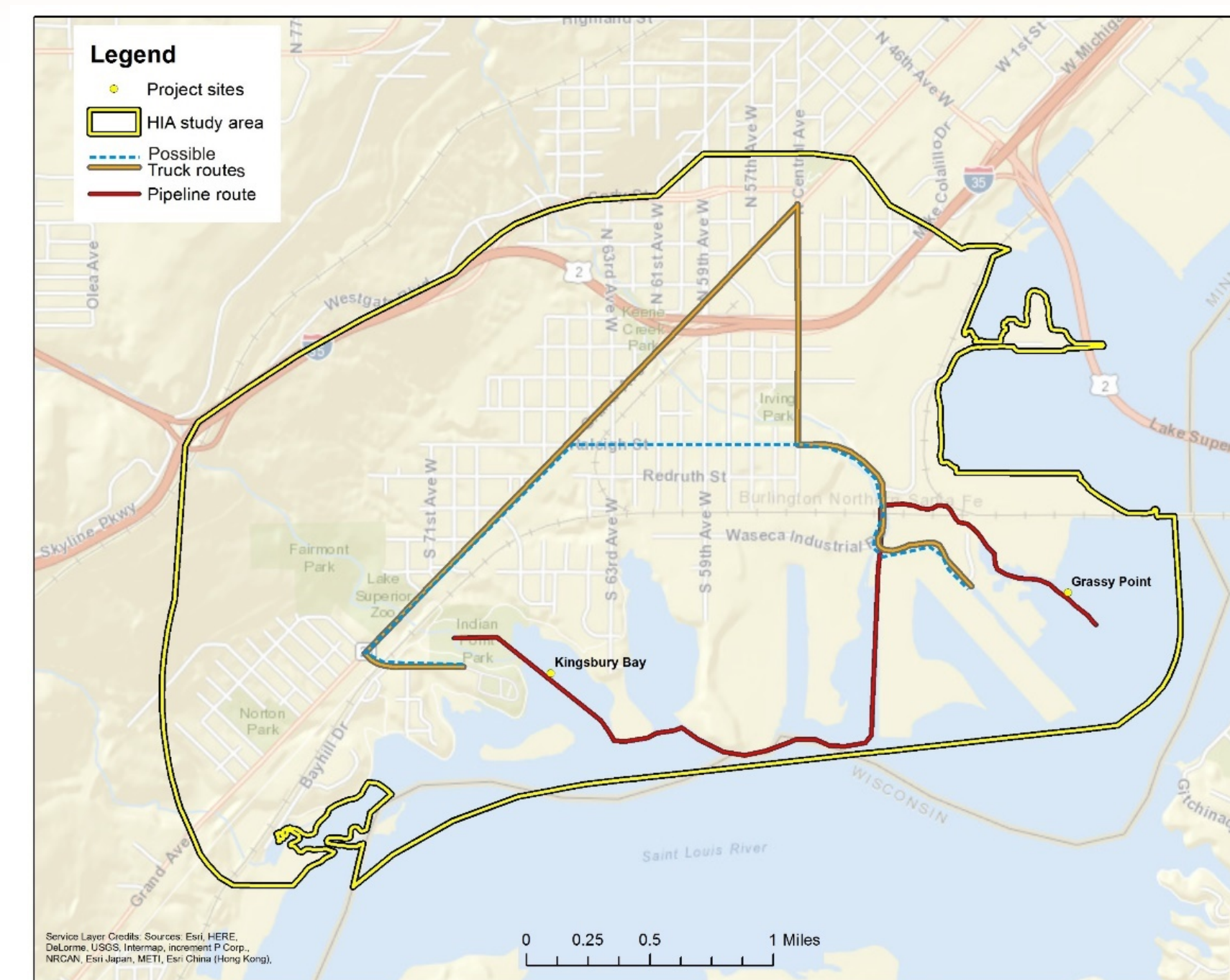
Grand Avenue – an arterial route into Duluth that provides access to land uses along the St. Louis River and links neighborhoods in West Duluth to the rest of the city

63rd Avenue, 59th Avenue, and Central Avenue – north-south collector routes

Raleigh Street – only east-west collector roadway in the study area.

Grand Avenue, 59th Avenue, Central Avenue, Raleigh Street, and Waseca Industrial North Road all currently serve as truck routes. The City has a proposal to extend Waseca Industrial to Grand, which would allow trucks to be prohibited in the neighborhood all together; however, this is a new road project proposal and may not occur until after habitat restoration is complete.

- Equipment operation and transport of sediment and other materials to and from the project sites will impact roadway and water traffic and have the potential to result in traffic accidents and injury to construction crews, residents, and recreational users.
- Excavation and transport of sediment and other materials to and from the project sites have the potential to increase exposure to particulate matter and contaminants.



- Possible truck routes include:
 - Kingsbury Bay to Pulaski St. to Grand Ave. to North Central Ave. to Waseca Industrial Rd. to Lesure St. (Note the acute angle at Grand and North Central)
 - Kingsbury Bay to Pulaski St. to Grand Ave. to Raleigh St. to Waseca Industrial Rd. to Lesure St.

Note: There is also a rail line south of the Irving neighborhood that runs between the two sites

Literature-Based Evidence and Existing Conditions

Major Findings

Habitat Restoration

Equipment

Habitat Restoration work will require a fleet of equipment at both project sites, trucks and construction vehicles on local roads, and boats and barges on the St. Louis River. Work is expected to take place in varying degrees for 2 years, with seasonal downtime expected.

Kingsbury Bay

- Skid steers* (2-3) – to shave off vegetation during the winter months
- Trucks* – to drag around tires to “drive down the frost”
- Large excavators* (1-2) – to remove frozen material (mechanical dredging)
- Large barge at Kingsbury* (1) – to direct the cutter heads on the *hydraulic dredge unit* (hydraulic dredging)

Transport Between Kingsbury and Grassy

- Dump trucks* (10 or less) – hauling material from Kingsbury to Grassy
- Pumps on barges* – at perhaps 2-3 locations along the pipeline corridor from Kingsbury to Grassy Point
- Boats* – to transport fuel, supplies, personnel to/from the pumps and hydraulic dredge
- Barges (if material transported from Kingsbury Bay to Grassy Point by barge)

Grassy Point

- Large barge* (1) – to support an *excavator* to remove wood waste at Grassy
- Barges* (1-2) – to move wood waste from excavated areas to the disposal area
- Large barge with an excavator* (1) – to take wood waste out of transport barges and place in the island disposal location
- Barge with a dredge material distributor* (1) – to place biomedium at Grassy Point
- Trucks and excavators* at XIK Dock #7 (if used as a material management facility)

Traffic and Transport

Transport of Kingsbury Bay Sediment

- Mechanically-dredged material (80,000 cy) from Kingsbury Bay moved by (approx. 8,000) trucks: 20 trucks/hour max, seven days a week for approx. three months (winter)
- Hydraulically-dredged material (94,000 cy) from Kingsbury Bay moved by pipeline or barge to Grassy Point (summer); some sandy material may be placed along the Indian Point campground shore in support of the future swimming beach planned by the City.

Transport Routes

- Hydraulically-dredged sediment from Kingsbury Bay - pipeline extends across the water, following the shoreline, to the former XLK Superfund site, through an abandoned storm sewer at the head of the XLK site, and then into Grassy Point; may also transport by barge to Grassy Point.
- Mechanically-dredged sediment from Kingsbury Bay - MNDNR will work with the City of Duluth to determine the truck route.

Transport of Grassy Point Material

- Transport of material from Grassy Point: excess sediment to 40th Avenue West (19,000 cy), contaminated sediment to an off-site facility (16,400 cy), wood waste to the incinerator (100,000 cy), and debris (17,872 cy)

Transport Routes

- No details provided about transport of these materials from Grassy Point – assumed to be by truck, but possible routes unknown.
- Of particular concern is transport of the contaminated sediment and wood waste.

Park Improvements

Equipment

Construction

Assume equipment needed at Grassy Point would be relatively light duty (e.g., to build a path/board walk, upgrade the parking lot).

At Kingsbury Bay, there are amenities that would require earth movement (e.g., the swimming beach and stormwater retention pond), so assume excavators, front loaders, and dump trucks would be required,.

Park Improvements Construction at a much smaller scale than Habitat Restoration work.

Operations and Maintenance

Assume equipment used for park maintenance (e.g., mowers and smaller equipment used for trail compaction or regrading) would be utilized.

Traffic and Transport

Quantities and routes of construction-related traffic is unknown, but will be at a much smaller scale than Habitat Restoration work.

No data available on park-related vehicle traffic, but assume vehicle traffic will increase in the vicinity of the parks, given the improvements at the project sites and other park investment efforts in the study area.



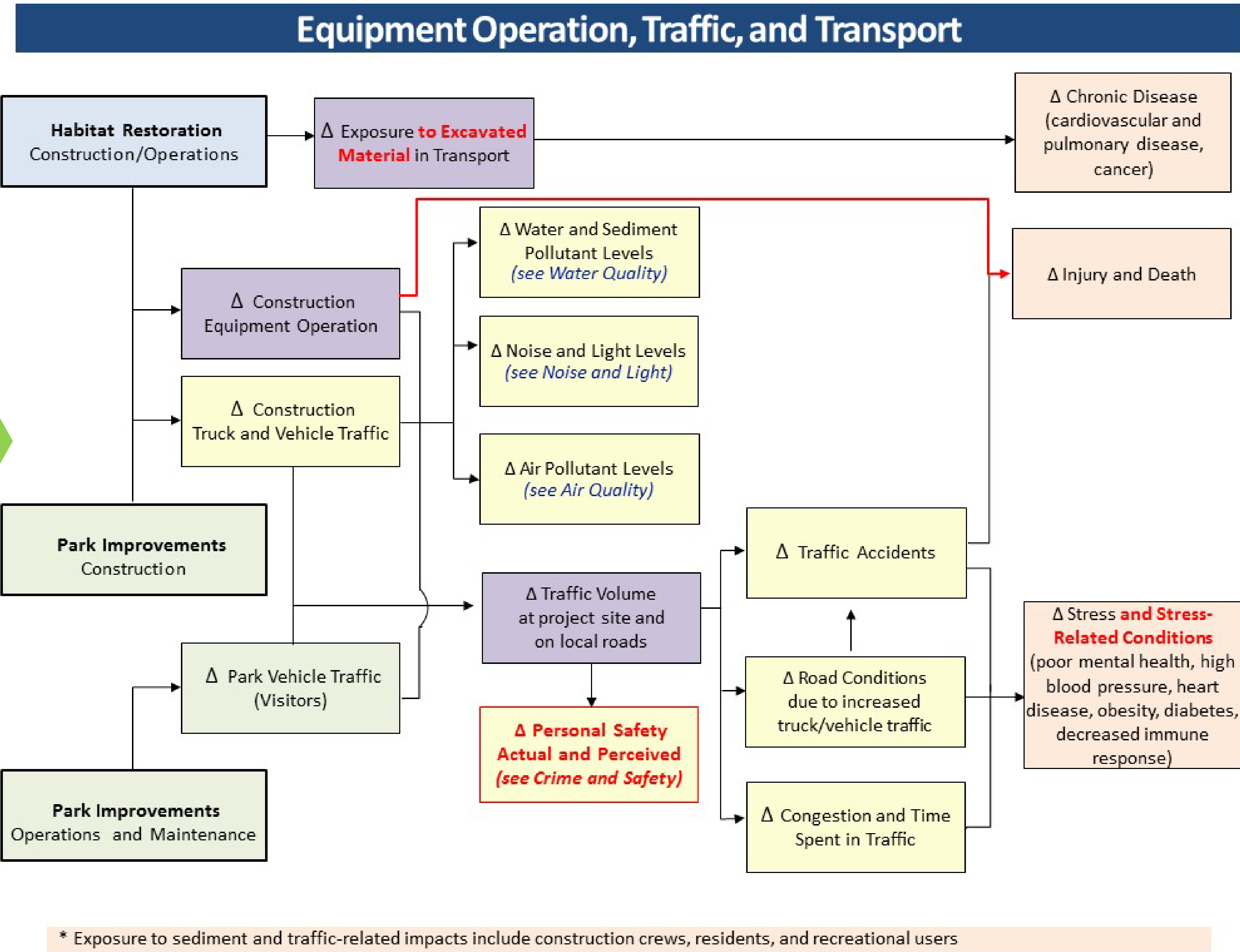
EQUIPMENT OPERATION, TRAFFIC, AND TRANSPORT: POTENTIAL IMPACTS TO HEALTH



What's the connection to health?

- Equipment, trucks, and vehicles are all sources of noise, light, and air pollution and have the potential for spills and leaks.
- Equipment operation and increased traffic present the potential for accidents, which can result in injury and even death.
- Increased truck and vehicle traffic can lead to congestion and increased time spent in traffic, and in the case of truck and heavy equipment traffic, the potential to deteriorate road conditions; all of these can be a source of stress for local residents and commuters.
- Excavation and transportation of material (sediment and wood waste) increases the risk of exposure to particulate matter and contaminants, which can cause cardiovascular and pulmonary disease, cancer, and other chronic disease.

Pathways Through Which Health Could Be Impacted



Health Impact Analysis

- The project is **highly likely** to increase equipment operation and truck and vehicle traffic at/near the project sites and material transport routes in the short-term (during **Habitat Restoration** and **Park Improvements construction**).
- In the long-term (during **Park Improvements operation and maintenance**), it is **possible** there will be increased traffic at and around the sites given the improvements at these sites and other park investment efforts currently planned in the study area as part of the St. Louis River Corridor Initiative.
- Increased equipment operation, traffic, and transport in the study area will **detract from health** because it increases the risk of accidents and related injury, stress due to changes in travel conditions, and exposure to particulates and contaminants during material transport.
- Equipment operation, traffic, and transport impacts will be experienced **disproportionately** by those living, working, going to school, or recreating at or near the project sites and material transport routes. Construction crews and pedestrians and motor vehicle operators in the area will be more **vulnerable** to these impacts.
- The **magnitude** of the population affected will depend greatly on the material transport route chosen, as well as the timing of earthwork activities at Kingsbury Bay and any increases in park visitor traffic.

