

Final Independent External Peer Review Report Bubbly Creek Ecosystem Restoration Feasibility Study

Prepared by
Battelle Memorial Institute

Prepared for
Department of the Army
U.S. Army Corps of Engineers
National Planning Center of Expertise for Ecosystem Restoration
Mississippi Valley Division

Contract No. W912HQ-10-D-0002
Task Order: 0062

July 15, 2014

This page is intentionally left blank.

CONTRACT NO. W912HQ-10-D-0002
Task Order: 0062

Final Independent External Peer Review Report Bubbly Creek Ecosystem Restoration Feasibility Study

Prepared by

Battelle
505 King Avenue
Columbus, Ohio 43201

for

Department of the Army
U.S. Army Corps of Engineers
Planning Center of Expertise for Ecosystem Restoration
Mississippi Valley Division

July 15, 2014

This page is intentionally left blank.

Final Independent External Peer Review Report Bubbly Creek Ecosystem Restoration Feasibility Study

Executive Summary

PROJECT BACKGROUND AND PURPOSE

Before the 1830s, the Bubbly Creek was a prairie slough that drained five square miles of a pristine aquatic and terrestrial habitat mosaic. Over a period of several decades, this ecosystem was severely altered by human activities. Currently, Bubbly Creek no longer provides a diversity of habitats, nor is the existing habitat quality sufficient to maintain structure and support healthy plant and animal communities. The study area includes the 1.25-mile long channel of Bubbly Creek and its immediate riparian zone. This channel is located entirely within the City of Chicago, Cook County, Illinois. Bubbly Creek is part of the Chicago Area Waterway System (CAWS).

The purpose of this study and environmental assessment is to identify the most environmentally beneficial, cost-effective, and publicly supported habitat restoration project to restore resources lost by the alteration of the South Fork of the South Branch of the Chicago River.

Independent External Peer Review Process

Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analysis. U.S. Army Corps of Engineers (USACE) is conducting an Independent External Peer Review (IEPR) of the Bubbly Creek Ecosystem Restoration Feasibility Study (hereinafter Bubbly Creek IEPR). As a 501(c)(3) non-profit science and technology organization, Battelle is independent, is free from conflicts of interest (COIs), and meets the requirements for an Outside Eligible Organization (OEO) per guidance described in USACE (2012). Battelle has experience in establishing and administering peer review panels for USACE and was engaged to coordinate the IEPR of the Bubbly Creek feasibility study. The IEPR was external to the agency and conducted following USACE and Office of Management and Budget (OMB) guidance described in USACE (2012) and OMB (2004). This final report presents the Final Panel Comments of the IEPR Panel (the Panel). Details regarding the IEPR (including the process for selecting panel members, the panel members' biographical information and expertise, and the charge submitted to the Panel to guide its review) are presented in appendices.

Based on the technical content of the Bubbly Creek review documents and the overall scope of the project, Battelle identified candidates for the Panel in the following key technical areas: biology/water quality, recognized environmental conditions, civil engineering, and economics. Four panel members were selected for the IEPR. USACE was given the list of candidate panel members, but Battelle made the final selection of the Panel.

The Panel received an electronic version of the 717 pages of Bubbly Creek review documents, along with a charge that solicited comments on specific sections of the documents to be reviewed. USACE prepared

the charge questions following guidance provided in USACE (2012) and OMB (2004), which were included in the draft and final Work Plans.

The USACE Project Delivery Team (PDT) briefed the Panel and Battelle during a kick-off meeting held via teleconference prior to the start of the review to provide the Panel an opportunity to ask questions of USACE and clarify uncertainties. Other than Battelle-facilitated teleconferences, there was no direct communication between the Panel and USACE during the peer review process. The Panel produced individual comments in response to the charge questions.

IEPR panel members reviewed the Bubbly Creek documents individually. The panel members then met via teleconference with Battelle to review key technical comments and reach agreement on the Final Panel Comments to be provided to USACE. Each Final Panel Comment was documented using a four-part format consisting of: (1) a comment statement, (2) the basis for the comment, (3) the significance of the comment (high, medium/high, medium, medium/low, or low), and (4) recommendations on how to resolve the comment. Overall, 12 Final Panel Comments were identified and documented. Of these, two were identified as having medium/high significance, five had medium significance, two had medium/low significance, and three had low significance.

Results of the Independent External Peer Review

The panel members agreed on their “assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used” (USACE, 2012; p. D-4) in the Bubbly Creek review documents. Table ES-1 lists the Final Panel Comment statements by level of significance. The full text of the Final Panel Comments is presented in Section 4.2 of this report. The following summarizes the Panel’s findings.

Based on the Panel’s review, the Bubbly Creek Draft Integrated Feasibility Report and Environmental Assessment (DFR-EA) is in most instances well-written, organized, and easy to follow. In general, the models and assumptions used in the analyses are sound and applied in an appropriate manner to support the conclusions drawn from them. While the Panel believes that many technical aspects of the environmental, engineering, plan formulation, and economic issues of the Bubbly Creek project are reasonable and presented clearly, the Panel identified some elements of the project where additional analysis are warranted and places where clarification of project findings and objectives need to be documented in the DFR-EA.

Environmental: The Panel recognizes that USACE is dealing with a very challenging project given the location (adjacent land use, urban storm, and combined sewer overflow (CSO) pollution inputs, etc.) and unusual baseline conditions. Although any improvement to this complex and degraded urban ecosystem is better than what is currently located in the area, the information provided does not demonstrate that the project will successfully achieve its objectives or the objectives would be sustainable over the long term. The document compares Bubbly Creek to a backwater, when it is really a novel urban system. Many of the project’s assumptions have been based on generalities associated with backwaters; however, because of the novel nature of the Bubbly Creek system, the assumptions are not supported by the generalities provided. The Panel believes that specific information on the existing conditions and techniques that will be employed need to be provided along with success stories achieved at reference sites in the CAWS that are similar to Bubbly Creek and used the same techniques on similar environments to demonstrate that the actions will achieve the objectives. For example, the general statement that the project will increase fish and bird diversity is not supported by any information that

demonstrates how the objectives will be met, or even whether these are realistically attainable or warranted objectives.

Based on the information provided, the Panel believes that the current National Ecosystem Restoration (NER) plan has a moderately high potential for plant failure. Currently, a risk level of low has been assigned, however, given the unusual existing baseline and forecasted future conditions (including hydrology and hydraulics, water quality, land use, etc.), the novel ecosystem that will exist, and the high potential for herbivory at the project site warrant a higher risk rating. Other factors that will impact the survivability of the plants and the ability of the restored system to meet stated project objectives include the ability of the proposed sediment cap to improve water quality. The Panel believes there is significant uncertainty regarding this issue. In addition, other factors influencing the likelihood of success include species chosen, light penetration, nutrient concentrations, and total suspended solids concentrations. Lastly, continued ebullition processes could impact the plant biogeochemical processes. The Panel believes more information needs to be provided in the document regarding these factors, the risk rating should be increased, and additional information should be included in the Adaptive Management Plan on what will be implemented if the species chosen do not meet the project objectives. The Panel also believes that the recreational and educational values of the proposed restored wetlands are significant benefits of this project in such an urban setting and are underemphasized in both the approach and in the document.

The Panel is also concerned that the Monitoring Plan is missing some key elements that could result in the NER plan not being funded sufficiently to assess project performance, as well as not answering questions regarding important uncertainties. Information on the baseline conditions, types of monitoring to be conducted, restoration targets that will be achieved, such as specifics on water quality improvements and habitat rehabilitation, and adaptive management measures that will be implemented if they are not achieved need to be provided. In addition, the timeframes and costs quoted throughout the document related to the Monitoring Plan need to be checked since the Panel noted inconsistencies.

Civil Engineering: The engineering studies outlined in the hydrology and hydraulics (H&H) appendix are very well done and for the most part comprehensive. The geotechnical work is also thorough and includes risk-based analysis. The cost estimate makes good assumptions regarding contingencies and water work production, which seem very appropriate.

Plan Formulation: The DFR-EA follows the six-step planning process. The analyses are detailed and for the most part thorough. Overall treatment of the issues is comprehensive. However, the Panel believes that two ecosystem restoration measures were screened out early with little discussion or supporting technical calculations. The Panel believes that the “capping of the existing sediments” and “removing contaminated sediments” measures need further discussion and supporting information as to why they were not considered. The Panel is mainly concerned that the DFR-EA does not fully address the combination of these two measures to produce alternatives that meet all project goals while potentially addressing the gas ebullition issues and further improving water quality in the Bubbly Creek study area. For example, the reason capping sediments was dropped was because it reportedly would only improve water quality; however, most of the improvements proposed are based on improving habitat structure through plantings that are themselves dependent upon improved water quality.

Economics: From an economic standpoint, the appropriate method (cost effectiveness/incremental cost analysis [CE/ICA]) and model (IWR-PLAN) were used to identify the best buy alternatives and resulting NER plan. During the review, the USACE PDT provided a spreadsheet containing the detailed cost data

used in the CE/ICA. This allowed the Panel to verify costs provided in the DFR-EA. However, it also allowed the Panel to identify inconsistencies in the cost data provided in the spreadsheet versus the information reported in the DFR-EA. In particular, the Monitoring Plan costs used in the CE/ICA included costs for only years 1 to 5 of the project life, whereas the report indicates that monitoring costs occur in years 1 to 10. The Panel believes monitoring costs for all 10 years of the Monitoring Plan should be evaluated in the CE/ICA, and the report revised accordingly. In addition, the inclusion of additional data on how the average annual costs used in the CE/ICA were developed would enable a better understanding of the report.

Table ES-1. Overview of 12 Final Panel Comments Identified by the Bubbly Creek IEPR Panel

No.	Final Panel Comment
Medium/High – Significance	
1	Several sources of uncertainty remain concerning the potential effectiveness of the proposed restoration measures in achieving the project objectives.
2	The risks are understated relative to the potential success of submerged plant communities, which are a vital part of the restoration plan for the proposed novel ecosystem.
Medium – Significance	
3	The Monitoring Plan is missing key elements and may not be funded sufficiently to assess project performance and address important uncertainties.
4	Comparable reference site(s) have not been identified from which tangible targets can be determined and by which success can be measured.
5	Two-measures – capping existing sediments and removing contaminated sediments – have been prematurely eliminated during screening without adequate evaluation.
6	The effectiveness of the proposed sand and gravel cap versus a clay cap with vents in improving future water quality, in regards to the contribution of shallow groundwater flow to the system, as well as the ability of contaminants and gases to migrate to the surface, has not been demonstrated.
7	The potential risk of large-scale plant failure due to geese and carp herbivory, invasive plants, drought, and ice damage is understated.
Medium/Low – Significance	
8	The principal goal of the project is the restoration of backwater habitat and riparian area for resident and migratory birds, but the habitat value of the area for birds is not documented.
9	Cost data used in the CE/ICA are inconsistent with statements in the report, making it difficult to determine if the results of the analysis are accurate.

Table ES-1. Overview of 12 Final Panel Comments Identified by the Bubbly Creek IEPR Panel (continued)

No.	Final Panel Comment
Low – Significance	
10	Existing ecological impacts from sediment and water quality, which are both a benchmark for existing conditions and a basis for future monitoring efforts, are not evaluated.
11	Subsurface hydrology issues and the contribution of surface and groundwater flows to the creek system have not been addressed.
12	Although the project is located in the area of residential development, very little information is provided about impacts from the surrounding area and any educational and recreational benefits of the project.

This page is intentionally left blank.

Table of Contents

	Page
Executive Summary	iii
1. INTRODUCTION.....	1
2. PURPOSE OF THE IEPR.....	1
3. METHODS FOR CONDUCTING THE IEPR	2
4. RESULTS OF THE IEPR.....	3
4.1 Summary of Final Panel Comments	3
4.2 Final Panel Comments	3
5. REFERENCES.....	24
Appendix A. IEPR Process for the Bubbly Creek Project	
Appendix B. Identification and Selection of IEPR Panel Members for the Bubbly Creek Project	
Appendix C. Final Charge to the IEPR Panel as Submitted to USACE on May 14, 2014, for the Bubbly Creek Project	

List of Tables

	Page
Table ES-1. Overview of 12 Final Panel Comments Identified by the Bubbly Creek IEPR Panel.	vi
Table 1. Major Milestones and Deliverables of the Bubbly Creek IEPR.....	2

LIST OF ACRONYMS

AAHU	Average Annual Habitat Unit
ATR	Agency Technical Review
CAWS	Chicago Area Waterway System
CE/ICA	Cost Effectiveness/Incremental Cost Analysis
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COI	Conflict of Interest
CSO	Combined Sewer Overflow
DFR-EA	Draft Integrated Feasibility Report and Environmental Assessment
DO	Dissolved Oxygen
DrChecks	Design Review and Checking System
EC	Engineer Circular
EP	Emergent Planting
EPA	U.S. Environmental Protection Agency
ER	Engineer Regulation
ERDC	Engineer Research and Development Center
H&H	Hydrology and Hydraulics
HTRW	Hazardous Toxic and Radioactive Waste
IEPR	Independent External Peer Review
MWRD	Metropolitan Water Reclamation District
NEPA	National Environmental Policy Act
NER	National Ecosystem Restoration
NTP	Notice to Proceed
OEO	Outside Eligible Organization
OMB	Office of Management and Budget
PDT	Project Delivery Team
SAV	Submergent Aquatic Vegetation
SOD	Sediment Oxygen Demand
SP	Submergent Planting
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Services
WRDA	Water Resources Development Act

1. INTRODUCTION

Before the 1830s, the Bubbly Creek was a prairie slough that drained five square miles of a pristine aquatic and terrestrial habitat mosaic. Over a period of several decades, this ecosystem was severely altered by human activities. Currently, Bubbly Creek no longer provides a diversity of habitats, nor is the existing habitat quality sufficient to maintain structure and support healthy plant and animal communities. The study area includes the 1.25-mile long channel of Bubbly Creek and its immediate riparian zone. This channel is located entirely within the City of Chicago, Cook County, Illinois. Bubbly Creek is part of the Chicago Area Waterway System (CAWS).

The purpose of this study and environmental assessment is to identify the most environmentally beneficial, cost-effective, and publicly supported habitat restoration project to restore resources lost by the alteration of the South Fork of the South Branch of the Chicago River.

Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analysis. The objective of the work described here was to conduct an Independent External Peer Review (IEPR) of the Bubbly Creek Ecosystem Restoration Feasibility Study (hereinafter: Bubbly Creek IEPR) in accordance with procedures described in the Department of the Army, U.S. Army Corps of Engineers (USACE), Engineer Circular (EC) *Civil Works Review* (EC 1165-2-214) (USACE, 2012) and the Office of Management and Budget (OMB) bulletin *Final Information Quality Bulletin for Peer Review* (OMB, 2004). Supplemental guidance on evaluation for conflicts of interest (COIs) was obtained from the *Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports* (The National Academies, 2003).

