

Envisioning a Chicago Area Waterway System for the 21st Century Project

Peer Review Session One May 9 and 10, 2011

Introduction / Team Members

On May 9th and 10th 2011 a Peer Review Team was convened to review the progress made to date by the HDR team. The session took place in the Chicago offices of HDR and was facilitated by staff from Environmental Consulting & Technology, Inc. [ECT]. A purposefully diverse group of experts was selected to provide input to the project from wide perspectives.

The purpose of the effort was to:

- Obtain objective, outside expert perspectives
- Raise questions early in the study – avoid ‘gotchas’
- Identify concerns that may be raised by others
- Validate the process being undertaken, and
- Bring new insights/direction to the effort early enough in the process to avoid delays in the completion date.

The desired outcomes as stated at the beginning of the session were:

- Pose specific technical questions to the HDR Team
- Allow HDR to interactively provide answers
- Raise issues/concerns that need to be considered prior to public review of the material
- Facilitate potential resolutions of the issues identified
- Propose any “redirection” that could improve acceptance of the final recommendations

The Peer Reviewers were selected from experts in the fields of engineering, water quality, transportation planning, and economics with specific knowledge of the Chicago metropolitan area and the Chicago Area Waterway System. Team members and their backgrounds are presented below.

Frank H. Beal

Frank Beal is the Executive Director of Metropolis Strategies (formerly Chicago Metropolis 2020). He previously served as president of Ryerson International Inc., an operating unit of the former Inland Steel Industries. Prior to joining Inland Steel, he served as director of the Illinois Department of Energy and Natural Resources under Governor Thompson, and, as the state’s first deputy director of the Institute for Environmental Quality under Governor Ogilvie.

Formerly with the American Planning Association, he has edited and published several books, articles and reports on urban affairs and land use planning. Mr. Beal was appointed to the Chicago Metropolitan Agency for Planning Board as one of five representatives for the City of Chicago. He serves both the Waste Water Committee and the Programming Coordinating Committee. Mr. Beal graduated from the University of Illinois with a Master’s degree in Urban Planning and has a Bachelor’s degree in Engineering from Antioch College.

Josh Ellis

Josh Ellis has been on the staff of the Metropolitan Planning Council (MPC) since 2006. His focus is on advancing MPC's environmental and economic goals through policy research, advocacy, and community engagement. He manages MPC's water resources protection initiatives, co-authored *Before the Wells Run Dry*, and now works with state, regional and local leaders on strategies to sustainably manage Illinois' finite water resources. Mr. Ellis has served in an advisory capacity to governmental bodies including the Illinois Environmental Protection Agency, Metropolitan Water Reclamation District of Greater Chicago, City of Chicago mayoral transition team, and Village of Lake Zurich, as they develop new policy, programs, and investments in water infrastructure. He blogs and is a frequent public speaker on northeastern Illinois's water challenges, and has been a resource for national and local media. Through the Community Building Initiative, he provides technical assistance on transit-oriented development, energy efficiency, water supply, and stormwater. He co-authored *Retail 1-2-3*, one of MPC's guidebooks for local elected officials and staff. He also manages MPC's internal GIS for geospatial analysis of environmental, economic and demographic trends. This work includes investigating the jobs-housing mismatch, opportunities for transit expansion, and federal investment patterns.

Mr. Ellis has the following degrees: M.P.P., Public Policy, University of Chicago; M.A., Middle Eastern Studies, University of Chicago; B.A., English Literature, College of William and Mary

William Testa

Bill Testa has written widely in the areas of economic growth and development, the Midwest economy and state-local public finance. He directed a comprehensive long-term study and forecast of the Midwest economy, *Assessing the Midwest Economy: Looking Back for the Future*. He serves in an advisory or director's capacity to a variety of professional journals, nonprofit organizations, advisory boards and economic development initiatives in the Midwest. He chairs the Board of Trustees of the Illinois Council on Economic Education and serves on the boards of the Global Chicago Center of the Chicago Council on Global Affairs and the Economic Development Council of Chicago.

Mr. Testa was a visiting faculty member in the economics department at Tulane University in New Orleans and a graduate research fellow at the Academy for Contemporary Problems in Columbus, Ohio. He currently lectures at DePaul University's College of Commerce. Testa received his undergraduate degree from Northwestern University and a Ph.D. in economics from the Ohio State University.