Existing Conditions

Annual Average Daily Traffic (AADT) <i>Traffic volume in vehicles per day</i>		Level of Service (LOS) <i>Indicates flow and congestion</i>
Street	AADT	LOS Description
Grand Avenue	8,300-15,100	Virtually no congestion
Central Avenue	5,800-10,900	Slight delays during peak hours
Raleigh Street	1,300	No congestion

Traffic Accidents
Between 2005-2014, approximately 210 vehicle crashes occurred in the study area.

Of the 210 crashes, 82 occurred on Grand Avenue. Many of the accidents on Grand resulted in minor to moderate injury, which is expected given the higher speeds and traffic volumes.

There were no traffic-related fatalities during this timeframe.

Risk

The main truck routes to and from Kingsbury Bay and Grassy Point are in close proximity to multi-unit, single-unit, and low income or public housing; senior centers and care facilities; schools; businesses; and parks and trails. The setback of buildings from the street varies along the routes, but in many areas the building set back is minimal. And many of the streets also serve as on-street bike routes.

Kingsbury Bay sediment is proposed to be transported by truck during winter to minimize exposure because soil would be frozen and it is assumed that residents would be indoors more.

An analysis of photos taken outdoors in the study area from December-March and then posted to Panoramio, Instagram, or Flickr (n=124) indicates that there are still recreational users during the winter months in the study area. Foot traffic in the Spirit Valley business district at Grand and Central is also expected to continue through the winter months, as well as foot traffic to schools, libraries, and other amenities and businesses along the routes.





EQUIPMENT OPERATION, TRAFFIC, AND TRANSPORT: PRELIMINARY HIA RECOMMENDATIONS



What's the connection to health?

- Equipment, trucks, and vehicles are all sources of noise, light, and air pollution and have the potential for spills and leaks.
- Equipment operation and increased traffic present the potential for accidents, which can result in injury and even death.
- Increased truck and vehicle traffic can lead to congestion and increased time spent in traffic, and in the case of truck and heavy equipment traffic, the potential to deteriorate road conditions; all of these can be a source of stress for local residents and commuters.
- Excavation and transportation of material (sediment and wood waste) increases the risk of exposure to particulate matter and contaminants, which can cause cardiovascular and pulmonary disease, cancer, and other chronic disease.

Major Finding

Equipment operation and transport of sediment and other materials to and from the project sites will impact roadway and water traffic and have the potential to result in traffic accidents and injury to construction crews, residents, and recreational users.

- Clearly communicate the project, its duration, and expected roadway and water traffic impacts to residents, schools and daycare centers, senior centers and care facilities, businesses, and recreational users in the project area and along the transport route
- Hire companies with a proven safety record; local companies given priority in hiring can benefit the local economy
- Route trucks and other equipment and vehicle traffic away from neighborhoods, schools and daycare centers, senior centers and care centers, and recreation areas to the extent possible
- Take additional safety measures and/or limit the amount of truck traffic at the start and end of the school day to create safe routes to and from school for children
- Take into account traffic patterns, road geometry, and frequency and timing of trips to minimize traffic disturbance and congestion
- Repair damage to roadways caused by construction vehicles and transport (e.g., potholes, broken curbs, collapsed manholes, rail crossing damage)
- Consider the use of rail or barge to transport sediment between the two sites, as these routes would avoid residential areas, minimize roadway traffic impacts, and likely reduce the number of trips given the larger capacity of rail cars and barges
- Minimize impacts of the hydraulic pipeline and project-related barge traffic on recreational boaters and the navigation channel of the St. Louis River by using signs, markings, and warnings
- If the parks and other nearby enhancements increase the amount of traffic in the area post-construction, consider traffic calming measures (such as speed humps, raised crosswalks/intersections, traffic circles, medians, curb extensions or bump-outs, and signage or pavement markings) to minimize the risk for increased accidents

Major Finding

Excavation and transport of sediment and other materials to and from the project sites have the potential to increase exposure to particulate matter and contaminants.

- Route material transport traffic away from neighborhoods, schools and daycare centers, senior centers and care facilities, and recreation areas
- Minimize exposure to material in transport by covering transport vehicles and implementing other fugitive dust measures

Community/Stakeholder Input



NOISE AND LIGHT POLLUTION: HIA FINDINGS



What's the connection to health?

- Noise and light pollution are unwanted or disturbing sound or light that interferes with normal activities, diminishes quality of life, and has adverse effects on human health and ecosystem function.
- Operating equipment, trucks, and vehicles all produce noise and when operating at night time, produce light.
- Both noise and light pollution can cause sleep disturbance, impaired task or functional performance (which may lead to injury), stress, cardiovascular disease and hypertension, and affect ecosystem function, particularly in fauna. Noise pollution also has the potential to cause hearing impairment and has been associated with lowered cognitive performance among school-aged children.

Noise

- Baseline noise levels for the area are not known, but Grassy Point is surrounded by industry and the railroad runs in close proximity to both sites, so background noise levels near the sites may be higher than a typical suburban neighborhood.

Traffic

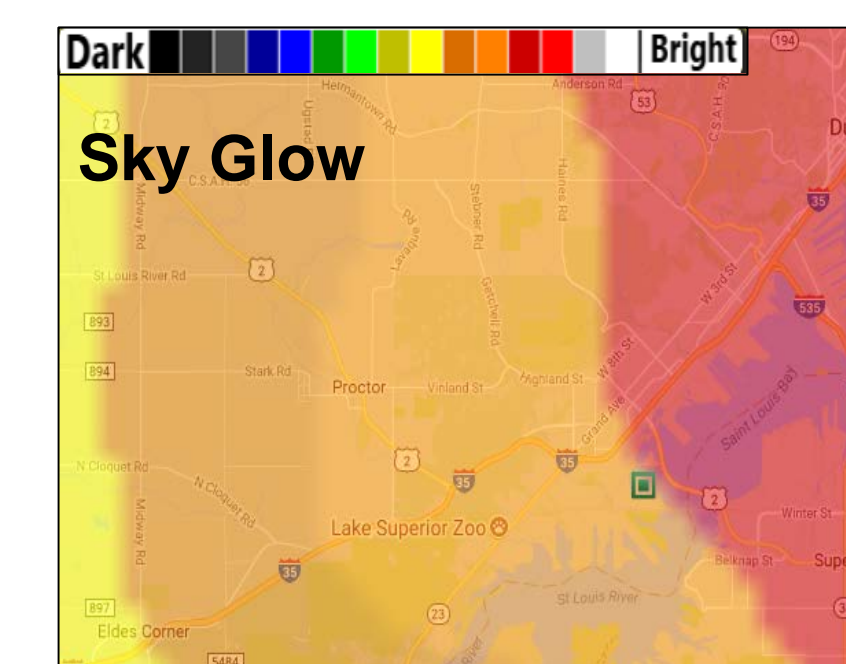
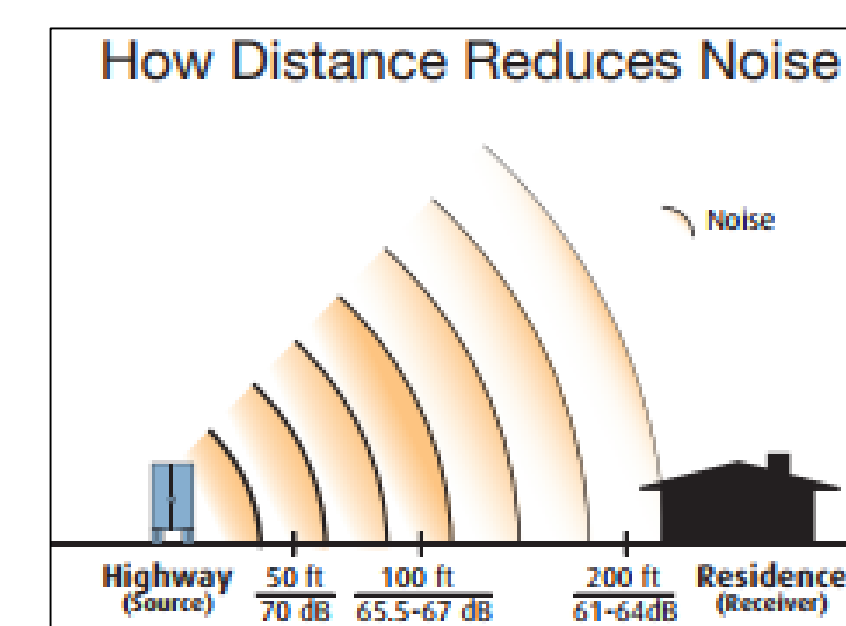
- The main contributor to ambient noise levels in urban communities is road traffic. Near-roadway noise decreases with distance from the source.

Vegetation

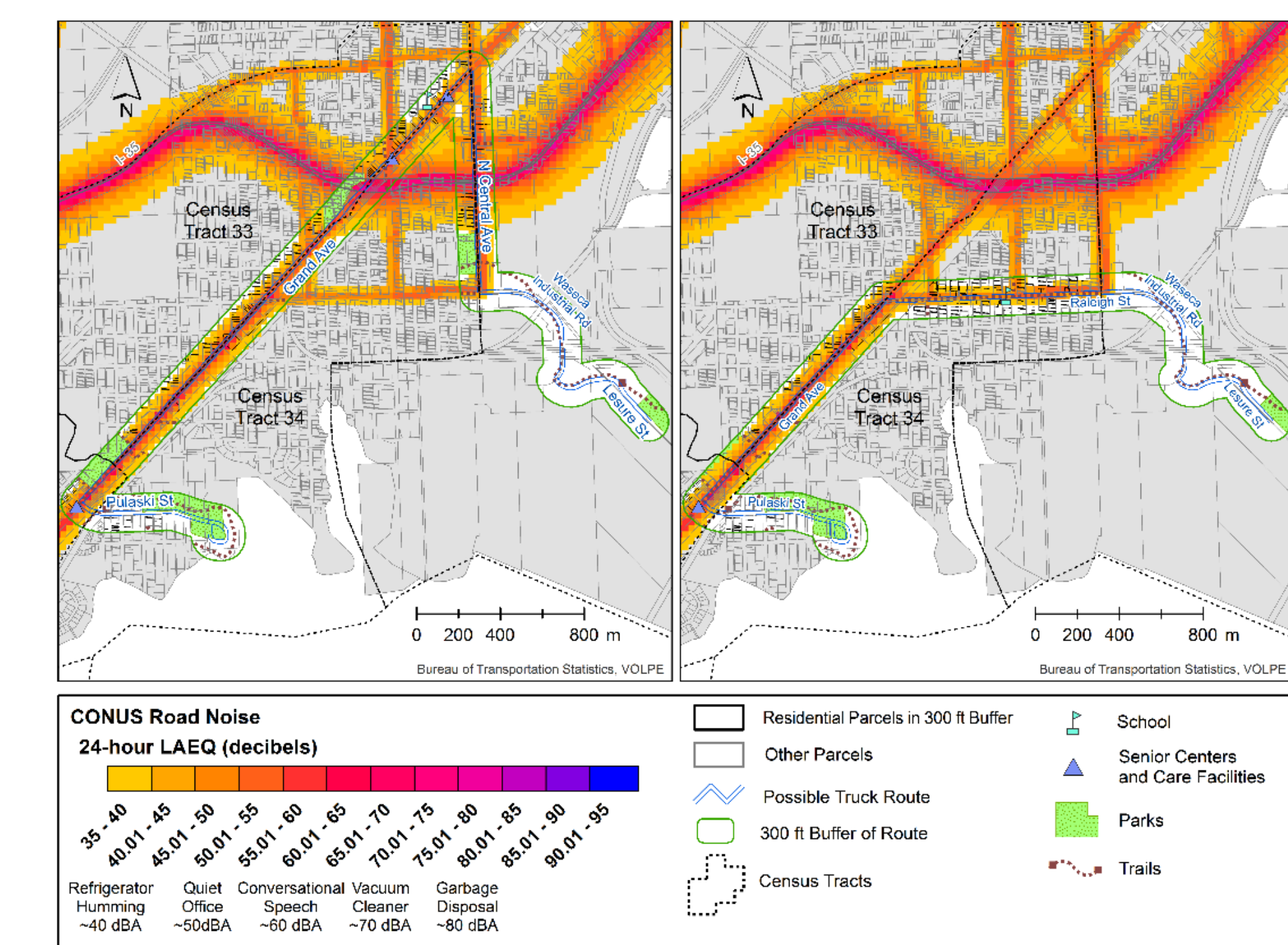
- Trees, bushes, and greenery can provide a physical barrier to traffic and street noise pollution

Light

- Light pollution (or light at night) comes in many forms, including sky glow, which is the bright halo that appears over urban areas at night, and light trespass, when unwanted artificial light spills onto an adjacent property, lighting an area that would otherwise be dark.



Traffic Noise – Transport from Kingsbury Bay to Grassy Point



% Poverty

Tract 33
19.4%

Tract 34
8.4%

★ Also experience greater exposure to noise pollution from I-35

Residential parcels within 300-feet of possible truck routes

Grand to Central ★ – 309 residences (of which 5 are public housing, housing authority or low income housing), 1 school, 3 senior centers or care facilities, and numerous parks and trails

Grand to Raleigh – 306 residences (of which 8 are public housing or housing authority), 1 school, 1 senior care facility, and numerous parks and trails

Additional Traffic-Related Impacts

- Noise expected from transport of material from Grassy Point, Park Improvements construction activities, and any increase in park vehicle traffic post-construction. Unable to quantify population affected by air pollutants during these periods, because no details on traffic equipment or routes were provided. A low to moderate number of individuals expected to be impacted depending on the transport route.

Construction Impacts on Light

- During Habitat Restoration, the EAW stated equipment would be operated during daylight hours (7 am-9 pm) only, with *exception* of hydraulic dredging.
- During winter, sunset is between 4:30 and 7:30 pm (much earlier than 9:00 pm).
- During Park Improvements construction, no night-time work is anticipated.

Park Operations and Maintenance Impacts on Light

- If lighting is installed at the Kingsbury Bay entrance/parking lot to decrease crime and improve safety, there is the potential for light trespass to nearby residences if not properly placed.

Literature-Based Evidence and Existing Conditions

Major Findings

Habitat Restoration and Park Improvements Equipment Noise

- Average noise level from a diesel-powered piece of construction equipment, including trucks, at 50 feet is 85 A-weighted decibels (dBA) and decreases with distance from the source.