This final report presents the Final Panel Comments of the IEPR Panel (the Panel) on the existing engineering, economic, environmental, and plan formulation analyses contained in the Bubbly Creek IEPR documents (Section 4). Appendix A describes in detail how the IEPR was planned and conducted. Appendix B provides biographical information on the IEPR panel members and describes the method Battelle followed to select them. Appendix C presents the final charge to the IEPR panel members for their use during the review; the final charge was submitted to USACE on May 14, 2014.

2. PURPOSE OF THE IEPR

To ensure that USACE documents are supported by the best scientific and technical information, USACE has implemented a peer review process that uses IEPR to complement the Agency Technical Review (ATR), as described in USACE (2012).

In general, the purpose of peer review is to strengthen the quality and credibility of the USACE decision documents in support of its Civil Works program. IEPR provides an independent assessment of the engineering, economic, environmental, and plan formulation analyses of the project study. In particular, the IEPR addresses the technical soundness of the project study's assumptions, methods, analyses, and calculations and identifies the need for additional data or analyses to make a good decision regarding implementation of alternatives and recommendations.

In this case, the IEPR of the Bubbly Creek was conducted and managed using contract support from Battelle, which is an Outside Eligible Organization (OEO) (as defined by EC 1165-2-214). Battelle, a 501(c)(3) organization under the U.S. Internal Revenue Code, has experience conducting IEPRs for USACE.

3. METHODS FOR CONDUCTING THE IEPR

The methods used to conduct the IEPR are briefly described in this section; a detailed description can be found in Appendix A. Table 1 presents the major milestones and deliverables of the Bubbly Creek IEPR. Due dates for milestones and deliverables are based on the award/effective date of March 24, 2014. Note that the public comment review, Task 6 activities, and the Civil Works Review Board (CWRB) Meeting will occur after the submission of this report. The dates provided below are estimated dates of the Task 6 activities related to the 12 Final Panel Comments provided here.

Upon receipt of the public comments, the Panel will review the comments and determine if an additional Final Panel Comment is necessary. If a Final Panel Comment results from the review of the Public Comments, an addendum to this report will be prepared, the comment will be entered into USACE's Design Review and Checking System (DrChecks), and a Comment Response process will occur for that comment. At this time, the dates of those activities are unknown and therefore have not been reported here.

Battelle will submit the pdf printout of the DrChecks project file (the final deliverable) after the public comment review has been conducted and comment response process has been finalized. In Table 1 below, the current contract end date is provided; however, the actual date for contract end will depend on the date that all activities for this IEPR, including CWRB preparation and participation, are conducted.

Table 1. Major Milestones and Deliverables of the Bubbly Creek IEPR

Task	Action	Due Date
1	Award/Effective Date	3/24/2014
	Review documents available	5/13/2014
2	Battelle submits list of selected panel members	4/9/2014
	USACE confirms the panel members have no COI	4/15/14
3	Battelle convenes kick-off meeting with USACE	5/2/2014
	Battelle convenes kick-off meeting with USACE and panel members	5/6/2014
4	Panel members complete their individual reviews	6/3/2014
	Panel members provide draft Final Panel Comments to Battelle	6/17/2014
5	Battelle submits Final IEPR Report to USACE	7/15/2014
6 ^a	Battelle submits pdf printout of DrChecks project file ^a	TBD
	CWRB Meeting ^b	TBD
	Contract End	3/24/2015

* Deliverable.

^a Task 6 occurs after the submission of this report, dates provided are estimates of the dates for the comment response process associated with the 12 Final Panel Comments reported here. The final deliverable will be held until the Public Comment Review and Comment Response process is completed

^b The CWRB meeting was listed in the Performance Work Statement under Task 3 but was relocated in this schedule to reflect the chronological order of activities.

Battelle identified, screened, and selected four panel members to participate in the IEPR based on their expertise in the following disciplines: biology/water quality, recognized environmental conditions, civil engineering, and economics. The Panel reviewed the Bubbly Creek document and produced 12 Final Panel Comments in response to 48 charge questions provided by USACE for the review. This charge included two questions added by Battelle that sought summary information from the IEPR Panel. Battelle instructed the Panel to develop the Final Panel Comments using a standardized four-part structure:

1. Comment Statement (succinct summary statement of concern)
2. Basis for Comment (details regarding the concern)
3. Significance (high, medium/high, medium, medium/low, or low; in accordance with specific criteria for determining level of significance)
4. Recommendation(s) for Resolution (at least one implementable action that could be taken to address the Final Panel Comment).

Battelle reviewed all Final Panel Comments for accuracy, adherence to USACE guidance (EC 1165-2-214, Appendix D), and completeness prior to determining that they were final and suitable for inclusion in the Final IEPR Report. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The Panel's findings are summarized in Section 4.1; the Final Panel Comments are presented in full in Section 4.2.

4. RESULTS OF THE IEPR

This section presents the results of the IEPR. A summary of the Panel's findings and the full text of the Final Panel Comments are provided.

4.1 Summary of Final Panel Comments

The panel members agreed on their "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (USACE, 2012; p. D-4) in the Bubbly Creek IEPR review document. The following summarizes the Panel's findings.

Based on the Panel's review, the Bubbly Creek Draft Integrated Feasibility Report and Environmental Assessment (DFR-EA) is in most instances well-written, organized, and easy to follow. In general, the models and assumptions used in the analyses are sound and applied in an appropriate manner to support the conclusions drawn from them. While the Panel believes that many technical aspects of the environmental, engineering, plan formulation, and economic issues of the Bubbly Creek project are reasonable and presented clearly, the Panel identified some elements of the project where additional analysis are warranted and places where clarification of project findings and objectives need to be documented in the DFR-EA.

Environmental: The Panel recognizes that USACE is dealing with a very challenging project given the location (adjacent land use, urban storm, and combined sewer overflow (CSO) pollution inputs, etc.) and unusual baseline conditions. Although any improvement to this complex and degraded urban ecosystem is better than what is currently located in the area, the information provided does not demonstrate that the project will successfully achieve its objectives or the objectives would be sustainable over the long term. The document compares Bubbly Creek to a backwater, when it is really a novel urban system. Many of the project's assumptions have been based on generalities associated with backwaters; however, because of the novel nature of the Bubbly Creek system, the assumptions are not supported by the

generalities provided. The Panel believes that specific information on the existing conditions and techniques that will be employed need to be provided along with success stories achieved at reference sites in the CAWS that are similar to Bubbly Creek and used the same techniques on similar environments to demonstrate that the actions will achieve the objectives. For example, the general statement that the project will increase fish and bird diversity is not supported by any information that demonstrates how the objectives will be met, or even whether these are realistically attainable or warranted objectives.

Based on the information provided, the Panel believes that the current National Ecosystem Restoration (NER) plan has a moderately high potential for plant failure. Currently, a risk level of low has been assigned, however, given the unusual existing baseline and forecasted future conditions (including hydrology and hydraulics, water quality, land use, etc.), the novel ecosystem that will exist, and the high potential for herbivory at the project site warrant a higher risk rating. Other factors that will impact the survivability of the plants and the ability of the restored system to meet stated project objectives include the ability of the proposed sediment cap to improve water quality. The Panel believes there is significant uncertainty regarding this issue. In addition, other factors influencing the likelihood of success include species chosen, light penetration, nutrient concentrations, and total suspended solids concentrations. Lastly, continued ebullition processes could impact the plant biogeochemical processes. The Panel believes more information needs to be provided in the document regarding these factors, the risk rating should be increased, and additional information should be included in the Adaptive Management Plan on what will be implemented if the species chosen do not meet the project objectives. The Panel also believes that the recreational and educational values of the proposed restored wetlands are significant benefits of this project in such an urban setting and are underemphasized in both the approach and in the document.

The Panel is also concerned that the Monitoring Plan is missing some key elements that could result in the NER plan not being funded sufficiently to assess project performance, as well as not answering questions regarding important uncertainties. Information on the baseline conditions, types of monitoring to be conducted, restoration targets that will be achieved, such as specifics on water quality improvements and habitat rehabilitation, and adaptive management measures that will be implemented if they are not achieved need to be provided. In addition, the timeframes and costs quoted throughout the document related to the Monitoring Plan need to be checked since the Panel noted inconsistencies.

Civil Engineering: The engineering studies outlined in the hydrology and hydraulics (H&H) appendix are very well done and for the most part comprehensive. The geotechnical work is also thorough and includes risk-based analysis. The cost estimate makes good assumptions regarding contingencies and water work production, which seem very appropriate.

Plan Formulation: The DFR-EA follows the six-step planning process. The analyses are detailed and for the most part thorough. Overall treatment of the issues is comprehensive. However, the Panel believes that two ecosystem restoration measures were screened out early with little discussion or supporting technical calculations. The Panel believes that the “capping of the existing sediments” and “removing contaminated sediments” measures need further discussion and supporting information as to why they were not considered. The Panel is mainly concerned that the DFR-EA does not fully address the combination of these two measures to produce alternatives that meet all project goals while potentially addressing the gas ebullition issues and further improving water quality in the Bubbly Creek study area. For example, the reason capping sediments was dropped was because it reportedly would only improve

water quality; however, most of the improvements proposed are based on improving habitat structure through plantings that are themselves dependent upon improved water quality.

Economics: From an economic standpoint, the appropriate method (cost effectiveness/incremental cost analysis [CE/ICA]) and model (IWR-PLAN) were used to identify the best buy alternatives and resulting NER plan. During the review, the USACE PDT provided a spreadsheet containing the detailed cost data used in the CE/ICA. This allowed the Panel to verify costs provided in the DFR-EA. However, it also allowed the Panel to identify inconsistencies in the cost data provided in the spreadsheet versus the information reported in the DFR-EA. In particular, the Monitoring Plan costs used in the CE/ICA included costs for only years 1 to 5 of the project life, whereas the report indicates that monitoring costs occur in years 1 to 10. The Panel believes monitoring costs for all 10 years of the Monitoring Plan should be evaluated in the CE/ICA, and the report revised accordingly. In addition, the inclusion of additional data on how the average annual costs used in the CE/ICA were developed would enable a better understanding of the report.

[4.2 Final Panel Comments](#)

This section presents the full text of the Final Panel Comments prepared by the IEPR panel members.

Final Panel Comment 1

Several sources of uncertainty remain concerning the potential effectiveness of the proposed restoration measures in achieving the project objectives.

Basis for Comment

The objectives of this restoration project focus largely on ecological diversity and similar targets aimed at improving ecosystem function. However, the proposed actions are aimed at improving an existing system that is not well-defined or explained in the Existing Conditions section of the Feasibility Study, specifically:

1. The existing distribution of impacted sediments (e.g., as quantified by thickness of the substrate, extent of gas ebullition by reach, and sediment quality as compared to ecologically based risk criteria for sediment)
2. Existing bird species diversity and habitats supporting breeding and migratory birds
3. Existing contribution of shallow groundwater flow into the overall water budget of the system
4. Existing contribution of nitrates, ammonia, fecal coliform, and other inputs to water quality in the creek
5. Recognition of relative small size of the restoration area (33 acres) relative to the surrounding landscape matrix as a highly disturbed urban system, and recognition of how this project fits in with other restoration initiatives within the region
6. Comparison of this system with other waterways or wetlands within the region that could provide useful points of reference for achievable restoration goals.

While the Panel understands the system is affected, it does not have a clear idea of what may be attainable in the future and whether the stated objectives of increasing habitat diversity are achievable or would result in the intended project benefits.

A second major source of uncertainty concerns the effectiveness of the proposed NER plan in achieving the stated objectives. The ability of a sand and gravel cap alone to adequately address potential impacts on the water column from contaminated sediment (and future surficial sediments) remains a high source of uncertainty regarding the potential effectiveness of the NER plan in achieving project objectives. The Panel believes the existing water quality issues and gas generation issues resulting from man-made waste disposal in the creek are not likely to be greatly improved by the NER plan. These issues will likely persist even with the plan in place and may reduce the likelihood of project success. For example, the creek may not be attractive for recreation purposes due to odors and poor water quality. The number of combined sewer overflow discharges will dramatically decrease in the future as a result of other projects (e.g., tunnel and reservoir), however, other sources of water quality problems are not being fully addressed (e.g., organic waste/sludge/soil, surface water runoff).

In addition, the substrate restoration measure included in the NER plan does not include a gas venting function, which appears to be a major shortcoming of the NER plan. Other aspects of the plan concern the extent to which physical structure and plantings will improve habitat if water quality continues to be affected, and whether diversity will actually increase due to the presence of exotic and nuisance species such as carp and geese.

A final but important source of uncertainty concerns the target restoration objectives themselves. The principal goal of the ecosystem restoration project is to restore a functional backwater habitat and riparian buffer zone for resident and migratory birds and spawning fishes in Bubbly Creek (DFR-EA, p. 44). The two planning objectives are to “Restore Diverse Habitat Structure within Bubbly Creek” and “Restore a Viable Foundation for Plant Growth and Aquatic Habitats” (p. 46). These objectives may be effective and

attainable for less impacted sites within the Chicago River watershed, but do not seem to apply as well to this one. The objectives of the project could benefit from greater specificity and tie-in with the regional context of this site within a major metropolitan area. Restoring diverse habitat structure may or may not result in achievable gains in fish or wildlife species diversity, for example, within this setting. Restoring viable foundation of plant growth will not matter if water quality improvements are not sufficient to promote submerged aquatic vegetation (SAV).

As such, realistic expectations and target goals need to be established that are simple, tangible, measurable, and achievable for this unique site. For example, the DFR-EA (p. 46) states that “The ecosystem restoration of Bubbly Creek has great potential to provide critical migratory bird habitat as identified by the Chicago Audubon Society in a letter dated July 2013, which is provided in Appendix B.” This broad statement is unsubstantiated by data and does not reflect specific targeted objectives in the plan. Large numbers of migratory waterfowl are unlikely to use the site due to its narrow corridor in an urban setting. Marsh birds such as rails could benefit, but the small acreage of channel habitat is unlikely to benefit them significantly. A significant opportunity would exist to improve habitat for migratory neotropical passerines if trees were planted, but that is not part of the current plan.