Dr. Charles Melching

Dr. Charles Melching is Professor of Civil and Environmental Engineering at Marquette University in Milwaukee, Wisconsin. His areas of expertise include surface-water hydrology, rainfall-runoff modeling, stream water-quality modeling and the application of risk, reliability, and uncertainty analysis to water-resources and environmental problems. He is the Director of the Institute for Urban Environmental Risk Management. He has nearly 20 years of experience working on the hydraulics and water quality in the Chicago Area Waterways (CAWS). This began while he worked for the U.S. Geological Survey (USGS) where he evaluated the flow record at the acoustic velocity meter on the Chicago Sanitary and Ship Canal at Romeoville. Also while working for the USGS he provided data and analysis in support of the 3rd and 4th Committees for the Review of the Lake Michigan Diversion at Chicago. Later while at Marquette University he served as the Hydrologic and Hydraulic Modeling Expert on the 5th and 6th Lake Michigan Diversion Review Committees. Beginning in 2000, Dr. Melching developed and applied a model of flow and water quality for the CAWS for the Metropolitan Water Reclamation District of Greater Chicago.

Dr. Melching has the following degrees: Ph.D., Civil Engineering, University of Illinois; M.S., Civil Engineering, University of Illinois; B.S.E., Civil Engineering, Arizona State University.

Dale Bryson

Dale Bryson worked to protect clean water for 34 years at the U.S. EPA. He ended his career there as the director of EPA's Region 5 water division. Dale is also a former Board Chairman for the Alliance for the Great Lakes. He led the Alliance through its transition to a regional organization in 2005. A special fund to support Alliance interns in their work to keep Great Lakes water clean was established in Dale's honor after he retired from the board.

Mr. Bryson Has a Masters Degree in Civil Engineering from the University of Michigan and a B.S. in Civil Engineering from the South Dakota School of Mines and Technology.

Key Issues

Certain key points emerged during the discussions that took place throughout the review sessions. These include

- 1 Is the project too ambitious or should we focus just on AIS prevention?
- 2 Have we limited the number of alternatives too much prior to the next Advisory Committee meeting?
- 3 Will GLC/Cities Initiative be able to garner sufficient Congressional support to launch the larger initiative?
- 4 Is the transportation plan and proposed harbor/port development too "ambitious" and is it too much of a "hard sell?"
- 5 New technology should be considered to address some of the most challenging aspects of water quality improvement.
- 6 Will WWTP discharge requirements be different between the two watersheds?
- 7 How will GLC/Cities Initiative present the "local costs" (those for which local municipalities are responsible vs. MWRD) for improving the collection/feeder systems to allow deeper water on the post-separation lakeside portions of the CAWS and transporting CSOs away from the lake to the CAWS?
- 8 How will the cost of expanding the flow transport capacity (should it be required) of the CAWS (i.e. widening and deepening) be shared among the benefiting parties.

Format

The meeting began with an overview presentation of the project history. Roles of the Great Lakes Commission and the Great Lakes and St. Lawrence Cities Initiative were presented, and the scope of the HDR Team's effort was defined. HDR made an introductory presentation describing the scope and schedule of the effort; described the project's geographic limits; and outlined the key assumptions upon which the work is based. Over the remainder of the two days, HDR then made presentations to the team describing activities in the following key project areas:

- Alternative barrier locations (Monday)
- Transportation issues (Monday)
- Economic analysis methodology (Monday)
- Water Quantity issues (Tuesday)
- Water Quality issues (Tuesday)

Peer review team members were encouraged to actively interact with the presenters to question assumptions, provide input and make suggestions. Members were told that comments made would all be attributed to “the review team” – not to individual members – to promote an open and candid dialogue. The meeting progressed with detailed and probing discussions within each topic area.

The following pages present a compilation of notes taken over the two-day session. They are formatted generally with presentation materials left justified and Peer Reviewer comments *indented and italicized*. Copies of the PowerPoint presentations made by the HDR team are attached to this report.

Day One Opening Comments

This project is examining the potential placement of barriers in the Chicago Area Waterway System (CAWS) to create a hydrologic separation between the Great Lakes and the Mississippi River basins. The project assumes hydrologic barriers will be in place and examines potential locations and impacts of those barriers on the chemical, physical and biological integrity of both watersheds as well as the economic and transportation infrastructure of the areas affected.