Distance from Source (Feet)	Noise Level (dBA)
50	85
100	79
200	73
400	67
900	31

- Doubling the number of pieces of equipment increases the decibels by 3. So, 4 pieces of equipment running at the same time would be 91 dBA at 50 feet.
- One study showed noise from a pipeline cutterhead is 172-185 dBA at 1 meter (3 ft); another showed cutterhead sounds peaked at 100-110 dBA and were inaudible at ~500 m (1640 ft) from the source.

- MPCA establishes noise standards based on the land use in the area of the receiver.

Noise Area Classification (NAC)	Daytime dBA		Nighttime dBA	
	L ₁₀	L ₅₀	L ₁₀	L ₅₀
1 <i>Residential, Religious & Camping</i>	65	60	55	50
2 <i>Commercial & Recreational</i>	70	65	70	65
3 <i>Manufacturing and Industrial</i>	80	75	80	75

L₁₀ – noise level that can't be exceeded for more than 10% of the time for one hour (6 minutes/hour)

L₅₀ – noise levels that can't be exceeded for more than 50% of the time for one hour (30 minutes/hour)

- Both sites considered NAC 2; but, during Habitat Restoration an NAC 1 area is 200 feet from the nearest excavation point at Kingsbury Bay (although most excavation will occur 400 ft from residences) and 0.5-1 mile from the Grassy Point construction zone
- During Park Improvements, creation of the swimming beach will be in an NAC 1 area and creation of the storm water retention pond will be in close proximity to an NAC 1 area.



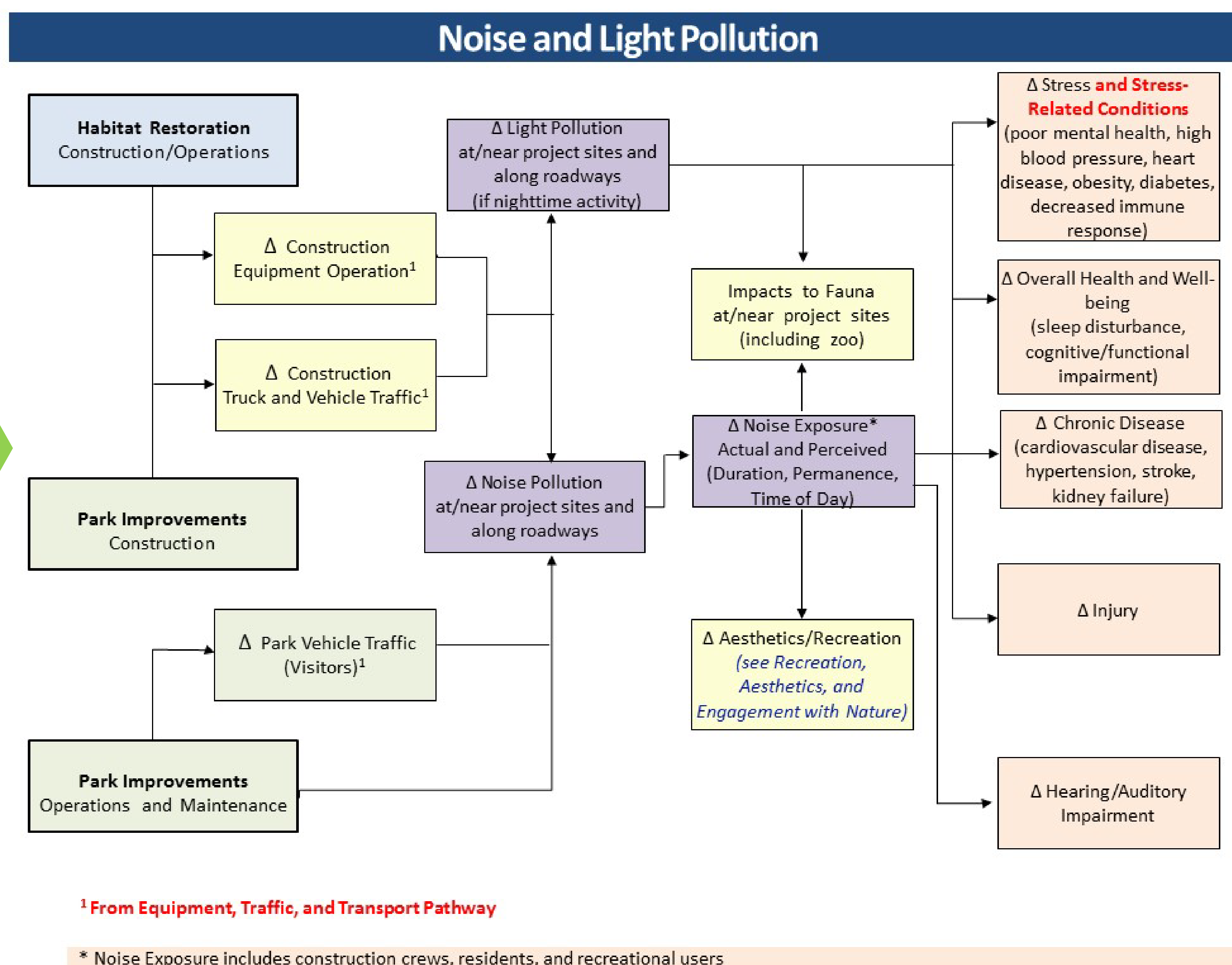
NOISE AND LIGHT POLLUTION: POTENTIAL IMPACTS TO HEALTH



What's the connection to health?

- Noise and light pollution are unwanted or disturbing sound or light that interferes with normal activities, diminishes quality of life, and has adverse effects on human health and ecosystem function.
- Operating equipment, trucks, and vehicles all produce noise and when operating at night time, produce light.
- Both noise and light pollution can cause sleep disturbance, impaired task or functional performance (which may lead to injury), stress, cardiovascular disease and hypertension, and affect ecosystem function, particularly in fauna. Noise pollution also has the potential to cause hearing impairment and has been associated with lowered cognitive performance among school-aged children.

Pathways Through Which Health Could Be Impacted



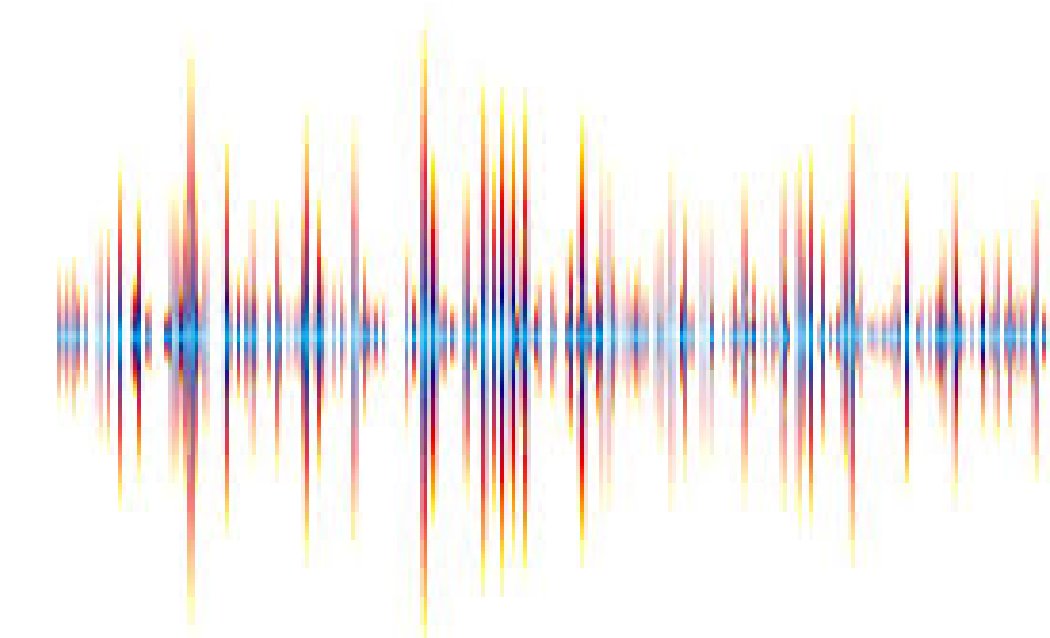
Noise

- Traffic noise has been found to impact the number of residents reporting frequent annoyance and sometimes and/or frequent sleep disturbance at noise levels above 50 decibels, and the desire to stay outdoors above 48 decibels. Exposure to constant ambient noise or periodic levels of noise above 55 decibels have been associated with changes in behavioral and mental activities, as well as lowered cognitive performance among school-aged children.

Health Impact Analysis

- The project is **highly likely** to increase equipment and truck and vehicle-related noise pollution and **possibly** light pollution (if nighttime activity occurs) at and near the project sites and material transport routes in the short-term (during **Habitat Restoration** and the construction phase of **Park Improvements**).
- In the long-term (post-construction), it is **possible** there will be increased traffic and traffic-related noise pollution at and around the sites given the improvements at these sites and other park investment efforts currently planned in the study area as part of the St. Louis River Corridor Initiative.
- Increased noise and light pollution in the study area will **detract from health** because both can cause sleep disturbance, impaired task or functional performance (which may lead to injury), stress, cardiovascular disease and hypertension, and affect ecosystem function, particularly in fauna. Noise pollution also has the potential to cause hearing impairment and has been associated with lowered cognitive performance among school-aged children. The adverse health impacts of noise pollution are related to total noise exposure from all sources.
- These impacts will be experienced **disproportionately** by those living, working, going to school, or recreating at or near the project sites and material transport routes.
- The **magnitude** of the population affected will depend greatly on the material transport route chosen, as well as the timing of earthwork activities at Kingsbury Bay and any increases in park visitor traffic.

Existing Conditions



Impacts to Fauna and the Zoo

- Aquatic organisms often rely on sound for a number of functions (e.g., echolocation to locate a mate or prey, detection of predators, navigation, etc.); the underwater sound from dredging and boats could impact these functions.
- Due to its close proximity, noise could also have an impact on zoo animals, zoo goers, and zoo staff.



NOISE AND LIGHT POLLUTION: PRELIMINARY HIA RECOMMENDATIONS



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Major Finding

Equipment operation and truck and vehicle traffic will increase noise pollution in the study area and have the potential of placing construction crews, residents, and recreational users in the study area at increased risk of adverse health impacts from noise exposure. The adverse health impacts of noise pollution are related to total noise exposure from all sources.

- Clearly communicate the project, its duration, and expected noise levels to residents, schools and daycare centers, senior centers and care facilities, businesses, and recreational users in the project area and along the transport route
- Provide a means for residents and other affected populations to provide feedback and/or lodge complaints about excess noise
- Include noise mitigation criteria/specifications in the contract (e.g., absolute noise criterion for equipment, restricted idling, and use of mufflers, dampeners, shieldings, and enclosures)
- Include incentives for contractors who have established noise mitigation programs/policies and/or newer fleets
- Implement a noise monitoring program in the vicinity of both sites to assess overall noise levels (i.e., baseline noise plus project noise) and implement mitigation measures, as necessary, to minimize impacts
- Limit construction activities to daylight hours or the hours specified in the Duluth noise ordinance (7 am – 9 pm), whichever is more restrictive (i.e., sunset December-March is between 4:30 and 7:30 pm). Limit noisy operations to non-sensitive time periods (e.g., mid-day)
- Position stationary noise sources as far away as possible from noise sensitive areas (areas where a quiet setting is a generally recognized feature or attribute, such as residential areas, parks, recreational and wilderness areas, and cultural and historical sites).
- Implement hearing protection and operations schedules to avoid exposure of construction workers to noise above NIOSH recommended exposure limits (73% of the time construction workers are exposed over the recommended exposure limits).
- Route trucks and other equipment/vehicle traffic away from neighborhoods, schools and daycare centers, senior centers and care centers, and recreation areas to minimize exposure to noise pollution
- Prohibit the use of truck engine brakes, unless in case of emergency.

Major Finding

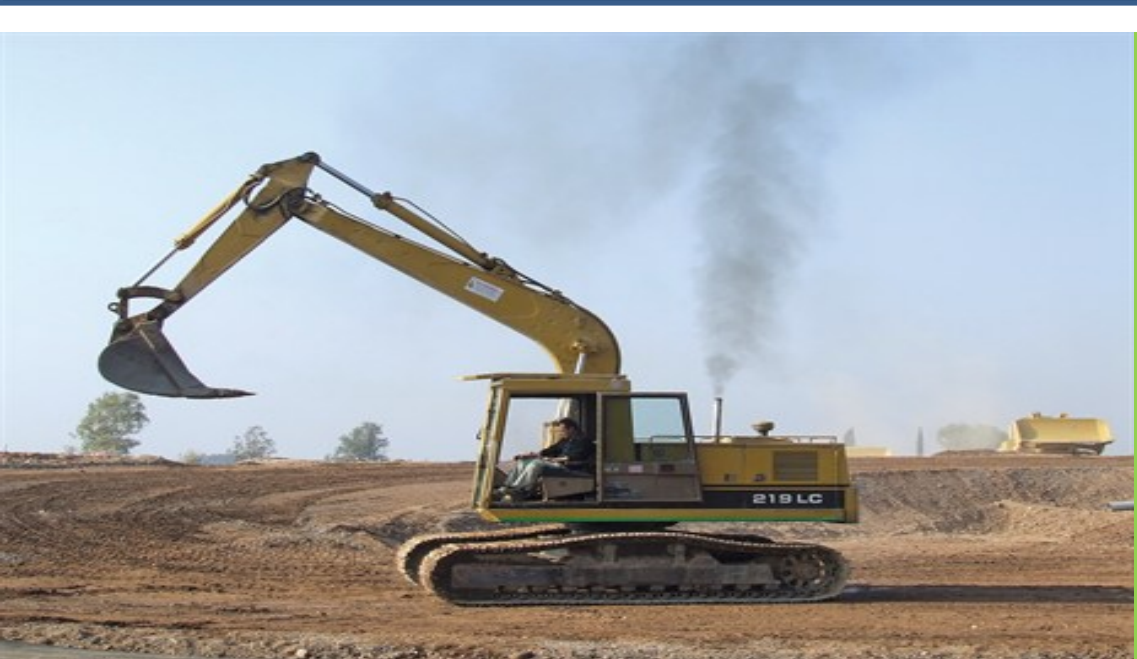
Nighttime construction activity is not anticipated with exception of hydraulic dredging; however, sound travels further at nighttime and nighttime noise and light pollution can cause sleep disturbance and other adverse health effects

- Avoid nighttime construction activity to the extent possible. During winter, sunset is between 4:30 and 7:30 pm (much earlier than 9:00 pm). When necessary, implement measures to minimize noise and light illumination impacts on nearby residences.
- Ensure any lighting used in the parks are intelligently-designed, low glare, efficient outdoor lighting fixtures that direct illumination toward the ground (rather than upward) and evaluate the potential for motion sensors on lighting in certain areas of the parks or parking lots to minimize over-illumination.