The site’s location in an urban area virtually ensures that its restoration to a system with a high degree of value to fish and wildlife populations is not likely attainable. Rather, the Panel believes greater emphasis should be placed on the existing and future value of Bubbly Creek and associated wetlands for educational and recreational purposes, since these are tangible goals associated with proposed ecosystem improvements. These values should be further highlighted and accentuated in the plan by focusing on attributes of the plan that are easily visible and attainable (e.g., planting trees on side slopes, increasing water and sediment quality and access for fishers and canoeists so they can enjoy this area). The refined objectives could translate into more easily quantifiable and discernible monitoring goals that rely less on generic measures such as diversity and more on targeted species and objectives (e.g., less emphasis on fish diversity and more emphasis on controlling carp, less emphasis on overall bird diversity and more focus on target groups such as neotropical migrants that are declining).

Significance – Medium/High

A clear understanding and thorough evaluation of the uncertainties cited above are necessary to increase the likelihood of achieving the objectives of the ecological restoration.

Recommendations for Resolution

1. Address the data gaps identified above (items 1-6) in the Existing Conditions section of the Feasibility Study by adding further clarifying narrative and discussion.
2. Further evaluate alternatives that would address contaminated sediment issues (e.g., ebullition, diffusion) more effectively than the sand and gravel only capping treatment. These could include the clay and venting alternative that was rejected, various combinations of sand and clay capping depending on the nature of the source and likelihood of ebullition or contaminant transfer, or varying the cap thickness as necessary within different areas of Bubbly Creek depending on the nature of substrate contamination.
3. Refine the target restoration objectives based on comparable field sites within the area and to better reflect the site’s location within a highly developed urban metropolitan area. This could include recognition of the importance of the surrounding landscape matrix to the likelihood of restoration success, or the fact that restoration to the original endpoint is not attainable and that the plan may allow for greater emphasis on the educational, recreational, and social values associated with wetlands, water and wildlife that would be restored (e.g., clean water and trees favoring recreational use may be more important and more easily deliverable in this system than improved emergent plant, SAV, or fish species diversity that USACE is trying to deliver through emphasis on plantings and increased physical structure).

Final Panel Comment 2

The risks are understated relative to the potential success of submerged plant communities, which are a vital part of the restoration plan for the proposed novel ecosystem.

Basis for Comment

Appendix H states (p. 7) that the risk of large-scale plant failure is low. As it relates to SAV and to a lesser degree for emergents, the Panel believes that the risk level for plant failure is at least moderate to moderately high based on the information provided. The Submergent Planting (SP) measure has the highest net average annual habitat unit (AAHU) benefits of any component of the NER plan based on USACE's assumption that 7.59 acres of submergent plantings will be provided. However, the Panel believes that the unusual existing baseline and forecasted future conditions (including hydrology and hydraulics, water quality, land use, etc.), the novel ecosystem that will exist, and the high potential for herbivory at the project site warrant a higher risk rating.

The DFR-EA notes (p. 54) that submergent plantings would only be implemented in areas where maximum water velocities are less than 3 feet/second and good sunlight penetration is present. While the likely maximum water velocities appear to be achievable in most areas of the project, the ability of the project to achieve the light conditions required for the selected SAV is not demonstrated by the information provided. For example, *Vallisneria americana*'s light and water quality requirements have been well-documented in the technical literature (Schloesser and Manny 2007; Chambers and Kaiff 1985; Bornette and Puijalon 2011). Secchi disk readings of from 1 to 2 meters are generally required along with low nutrient concentrations and total suspended solids in lake systems. It is uncertain that these conditions will be achieved because of continued urban stormwater runoff and associated nutrient and sediment loadings. Evidence is provided that light penetration will likely improve, but it is uncertain whether it will be enough to achieve required light penetration conditions.

Establishing *Potamogeton* species may also be a problem because it requires good light conditions and water quality, including good dissolved oxygen (DO) conditions. Appendix H (p. 7) addresses potential low DO conditions by proposing to induce flow to achieve more balanced DO conditions, however, this suggests risks are higher than stated at least for SAV. An assumption appears to have been made in the DFR-EA (p. 41) that impacted substrates are a primary reason that aquatic plants are not present within the creek. Even with combined sewer overflows diverted and a capped substrate, it remains to be seen whether the future creek conditions will allow sufficient light penetration to support SAV.

In addition, information is not provided whether the ebullition process will potentially impact SAV plant biogeochemical processes, particularly as it relates to the plant roots and the sand and rock bottom layer to be provided. While the Grand Calumet (and dense population of pondweeds) is briefly mentioned in the DFR-EA (p. 63) as evidence, the discussion does not provide information on water quality, substrate, and light conditions from which to draw conclusions as to whether the site conditions are similar to Bubbly Creek, with the exception of water velocity. Other reference information supports the riparian and the emergent measures, but no data are provided that correlate to the conditions found at Bubbly Creek.

The DFR-EA notes (p. 94) that temporary predator controls will be provided due to the presence of geese and carp, however, it is not clear how long temporary measures will be instituted. The Panel's experience is that herbivory will be an ongoing risk that will extend through and beyond the monitoring period, given the novel ecosystem being created in Bubbly Creek. It is likely that if SAV is successful in the patch/novel ecosystem planned, herbivores will be attracted to the project area.

Inconsistencies exist throughout the discussion of the SP measure (coontail mentioned one location, buttonbush another, plant list found in Table 14, lists neither). Given the variation in named combinations, the Panel suggests clarifying the uncertainty regarding which SAV are suitable for the site.

Significance – Medium/High

Future water quality conditions, herbivory threats, the impact of ebullition on biogeochemical processes of identified SAV, and uncertainty of which SAV are suitable for the site, do not support a low risk rating, at least for this measure of the NER plan.

Recommendations for Resolution

1. Provide additional background information on the Grand Calumet and other identified reference sites that demonstrate that even though these sites may be not directly comparable to the unique conditions found at Bubbly Creek, SAV will be successfully established due to similar former and existing conditions.
2. Revise the risk rating in Appendix H (p. 7) to Moderate or Moderately/High.
3. Expand the DFR-EA Implementation Section and Adaptive Management Plan to consider the possibility of conducting SAV pilot/demonstration projects to confirm proof of concept, establish most suitable SAV plant material for site, and appropriate herbivory measures.
4. Add discussion in the DFR-EA on whether the potential ongoing ebullition process may impact the biogeochemical process of SAV plants and ultimately their survival.
5. Revise discussions of SP measures to consistently identify the target SAV that will be provided.

Final Panel Comment 3

The Monitoring Plan is missing key elements and may not be funded sufficiently to assess project performance and address important uncertainties.

Basis for Comment

The Bubbly Creek restoration effort is ambitious and complex due to its unique existing conditions. The restoration effort is in reality the creation of a “novel ecosystem” in the study area consistent with the altered hydrology of the basin. The existing creek substrate and water quality is highly degraded due to past anthropogenic impacts from combined sewer overflows and waste/detritus disposal from the historic Chicago Stock Yards. All of these unique factors impart significant risk and uncertainty to any restoration or environmental creation project implemented in the area. In order to reduce the risk and uncertainty, USACE has developed a Monitoring and Adaptive Management Plan (Appendix H of the DFR-EA) as required by the Water Resources Development Act (WRDA) 2007. The Panel commends this effort but has a number of concerns regarding the basis of the plan, as well as its completeness and budget. A primary issue regarding the plan is the lack of defined and tangible restoration targets, whether water quality improvement, habitat rehabilitation, or hydrological in nature. In addition, the plan does not effectively describe an end goal for the restoration effort. The Panel assumes that USACE will use the Grand Calumet or similar sites as a restoration benchmark with which to compare the status of Bubbly Creek, but this is not definitive in the plan. Moreover, these sites may differ significantly from Bubbly Creek based on its unique history.

Another issue is that many details are lacking regarding the actual monitoring activities themselves. For example, substrate spatial distribution and thickness is important for the project and replacement of substrate is spelled out as part of the adaptive management effort, but it is not clear how changes in substrate will be measured. Moreover, the Existing Conditions section of the DFR-EA does not effectively describe baseline conditions regarding difference in substrate thickness throughout the waterway.

The Panel is not sure how changes in substrate or water quality will be documented. In addition, the Panel is very concerned about the continual control of exotic species such as carp or reed-canary grass given that exotic species control was identified as a key risk in the Risk Register listed as part of the Cost Engineering Appendix. However, this is not discussed in detail in the monitoring plan.

In addition, the monitoring plan timeframe and costs are inconsistently cited in the review documents. The DFR-EA indicates (p. 98) that a five-year monitoring plan would be implemented following completion of construction, whereas the narrative for Component 1 indicates that monitoring would take place once a year for 10 years, and the narrative for Component 2 indicates that monitoring would take place every other year for five years. However, the monitoring costs presented in Table 15 (p. 100) of the DFR-EA only includes costs for years 1 to 5 for Component 1 and for years 5 to 9 for Component 2.

Lastly, the overall resources scheduled for the continuing monitoring effort appear low based upon Panel experience. The Panel assumes that as part of water quality monitoring USACE will periodically conduct a full analytical suite of parameters. This cost alone may consume the entire monitoring budget for some years.

Significance – Medium

The scope and detail of the Monitoring and Adaptive Management Plan does not appear to be sufficient to ensure the success of the project.

Recommendations for Resolution

1. Revise the Monitoring and Adaptive Management Plan to include definitive restoration targets.
2. Adopt a benchmark restored system as a basis for continual comparison for Bubbly Creek.
3. Provide further monitoring activity details for all plan elements.
4. Revise the report to ensure monitoring plan description and costs are accurately and consistently described throughout the DFR-EA and relevant appendices.
5. Revise annual monitoring costs to more appropriately match the level of effort required for the project and to ensure that success can be measured.

Final Panel Comment 4

Comparable reference site(s) have not been identified from which tangible targets can be determined and by which success can be measured.

Basis for Comment

The Panel agrees that, given the nature of impacts on Bubbly Creek and the surrounding area, restoration to a historical prairie slough ecosystem is not attainable. As a result, it is critical to justify the particular restoration objectives both in a regional context and in terms of what is realistically attainable for this urban system. In the DFR-EA (pp. 11, 20, 42, 43, 70), several successful sites/restoration projects are described, implying that restoration efforts in the Bubbly Creek project would be similarly successful, even as a backwater area. The Panel understands that it will be challenging to find comparable backwater areas given that Bubbly Creek's future with-project condition represents a novel ecosystem, but the Panel is concerned that the descriptions of the cited reference sites do not address or provide evidence to support the success of the SP habitat measure or provide sufficient information to establish meaningful and measurable metrics for success. For example, several objectives target increasing diversity, but diversity for the sake of diversity may not be logical or attainable. Reference locations would provide meaningful comparisons upon which to base such targets by evaluating what is realistically attainable within a regional context.

Both the Eugene Field Park and the Red Mill Pond are presented as "reference sites," but there is not enough information to determine if these sites had pre-construction conditions similar to Bubbly Creek, or might have substrate and water quality conditions that were overcome to support a SP measure like what is being proposed at Bubbly Creek. In addition, reference is made to the Grand Calumet as a comparable ecosystem (flow and macrophyte cover), but there is insufficient water quality information from which to draw conclusions on how the Bubbly Creek project area would support a similar healthy SP measure. Supplemental macrophyte cover information (CAWS showed highest percentage coverage), submerged aquatic macrophyte cover in the North Shore Channel, and a map provided by USACE in response to Panel questions during the mid-review teleconference on May 28, 2014 between the Panel and USACE (facilitated by Battelle) suggest there are better candidate reference sites that could be described in the DFR-EA and be the basis for identifying restoration targets (Metropolitan Water Reclamation District [MWRD], 2010a and 2010b).

Other restoration sites referenced in the DFR-EA and not shown on the map (p. 70) may also be better sites from which to draw comparisons, at least for the SAV component of the plan. The Panel believes that by providing information from reference sites more aligned with future with-project conditions (e.g., water quality, light penetration), there will be a logical and sound scientific basis from which to establish metric/targets for success.

The Panel also received a response from USACE during the mid-review teleconference that trees are not a part of the restoration program because they historically have not been part of the regional ecosystem. Yet the Panel's review of the individual restoration sites cited indicates that all have trees present as a component of the system. Incorporation of trees into the Bubbly Creek NER plan would provide tangible, measurable benefits by providing habitat for neotropical migrants, as well as shading for fish, shade for recreationists, further bank stabilization, and aesthetics.

Significance – Medium

Without established appropriate restoration targets for the Bubbly Creek project, sufficient information will not be available from which to draw conclusions regarding the success of key components.

Recommendations for Resolution

1. Add and describe one or more reference sites from the CAWS study or other restoration projects that best support restoration targets and success metrics for the NER plan.
2. Redraft/edit existing referenced sites to more clearly define what Bubbly Creek NER measures they support (i.e., riparian, emergent, submergent, etc.).
3. Expand discussion of Grand Calumet (DFR-EA, p. 70) to more fully characterize its biological and water quality to demonstrate how this reference site is relevant to Bubbly Creek project restoration targets. Include a map that shows (1) the location of other restoration projects (both USACE and other agency/organization projects) to support the discussion in the DFR-EA, p. 70), and (2) sites with similar backwater characteristics as anticipated in Bubbly Creek. Suggest color coding or a key that correlates measures with those proposed for Bubbly Creek.

Final Panel Comment 5

Two measures – capping existing sediments and removing contaminated sediments – have been prematurely eliminated during screening without adequate evaluation.

Basis for Comment

The development of ecosystem restoration measures is an important consideration in the Bubbly Creek study. The Panel believes that for the most part the development of measures is thorough and comprehensive. However, the Panel noted in its review of DFR-EA, Section 4.1, that two measures (capping existing sediments and removing contaminated sediments) have been screened out with little discussion or supporting technical calculations.

The reason for excluding these two measures is not well-documented in the report and the Panel believes that their exclusion precluded development of additional alternatives for the restoration of Bubbly Creek. As a result, the potential benefit of separately combining these measures with limited substrate introduction or other measures was not evaluated. For example, the DFR-EA notes that capping sediments would only improve water quality and not produce the other benefits of the NER plan. However, most of the improvements proposed on the basis of improving habitat structure through plantings are themselves dependent upon improved water quality. The incremental improvement of these measures versus capping alone remains unknown because this alternative was never fully analyzed. Moreover, exclusion of that alternative precludes a potential “phased approach” or pilot study alternative, wherein improvements from select capping alone could be monitored to determine if the other elements are necessary or likely to succeed. For example, if capping does not improve turbidity, investment in SAV establishment might not be worth the effort.

The two measures that were eliminated could be combined with other measures to produce alternatives that meet all project goals similar to the NER plan while potentially solving 100% of the gas ebullition issues, further improving water quality in the Bubbly Creek study area. The Panel understood from USACE during the mid-review teleconference, facilitated by Battelle, that the use of clay capping or dredging was more expensive than other measures under consideration for restoration, but the USACE assumption was for use of these measures across the entire project domain. The Panel believes that partial use (i.e., within certain reaches) of these measures might be more effective and less costly. Such an approach could be combined with elements of the NER plan to produce alternatives that address all the problems in the basin while also reducing the long-term uncertainties associated with the existing gas generation issues. The Panel believes that the value of further reducing the uncertainty inherent in the NER plan is high.

Significance – Medium

A complete analysis of the two eliminated measures might modify the results of the alternatives analysis.

Recommendations for Resolution

1. Formulate and evaluate additional alternatives using the two eliminated screening measures.
2. If appropriate, modify the recommendation for the NER plan should one or more of the new alternatives prove to be equivalent or better than those already compiled and evaluated.
3. Edit the DFR-EA and associated appendices as necessary to incorporate the new alternatives investigated.

Final Panel Comment 6

The effectiveness of the proposed sand and gravel cap versus a clay cap with vents in improving future water quality, in regards to the contribution of shallow groundwater flow to the system, as well as the ability of contaminants and gases to migrate to the surface, has not been demonstrated.

Basis for Comment

The question of whether a clay cap with venting would be more effective than the proposed sand and gravel cap at addressing gas ebullition and other toxics or nutrients (ammonia, nitrates, hydrogen sulfide) affecting water quality is not fully addressed in the DFR-EA. In the view of the Panel, this is important since most of the ecological benefits the project is attempting to achieve hinge directly on improved water quality. If the effectiveness of alternative means (e.g., clay cap with venting) is not economically justifiable, the report should provide a detailed analysis rather than simply eliminating the alternative.

Modeling results suggest that the sand and gravel cap would be about 90% as effective as the clay cap with venting in controlling sediment oxygen demand from the substrate below. However, the text is silent on sulfides, nitrates, coliform, and other issues in the substrate potentially affecting water quality for both the ecosystem and recreational users. These stressors could still migrate to the surface or be present in the water remaining in the system after combined stormwater overflows (CSOs) are diverted in the future.

NEPA applies to all aspects of a project including evaluation of alternative construction methods to minimize, avoid, and mitigate impacts. Because of this, further analysis of the effectiveness of the sand and gravel cap versus clay cap with gravel vents is warranted. There may well be a host of different alternatives associated with that element of the study alone (e.g., line the entire channel with clay and vent it, limit clay and venting to the most impacted areas, apply clay in the wet versus dewatering, etc.). The DFR-EA does not address whether the impacted substrate is equally distributed, or whether limited clay capping could be offset by no capping at all within some areas to achieve a better result than sand alone over the entire channel. Phased approaches to implementation do not appear to have been considered and can yield valuable information over what works and what does not before the entire recommended plan is implemented at full cost.

Finally, due to the lack of an objective documented baseline (i.e., comparison of surface water quality and sediment quality data to criteria or benchmarks based on ecological risks) and clear targeted objectives (e.g., improvement of water quality to what levels, other reference sites upstream within the Chicago River, etc.) it is difficult for the Panel to see how monitoring will show that the use of a sand and gravel cap versus a clay cap with vents is responsible for achieving water quality improvements. It is also difficult to ascertain how the benefits of the overall project using this capping alternative will be identifiable relative to the other improvements (e.g., CSO diversion) slated to occur under other projects as part of the future without-project conditions.

Significance – Medium

Implementation of the capping plan has a significant bearing on the ultimate success of the project, and the effectiveness regarding its implementation should be easily discernible.

Recommendations for Resolution

1. Expand upon existing water quality parameters and how they will be affected by the proposed cap.
2. Summarize the ebullition modeling results in the DFR-EA text when discussing alternatives.

3. Consider implementing a simple bench-scale treatability study to support model conclusions, a pilot study in the field, or a phased approach to implementation to ensure success of the capping plan prior to making the full investment.

Final Panel Comment 7

The potential risk of large-scale plant failure due to geese and carp herbivory, invasive plants, drought, and ice damage is understated.

Basis for Comment

The risk of large-scale plant failure is rated as low in the DFR-EA (pp. 73, 100, 101). Invasive threats are considered throughout the report, and it acknowledges the presence of carp and geese (pp. 25, 27–Table 2, 73) and that steps will be taken to control these herbivores by stringing and caging. Physical and chemical treatment is provided during native plant community establishment, particularly in the riparian community. A sum of \$13,000 has been budgeted annually for operation and maintenance, repair, replacement, and rehabilitation, which would address herbivory as well as general plant failure typically associated with restoration projects. However, the Panel believes that a moderate risk rating is appropriate based on the information provided in the DFR-EA. The NER plan would benefit from additional discussion of how design of the riparian area can reduce desirability of the project area to geese and other waterfowl that may be attracted to the area during the establishment period. In addition, while carp are a fact of life in the CAWS, more information/data on how other restoration projects have successfully overcome this threat would help to support the low risk rating.

The DFR-EA does a good job of discussing invasive species threats to the project area, but more information on managing the introduction of invasive species (seeds) during construction (soil augmentation activities, off-site vehicle tracking, quality of seed material/source, etc.) would further support the low risk rating. The Panel notes there are potentially conflicting statements in the report. On p. 39 it is stated that “The riverbanks and side-stream vegetation pockets are impaired as well and are dominated by non-native and invasive plant species,” whereas on p. 86 (Aesthetics) it is stated that “There is minimal invasive vegetation along the banks of the channel.”

Appendix H provides for monitoring of the plant communities and addresses the importance of aggressive invasive plant management control. The Panel recommends that a general statement be added to Appendix H, Adaptive Management Plan that if herbivory issues are identified during monitoring, then adaptive management steps may be required to address the impacts. Currently, there is no discussion of herbivory threats in the operation and maintenance part of the monitoring plan, just invasive species. More discussion of the role and experience of the non-Federal sponsor in maintaining the project as constructed would also help support the low risk rating (DFR-EA, p. 73).

The Panel noted the statement (p. 73), “to compensate for climatic shifts, the plant selection includes a diverse array of functionally similar and complementary plant species originating from multiple genetically distinct and diverse source locations” and questions if this was accounted for in the cost of seed/plant material. Meeting this requirement will require quality control testing by the contractor or vendor, which can be expensive and may increase the costs for seed and plant materials.

The NER plan seems to rely on repeated herbicide application for control of reed canary grass. This may not be sustainable long term and it is not clear whether other approaches have been considered. For example, a Minnesota study found that the most effective means of reed-canary grass control was burning followed by fall application of herbicide (Reinhardt and Galatowitsch, 2004).

Finally, the Panel could not find a discussion of the potential risk of ice damage on native plantings, particularly the emergent planting (EP) and SP measures of the NER plan, or how potential drought conditions during construction would be addressed to reduce large-scale risk to plantings. The DFR-EA discusses drought risk (p. 73), but does not mention the role that watering may play in reducing drought risks, if necessary.

Significance – Medium

The low risk rating is not fully supported by the information provided. Herbivory, invasive plants, ice damage, and drought pose a moderate risk of large-scale plant failure.

Recommendations for Resolution

1. Resolve potential conflict of invasive species wording on p. 39 with the statement found on p. 86 that implies that “minimal invasive vegetation” exists.
2. Add discussion to Appendix H, Adaptive Management Plan that herbivory threats will be monitored and if the scale of herbivory exceeds thresholds then adaptive management may be required to reduce impacts.
3. Add discussion of risk of ice damage (assuming Bubbly Creek freezes, which it may not due to warming water by CSO discharges and effects of ebullition) on survivability of plants and overall integrity of NER plan features.
4. Expand discussion on the experience/qualification/resources of the non-Federal sponsor to manage the site for invasive species.
5. Address/revise statement on p. 73 about using seed/plant materials from genetically diverse locations as to impact on costs and quality of seed/plant material.
6. Discuss controlled burning as a possible technique to eliminate reed canary grass.

Final Panel Comment 8

The principal goal of the project is the restoration of backwater habitat and riparian area for resident and migratory birds, but the habitat value of the area for birds is not documented.

Basis for Comment

The principal goal of the project is to provide backwater and riparian habitat for migratory birds (DFR-EA, pp. 28, 29, 66, 67, 74, 84; Appendix H, pp. 4, 5, 6). Anecdotal baseline data are provided throughout the document, and a letter is provided by Audubon to support this assertion, but only general statements are made. Currently, most of the information consists of secondary information with no supporting data and very limited actual observation data. For example, the Black-crowned night heron is mentioned as visiting the area, but no reference is provided for the source of this information. Observational data/sources (i.e., actual bird counts or other data) are important to supporting the restoration of backwater and riparian habitat for resident and migratory birds, and demonstrating the benefits of the project.

Observation data may be available from previous counts for patch/park areas/previous restoration projects (monitoring data) in the Chicago area to support assertions and provide baseline data on existing conditions. The Panel suggests that observations by amateur and professional ornithologists can also be a good source of information since these groups tend to know where the hot spots are (Cornell Laboratory BirdsEye Application hotspot data). The discussion in Appendix H (p. 4) suggests the Bird Conservation Network may already have information that can be incorporated, but the Panel is uncertain whether the Network was actually contacted for data.

Design features in the NER plan such as riparian, emergent, and submerged aquatic habitat and roosting features for resting and feeding will promote use of the area by migratory and resident bird species, but observational data from elsewhere in the CAWS on the use of these habitat features would strengthen and demonstrate their value.

Significance – Medium/Low

Providing actual bird counts or other data will strengthen and better demonstrate the benefits of the project.

Recommendations for Resolution

1. Expand discussions of the importance of the Bubbly Creek area to residential and migratory birds by citing actual studies and count locations completed by Audubon, Chicago Field Museum – Zoology Department, Bird Conservation Network, Chicago Migratory Bird Alliance, Illinois Breeding Bird Atlas (Kleen et al., 2004) and Cornell Laboratory from parklands and other natural patch areas along the shoreline.
2. Review monitoring reports from restoration projects in the region to document benefits of restoration projects to migratory birds and cite where appropriate.
3. Provide sources of data/observations for Bubbly Creek (i.e., Black-crowned night heron).
4. Provide supporting information/data from other restoration projects where habitat features similar to those being proposed for Bubbly Creek have been constructed and successfully increased bird use of backwater areas or in the CAWS, if data exists.

Final Panel Comment 9

Cost data used in the CE/ICA are inconsistent with statements in the report, making it difficult to determine if the results of the analysis are accurate.

Basis for Comment

Based on a review of the USACE-provided spreadsheet detailing the costs developed during the conduct of the Bubbly Creek Ecosystem Restoration Feasibility Study, the Panel determined that Monitoring Plan costs used in the CE/ICA to identify the NER plan are inconsistent with statements in the report. Contrary to the data presented in the DFR-EA, which indicated monitoring costs occur in years 1 to 10, the monitoring costs included in the detailed life cycle costs for all measures only occur in years 1 to 5.

In addition, detailed cost data, used in the conduct of the CE/ICA, are not presented in the report. Table 11 (p. 60) of the DFR-EA presents the average annual costs for each best buy alternative, but not the total implementation costs or the costs of the components used to develop the total costs and resulting average annual costs. The inclusion of additional data on how the average annual costs used in the CE/ICA were developed would enable a better understanding of the report.

Significance – Medium/Low

The use of inaccurate monitoring costs could affect the CE/ICA, but is unlikely to affect the selection of the NER plan.

Recommendations for Resolution

1. Review and revise life cycle costs throughout the analysis and report to ensure they are consistently cited.
2. Describe the total implementation costs, and the costs of the components used to develop the total costs and resulting average annual costs, for each best buy alternative.

Final Panel Comment 10

Existing ecological impacts from sediment and water quality, which are both a benchmark for existing conditions and a basis for future monitoring efforts, are not evaluated.

Basis for Comment

Potential ecological impacts from existing water and sediment quality have not been evaluated for the Bubbly Creek project and should be, both as a benchmark for existing conditions and as a basis for future monitoring efforts.

Comparing sediment quality data from prior sampling events (Table B1, Appendix F) to ecological screening criteria or benchmarks for freshwater sediments (e.g., Ontario Provincial Sediment Guidelines [Persaud et al., 1992]), or to consensus-based ecological screening benchmarks for the Great Lakes (Ingersoll et al., 2000) can provide objective documentation of existing conditions and allow better quantification of future benefits from the project.

Conducting such a comparison at the start of the project would better ensure identification of water quality and sediment quality issues such as polycyclic aromatic hydrocarbons, ammonia, nitrates, and fecal coliform, which could potentially affect the selection of the final cap design.

Significance – Low

Objective documentation of existing conditions in Bubbly Creek is important as a baseline for evaluation of alternatives and will allow for better quantification of future benefits from the project.

Recommendations for Resolution

1. Construct a comparison table by adding sediment criteria to Table B1 (Appendix F), and shading any values that exceed criteria. Move the entire table up into the main body of the text under Existing Conditions where sediment quality is first discussed. Appropriate benchmarks would be the Ontario Provincial Sediment Guidelines (Persaud et al., 1992) for freshwater sediments, consensus-based ecological screening benchmarks for the Great Lakes (Ingersoll et al., 2000), and U.S. Environmental Protection Agency (EPA) (2013).
2. Construct a comparison table for existing water quality data, which were provided only in the Appendix and should be summarized in the text. Compare the data to EPA Ambient Water Quality Criteria for Protection of Aquatic Life, found in:
<http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm#altable>

Final Panel Comment 11

Subsurface hydrology issues and the contribution of surface and groundwater flows to the creek system have not been addressed.

Basis for Comment

The major contribution of water to the system is assumed to be runoff, but the analysis does not address water quality conditions during the stagnant condition in the future, when the potential contribution of shallow groundwater to the system would represent a larger proportion of overall flows. Presentation of a complete water budget for present and future flows would address that issue. The DFR-EA and justification for the NER plan would benefit from a discussion of these subsurface hydrology issues and contribution of groundwater flow to the creek system.

Knowledge of subsurface hydrology is critical to designing an effective mitigation system for contaminants entering the system, gaseous or in solution. For example, it is unknown how much of the existing water quality within the creek is attributable to leaching from sediments of ammonia, nitrates, metals, and other stressors. Dissolved methane concentrations in groundwater and surface water are measurable and their flux should be quantified to determine impacts on dissolved oxygen (Kampbell and Vandegrift, 1998). This information will be useful in predicting the impacts on future water quality of diverting CSO flows to the existing system because even if the present contribution is small, a greater proportion of the water remaining will consist of shallow groundwater flow.