Community/Stakeholder Input



AIR QUALITY: HIA FINDINGS



What's the connection to health?

- Burning of diesel fuel in construction equipment and truck and vehicle traffic release pollutants such as PM2.5, particulates, ozone, and other toxics.
- Exposure to air pollutants and particulates can exacerbate asthma conditions and cause respiratory illness or disease, heat-related illness, chronic disease (such as cardiovascular disease, hypertension, stroke, and cancer), and even premature death.
- Children, the elderly, and those with pre-existing health conditions are more vulnerable to these health impacts.

Equipment

- Air pollution from equipment operation includes fumes, particulate matter, fuel combustion, pollutants, dust, and more.

Traffic

- Harmful air pollutants such as airborne particles, nitrogen dioxide, and carbon monoxide are found in high concentrations along busy roadways and can persist as much as 300 meters or more from the road edge. Low income and other socially-disadvantaged populations are often located disproportionately in this near-road zone.

Vegetation

- Trees, bushes, and greenery can influence levels of ambient air pollutants by absorbing pollutants and trapping airborne particulates on their leaves, and reduce surface and air temperatures through shading and evapotranspiration.

Air Quality Monitors

There is one **Air Quality Monitoring (AQS) Site** located at Coca-Cola Enterprises Inc.

Industry

The **C. Reiss Coal Company** operates a bulk solid material handling facility directly adjacent to Grassy Point to the west. Materials such as coal, limestone, petroleum coke, salt, and other bulk solid fuels and bulk material commodities are unloaded onto a 19.5-acre storage pad area until they are loaded for final shipment. Dust emissions are controlled on-site with dust suppressants. Water is used as the main suppressant when temps allow; others used in freezing conditions. Facility was last inspected on July 10, 2015 with no violation observed.

Other facilities in study area regulated for air emissions: **Minnesota Power Inc - Hibbard Renewable Energy Ctr**, and **Duluth Paper Mill, Hallett Dock Co - Dock 6**.

Literature-Based Evidence and Existing Conditions

Major Findings

- Equipment operation and truck and vehicle traffic will increase air pollution in the study area and have the potential of placing construction crews, residents, and recreational users at increased risk of exposure to air pollutants (fumes, particulate matter, fuel combustion pollutants, dust, etc.) and their adverse health impacts.
- The vegetative features created by the habitat restoration and park improvements will have the ability to filter air pollutants and particulates and reduce surface and air temperatures

Habitat Restoration and Park Improvements

Equipment Operation

Emissions measured from 18 different pieces of diesel-powered equipment used in earthmoving activities:

- Carbon dioxide – 2608-2672 g/L
- Hydrocarbons – 0.5-16.3 g/L
- Nitrogen oxide – 3.5-63.1 g/L
- Carbon monoxide – 0.4-54.3 g/L

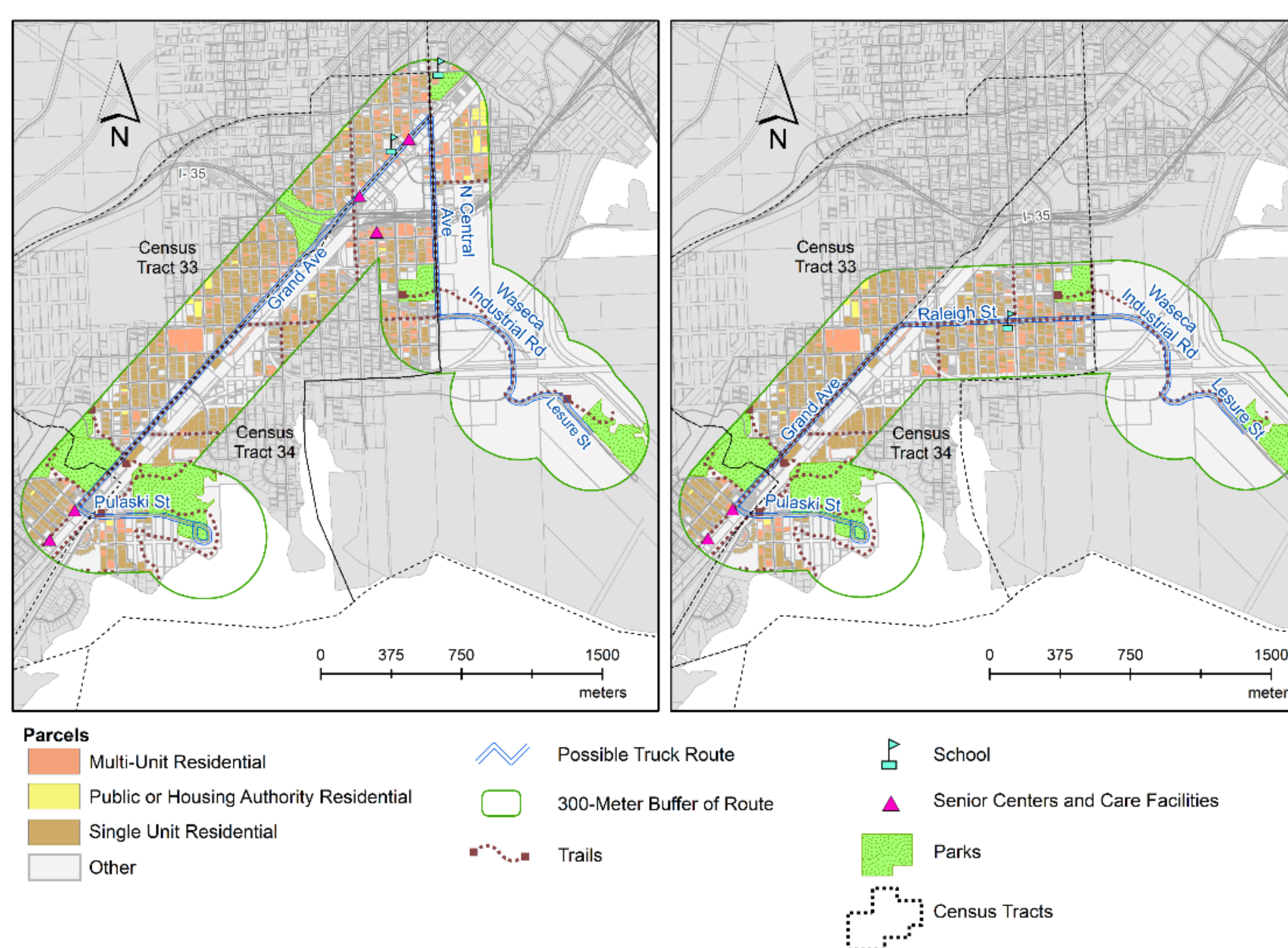
Equipment emissions during hydraulic dredging (Habitat Restoration) and earthwork activities at Kingsbury Bay during Park Improvements (e.g., building the beach and storm water retention pond) have the potential to impact residents and recreational users due to the close proximity of these activities to residences and Indian Point Campground.

Assume equipment needed at Grassy Point will be relatively light duty and will not be a major air pollutant contributor. Air pollution from equipment used for park maintenance could impact recreational users, but is expected to be minor.

Park Improvements

Vehicle Traffic

Assume vehicle traffic will increase in the vicinity of the parks, given improvements at the project sites and other park investment efforts currently planned as part of the St. Louis River Corridor Initiative, which will result in increased traffic-related air pollutants.



Habitat Restoration

Truck Traffic – Transport from Kingsbury Bay to Grassy Point

Residential parcels within 300-meters of possible truck routes
Grand to Central ★ – 1392 residences (of which 37 are public housing, housing authority or low income housing), 2 schools, 5 senior centers or care facilities, and numerous parks and trails

Grand to Raleigh – 745 residences (of which 20 are public housing, housing authority or low income housing), 1 school, 2 senior centers or care facilities, and numerous parks and trails

★ Also experience greater exposure to air pollution from I-35

% Tree Canopy within 26-m of possible truck routes

Grand to Central – 20.82%

Grand to Raleigh – 25.24%

Truck Traffic – Transport from Grassy Point

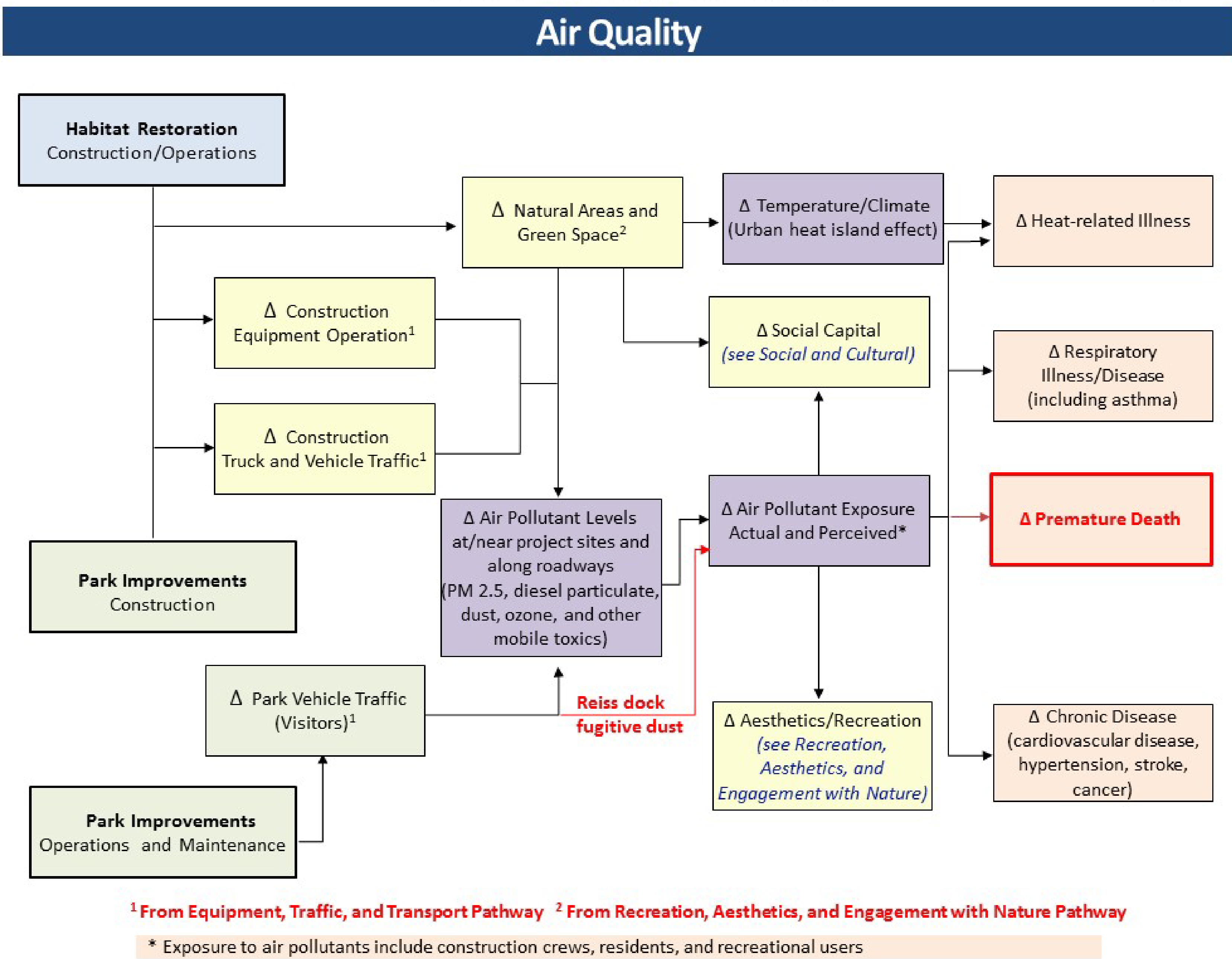
- Impacts to air quality expected from transport of material from Grassy Point, but unable to quantify population affected, because no details on routes were provided. A low to moderate number of individuals expected to be impacted depending on the transport route.



What's the connection to health?

- Burning of diesel fuel in construction equipment and truck and vehicle traffic release pollutants such as PM_{2.5}, particulates, ozone, and other toxics.
- Exposure to air pollutants and particulates can exacerbate asthma conditions and cause respiratory illness or disease, heat-related illness, chronic disease (such as cardiovascular disease, hypertension, stroke, and cancer), and even premature death.
- Children, the elderly, and those with pre-existing health conditions are more vulnerable to these health impacts.

Pathways Through Which Health Could Be Impacted



Health Impact Analysis

- The project is **highly likely** to increase equipment and truck and vehicle-related air pollution at and near the project sites and material transport routes in the short-term (during **Habitat Restoration** and **Park Improvements construction**).
- In the long-term (during **Park Improvements operation and maintenance**), it is **possible** there will be increased traffic and traffic-related air pollution at and around the sites given the improvements at these sites and other park investment efforts currently planned in the study area as part of the St. Louis River Corridor Initiative. However, the vegetative features created by the **Habitat Restoration** and **Park Improvements** will have the ability to filter air pollutants and particulates and reduce surface and air temperatures.
- Increased air pollution in the study area will **detract from health** because exposure to air pollutants and particulates can exacerbate asthma conditions and cause respiratory illness or disease, heat-related illness, chronic disease (such as cardiovascular disease, hypertension, stroke, and cancer), and premature death.
- Air pollution impacts will be experienced **disproportionately** by those living, working, going to school, or recreating at or near the project sites and material transport routes. Children, the elderly, and those with pre-existing health conditions are more **vulnerable** to these impacts.
- The **magnitude** of the population affected will depend greatly on the material transport route chosen, as well as the timing of earthwork activities at Kingsbury Bay and any increases in park visitor traffic.

Existing Conditions

Diesel PM environmental concentrations, human exposure estimates, air toxics health risk estimates, and asthma rates among adults are higher in the Census tracts in which the sites are located when compared to estimates at the city, county, state, or national level.