The recurring statement in the DFR-EA that the proposed cap will isolate the underlying organic substrate and that, as a result, water quality will improve is not substantiated (p. 82; Appendix A, Table 1; Appendix B, p. 11). The Panel does not believe this statement can be made until the subsurface hydrology is examined and it is shown that upwelling carrying contaminants and gases into the water column will not continue to degrade water quality. Modeling by USACE Engineer Research and Development Center (ERDC) has indicated the proposed cap would be sufficient to control sediment oxygen demand (SOD) in the system. Even so, the existing substrate will still allow some diffusion of contaminants toward the surface, as well as gas exchange with the surface water through the hyporrheic zone. Because of the continued ability of gases to reach the surface, it is unclear if the proposed alternative will be effective in improving water quality. A simple bench-scale treatability study or pilot study should be simple enough to confirm the conclusions of the modeling and address other potential water quality issues other than SOD (e.g., nitrates).

Significance – Low

Knowledge of surface and subsurface hydrology as well as groundwater flow is necessary to ensure the final design accounts for the potentially large contribution of shallow groundwater to the system.

Recommendations for Resolution

1. Construct a water budget for the Bubbly Creek system and present it under Existing Conditions within the DFR-EA. Include a diagram showing the existing and future flows and their contribution to the system.
2. The CSO project should be addressed in the Water Budget showing future without-project conditions and throughout the DFR-EA as part of the future without-project condition.
3. Describe model results on SOD from cap placement, and model the effects of parameters such as nitrates, ammonia, and coliform on the system after CSOs have been diverted.
4. Describe methane flow through the system, including impacts of the dissolved component.
5. Conduct a pilot study or bench-scale treatability study to confirm modeling results that the cap is capable of improving water quality prior to construction.

Final Panel Comment 12

Although the project is located in an area of residential development, very little information is provided about impacts from the surrounding area and any educational and recreational benefits of the project.

Basis for Comment

The NER plan includes significant efforts to create a more valuable environmental footprint in the Bubbly Creek project area. At the same time, the City of Chicago is developing a more comprehensive urban renewal plan for the neighborhoods around the study area. According to Section 3.3 of the DFR-EA, the Bubbly Creek restoration project is a “centerpiece” of the plan.

Although the Panel could not locate a figure showing these new residential developments within the study area, the Panel assumes that continued residential development will occur, resulting in increased recreational and educational opportunities for residents. The Panel views these opportunities as a definite plus for the proposed NER plan; however, the residents themselves may also be the source of unintended impacts on the project (e.g., non-point source pollution from nutrients). The Panel could not find much discussion of this in the DFR-EA or the Monitoring and Adaptive Management Plan.

Given the location and nature of the creek, a ribbon of green surrounded by an otherwise highly developed urban landscape, opportunities for significant long-term sustainable ecological improvement may be limited. The value of this creek system and associated wetlands seems to be primarily from the benefits it may offer to society from recreational benefits (e.g., use for rowing, fishing, birding, and walking), and educational benefits to school children, given its history in the overall context of the City. The Panel sees the overall integration of recreational and perhaps educational opportunities into the NER plan as important to the overall system under study. The NER plan does not seem as integrated with the City of Chicago future plans as it could be. The Panel is familiar with other, similar USACE restoration projects (e.g., Fort Worth District, Balanced Vision Plan) that are entirely integrated with the local system and sponsor, and in which the benefits of the proposed plan are thus well-explained in the text and understandable by the public.

Significance – Low

Further integration of recreation and educational opportunities by USACE, sponsor, and residents would significantly enhance the Bubbly Creek project and the presentation of the DFR-EA.

Recommendations for Resolution

1. Include a figure showing the current location of residential developments, as well as planned future ones, along with other land use along Bubbly Creek.
2. Develop additional narrative for the DFR-EA discussing future recreational and educational outreach opportunities for the project as part of an integrated systems approach tied to the City of Chicago long-term plans.
3. As part of an integrated systems approach, work with the local project sponsor to add an educational outreach component to the NER plan and the Operation and Maintenance Plan to notify and educate area residents regarding the proposed project so that they will embrace it, as well as protect the restored areas in the future.

5. REFERENCES

- Bornette, G., and S. Puijalon (2011). Response of aquatic plants to abiotic factors: a review. *Aquatic Sciences*, 73(1):1-14.
- Chambers, P.A., and J. Kaiff (1985). Depth distribution and biomass of submersed aquatic macrophyte communities in relation to Secchi depth. *Canadian Journal of Fisheries and Aquatic Sciences*, 42(4):701-709. 10.1139/f85-090.
- Cornell Lab of Ornithology (2014). BirdsEye NA – Hotspots. <http://www.birdseyebirding.com/#hotspots>
- EPA (2013). Region 5 Superfund: Sediment Screening Values. U.S. Environmental Protection Agency [Online]. <http://www.epa.gov/Region5/superfund/ecology/benchmemo.htm>
- Ingersoll, C.G., D.D. MacDonald, N. Wang, J.L. Crane, L.J. Field, P.S. Haverland, N.E. Kemble, R.A. Lindscoog, C. Severn, and D.E. Smorong (2000). Prediction of sediment toxicity using consensus-based freshwater sediment quality guidelines. EPA 905/R-00/007. U.S. Environmental Protection Agency Great Lakes National Program Office, Chicago, IL. <http://www.cerc.usgs.gov/pubs/center/pdfDocs/91126.pdf>
- Kampbell, D.H. and S.A. Vandegrift (1998). Analysis of dissolved methane, ethane, and ethylene in groundwater by a standard gas chromatographic technique. *Journal of Chromatographic Science*, 36:253-256.
- Kleen, V.M., L. Cordle, and R.A. Montgomery (2004). The Illinois Breeding Bird Atlas. Illinois Natural History Survey Special Publication No. 26. xvii + 459 pp. ISBN: 1-882932-07-2.
- MWRD (2010a). Chicago Area Waterway System Habitat Evaluation and Improvement Study: Habitat Evaluation Report and Technical Appendices. Prepared by LimnoTech,
- MWRD (2010b). Chicago Area Waterway System Habitat Evaluation and Improvement Study: Habitat Improvement Report and Technical Appendices. Prepared by LimnoTech.
- OMB (2004). Final Information Quality Bulletin for Peer Review. Executive Office of the President, Office of Management and Budget, Washington, D.C. Memorandum M-05-03. December 16.
- Persaud, D., R. Jaagumagi, and A. Hayton (1992). Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario. Toronto, Ontario: Water Resources Branch, Ontario Ministry of the Environment. http://www.itrcweb.org/contseds-bioavailability/References/guide_aquatic_sed93.pdf
- Reinhardt, C. H., and S. M. Galatowitsch (2004). Best Management Practices for the Invasive *Phalaris arundinacea* L. (Reed canary grass) in Wetland Restorations. Report No. 2
- Schloesser, D.W., and B.A. Manny (2007). Restoration of wildcelery, *Vallisneria americana* Michx., in the Lower Detroit River of the Lake Huron-Lake Erie corridor. *Journal of Great lakes Research*, 33(sp1):8-19.
- The National Academies (2003). Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports. The National Academies (National Academy of Science, National Academy of Engineering, Institute of Medicine, National Research Council). May 12.
- USACE (2012). Water Resources Policies and Authorities: Civil Works Review. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Engineer Circular (EC) 1165-2-214. December 15.
- WRDA (2007). Section 2039, Monitoring Ecosystem Restoration. Water Resources Development Act, Public Law 110–114—Nov. 8, 2007.

APPENDIX A

IEPR Process for the Bubbly Creek Project

This page is intentionally left blank.

A.1 Planning and Conduct of the Independent External Peer Review (IEPR)

Table A-1 presents the schedule followed in executing the Bubbly Creek Ecosystem Restoration Feasibility Study Independent External Peer Review (hereinafter: Bubbly Creek IEPR). Due dates for milestones and deliverables are based on the award/effective date of March 24, 2014. The review documents were provided by U.S. Army Corps of Engineers (USACE) on May 13, 2014. Note that the public comment review, Task 6 activities, and the Civil Works Review Board Meeting (CWRB) will occur after the submission of this report.. Battelle will enter the 12 Final Panel Comments developed by the Panel and included in this report into USACE's Design Review and Checking System (DrChecks), a Web-based software system for documenting and sharing comments on reports and design documents, so that USACE can review and respond to them. USACE will provide responses (Evaluator Responses) to the Final Panel Comments, and the Panel will respond (BackCheck Responses) to the Evaluator Responses. The dates provided below are estimated dates of the Task 6 activities related to the 12 Final Panel Comments provided here.

Upon receipt of the public comments, the Panel will review the comments and determine if an additional Final Panel Comment is necessary. If a Final Panel Comment results from the review of the Public Comments, an addendum to this report will be prepared, the comment will be entered into DrChecks, and a Comment Response process will occur for that comment. At this time, the dates of those activities are unknown and therefore have not been reported here.

All USACE and Panel responses will be documented by Battelle. Battelle will provide USACE and the Panel a pdf printout of all DrChecks entries, through comment closeout, as a final deliverable and record of the IEPR results. This will be provided after completion on the public comment review and comment response. In Table A-1 below, the current contract end date is provided; however, the actual date for contract end will depend on the date that all activities for this IEPR, including CWRB preparation and participation, are conducted

Table A-1. Bubbly Creek Complete IEPR Schedule

Task	Action	Due Date
1	Award/Effective Date	3/24/2014
	Review documents available	5/13/2014
	Battelle submits draft Work Plan ^a	4/3/2014
	USACE provides comments on draft Work Plan	4/10/2014
	Battelle submits final Work Plan ^a	5/14/2014
2	Battelle requests input from USACE on the conflict of interest (COI) questionnaire	3/28/2014
	USACE provides comments on COI questionnaire	4/1/2014
	Battelle submits list of selected panel members ^a	4/9/2014
	USACE confirms the panel members have no COI	4/15/2014
	Battelle completes subcontracts for panel members	5/2/2014

Table A-1. Bubbly Creek Complete IEPR Schedule (continued)

Task	Action	Due Date
3	Battelle convenes kick-off meeting with USACE	5/2/2014
	Battelle sends review documents to panel members	5/13/2014
	Battelle convenes kick-off meeting with panel members	5/6/2014
	Battelle convenes kick-off meeting with USACE and panel members	5/15/2014
	Battelle convenes mid-review teleconference for panel members to ask clarifying questions of USACE	5/27/2014
4	Panel members complete their individual reviews	6/3/2014
	Battelle provides panel members with talking points for Panel Review Teleconference	6/5/2014
	Battelle convenes Panel Review Teleconference	6/9/2014
	Battelle provides Final Panel Comment templates and instructions to panel members	6/10/2014
	Panel members provide draft Final Panel Comments to Battelle	6/17/2014
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	6/17/2014-6/26/2014
	Panel finalizes Final Panel Comments	6/26/2014
	Public Comment Review Period	TBD
	Panel reviews public comments and drafts a Final Panel Comment, if necessary	TBD
5	Battelle provides Final IEPR Report to panel members for review	6/30/2014
	Panel members provide comments on Final IEPR Report	7/2/2014
	Battelle submits Final IEPR Report to USACE ^a	7/15/2014
6^a	Battelle inputs Final Panel Comments to DrChecks and provides Final Panel Comment response template to USACE	7/15/2014
	Battelle convenes teleconference with USACE to review the Post-Final Panel Comment Response Process	7/17/2014
	Battelle convenes teleconference with Panel to review the Post-Final Panel Comment Response Process	7/17/2014
	USACE provides draft PDT Evaluator Responses to Battelle	7/22/2014
	Battelle provides the panel members the draft PDT Evaluator Responses	7/24/2014
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	7/30/2014
	Battelle convenes Comment-Response Teleconference with panel members and USACE	7/31/2014
	USACE inputs final PDT Evaluator Responses to DrChecks	8/5/2014
	Battelle provides final PDT Evaluator Responses to panel members	8/8/2014
	Panel members provide Battelle with final BackCheck Responses	8/13/2014

Table A-1. Bubbly Creek Complete IEPR Schedule (continued)

Task	Action	Due Date
	Battelle inputs the panel members' final BackCheck Responses to DrChecks	8/15/2014
	Battelle submits pdf printout of DrChecks project file ^a	TBD
	CWRB Meeting ^b	TBD
	Contract End/Delivery Date	3/24/2015

* Deliverable.

^a Task 6 occurs after the submission of this report, dates provided are estimates of the dates for the comment response process associated with the 12 Final Panel Comments reported here. The final deliverable will be held until the Public Comment Review and Comment Response process is completed

^b The CWRB meeting was listed in the Performance Work Statement under Task 3 but was relocated in this schedule to reflect the chronological order of activities.

At the beginning of the Period of Performance for the Bubbly Creek IEPR, Battelle held a kick-off meeting with USACE to review the preliminary/suggested schedule, discuss the IEPR process, and address any questions regarding the scope (e.g., clarify expertise areas needed for panel members). Any revisions to the schedule were submitted as part of the final Work Plan. In addition, 48 charge questions were provided by USACE and included in the draft and final Work Plans. Battelle added two questions that seek summary information from the IEPR Panel. The final charge also included general guidance for the Panel on the conduct of the peer review (provided in Appendix C of this final report).

Prior to beginning their review and within four days of their subcontracts being finalized, all members of the Panel attended a kick-off meeting via teleconference planned and facilitated by Battelle in order to review the IEPR process, the schedule, communication procedures, and other pertinent information for the Panel. Battelle planned and facilitated a second kick-off meeting via teleconference during which USACE presented project details to the Panel. Before the meetings, the IEPR Panel received an electronic version of the final charge as well as the Bubbly Creek review documents and reference materials listed below. The documents and files in bold font were provided for review; the other documents were provided for reference or supplemental information only.

- **Draft Integrated Feasibility Report and Environmental Assessment, November 2013 (122 pages)**
- **Appendix A: Hydrology and Hydraulics (191 pages)**
- **Appendix B: Compliance, Coordination and Information (61 pages)**
- **Appendix C: Civil Design (21 pages)**
- **Appendix D: Geotechnical (163 pages)**
- **Appendix E: Cost Engineering (24 pages)**
- **Appendix F: Hazardous, Toxic and Radioactive Waste (59 pages)**
- **Appendix G: Real Estate Planning Report (16 pages)**
- **Appendix H: Monitoring and Adaptive Management Plan (10 pages)**
- Appendix I Bubbly Creek Value Engineering Study (120 pages)
- USACE guidance Civil Works Review, (EC 1165-2-214, 15 December 2012)

- Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (December 16, 2004).

About halfway through the review of the Bubbly Creek IEPR documents, a teleconference was held with USACE, the Panel, and Battelle so that USACE could answer any questions the Panel had concerning either the review documents or the project. Prior to this teleconference, Battelle submitted 38 panel member questions to USACE. USACE provided responses to all of the questions during the teleconference or within one week of the call.

In addition, throughout the review period, USACE provided documents at the request of panel members. These documents were provided to Battelle and then sent to the Panel as additional information only and were not part of the official review. A list of these additional documents provided to the Panel is provided below.

- App_D_Bubbly_Creek_Geotech_IEPR-updated.pdf
- Geotech Appendix D Version Differences Chart.xlsx
- No 1 Response_WaterLevels.pdf
- No 3_Mape of Restoration Sites within Chicago and along the CAWS.pdf
- No 4A_Report USACE Bubbly Creek_VOL1_July 2010_Final.pdf
- No 4B_Report USACE Bubbly Creek_VOL2_July 2010_Final.pdf
- No 5 Bathymetry.pdf
- No 8_Response_MWRD BC Archer Ave Data5-14.xlsx
- No 13 CDMBorings.pdf
- No 13 STS Borings.pdf
- No 13 PEIBorings.pdf
- No 13 Materials.pdf
- No 24_Response_macrophyte cover.pdf
- No 26_MWRD N Shore Channel Data5-14.xlsx
- No 30_picture of Northerly Island vegetation.jpg
- No 32 Bubbly Creek-FEAS-PlantingDesign_QuantitiesForCost.pdf
- BC_AA_Costs_Nov2013_IEPR.xlsx.

A.2 Review of Individual Comments

The Panel was instructed to address the charge questions/discussion points within a charge question response table provided by Battelle. At the end of the review period, the Panel produced individual comments in response to the charge questions/discussion points. Battelle reviewed the comments to identify overall recurring themes, areas of potential conflict, and other overall impressions. At the end of the review, Battelle summarized the individual comments in a preliminary list of 16 overall comments and discussion points. Each panel member's individual comments were shared with the full Panel in a merged individual comments table.

A.3 IEPR Panel Teleconference

Battelle facilitated a 4-hour teleconference with the Panel so that the panel members could exchange technical information. The main goal of the teleconference was to identify which issues should be carried forward as Final Panel Comments in the Final IEPR Report and decide which panel member would serve as the lead author for the development of each Final Panel Comment. This information exchange ensured that the Final IEPR Report would accurately represent the Panel's assessment of the project, including any conflicting opinions. The Panel engaged in a thorough discussion of the overall positive and negative comments, added any missing issues of significant importance to the findings, and merged any related individual comments. At the conclusion of the teleconference, Battelle reviewed each Final Panel Comment with the Panel, including the associated level of significance, and confirmed the lead author for each comment.

The Panel also discussed responses to four specific charge questions where there appeared to be disagreement among panel members. The conflicting comments were resolved based on the professional judgment of the Panel, and all sets of comments were determined not to be conflicting. Each comment was either incorporated into a Final Panel Comment, determined to be consistent with other Final Panel Comments already developed, or determined to be a non-significant issue.

At the end of these discussions, the Panel identified 12 comments and discussion points that should be brought forward as Final Panel Comments.

A.4 Preparation of Final Panel Comments

Following the teleconference, Battelle prepared a summary memorandum for the Panel documenting each Final Panel Comment (organized by level of significance). The memorandum provided the following detailed guidance on the approach and format to be used to develop the Final Panel Comments for the Bubbly Creek IEPR:

- **Lead Responsibility:** For each Final Panel Comment, one Panel member was identified as the lead author responsible for coordinating the development of the Final Panel Comment and submitting it to Battelle. Battelle modified lead assignments at the direction of the Panel. To assist each lead in the development of the Final Panel Comments, Battelle distributed the merged individual comments table, a summary detailing each draft final comment statement, an example Final Panel Comment following the four-part structure described below, and templates for the preparation of each Final Panel Comment.
- **Directive to the Lead:** Each lead was encouraged to communicate directly with the other panel member as needed and to contribute to a particular Final Panel Comment. If a significant comment was identified that was not covered by one of the original Final Panel Comments, the appropriate lead was instructed to draft a new Final Panel Comment.
- **Format for Final Panel Comments:** Each Final Panel Comment was presented as part of a four-part structure:
 1. Comment Statement (succinct summary statement of concern)
 2. Basis for Comment (details regarding the concern)
 3. Significance (high, medium/high, medium, medium/low, and low; see description below)
 4. Recommendation(s) for Resolution (see description below).

- **Criteria for Significance:** The following were used as criteria for assigning a significance level to each Final Panel Comment:
 1. **High:** Describes a fundamental issue with the project that affects the current recommendation or justification of the project, and which will affect its future success, if the project moves forward without the issue being addressed. Comments rated as high indicate that the Panel determined that the current methods, models, and/or analyses contain a “showstopper” issue.
 2. **Medium/High:** Describes a potential fundamental issue with the project, which has not been evaluated at a level appropriate to this stage in the Planning process. Comments rated as medium/high indicate that the Panel analyzed or assessed the methods, models, and/or analyses available at this stage in the Planning process and has determined that if the issue is not addressed, it could lead to a “showstopper” issue.
 3. **Medium:** Describes an issue with the project, which does not align with the currently assessed level of risk assigned at this stage in the Planning process. Comments rated as medium indicate that, based on the information provided, the Panel identified an issue that would raise the risk level if the issue is not appropriately addressed.
 4. **Medium/Low:** Affects the completeness of the report at this time in describing the project, but will not affect the recommendation or justification of the project. Comments rated as medium/low indicate that the Panel does not currently have sufficient information to analyze or assess the methods, models, or analyses.
 5. **Low:** Affects the understanding or accuracy of the project as described in the report, but will not affect the recommendation or justification of the project. Comments rated as low indicate that the Panel identified information that was mislabeled or incorrect or that certain data or report section(s) were not clearly described or presented.
- **Guidelines for Developing Recommendations:** The recommendation section was to include specific actions that USACE should consider to resolve the Final Panel Comment (e.g., suggestions on how and where to incorporate data into the analysis, how and where to address insufficiencies, areas where additional documentation is needed).

Battelle reviewed and edited the Final Panel Comments for clarity, consistency with the comment statement, and adherence to guidance on the Panel’s overall charge, which included ensuring that there were no comments regarding either the appropriateness of the selected alternative or USACE policy. At the end of this process, 12 Final Panel Comments were prepared and assembled. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The Final Panel Comments are presented in the main report.

APPENDIX B

Identification and Selection of IEPR Panel Members
for the Bubbly Creek Project

This page is intentionally left blank.

B.1 Panel Identification

The candidates for the Bubbly Creek Ecosystem Restoration Feasibility Study (hereinafter: Bubbly Creek IEPR) Panel were evaluated based on their technical expertise in the following key areas: economics, recognized environmental conditions, biology/water quality and civil engineering. These areas correspond to the technical content of the Bubbly Creek IEPR review documents and overall scope of the Bubbly Creek project.

To identify candidate panel members, Battelle reviewed the credentials of the experts in Battelle's Peer Reviewer Database, sought recommendations from colleagues, contacted former panel members, and conducted targeted Internet searches. Battelle evaluated these candidate panel members in terms of their technical expertise and potential conflicts of interest (COIs). Of these candidates, Battelle chose the most qualified individuals, confirmed their interest and availability, and ultimately selected four experts for the final Panel.

The four selected reviewers constituted the final Panel. The remaining candidates were not proposed for a variety of reasons, including lack of availability, disclosed COIs, or lack of the precise technical expertise required.

The candidates were screened for the following potential exclusion criteria or COIs.¹ These COI questions serve as a means of disclosure and to better characterize a candidate's employment history and background. Providing a positive response to a COI screening question did not automatically preclude a candidate from serving on the Panel. For example, participation in previous USACE technical peer review committees and other technical review panel experience was included as a COI screening question. A positive response to this question could be considered a benefit.

- Previous and/or current involvement by you or your firm² in the Bubbly Creek Ecosystem Restoration Feasibility Study, Draft Integrated Feasibility Report and Environmental Assessment.
- Previous and/or current involvement by you or your firm² in ecosystem restoration in urban areas specifically, the upper Midwest or Chicago.
- Previous and/or current involvement by you or your firm² in the Bubbly Creek Ecosystem Restoration Feasibility Study, Draft Integrated Feasibility Report and Environmental Assessment or related projects.
- Previous and/or current involvement by you or your firm² in the conceptual or actual design, construction, or operations and maintenance of any projects in the Bubbly Creek Ecosystem Restoration Feasibility Study, Draft Integrated Feasibility Report and Environmental Assessment or related projects.

¹ Battelle evaluated whether scientists in universities and consulting firms that are receiving USACE-funding have sufficient independence from USACE to be appropriate peer reviewers. See OMB (2004, p. 18), "...when a scientist is awarded a government research grant through an investigator-initiated, peer-reviewed competition, there generally should be no question as to that scientist's ability to offer independent scientific advice to the agency on other projects. This contrasts, for example, to a situation in which a scientist has a consulting or contractual arrangement with the agency or office sponsoring a peer review. Likewise, when the agency and a researcher work together (e.g., through a cooperative agreement) to design or implement a study, there is less independence from the agency. Furthermore, if a scientist has repeatedly served as a reviewer for the same agency, some may question whether that scientist is sufficiently independent from the agency to be employed as a peer reviewer on agency-sponsored projects."

² Includes any joint ventures in which a panel member's firm is involved and if the firm serves as a prime or as a subcontractor to a prime.

- Current employment by the U.S. Army Corps of Engineers (USACE).
- Previous and/or current involvement with paid or unpaid expert testimony related to Bubbly Creek Ecosystem Restoration Feasibility Study, Draft Integrated Feasibility Report and Environmental Assessment.
- Previous and/or current employment or affiliation with members of the cooperating agencies or local sponsors: City of Chicago (for pay or pro bono).
- Past, current, or future interests or involvements (financial or otherwise) by you, your spouse, or your children related to Midwest or Chicago.
- Current personal involvement with other USACE projects, including whether involvement was to author any manuals or guidance documents for USACE. If yes, provide titles of documents or description of project, dates, and location (USACE district, division, Headquarters, Engineer Research and Development Center [ERDC], etc.), and position/role. Please highlight and discuss in greater detail any projects that are specifically with the Chicago District.
- Previous or current involvement with the development or testing of models that will be used for or in support of the Bubbly Creek Ecosystem Restoration Feasibility Study, Draft Integrated Feasibility Report and Environmental Assessment project.
- Current firm² involvement with other USACE projects, specifically those projects/contracts that are with the Chicago District. If yes, provide title/description, dates, and location (USACE district, division, Headquarters, ERDC, etc.), and position/role. Please also clearly delineate the percentage of work you personally are currently conducting for the Chicago District. Please explain.
- Any previous employment by USACE as a direct employee, notably if employment was with the Chicago District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.
- Any previous employment by USACE as a contractor (either as an individual or through your firm²) within the last 10 years, notably if those projects/contracts are with the Chicago District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.
- Previous experience conducting technical peer reviews. If yes, please highlight and discuss any technical reviews concerning ecosystem restoration in urban areas, and include the client/agency and duration of review (approximate dates).
- Pending, current, or future financial interests in Bubbly Creek Ecosystem Restoration Feasibility Study, Draft Integrated Feasibility Report and Environmental Assessment or related contracts/awards from USACE.
- A significant portion (i.e., greater than 50%) of personal or firm² revenues within the last 3 years came from USACE contracts.
- A significant portion (i.e., greater than 50%) of personal or firm² revenues within the last 3 years from contracts with the non-Federal sponsor (City of Chicago).
- Any publicly documented statement (including, for example, advocating for or discouraging against) related to Bubbly Creek Ecosystem Restoration Feasibility Study, Draft Integrated Feasibility Report and Environmental Assessment.
- Participation in relevant prior and/or current Federal studies relevant to this project and/or Bubbly Creek Ecosystem Restoration Feasibility Study, Draft Integrated Feasibility Report and Environmental Assessment.

- Previous and/or current participation in prior non-Federal studies relevant to this project and/or Bubbly Creek Ecosystem Restoration Feasibility Study, Draft Integrated Feasibility Report and Environmental Assessment.
- Is there any past, present, or future activity, relationship, or interest (financial or otherwise) that could make it appear that you would be unable to provide unbiased services on this project? If so, please describe:

Other considerations:

- Participation in previous USACE technical review panels
- Other technical review panel experience.

B.2 Panel Selection

In selecting the final members of the Panel, Battelle chose experts who best fit the expertise areas and had no COIs. One of the four final reviewers was affiliated with a university; the others were affiliated with consulting companies. Battelle established subcontracts with the panel members when they indicated their willingness to participate and confirmed the absence of COIs through a signed COI form. USACE was given the list of candidate panel members, but Battelle selected the final Panel.

An overview of the credentials of the final four members of the Panel and their qualifications in relation to the technical evaluation criteria is presented in Table B-1. More detailed biographical information regarding each panel member and his area of technical expertise is presented in Section B.3.

Table B-1. Bubbly Creek IEPR Panel: Technical Criteria and Areas of Expertise

Technical Criterion	Maier	Bovitz	Denbow	Brown
Economics				
Ability to evaluate the appropriateness of cost effectiveness/incremental cost analysis (CE/ICA) as applied to dollar costs and ecosystem restoration benefits	X			
Familiarity with Corps of Engineers IWR-Planning Suite is preferred	X			
Experience with National Ecosystem Restoration (NER) analysis procedures	X			
Recognized Environmental Conditions				
Minimum 10 years' experience with hazardous materials and contaminants related to aquatic environments		X		
Expertise in reclamation and habitat restoration in contaminated aquatic areas.		X		
Strong knowledge of law and policy associated with Resource Conservation and Recovery Act/Hazardous Toxic and Radioactive Waste (HTRW) issues including Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)		X		
Active participation in related professional societies is preferred		X		
Biology/Water Quality				
Minimum 10 year's demonstrated experience in the upper Midwest			X	
Strong knowledge of the following:				
wetlands ecology and restoration			X	
submergent & emergent aquatic vegetation			X	
aquatic ecology			X	
water quality			X	
Extensive aquatic and wetlands habitat restoration experience in urban landscapes			X	
M.S. degree or higher in appropriate field of study			W ¹	
Active participation in related professional societies is preferred			X	
Civil Engineering				
Minimum 10 years' experience in engineering with an emphasis on public works projects associated with ecosystem restoration design				X
Background in hydrology and hydraulics engineering and geotechnical engineering				X
Experience working with urban hydrology, stormwater issues and sediment transport				X
Experience with design and implementation of habitat restoration projects in urban landscapes				X
Registered Professional Engineer				X

W¹ - Waiver submitted and approved by USACE

B.3 Panel Member Qualifications

Daniel Maher, PMP

Role: Economics experience and expertise.