Air Toxics Exposure and Risk	Tract 33	Tract 34	St. Louis County	MN
Environmental Concentration Estimates				
Outdoor Air - Diesel PM (µg/m ³)	1.3	1.1	0.3	0.4
Human Exposure Estimates				
Outdoor Air - Diesel PM (µg/m ³ annual avg in human breathing Zone)	0.6	0.5	0.2	0.4
Health Risk Estimates				
Cumulative Air Toxics Cancer Risk ¹ (risk per one million persons)	35.5	33.8	27.6	35.6
Cumulative Air Toxics Non-Cancer Respiratory Risk (Hazard Quotient ²)	1.98	1.73	1.03	2.20
Outdoor Air - Diesel PM Non-Cancer Respiratory Risk (Hazard Quotient ²)	0.12	0.11	0.04	0.08

Asthma	Tract 33	Tract 34	City	US
Current Asthma among adults aged 18 or older	10.4	10.5	9.4	8.9



AIR QUALITY: PRELIMINARY HIA RECOMMENDATIONS



What’s the connection to health?

- Burning of diesel fuel in construction equipment and truck and vehicle traffic release pollutants such as PM2.5, particulates, ozone, and other toxics.
- Exposure to air pollutants and particulates can exacerbate asthma conditions and cause respiratory illness or disease, heat-related illness, chronic disease (such as cardiovascular disease, hypertension, stroke, and cancer), and even premature death.
- Children, the elderly, and those with pre-existing health conditions are more vulnerable to these health impacts.

Major Finding

Equipment operation and truck and vehicle traffic will increase air pollution in the study area and have the potential of placing construction crews, residents, and recreational users at increased risk of exposure to air pollutants (fumes, particulate matter, fuel combustion pollutants, dust, etc.) and their adverse health impacts.

- Clearly communicate the project, its duration, and expected air pollution levels to residents, schools and daycare centers, senior centers and care facilities, businesses, and recreational users in the project area and along the transport route
- Provide a means for residents and other affected populations to provide feedback and/or lodge complaints about excess air impacts
- Include mitigation specifications in the contract (reduced idling and requirements for equipment fitted with catalysts and filters) and incentives for contractors with idle reduction policies, and newer or retrofitted equipment
- Route trucks and other equipment/vehicle traffic away from neighborhoods, schools, daycare centers, senior centers and care facilities, and recreation areas to minimize exposure to air pollution
- Consider the use of rail or barge to transport sediment between the two sites, as these routes would greatly minimize traffic-related air pollutants in the residential areas.
- Implement fugitive dust mitigation measures, including covering transport vehicles, watering access routes, and covering exposed soils/stockpiles

Major Finding

The vegetative features created by the habitat restoration and park improvements will have the ability to filter air pollutants and particulates and reduce surface and air temperatures.

- Select native trees and plants for planting. Trees have the greatest potential to filter air pollutants, followed by shrubs, and then grasses
- Select trees that have tall, broad canopies for increased shading and place in areas where people may congregate

Community/Stakeholder Input



What's the connection to health?

- Restoration of damaged habitats and improvements to these landscapes can provide concomitant benefits to the environment and human health.
- Restoration and improvements often shape community attitudes and behaviors towards crime and safety.
- Negative perceptions of green spaces can often translate directly to poorer health outcomes, such as decreased physical activity, poorer mental health, and increased risk of cardiovascular and chronic disease.

Community Perceptions

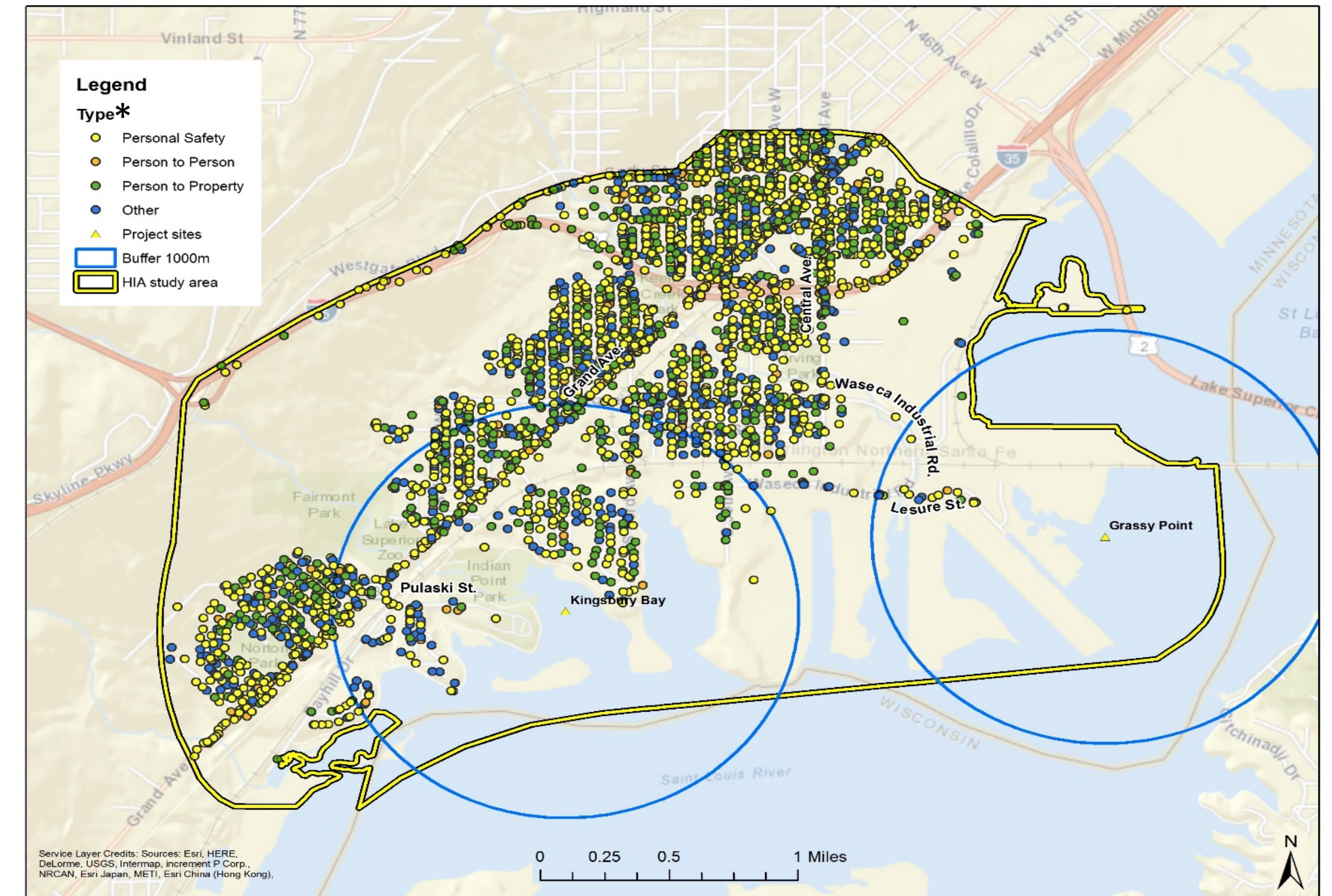
- When asked about current uses of both sites, in addition to the opportunities for birdwatching and walking, community members (especially the elderly), did not feel safe walking through the number of small under-road tunnels and neglected walking paths to get to Grassy Point, cited illicit drug use, and overall, expressed a sense of fear and lack of safety.
- Habitat degradation is extensive within the project sites and visible along their existing, multi-purpose trails.

Current Crime Rate (2010-2017)

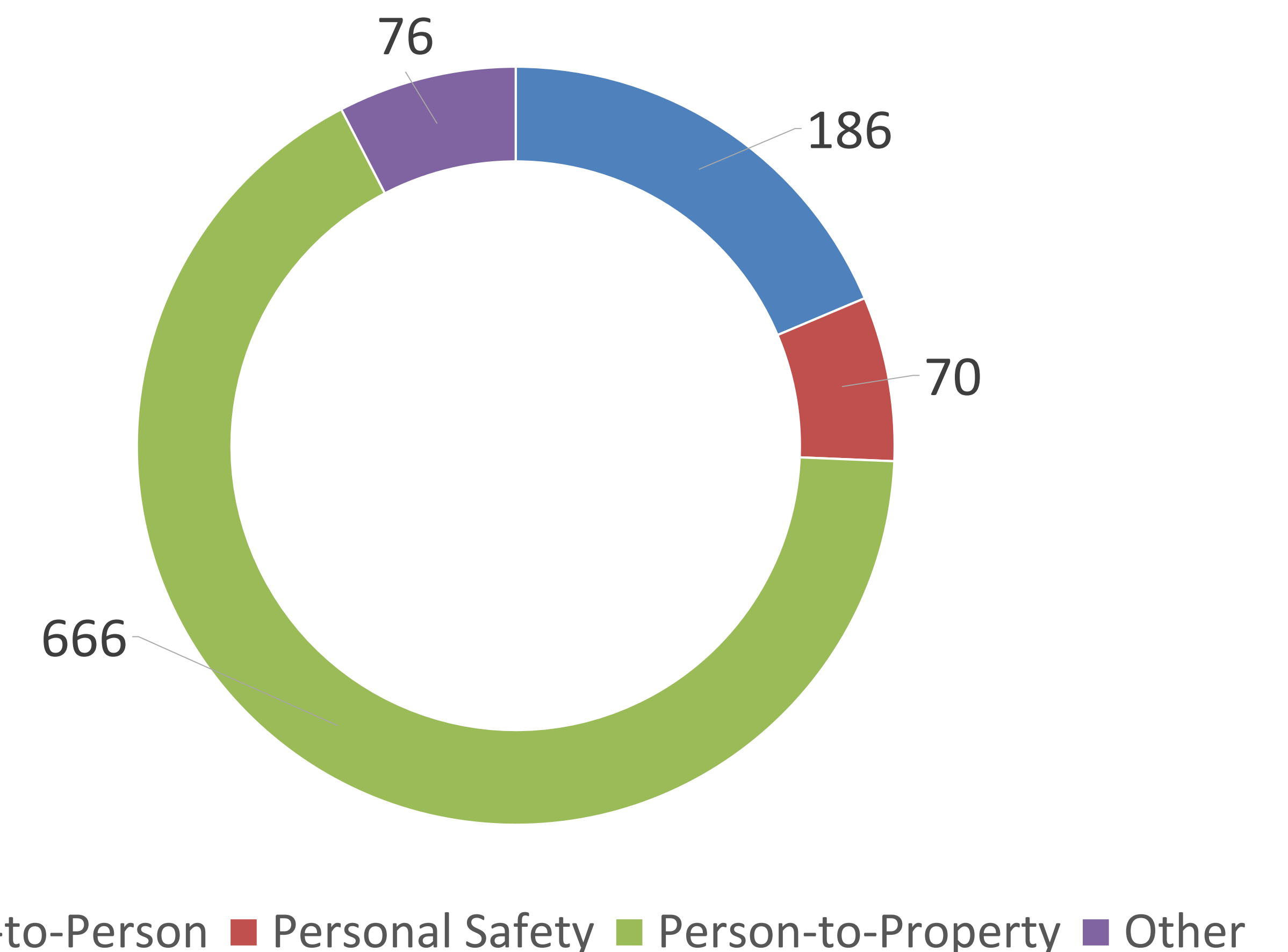
- From 2010-2017, there were 7,919 reported crime incidents in the study area (Census tracts 33, 34 and 36). **The crime rate was calculated as 171.3 average cases for every 1,000 people in the HIA study area.** For reference, the crime rate for the City of Duluth as a whole is roughly 121 cases per 1,000.
- From 2010-2017, there were 998 reported crime incidents within 1,000 meters of the project sites. Among these incidents, the majority of crimes were around the Kingsbury Bay project site and fewer around Grassy Point.
- There were fewer violent crime (person-to-person) and property crime (person-to-property) within the buffer zones.

Walkability and Bikeability

- West Duluth has a Walk Score of 29/100 (car dependent, most errands require a car) and a Transit Score of 36/100 (few nearby public transportation options). Irving has a Walk Score of 35/100 (car dependent, most errands require a car) and a Transit Score of 30/100 (few nearby public transportation options).
- A portion of the Grassy Point Trail has an on-street segment along Waseca Industrial Road that has paved markings and signage for a designated bike lane. However, the bike routes along Raleigh Street and Central Avenue lack painted bike lane markings or signage, which discourages users from its intended purpose.
- There is a lack of a direct bicycle connection to the Willard Munger State Trail. Currently, bicyclists from the Irving neighborhood would need to travel on-road along Grand Avenue to access the State Trail which may pose issues given the high traffic volumes and speeds along Grand Avenue.



Types of Crime* within 1,000-meter Buffer of Project Sites



*The crime data was coded into four categories: non-violent crime related to personal safety (i.e. drug incidents, suspicious activities, etc.); person-to-person crime involving physical injury (i.e. assault, physical harm to others, etc.); person-to-property (i.e. burglary, vandalism, etc.); and other (i.e. animal disturbances).