Affiliation: DSM Contracting, LLC

Mr. Maher is an independent consultant and senior economist at DSM Contracting, LLC and has 25 years of experience managing numerous ecosystem restoration, incremental analyses, economic impact, and water supply studies for clients throughout the United States. He earned his M.S. in agricultural economics from Louisiana State University in 1988. He has served as an economist and project manager on over 50 USACE planning studies and has been responsible for assisting in alternative development and screening, and conducting economic analysis in accordance with USACE principles and guidelines for ecosystem restoration, flood risk management, navigation, recreation, and water supply studies.

Mr. Maher is able to evaluate the appropriateness of CE/ICA as applied to dollar costs and ecosystem restoration benefits. He has conducted this work on numerous USACE ecosystem restoration projects, notably the Canonsburg Lake Ecosystem Restoration Project, Pennsylvania and the Licking River/Dillon Lake Ecosystem Restoration Project, Ohio. His work on the Canonsburg Lake project involved evaluating alternatives to determine the net increase in habitat units resulting from the enhancement of natural lake, wetland, and riparian zone areas. He has experience with the USACE IWR-Planning Suite and has conducted CE/ICA using IWR-Planning Suite, and its predecessor IWR-Plan, on numerous ecosystem restoration projects including Incremental Analysis for Four Feasibility Level Studies on the Ohio River Ecosystem Restoration Project, Ohio; Section 1135: Ecosystem Restoration for Chicopit Bay, Florida; and Incremental Analysis on the Ohio River – Hovey Lake Restoration Project. For the Ohio River Ecosystem Restoration Project, Mr. Maher served as the project manager and senior economist responsible for preparing incremental cost analyses on four feasibility level studies associated with a proposed ecosystem restoration program for the Ohio River. Major tasks he performed included developing alternatives for meeting the objectives of the project, developing construction costs and environmental output associated with each alternative and the incremental costs of producing environmental output of each cost effective alternative.

Mr. Maher also has experience with NER analysis procedures. He was responsible for assisting in the development of restoration alternatives, guiding USACE study teams in estimating the environmental benefits in the appropriate metric, annualizing costs and benefits, and using the IWR-Planning Suite software to determine the cost-effective and "best buy" restoration alternatives to assist decision makers in selecting the NER Plan. Projects include the Canonsburg Lake Restoration Project; the Licking River and Dillon Lake Ecosystem Restoration Project, Incremental Analysis for Four Feasibility Level Studies on the Ohio River Ecosystem Restoration Project; Section 1135: and the Incremental Analysis on the Ohio River Ecosystem Restoration Project, IN10 – Hovey Lake Restoration Project.

Mr. Maher has also participated as the economics panel member for several IEPRs, including one with a large ecosystem restoration component, the General Reevaluation Report for the Truckee Meadows Flood Control Project, Nevada, and IEPRs such as the Major Rehabilitation of the Jetty System at the Mouth of the Columbia River; Berryessa Creek, Santa Clara County, California, General Reevaluation Study Draft General Reevaluation Report and Environmental Impact Statement/Environmental Impact Report; and Jacksonville Harbor, Florida Navigation Project Integrated General Reevaluation Report and Environmental Impact Statement. Mr. Maher maintains Project Management Professional certification through the Project Management Institute.

Paul Bovitz, PWS, LSRP, CEM, LEED AP

Role: Recognized environmental conditions experience and expertise.

Affiliation: Worley Parsons, USA

Mr. Bovitz is an environmental scientist and project manager with Worley Parsons located in Hillsborough, New Jersey. He has more than 24 years of experience in environmental assessments, including several Department of Defense sites, and U.S. Environmental Protection Agency (EPA) National Priority List sites nationwide. He has 29 years of technical experience in ecological assessment and natural resources management in public, private, and academic sectors, engaging in both theoretical and applied aspects of ecological research and encompassing a variety of geographic regions and aquatic environments. He earned an M.S. in ecology from Rutgers University in 1992. He has managed and participated as principal investigator in a variety of projects and programs with varied environmental impacts including environmental assessments under NEPA, water quality and storm water studies, wetlands delineation, assessment, mitigation and permitting, and essential fish habitat investigation.

Mr. Bovitz has expertise in reclamation and habitat restoration in contaminated aquatic areas demonstrated by his work experience on a variety of projects throughout the United States. He has led restoration efforts for contaminated wetlands at several sites in New Jersey, and made recommendations regarding sites in several Midwestern states including Indiana, Michigan, and Wisconsin, as well as in New York and Massachusetts. For example, on the Hatco Facility (Fords, New Jersey) Ecological Risk Assessment and Restoration project, he directed the design and implementation of a 4.5-acre wetland restoration project adjacent to an active chemical manufacturing facility associated with the removal of over 20,000 cubic yards of PCB-contaminated sediments. The project involved removal of historical fill, stabilization of stream channels, replanting of over 1,200 trees and 2,000 shrubs, and removal of invasive species. He has also been involved in ecological assessments and site characterization studies in Wisconsin, Michigan, Utah, and Colorado with EPA Environmental Response Teams (ERTs).

Mr. Bovitz has a strong knowledge of law and policy associated with HTRW issues including CERCLA. He is a Licensed Site Remediation Professional in New Jersey and has extensive experience as a USACE and EPA contractor in investigation and remediation of CERCLA sites. He is also a certified Professional Wetland Scientist (PWS), a Certified Energy Manager, and is a LEED® Accredited Professional. He is a member of the New Jersey Governor's Science Advisory Board, Ecological Sciences Committee, and served on the New Jersey Department of Environmental Protection, Comparative Ecological Risk Analysis Panel. Relevant Midwest experience includes his participation in the Ecological Assessment of Kalamazoo River, Enbridge Oil Spill, Marshall, Michigan, U.S. EPA Region 5 (EPA Representative); and his participation as an IEPR panel member focused on identifying ecological and HTRW issues for the Wood River Flood Control Project, USACE, St. Louis District. He has served on other IEPRs that included various degrees of ecological restoration components as well.

Mr. Bovitz is an active member of several professional groups including the Society of American Military Engineers, a New Jersey chapter of the Society of Environmental Toxicology and Chemistry and attends Association of Environmental and Engineering Geologist meetings. This summer he will be chairing a session on urban ecological restoration for the Conference on Ecological and Ecosystem Restoration 2014 meeting in New Orleans.

Thomas Denbow, PMP

Role: Biology/water quality experience and expertise.

Affiliation: Biohabitats, Inc.

Mr. Denbow is a certified Project Management Professional and the Great Lakes Bioregional Team Leader and Senior Environmental Scientist with Biohabitats, Inc. He earned his B.S. in zoology from Bowling Green State University in 1971, and has 35 years direct experience in specializing in water resources management including watershed and regional conservation planning, innovative floodplain management, storm water management, innovative best management practices including low impact development, wetlands, riparian, and stream protection and restoration, and water quality management for both public and private project stakeholders and clientele.

Mr. Denbow has a strong knowledge of wetland ecology and restoration with relevant studies in the Upper Midwest including Wetland Conservation Area, New Albany Company and Ohio Department of Transportation (Columbus, OH) and Portage County, Comprehensive Wetland Inventory and Map and Advanced Identification Demonstration Project, U.S. EPA, Region 5 (Chicago, Illinois). As project manager for the Wetland Conservation Area project, he was responsible for the siting and design of a 17-acre wetland replacement site designed to protect existing water quality in a watershed rapidly undergoing development. He was also the co-principal investigator responsible for another habitat restoration project by developing a technical manual for the siting, design, construction, and monitoring of replacement wetlands¹.

Mr. Denbow is familiar with submergent and emergent aquatic vegetation and aquatic ecology and also has experience with aquatic vascular plants and aquatic insects. He has been involved in such studies as the evaluation of Priority Wetland and Stream Restoration Sites in the Blanchard River Watershed to establish priority restoration areas; Ecological Restoration Master Plan for Lower Black River in Lorain, Ohio, that included identifying priority aquatic restoration sites using the Lake/Lacustrine Qualitative Habitat Evaluation Index (LQHEI) and monitoring data; and Assessment of Aquatic Vascular Plants at Honey Point, North Bass Island. He was also responsible for the preparation and implementation of a 32-hour technical training course² for engineers and water quality scientists that served as a technical manual on all aspects of highway stormwater runoff that included aquatic and wetland impacts, monitoring procedures, impact prediction techniques, and best management practices mitigation techniques.

Mr. Denbow's extensive experience with aquatic and wetlands habitat restoration in urban landscapes include the I-490 Corridor Study and Draft Environmental Impact Statement, Cleveland, Ohio; Little Cuyahoga River Restoration Project (USACE Buffalo District); the Portage County Comprehensive Wetland Inventory and Map and Advanced Identification Demonstration Project (EPA Region 5, Chicago, Illinois); and the Brush Creek Watershed Assessment, Kansas City, Kansas. For the Cuyahoga River project, he led a team of biologists, landscape architects, and civil engineers in developing a recommended restoration plan for restoring this highly disturbed section of the river. Key features that had to be considered were a low-head dam, railroad and roadway bridge crossings through the study area, extensive encroachment by and presence of suspected hazardous waste sites of potential concern. The project was anticipated to significantly improve habitat outputs and help with the overall goal of restoring beneficial uses of the Cuyahoga River watershed. Mr. Denbow is a member of the Society of Ecological Restoration and Natural Areas Association.

¹*Guidelines for the Development of Wetland Mitigation Areas - NCHRP Report No. 379, Transportation Research Board, Washington, D.C.*

²Highway Runoff Water Quality Training Course, Federal Highway Administration, National Highway Institute, Washington, D.C.

Christopher Brown, P.E., Ph.D.

Role: Civil engineering experience and expertise.

Affiliation: University of North Florida

Dr. Brown is an assistant professor at the University of North Florida teaching civil engineering, fluid mechanics, hydraulics, senior design, foundation engineering, and engineering geology. He earned his Ph.D. in civil engineering in 2005 from the University of Florida and is a licensed, practicing professional engineer in Florida and Pennsylvania focusing on water resources and geotechnical engineering. Dr. Brown has 23 years of experience working with and for USACE (Philadelphia District, 1991 to 1999, Jacksonville District, 1999 to 2006), as well as municipal governments and private engineering firms.

Dr. Brown is a civil engineer with experience and knowledge in both hydrology and hydraulics (H&H), and geotechnical engineering. His Ph.D. research focused on hydrology and his Master's work focused on geoenvironmental engineering. Dr. Brown has worked in water resources and geotechnical engineering for his entire career for Waste Management Inc., USACE (Philadelphia and Jacksonville Districts), Golder Associates, and the University of North Florida (research projects). His H&H and geotechnical engineering experience ranges from development of numerical models (HEC, HEC-HMS, HEC-RAS, SWMM) to the design of foundation systems, design of retaining walls in urban areas, hazardous waste remediation (groundwater hydrology), and earthwork to more significant restoration of the Everglades ecosystem. His Everglades Restoration experience includes the development of an aquifer, storage and recovery (ASR) site selection suitability index in support of the Comprehensive Everglades Restoration Project, studies on the environmental restoration of the C-111 basin, and the assessment of seepage along the L-31N Canal.

He has extensive experience conducting independent peer reviews and project evaluations for projects in the St. Louis, Rock Island, New Orleans, Omaha, Louisville, Dallas, and Walla Walla USACE Districts. The projects have included wetland mitigation design, urban stream restoration, canals, and stormwater reuse. Demonstrable project study experience in the Midwest includes his involvement as an engineering discipline reviewer for the IEPRs of the USACE Missouri River Environmental Restoration Mega Study; the USACE Alton to Gale Organized Levee Districts, Illinois and Missouri; the USACE Melvin Price Wood River Underseepage Design Deficiency Project, Madison County, Illinois; and the USACE Olmsted Locks and Dam 52 and 53 Replacement Project, Ohio.

Dr. Brown has experience working with urban hydrology, stormwater issues, and sediment transport from his academic research and his consulting work. He has worked on flood control and restoration projects in Patterson, New Jersey; Little Mill Creek in Delaware; Schuylkill River in Reading, Pennsylvania; Alafia River in Tampa, Florida; Portugués River in Ponce, Puerto Rico; and Little Fishweir Creek in Jacksonville, Florida. Dr. Brown has investigated erosion, sediment movement, wetlands, restoring natural channels, adding riffles, adding fish refugia, and pilot channels. He also has experience with design and implementation of habitat restoration projects in urban landscapes and is currently working on a project involving the restoration of an urban basin in Jacksonville, Florida.

APPENDIX C

Final Charge to the IEPR Submitted
to USACE on May 14, 2014 for the
Bubbly Creek Project

This page is intentionally left blank.

CHARGE QUESTIONS AND GUIDANCE TO THE PANEL MEMBERS FOR THE IEPR OF THE BUBBLY CREEK ECOSYSTEM RESTORATION FEASIBILITY STUDY

Charge Questions and Guidance to the Panel Members for the

Independent External Peer Review of the Bubbly Creek Ecosystem Restoration Feasibility Study

BACKGROUND

The study area includes the 1.25 mile long channel of Bubbly Creek and its immediate riparian zone. This channel is located entirely within the City of Chicago, Cook County, Illinois. Bubbly Creek is part of the Chicago Area Waterway System (CAWS) (Figure 1).

Before the 1830s, the Bubbly Creek was a prairie slough that drained five square miles of a pristine aquatic and terrestrial habitat mosaic. Over a period of several decades, this ecosystem was severely altered by human activities. Currently, Bubbly Creek no longer provides a diversity of habitats, nor is the existing habitat quality sufficient to maintain structure and support healthy plant and animal communities. To date, there have been numerous studies and assessments describing and characterizing the Bubbly Creek study area. Based on these and additional information and modeling produced by the U.S. Army Corps of Engineers (USACE), a set of Problems and Opportunities were developed by the study team, non-Federal sponsors, and supporting stakeholders. These drive the need for action, which is summarized as the historic loss of significant migratory bird, fish, and wildlife aquatic habitat.

OBJECTIVES

The objective of this work is to conduct an independent external peer review (IEPR) of the Bubbly Creek Ecosystem Restoration Feasibility Study (hereinafter: Bubbly Creek IEPR) in accordance with the Department of the Army, USACE, Water Resources Policies and Authorities' *Civil Works Review* (Engineer Circular [EC] 1165-2-214, December 15, 2012), and the Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (December 16, 2004).

Peer review is one of the important procedures used to ensure that the quality of published information meets the standards of the scientific and technical community. Peer review typically evaluates the clarity of hypotheses, validity of the research design, quality of data collection procedures, robustness of the methods employed, appropriateness of the methods for the hypotheses being tested, extent to which the conclusions follow from the analysis, and strengths and limitations of the overall product.