Literature-Based Evidence and Existing Conditions

Major Findings

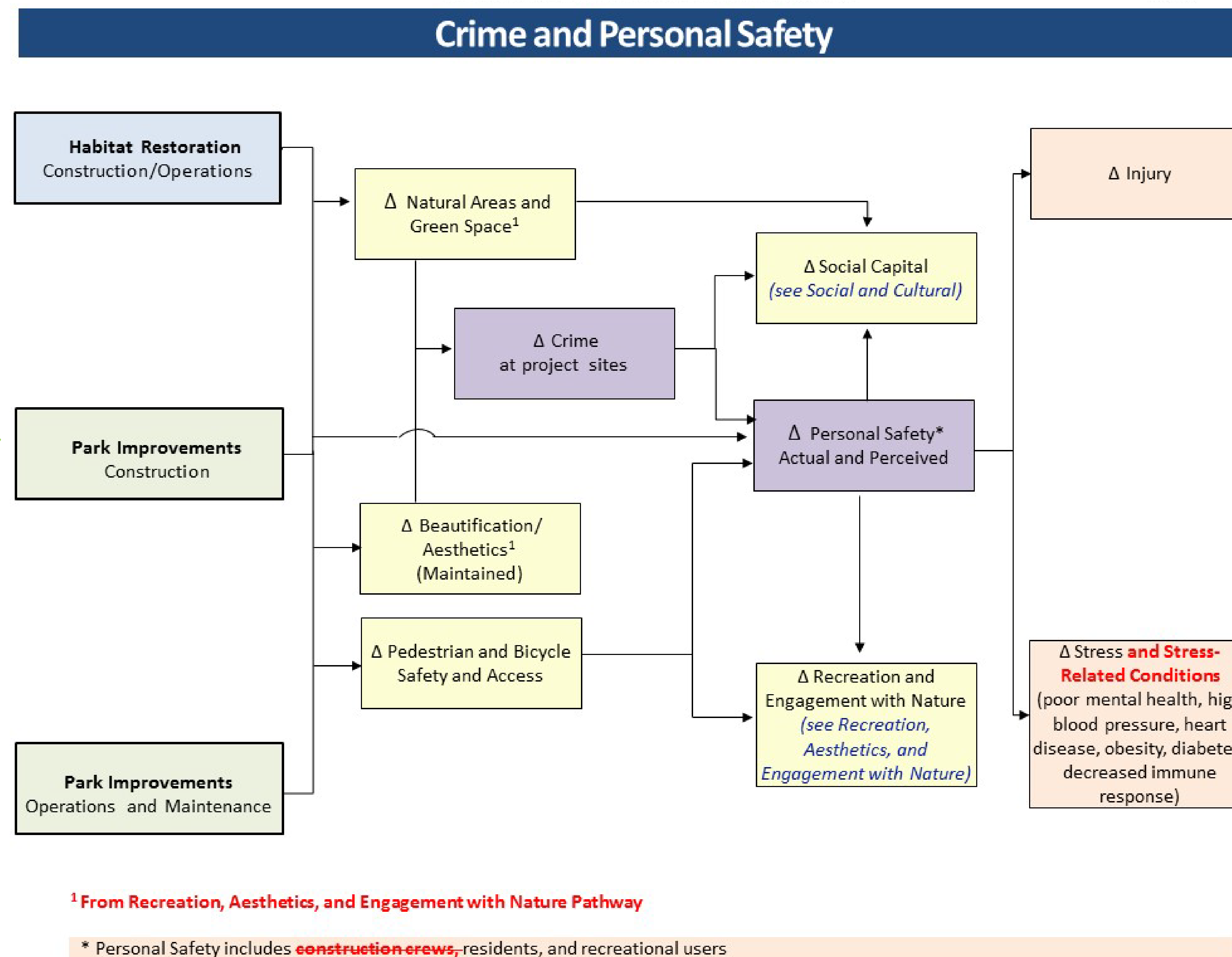
- Design and maintenance of green spaces and natural elements can facilitate a reduction in crime and improvements in perceived safety and/or security.
- Improvements to aesthetics and existing infrastructure at Grassy Point will improve personal safety and perception of safety and/or security.
- The new parks and amenities need to be safely accessible by pedestrians and bicyclists, and access routes should be Americans with Disability Act (ADA)-compliant.



What's the connection to health?

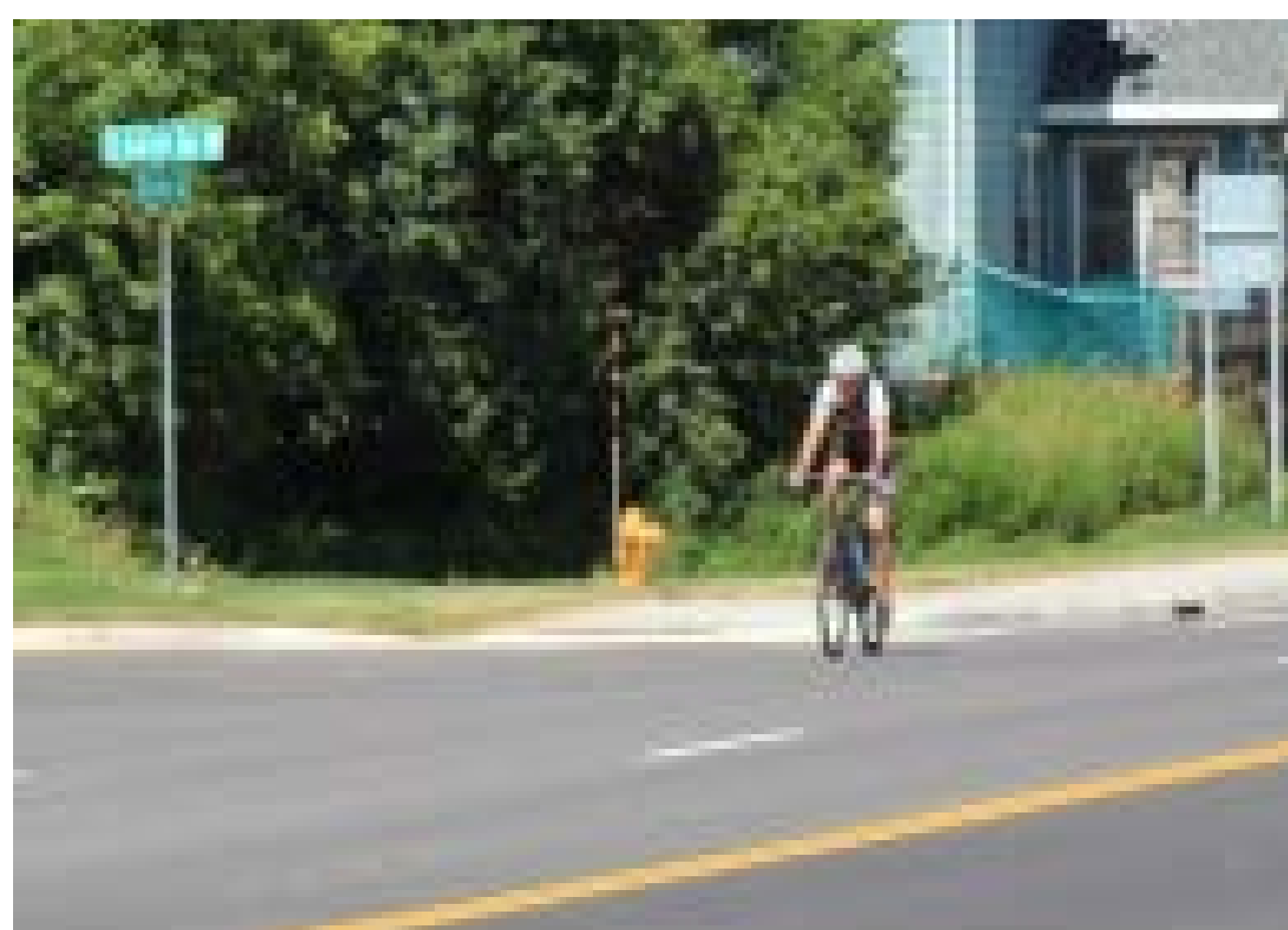
- Restoration of damaged habitats and improvements to these landscapes can provide concomitant benefits to the environment and human health.
- Restoration and improvements often shape community attitudes and behaviors towards crime and safety.
- Negative perceptions of green spaces can often translate directly to poorer health outcomes, such as decreased physical activity, poorer mental health, and increased risk of cardiovascular and chronic disease.

Pathways Through Which Health Could Be Impacted



Health Impact Analysis

- Ecological restoration of the coastal wetlands will **benefit health** because it will improve attitudes and behaviors, and help reduce the risk of crime-related injury and stress. Improving and maintaining park amenities will also **benefit health** because it will support healthy attitudes, behaviors, and perceptions of the parks.
- It is likely that the improved aesthetics and green space will result in higher enjoyment of surroundings, improved safety and sense of well-being, and reduced crime. It is **likely** that increasing public access points, maintenance of park amenities, and availability of lighting on the trails will enhance perceived security and reduce the risk of crime-related injury, stress, and stress-related illness.
- Changes in crime and personal safety will only affect a **moderate number** of people due to the availability of public access points and size of residential zones surrounding the sites. Improvements to public perceptions of crime and safety at the sites will affect a **high number**, if the trails are well-maintained and connected to the larger trail network.
- Improving crime and personal safety will **benefit vulnerable populations** such as youth, the elderly, and individuals in poor physical health.
- The health impacts from crime and decreased personal safety can be **minor to moderate**, depending on the nature of the crime.
- Building positive perceptions on the safety of the sites will likely take a **long time** to take effect and could be **easily reversed** if conditions are allowed to deteriorate





CRIME & SAFETY: PRELIMINARY HIA RECOMMENDATIONS



What's the connection to health?

- Restoration of damaged habitats and improvements to these landscapes can provide concomitant benefits to the environment and human health.
- Restoration and improvements often shape community attitudes and behaviors towards crime and safety.
- Negative perceptions of green spaces can often translate directly to poorer health outcomes, such as decreased physical activity, poorer mental health, and increased risk of cardiovascular and chronic disease.

Major Finding

- Design and maintenance of green spaces and natural elements can facilitate a reduction in crime and improvements in perceived safety and/or security.
- Improvements to aesthetics and existing infrastructure at Grassy Point will improve personal safety and perception of safety and/or security

- Communicate the improvements being made to Grassy Point to alleviate existing perceptions of crime and personal safety issues and encourage utilization of the space post-restoration
- Follow Crime Prevention through Environmental Design (CPTED) guidelines, including lighting and planting configurations. Where possible, reduce dense planting and shrubs around narrow pedestrian paths
- Construction activities that alter existing routes and access points should have clear signs and barriers to minimize the potential for trespassers
- Lighting should be improved to reduce crime and the perception of risk at these sites
- Provide clear signage and maps for pedestrian and bicyclist access to the parks. Important elements of access and design include effective wayfinding systems such as the use of landmarks, signage, distance to destination markers, and interest points to assist in navigating the routes easily
- After improvements of parks begin, increase enforcement or police presence to “set the tone.” Communicate to police department that their presence is important in the beginning to deter bad behavior and reduce crime. This is especially true at Grassy Point where it is more secluded and thereby, necessitates more formal surveillance

Major Finding

The new parks and amenities need to be safely accessible by pedestrians and bicyclists, and access routes should be Americans with Disability Act (ADA)-compliant.

- Consider using NHTSA's Walkability and Bikeability Checklist to inform design of trails within the parks and leading to the parks
- Improve pedestrian and bicycle access to Grassy Point from the Irving neighborhood. Current access is by footpath or walking/biking along Waseca Industrial Road
- Make trails and water access ADA-compliant
- Implement traffic calming measures (such as speed humps, raised crosswalks/intersections, traffic circles, medians, curb extensions or bump-outs, and signage or pavement markings) and bikeway improvements such as clear painted bike lane markings and signage to already designated bike routes

Community/Stakeholder Input



RECREATION, AESTHETICS, AND ENGAGEMENT WITH NATURE: HIA FINDINGS



Literature-Based Evidence and Existing Conditions

Major Findings

What’s the connection to health?

- Access to outdoor recreation areas is an important component to individual and community mental and physical well-being. Parks provide opportunities for physical activity, which is known to reduce stress, cardiovascular disease, obesity, and other chronic disease. Activities such as fishing can further impact health through consumption of the catch.
- Parks and aesthetically pleasant green spaces also promote engagement with nature, which has been shown to reduce stress and improve mental and overall health and well-being. The value of these spaces can be a product of ongoing contact with them.

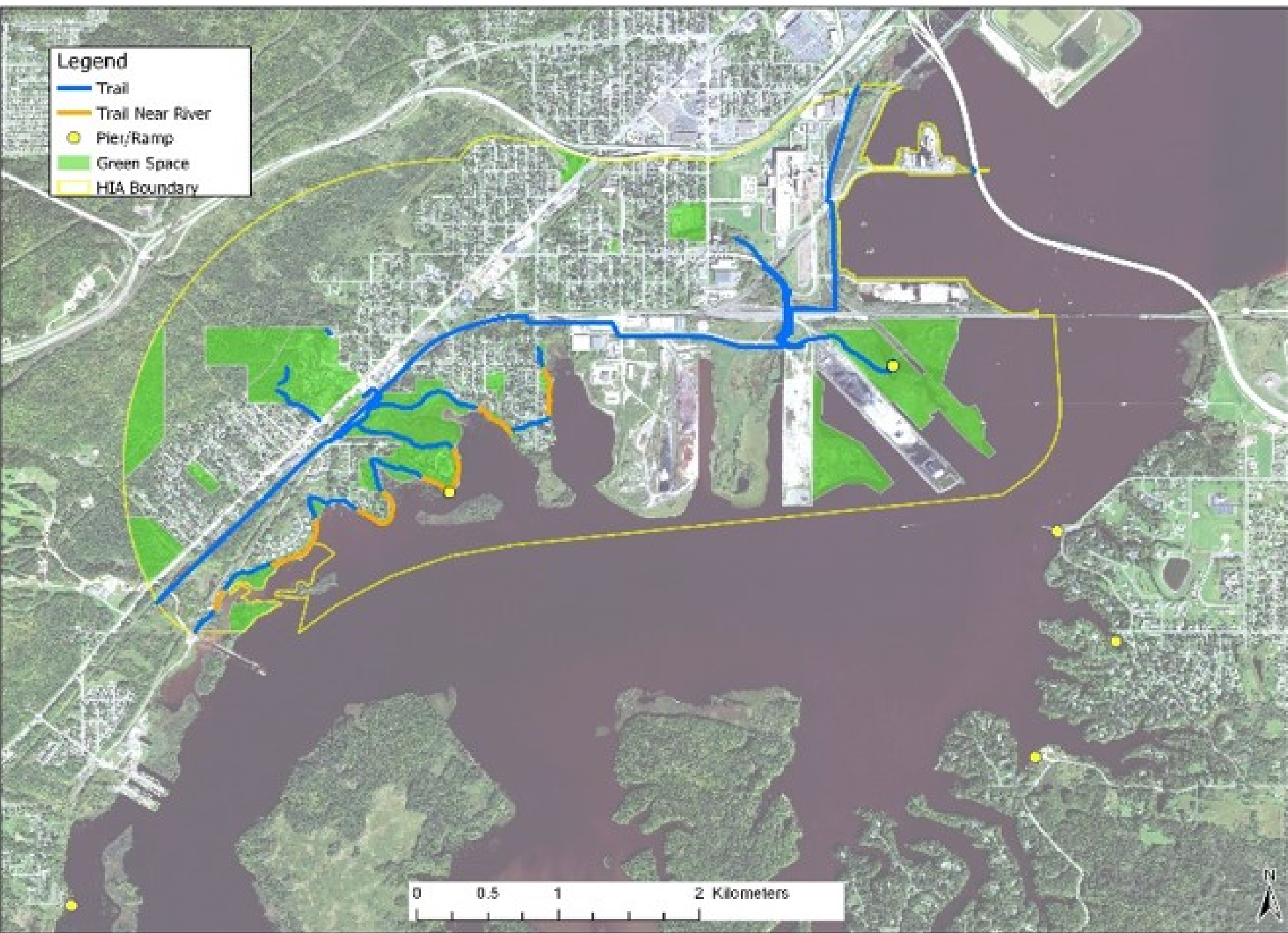
Aesthetics and Engagement with Nature

- Nature is good for us
 - Beautiful nature may promote pro-social behavior
 - Facilitate social interactions
- Charismatic species and biodiversity may contribute to ecosystem services, such as engagement with nature, place identity, and therapeutic value

Recreation

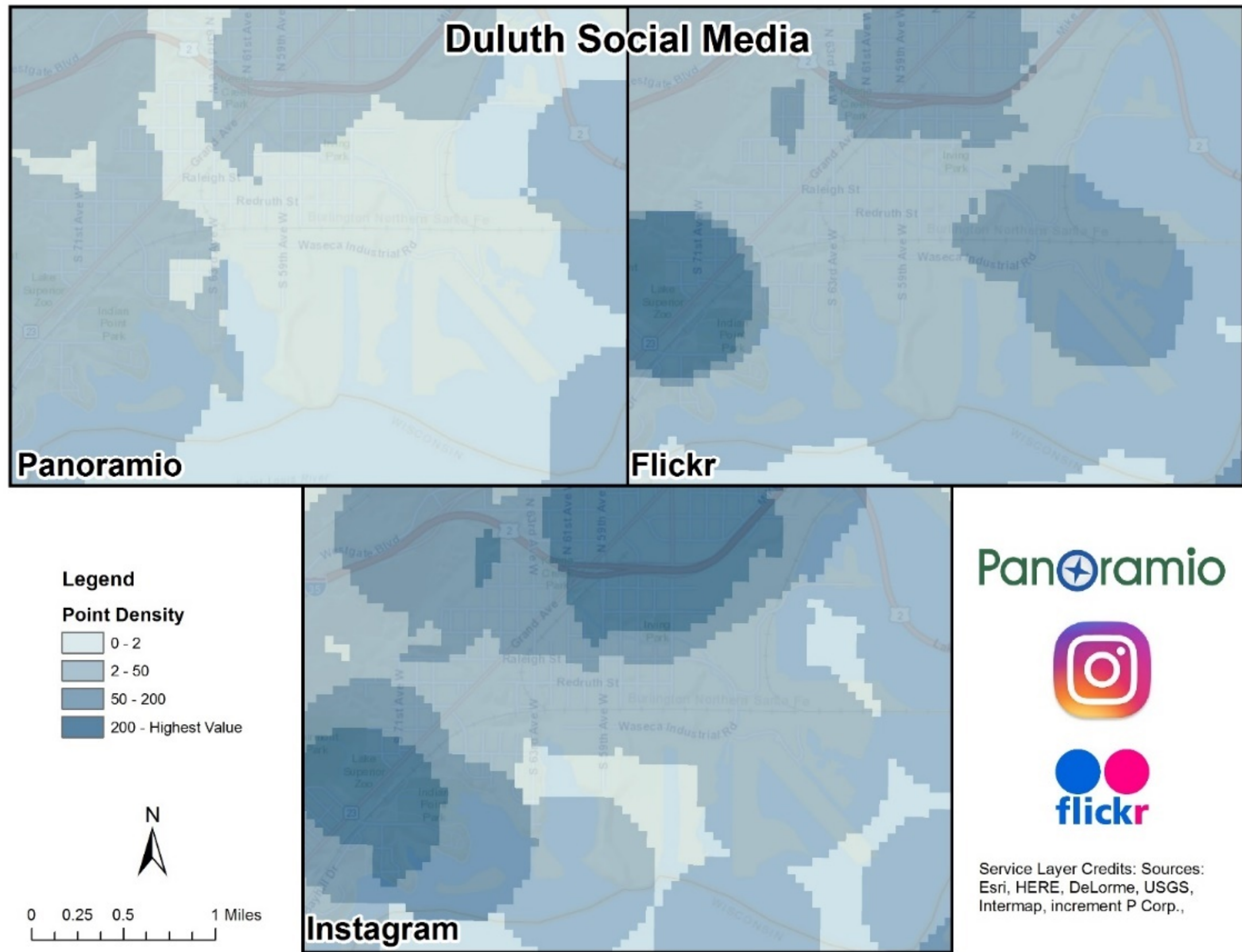
- Proximity to parks has been shown to increase physical activity, but factors like crime or over-use may mitigate the positive effects of park proximity
 - Other park characteristics that are important for park use including safety, maintenance, amenities, and aesthetics
 - Urban blue spaces contribute to human wellbeing and the act of birdwatching can be important for connecting people to nature and place, as well as creating a sense of identity
 - For some groups, fishing is a social activity, but lack of time, gear, knowledge or skills, water access (or inadequate facilities), or feelings of safety may influence recreational fishing choices
 - Volunteers can contribute to park management and supplement shrinking resources
-
- Well-maintained spaces with diverse recreational options will enhance opportunities for recreation and overall health. *In spite of perceived condition, the recreational spaces around Grassy Point and Kingsbury Bay are well utilized for hiking, birding, and camping. Partnerships with volunteer organizations may help support park maintenance.*
 - Recreational fishing improves nutrition and overall health. Different populations fish for different reasons: subsistence, recreation, and as a social activity. *However, there are currently limited opportunities for shore and boat-based fishing in the study area.*

Existing Conditions: Amount of Greenspace



- In the HIA study area:
- 235 acres in 9 parks and special use areas
 - 5 miles of unpaved walking trails
 - Many miles of paved or on-street trails

Existing Conditions: Park Use Social Media Analysis



Park use hotspots: Zoo, Grassy Point (birding), Keene Creek Park (dog park), Superior Hiking Trail, Burlington Northern Tracks

Both Grassy Point and Indian Point Campground, like most parks in the HIA study area, have maintenance challenges and more limited opportunities for recreation (e.g., Indian Point Campground is a special use area and not open for public recreation).

Changes in swimming and fishing access	Impact on existing resources
New swimming beach at the mouth of Kingsbury Bay	Swimming beach will be located along the Western Waterfront Trail and Indian Point Campground, which may impact the current use of or access to Indian Point Campground
Four new shore fishing locations at Grassy Point (one with deep water access)	Additional fishing opportunities at Grassy Point, boardwalks, and trails will facilitate access to Big Island and the pier. Increased depth at Kingsbury Bay will improve winter fishing
The existing pier at Kingsbury Bay will move inside the bay on the other side of Indian Point Campground	The current fishing pier will move from the western edge of Indian Point Campground to the tip of the point
Net gain of 12 acres of kayak and canoe access	Removing the delta in Kingsbury Bay and deepening channels at Grassy Point will create human-powered boat access and additional launches
Net gain of 46 acres of recreational boating access	Removing the delta in Kingsbury Bay and deepening channels at Grassy Point will create deeper water for other types of boats

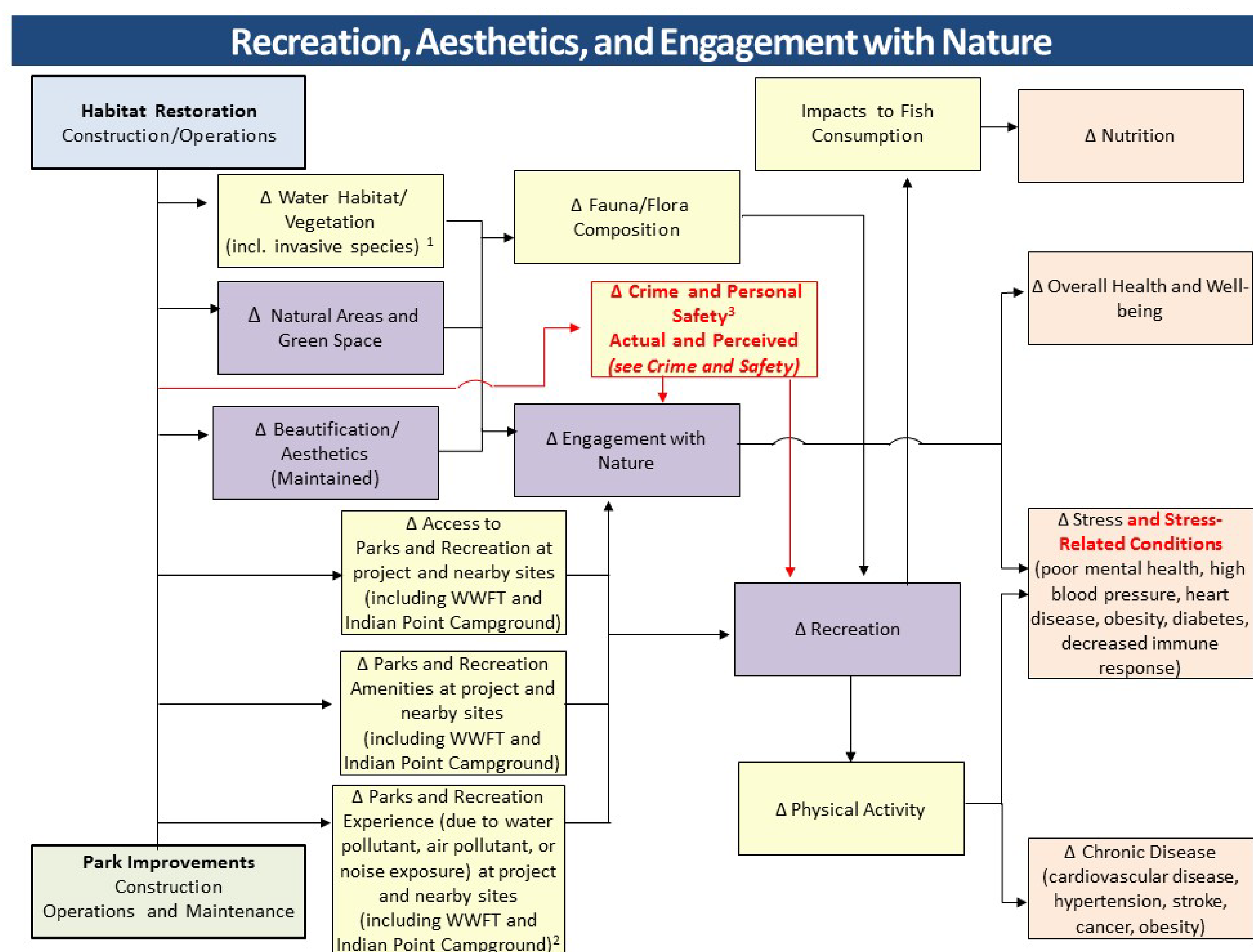
RECREATION, AESTHETICS, AND ENGAGEMENT WITH NATURE: HIA FINDINGS



What's the connection to health?

- Access to outdoor recreation areas is an important component to individual and community mental and physical well-being. Parks provide opportunities for physical activity, which is known to reduce stress, cardiovascular disease, obesity, and other chronic disease. Activities such as fishing can further impact health through consumption of the catch.
- Parks and aesthetically pleasant green spaces also promote engagement with nature, which has been shown to reduce stress and improve mental and overall health and well-being. The value of these spaces can be a product of ongoing contact with them.

Pathways Through Which Health Could Be Impacted



¹ From Water Habitat and Quality Pathway ² From Water Habitat and Quality, Air Quality and Noise Pathways ³ From Crime and Personal Safety Pathway



"The City already doesn't take care of the Western parks that it has and now they are going to add two more?"

Health Impact Analysis

- It is **highly likely** that overall health and well-being will be **negatively impacted** during **Habitat Restoration and Park Improvements construction** because there will be fewer opportunities for physical activity. The impact will be **moderate** because the public will be impacted in their ability to use the space, be affected by recreational amenity changes, and by the construction that will be occurring through the surrounding neighborhood.
- It is **highly likely** that stress will be increased during **Habitat Restoration and Park Improvements construction** for two reasons: because of disruption during construction and because landscape change may impact place identity and attachment, including reduced opportunities for birding at both Kingsbury Bay and Grassy Point.
- It is **highly likely** that the **Park Improvements operations and maintenance** will **benefit overall health and wellbeing**, as it will increase the public's ability to utilize the green space for recreation, aesthetics appreciation, or engagement with nature because increased amounts of green space will provide additional opportunities for physical activity.
- The impacts on stress and overall health and well-being in the long-term (**post Habitat Restoration and Park Improvements**) will positive as biodiversity increases and the landscape becomes more familiar. The negative effects of stress will be felt **disproportionately** on those who are most attached to the current sites because there is high value placed on the existing amenities and changing them could cause distress. Furthermore, residents fear duplication of services and the subsequent neglect of existing parks.
- It is **somewhat likely** the projects will have a positive impact on nutrition as a result of improved natural resources and access, **benefitting health**. The impact will be **moderate** because of the diversity of the public that will benefit from the restoration and park amenities. The groups that are **most likely to be impacted** include those who participate or depend on subsistence fishing for fulfilling their nutritional needs .
- Nutrition will likely be **positively impacted** by an increased opportunity for fishing because of more fish habitat.



RECREATION, AESTHETICS, AND ENGAGEMENT WITH NATURE: HIA FINDINGS



What’s the connection to health?

- Access to outdoor recreation areas is an important component to individual and community mental and physical well-being. Parks provide opportunities for physical activity, which is known to reduce stress, cardiovascular disease, obesity, and other chronic disease. Activities such as fishing can further impact health through consumption of the catch.
- Parks and aesthetically pleasant green spaces also promote engagement with nature, which has been shown to reduce stress and improve mental and overall health and well-being. The value of these spaces can be a product of ongoing contact with them.