The purpose of the IEPR is to assess the "adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (EC 1165-2-214; p. D-4) for the Bubbly Creek IEPR documents. The IEPR will be limited to technical review and will not involve policy review. The IEPR will be conducted by subject matter experts (i.e., IEPR panel members) with extensive experience in biology/water quality, environmental conditions specific to hazardous, toxic, and radioactive waste

(HTRW), civil engineering, and economic issues relevant to the project. They will also have experience applying their subject matter expertise to ecosystem restoration.

The Panel will be “charged” with responding to specific technical questions as well as providing a broad technical evaluation of the overall project. Per EC 1165-2-214, Appendix D, review panels should identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods. Review panels should be able to evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable. Reviews should focus on assumptions, data, methods, and models. The panel members may offer their opinions as to whether there are sufficient analyses upon which to base a recommendation.

DOCUMENTS PROVIDED

The following is a list of documents, supporting information, and reference materials that will be provided for the review.

Documents for Review

The following documents are to be reviewed by designated discipline:

Review Document	Approx. No. of Pages	Required Disciplines
Draft Integrated Feasibility Report and EA (November 2013 version)	122	All Disciplines
Appendix A: Hydrology and Hydraulics	191	Civil Engineering
Appendix B: Compliance, Coordination and Information	61	Biology/Water Quality and Environmental Conditions
Appendix C: Civil Design	21	Civil Engineering
Appendix D: Geotechnical	163	Civil Engineering
Appendix E: Cost Engineering	24	Civil Engineering and Economics
Appendix F: Hazardous, Toxic and Radioactive Waste	59	Biology/Water Quality, Environmental Conditions, and Civil Engineering
Appendix G: Real Estate Planning Report	16	Biology/Water Quality, Environmental Conditions, and Economics
Appendix H: Monitoring and Adaptive Management Plan	10	Biology/Water Quality and Environmental Conditions
Public Comments	50	All Disciplines
Total Page Count	717	
Supplemental Information		
Appendix I Bubbly Creek Value Engineering Study	120	Civil Engineering, Economics

Documents for Reference

- USACE guidance *Civil Works Review*, (EC 1165-2-214, December 15, 2012)
- Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (December 16, 2004).

SCHEDULE

This draft schedule is based on the May 1, 2014, receipt of the final review documents. Note that dates presented in the schedule below could change due to panel member and USACE availability.

Task	Action	Due Date
Conduct Peer Review	Battelle sends review documents to panel members	5/13/2014
	Battelle convenes kick-off meeting with panel members	5/6/2014
	Battelle convenes kick-off meeting with USACE and panel members	5/15/2014
	Battelle convenes mid-review teleconference for panel members to ask clarifying questions of USACE	5/27/2014
	Panel members complete their individual reviews	6/3/2014
Prepare Final Panel Comments and Final IEPR Report	Battelle provides panel members with talking points for Panel Review Teleconference	6/5/2014
	Battelle convenes Panel Review Teleconference	6/9/2014
	Battelle provides Final Panel Comment templates and instructions to panel members	6/10/2014
	Panel members provide draft Final Panel Comments to Battelle	6/17/2014
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	6/17/2014-6/26/2014
	Panel finalizes Final Panel Comments	6/26/2014
	Battelle provides Final IEPR Report to panel members for review	6/30/2014
	Panel members provide comments on Final IEPR Report	7/2/2014
	Public Comment Review Period	6/1/2014-6/30/2014
	USACE provides public comments	7/7/2014
	Battelle sends public comments to Panel	7/8/2014
	Panel completes their review of the public comments	7/10/2014
	Panel drafts Final Panel Comment, if necessary	7/11/2014
	Panel finalizes Final Panel Comment regarding public comments	7/14/2014
	Battelle submits Final IEPR Report to USACE *	7/15/2014
Comment/Response Process	Battelle inputs Final Panel Comments to DrChecks and provides Final Panel Comment response template to USACE	7/15/2014
	Battelle convenes teleconference with Panel to review the Post-Final Panel Comment Response Process	7/17/2014
	USACE provides draft PDT Evaluator Responses to Battelle	7/22/2014
	Battelle provides the panel members the draft PDT Evaluator Responses	7/24/2014
	Panel members provide Battelle with draft BackCheck Responses	7/29/2014
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	7/30/2014
	Battelle convenes Comment-Response Teleconference with panel members and USACE	7/31/2014
	USACE inputs final PDT Evaluator Responses to DrChecks	8/5/2014
	Battelle provides final PDT Evaluator Responses to panel members	8/8/2014
	Panel members provide Battelle with final BackCheck Responses	8/13/2014
	Battelle inputs the panel members' final BackCheck Responses to DrChecks	8/15/2014
	Battelle submits pdf printout of DrChecks project file *	8/18/2014
Civil Works Review Board (CWRB)	Panel prepares and/or reviews slides for CWRB	TBD
	Civil Works Review Board	TBD

* Deliverables

CHARGE FOR PEER REVIEW

Members of this IEPR Panel are asked to determine whether the technical approach and scientific rationale presented in the Bubbly Creek IEPR documents are credible and whether the conclusions are valid. The Panel is asked to determine whether the technical work is adequate, competently performed, and properly documented; satisfies established quality requirements; and yields scientifically credible conclusions. The Panel is being asked to provide feedback on the economic, engineering, environmental resources, and plan formulation. The panel members are not being asked whether they would have conducted the work in a similar manner.

Specific questions for the Panel (by report section or appendix) are included in the general charge guidance, which is provided below.

General Charge Guidance

Please answer the scientific and technical questions listed below and conduct a broad overview of the Bubbly Creek IEPR documents. Please focus your review on the review materials assigned to your discipline/area of expertise and technical knowledge. Even though there are some sections with no questions associated with them, that does not mean that you cannot comment on them. Please feel free to make any relevant and appropriate comment on any of the sections and appendices you were asked to review. In addition, please note the following guidance. Note that the Panel will be asked to provide an overall statement related to 2 and 3 below per USACE guidance (EC 1165-2-214; Appendix D).

1. Your response to the charge questions should not be limited to a “yes” or “no.” Please provide complete answers to fully explain your response.
2. Assess the adequacy and acceptability of the economic and environmental assumptions and projections, project evaluation data, and any biological opinions of the project study.
3. Assess the adequacy and acceptability of the economic analyses, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating risk and uncertainty, and models used in evaluating economic or environmental impacts of the proposed project.
4. If appropriate, offer opinions as to whether there are sufficient analyses upon which to base a recommendation.
5. Identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods.
6. Evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable.
7. Please focus the review on assumptions, data, methods, and models.

Please **do not** make recommendations on whether a particular alternative should be implemented, or whether you would have conducted the work in a similar manner. Also, please **do not** comment on or make recommendations on policy issues and decision making. Comments should be provided based on your professional judgment, **not** the legality of the document.

1. If desired, panel members can contact one another. However, panel members **should not** contact anyone who is or was involved in the project, prepared the subject documents, or was part of the USACE Agency Technical Review (ATR).
2. Please contact the Battelle Project Manager (Lynn McLeod, mcleod@battelle.org) or Deputy Program Manager (Rachel Sell (SellR@battelle.org) for requests or additional information.
3. In case of media contact, notify the Battelle Program Manager, Karen Johnson-Young (johnson-youngk@battelle.org) immediately.
4. Your name will appear as one of the panel members in the peer review. Your comments will be included in the Final IEPR Report, but will remain anonymous.

Please submit your comments in electronic form to Lynn McLeod, mcleod@battelle.org, no later than June 3, 2014, 10 pm ET.

Independent External Peer Review
of the
Bubbly Creek Ecosystem Restoration Feasibility Study

Charge Questions and Relevant Sections as Supplied by USACE

General

1. Were all models used in the analyses used in an appropriate manner?
2. Are the models used sufficiently discriminatory to support the conclusions drawn from them (i.e., identify meaningful differences between alternatives)?
3. Were risk and uncertainty sufficiently considered?
4. Are potential life and safety issues accurately and adequately described under existing, future without-project, and future with-project conditions?
5. Are the risks associated with sediment contaminants and proposed restoration adequately characterized?
6. In your opinion, are there sufficient analyses upon which to base the recommendation?
7. To what extent has it been shown that the project is technically sound, environmentally acceptable, and economically justified?
8. In general terms, are the planning methods sound?
9. Are the interpretations of analysis and conclusions based on the analysis reasonable?

Problem, Needs, Constraints, and Opportunities

10. Are the problems, needs, constraints, and opportunities adequately and correctly defined?
11. Do the identified problems, needs, constraints, and opportunities reflect a systems, watershed, and/or ecosystem approach, addressing a geographic area large enough to ensure that plans address the cause-and-effect relationships among affected resources and activities that are pertinent to achieving the study objectives, i.e., evaluate the resources and related demands as a system?
12. Did the study address those resources identified during the scoping process as important in making decisions relating to the study?

Existing and Future Without-Project Resources

13. Has the character and scope of the study area been adequately described, and is the identified study area appropriate in terms of undertaking a systems/watershed/ecosystem based investigation?
14. Do you agree with the general analyses of the existing social, financial, and natural resources within the study area?
15. For your particular area of expertise, provide an in-depth review of whether the analyses of the existing social, financial, and natural resources within the project area are sufficient to support the estimation of impacts of the array of alternatives.
16. Given your area of expertise, does this section appropriately address the existing conditions of all resources pertinent to the study?
17. Were the surveys conducted to evaluate the existing social, financial, and natural resources adequate? If not, what types of surveys should have been conducted?
18. Were socioeconomic conditions adequately addressed? Were specific socioeconomic issues not addressed?
19. Was the hydrology discussion sufficient to characterize current baseline conditions and to allow for evaluation of how forecasted conditions (with and without proposed actions) are likely to affect hydrologic conditions? Please comment on the completeness of the discussion on the relationship between subsurface hydrology and the hydrodynamics of the project area.
20. Was the discussion of natural resources sufficient to characterize current baseline conditions and to allow for evaluation of forecasted conditions (with and without proposed actions)?
21. Were the assumptions used as the basis for developing the most probable future without-project conditions reasonable? Were adequate scenarios effectively considered (applied during analyses where relevant and/or reasonably investigated)? Were the potential effects of climate change addressed?
22. Are the future conditions expected to exist in the absence of a Federal project logical and adequately described and documented?
23. Please comment on the conclusion of the most probable future without-project condition. Do you envision other potential probable outcomes?

Plan Formulation / Evaluation

24. Was a reasonably complete array of possible measures considered in the development of alternatives?
25. Did the formulation process follow the requirement to avoid, minimize, and then mitigate adverse impacts on resources?
26. Does each alternative meet the formulation criteria of being effective, efficient, complete, and acceptable?

27. Were the assumptions made for use in developing the future with-project conditions for each alternative reasonable? Were adequate scenarios considered? Were the assumptions reasonably consistent across the range of alternatives and/or adequately justified where different?
28. Are the changes between the without- and with-project conditions adequately described for each alternative?
29. Are the uncertainties inherent in the evaluation of benefits, costs, and impacts, and any risk associated with those uncertainties, adequately addressed and described for each alternative?
30. Are future operation, maintenance, repair, replacement, and rehabilitation efforts adequately described and are the estimated costs of those efforts reasonable for each alternative?
31. Please comment on the screening of the proposed alternatives. Are the screening criteria appropriate? In your professional opinion, are the results of the screening acceptable? Were any measures or alternatives screened out too early?
32. Were the engineering, economic, and environmental analyses used for this study consistent with generally accepted methodologies? Why or why not?
33. Does any alternative include identified separable elements (i.e., a portion of a project that is physically separable, and produces hydrologic effects or physical or economic benefits that are separately identifiable from those produced by other portions of the project)? If so, is each identified separable element independently justified, and are the benefits, costs, and effects of the separable elements correctly divided?
34. Was the methodology used to conduct the incremental cost analysis adequate and valid?

Recommended Plan

35. Comment on whether you agree or disagree with how the alternatives were formulated. Comment on the plan formulation. Does the selected alternative meet the study objectives and avoid violating the study constraints?
36. Are there any unmitigated environmental impacts not identified and if so could they affect plan selection?
37. Please comment on the likelihood of the recommended plan to achieve the expected outputs.
38. Please comment on the completeness of the recommended plan, i.e., will any additional efforts, measures, or projects be needed to realize the expected benefits?
39. Please comment on the appropriateness of location, sizing, and design of plan features.
40. Are the scope and detail of the potential adverse effects that may arise as a result of project implementation sufficiently described and comprehensive?

Ecosystem Restoration

41. Are the expected changes in the quality and abundance of desired ecological resources clearly and precisely specified in justifying the ecosystem restoration and protection investment?

- a) Is the significance of the sought ecological resources clearly determined by institutionalized national goals (e.g., the ESA national goal to sustain native fish and wildlife, the NEPA goal to preserve natural heritage)?
 - b) Is the scarcity of the sought ecological resources characterized in terms of national abundance and significance (e.g., with indicators of low to high potential for sustainability)?
 - c) Is the distinctiveness of the sought ecological resources quality indicated (are there closely related resources that substitute in most respects)?
 - d) Are forecast changes in sought ecological resource quality quantified so as to indicate achievement of national goals?
42. Is it clear that restoration of the desired ecological resource quality is a function of improvements in habitat quality or quantity?
- a) Do planning models and procedures clearly link habitat improvement to the needs of the targeted ecological resources?
 - b) Do planning models and procedures adequately consider and provide for limiting factors beyond quality and quantity of habitat?
43. Is it clear that the restored ecological resource quality will be sustainable over the long run?
- o Are the risks facing successful restoration of sustainable ecological resource quality clearly shown to be managed and any residual risks identified in terms of :
 - a) Sufficient geophysical support (hydrology and geomorphology)?
 - b) Sufficient environmental chemistry?
 - c) Sufficient biological support (e.g., food, habitat, and systems-stabilizing species)?
 - d) Changes in climate and in the influential ecoregion (e.g., major land use changes)?
44. Are the required long-term commitments (both Federal and non-Federal) to sustaining the restored ecological resource quality adequately described and adequately demonstrated?
45. Are the proposed monitoring procedures clear and appropriate?
46. Is the proposed monitoring plan sufficiently detailed and comprehensive?
47. Are the costs for administering a monitoring and assessment program reasonable?
48. Is adaptive management adequately addressed?

Summary Questions

49. Please identify the most critical concerns (up to five) you have with the project and/or review documents. These concerns can be (but do not need to be) new ideas or issues that have not been raised previously.
50. Please provide positive feedback on the project and/or review documents.