Major Findings

Well-maintained spaces with diverse recreational options will enhance opportunities for recreation and overall health. *In spite of perceived condition, the recreational spaces around Grassy Point and Kingsbury Bay are well utilized for hiking, birding and camping.*

Recreational fishing improves nutrition and overall health. Different populations fish for different reasons: subsistence, recreation, and as a social activity. *However, there are currently limited opportunities for shore and boat-based fishing in the study area.*

- Recommend that the City solicit deliberative community and stakeholder engagement and examine the pathways through which the park efforts could impact health to help inform the Park Improvements design and implementation
- Offer diverse opportunities for recreation at both sites, including publically-accessible gathering spaces, fishing piers, birding platforms, access to the water for water-based recreation, and trails, taking into account maintenance requirements of installed features
- Preserve and enhance fishing opportunities, with more formal locations (e.g., piers) and social gathering opportunities adjacent to those locations. The creation of Big Island at Grassy Point would provide an opportunity for a fishing pier and access to a fishery with more biodiversity; a bridge would be needed to access Big Island
- Create a higher upland area on Big Island to form a more sheltered bay, providing safer harbor for kayaks and canoes
- All swimming areas should include measures to enhance safety and minimize potential for user conflict. Measures should include signage about the availability of lifeguards and current water quality status. Buoys should separate swimming and boating areas
- In advance of construction and in all project phases, clearly communicate to recreational users through multiple media sources disruptions to the Western Waterfront Trail and walkability and accessibility to both project sites
- Provide additional parking to increase access to and utilization of the restored Kingsbury Bay and Grassy Point sites
- Perform wetland restoration at the mouth of Kingsbury Creek to preserve the cold water habitat for trout and provide deeper water for kayak and canoe access
- Create opportunities for social gatherings in close proximity to the additional planned fishing piers, especially at Grassy Point, similar to improvements at Chambers Grove Park
- Because recreational amenities are enjoyed by residents, any plans for future changes should include recognition of the value placed by residents who use the resources frequently
- Preserve and enhance current birding locations, as well as enhance access to newly created birding habitat. Upland plant communities should be restored to maximize potential for pollinator, including bird, habitat
- Recognizing the value placed on the existing resources, any changes to park amenities could add new features to existing parks and green spaces

Major Finding

Well-maintained spaces with diverse recreational options will enhance opportunities for recreation and overall health. *Partnerships with volunteer organizations may help support park maintenance.*

- Research and develop co-management models, where neighborhood organizations have more formal responsibility for park management. Co-management arrangements could empower the neighborhood and ease the maintenance burden on the City of Duluth
- Explore partnerships with organizations to facilitate access, education, and equipment sharing, additional recreational opportunities and leadership capacity building for underrepresented communities

Community/Stakeholder Input

Deliberative engagement “makes a difference, is transparent, has integrity, is tailored to the circumstances, involves the right number and types of people, treats participants with respect, gives priority to participant’s discussions, is reviewed and evaluated to improve practice, and keeps participants fully informed.”



SOCIAL AND CULTURAL: HIA FINDINGS



What's the connection to health?

- Parks and green spaces provide space for socialization, which builds social capital and cohesion (the formation of social bonds and connections); spiritual reflection; and cultural resource use.
- The ability of the public to enjoy parks and green spaces in these capacities has been shown to improve health and well-being and reduce stress.
- The opportunity for public input during the planning of these spaces can also build social capital and lead to improved community health.

Social Cohesion

In order for communities to have social cohesion they initially need to create social capital, by building networks and relationships between people and places. Access to green space can influence social cohesion in communities by improving their ability to build social capital, through community activities such as neighborhood parties, game competitions, and public art productions and displays.

Access to Natural Space for Spiritual Reflection

An increase in access to natural space for spiritual reflection can positively impact overall health and well-being. Studies have shown that a person who holds spiritual beliefs and is able to practice their spirituality has positive overall health and well-being.

Cultural Resources (Wild Rice, Medicinal Plants, Indian Point Campground)

Cultural or historical amenities are important elements in community well-being and development. In some studies, cultural amenities translate as arts and culture in urban areas or contribute to a sense of place.

Additional health benefits of access to green space

- Providing the opportunity for increased physical activity and therefore reducing stress and increasing mental well-being
- Increasing a sense of community
- Strengthening neighborhood social ties
- Decreasing crime and fear
- Increasing sensory stimulation, creativity and excitement about daily living
- Assisting in mental fatigue recovery
- Increasing the ability to cope with life adversity

Literature-Based Evidence and Existing Conditions

Major Findings

- Parks are places of social and cultural value and sites for spiritual reflection. Social cohesion, spiritual reflection, and the ability to participate in culturally-significant behavior are all positively correlated with health. As part of the St. Louis River, this place has special significance to the Anishinaabe people. These aspects should be considered in the development of the Habitat Restoration and Park Improvements plans.
- Spiritual reflection, while significant, may be challenging to address because of the urban nature of the parks, but it should not be minimized or ignored in the development of the Habitat Restoration and Park Improvements plans.
- Public use of the green space for cultural resources will be increased as a result of the restored habitat, including wild rice production and restoration of viable populations of medicinal plants.

Habitat Restoration and Park Improvements

Access to Natural Space for Spiritual Reflection

Construction during Habitat Restoration and Park Improvements may limit the public's access to natural space for spiritual reflection because the sites will be closed to the public at the time. As noted in other pathways, the construction period will also cause traffic, noise, and air pollution.

The study area is located in an industrial area, which may affect the area's potential as a quiet space for spiritual reflection and social interaction.

Park Improvements

Social Cohesion

The restored environment will promote greater enjoyment of the natural spaces which is evidenced to contribute to improved health for the public. A more pleasant environment increases the public's interest in utilizing the space, and the restored habitat will promote use and improved health through increased use.



Habitat Restoration

Cultural Resources (Wild Rice, Medicinal Plants, Indian Point Campground)

At present, the industrial pollution (woody debris) affect the ecosystem's ability to support cultural natural resources such as wild rice. Once construction is complete, the natural space will provide an opportunity for the public to enjoy the area as a site for social interaction, through recreation and social events; for spiritual reflection; and for cultural resources, such as the restoration of wild rice production and viable populations of medicinal plants.

Public use of the green space for cultural resources will be increased as a result of the restored habitat. Utilizing local species, including species that are culturally significant and medicinally used, will increase the cultural benefit of these environments.

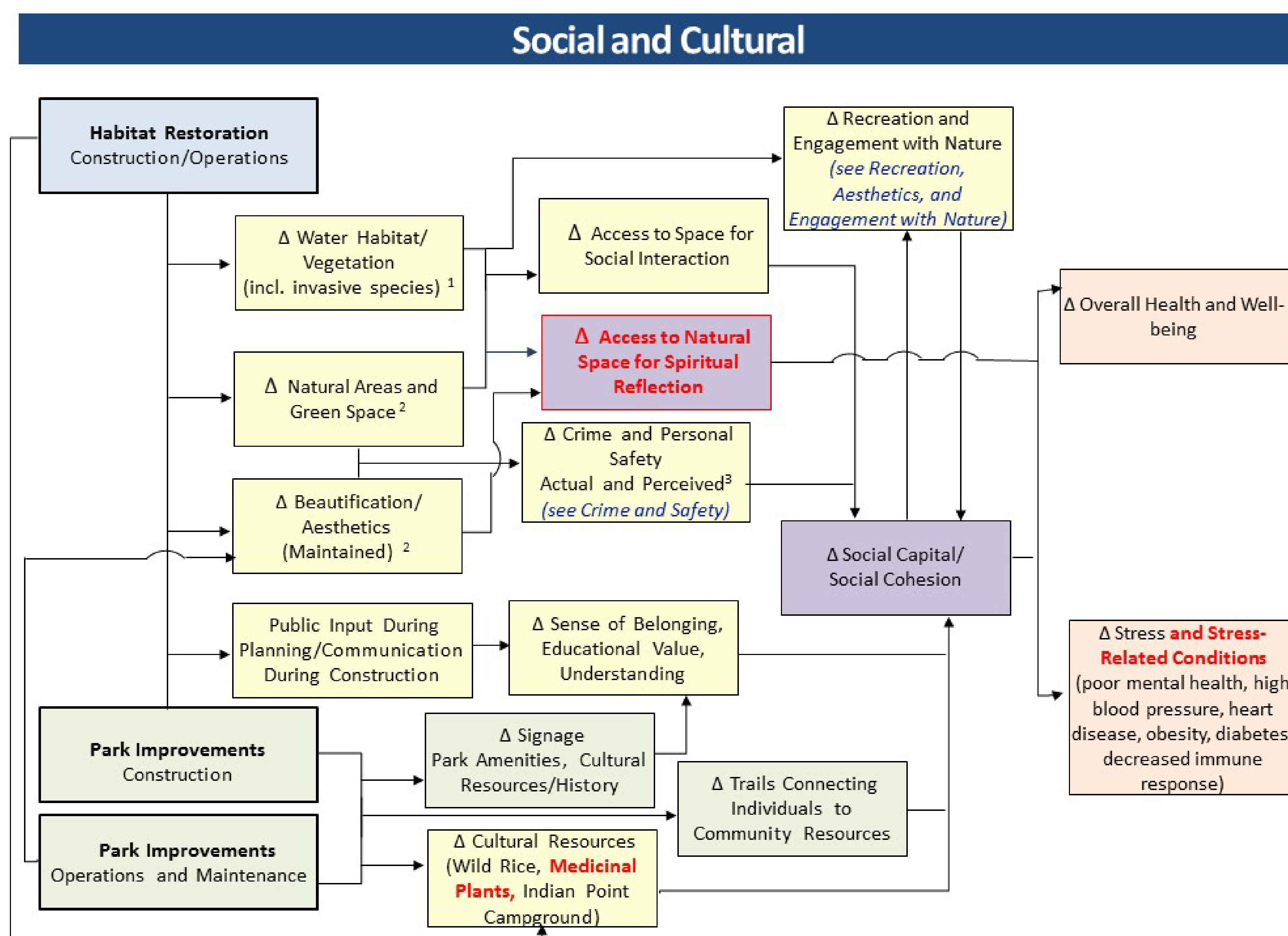
SOCIAL AND CULTURAL: POTENTIAL IMPACTS TO HEALTH



What's the connection to health?

- Parks and green spaces provide space for socialization, which builds social capital and cohesion (the formation of social bonds and connections); spiritual reflection; and cultural resource use.
- The ability of the public to enjoy parks and green spaces in these capacities has been shown to improve health and well-being and reduce stress.
- The opportunity for public input during the planning of these spaces can also build social capital and lead to improved community health.

Pathways Through Which Health Could Be Impacted



¹ From Water Habitat and Quality Pathway ² From Recreation, Aesthetics, and Engagement with Nature Pathway ³ From Crime and Personal Safety Pathway

Health Impact Analysis

- **Habitat Restoration** and **Park Improvements construction** will **temporarily and minimally detract from health** by limiting access to these green spaces for social and cultural use.
- Once **Habitat Restoration** and **Park Improvements construction** is complete, the natural space will **benefit health** by providing an opportunity for the public to enjoy the area as a site for:
 - **social interaction**, through recreation and social events;
 - **spiritual reflection**, and
 - **cultural resources**, such as the restoration of wild rice production and viable populations of medicinal plants.
- By preserving, promoting, and respecting the cultural and religious significance of these natural spaces and their species, the overall health and well-being of area residents, including indigenous communities in and near Duluth, can be further improved.



Important Sites in the Area from an Ethnographic Study of Indigenous Contributions to the City of Duluth

Aaron Crosier Point: There was once an Indian camp located on what would later become known as Aaron Crosier Point, near the St. Louis River at South 62nd Avenue West. The site served as a stop along an old Indian trail that was located between Minnesota Point and Duluth's Fond du Lac Neighborhood. The camp was apparently abandoned sometime prior to the mid 1850's, before Crosier owned the property.

Indian Point Campground: This site was the home of an early Ojibwe Indian camp. It is located along the St. Louis River at the very end of Pulaski Street in Duluth. The property is currently owned by the City of Duluth and is used as an RV park and campground.

Spirit Mountain: The large hill that extends for several miles along the far western end of Duluth was called Manitouahgebik (Spirit Mountain) by the Ojibwe Indians. They believed that the Great Spirit resided within the forest at the top of Spirit Mountain. The first known recorded reference to the area was on a map dated 1762. Famous English geographer, Thomas Jefferys, created the map for the use of fur traders who made deals with the local Ojibwe Indians.

Existing Conditions

- The public uses these sites for birding, for walking their dogs, and some use of the recreational facilities.
- Duluth has approximately three times more green space than other cities of similar size.
- The citizens of Duluth find green space to be very valuable to the city and consider engagement with nature to be a defining characteristic of Duluth.
- When citizens were asked about the amount of green space in Duluth, most residents felt there were already enough parks in the city.
- The parks in the HIA study serve as a focal point for social relations and opportunities to build social capital; however, there are not high quality social spaces currently available in the area. Both Irving Park and Norton Park have community clubs that use and support the parks. The Irving Park Community Club (IPCC) is an anchor and "voice of the Irving Neighborhood in West Duluth."
- The Kingsbury Bay and Grassy Point natural areas have traditionally provided space for spiritual reflection and other tribal uses for the Native American communities in the area.



SOCIAL AND CULTURAL: PRELIMINARY HIA RECOMMENDATIONS



What’s the connection to health?

- Parks and green spaces provide space for socialization, which builds social capital and cohesion (the formation of social bonds and connections); spiritual reflection; and cultural resource use.
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- The opportunity for public input during the planning of these spaces can also build social capital and lead to improved community health.

Major Finding

Parks are places of social and cultural value and sites for spiritual reflection. Social cohesion, spiritual reflection, and the ability to participate in culturally-significant behavior are all positively correlated with health. As part of the St. Louis River, this place has special significance to the Anishinaabe people. These aspects should be considered in the development of the Habitat Restoration and Park Improvements plans.

- Planners should conduct stakeholder meetings to the extent possible to better understand the social significance of these parks
- Make the public aware of construction activities in advance, the period of time for which construction will occur, and the planned changes, so they can plan when to visit and anticipate the improved resources
- Consult with 1854 Treaty Authority and Fond du Lac Band resource managers to identify significant sites for any use and determine the best approach to preserve, enhance or interpret resources

Major Findings

Spiritual reflection, while significant, may be challenging to address because of the urban nature of the parks, but it should not be minimized or ignored in the development of Habitat Restoration and Park Improvements plans.

Public use of the green space for cultural resources will be increased as a result of the restored habitat, including wild rice production and restoration of viable populations of medicinal plants.

- Planners should strive to create natural spaces for social interaction and solitary spiritual reflection. Attention should be paid to develop spaces for spiritual reflection that minimize the noise and distraction from the nearby industry
- Signage may be considered that demarcate culturally significant spaces and that promote quiet reflection
- The planning team should prioritize the placement of native, medicinal, and culturally significant plants
- Attention should be paid to promote the presence of wildlife that may be culturally significant and specifically the abundance of fish for subsistence fishing

Community/Stakeholder Input