The project will identify three potential alternatives for constructing barriers that will prevent the exchange of water between Lake Michigan and the Mississippi River system, keeping Asian carp and other aquatic invasive species from entering the Great Lakes from the Mississippi River watershed as well as preventing the introduction of aquatic invasive species (AIS) into the Mississippi River watershed from the Great Lakes. The barriers will have impacts on water quality, flooding, stormwater management, ecological health, transportation, recreation (including recreational boating, beach health and tourism) and a host of other issues. As a result, a broad range of impacts resulting from construction of the barriers is being detailed and documented. The impacts resulting from separation, the benefits to Chicago-land and the broader Great Lakes region, and the opportunities to enhance uses of all parts of the system are all incorporated into the alternatives. The process and the product must be credible and withstand technical challenges.

The project final report will be available to the public in January 2012 and will contribute to and help shape discussions of separation options (and their impacts and costs) among the public and in Congress. Ultimately, this information is intended to help “move the ball down the field.” The product will be prepared and vetted in a manner that will allow the Army Corps of Engineers to readily accept it as a foundation for their ongoing efforts.

The Great Lakes Commission (GLC) and the Great Lakes and St. Lawrence Cities Initiative (Cities Initiative) are leading the effort and have a broad mandate to deal with a wide range of issues associated with hydrologic separation. The GLC is on record supporting separation as the best permanent, long-term option for preventing Asian carp from invading the Great Lakes via the CAWS and halting other future AIS transfer via this pathway, while taking into account existing important uses of the waterways. The potential entry of Asian carp into the Great Lakes is the highest profile issue in the Great Lakes right now. It has generated substantial interest in the media, Congress, environmental/conservation groups, and among the eight Great Lakes states. Among other developments, lawsuits have been filed against the Corps and others calling for closure of navigation locks. (The GLC and Cities Initiative are not engaged in nor do they have positions on the litigation.) The GLC is the formal grantee for the project in partnership with the Cities Initiative, receiving approximately \$2 million from several funders to support the effort.

The project Advisory Committee (AC) represents a broad array of stakeholders that are interested in or will be affected by separation (or the lack thereof) and are being given the opportunity to provide advice and input to the study effort. Approximately two-thirds of the AC are from the Chicago area or/and Northwest Indiana. The Mayor of Grand Rapids, the Governor of Ohio, the Governor of Illinois and the Mayor of Chicago serve on an Executive Committee that is guiding the overall effort.

The discussion began with a differentiation between the "existing conditions" and the "baseline conditions."

The peer review team expressed the need to better understand the "baseline" conditions – specifically what costs would be attributable to separation versus other projects that would be required by the Clean Water Act (CWA) and other federal regulations. The proposed separation options should NOT assume (be accountable for) the costs of environmental compliance - both currently mandated projects and future projects that will be required whether separation is completed or not. The completed Tunnel and Reservoir Plan (TARP) is considered part of the baseline conditions. The issue of "technology forcing principle" was raised by one peer review member. In other words, the CWA requires compliance with the law and requires dischargers to be innovative in how they will achieve compliance. It was asked if we should rethink and increase the emphasis of green infrastructure and related BMPs to recognize their potential to have an impact on stormwater management. The idea is to force the issue of technology to get beyond status quo thinking. "If we think status quo, we are doomed to failure. It may be time to push the envelope in the CAWS system and be visionary."

The driver of the project is invasive species, but to address this, there is a need to look at the re-engineering (the water aspects) of metropolitan Chicago as it is currently configured and how this effort fits into that re-engineering. Chicago will likely look to Congress for several billion dollars. There is uncertainty regarding whether senators from Oklahoma, for example, will be willing to pay for a multi-billion dollar effort to keep Asian carp out of the Great Lakes.

One reviewer questioned the expansive scope of the project. He admired the ambitious nature but feared that the effort could collapse under its own weight. He noted that the main goal of the project was to prevent Asian carp from entering the Great Lakes. If carp make it into Lake Michigan, they will infest the entire Great Lakes region. He posed the rhetorical question, "Is this scenario compelling enough to drive the decision to separate the watersheds?" The larger group noted that this is not just about Asian carp, but also about long-term water management in the Chicago region, and AIS moving from the Great Lakes to the Mississippi River and beyond. Once the decision to address Asian carp is made, the region is forced to deal with other issues facing the system. The Chicago Sanitary and Ship Canal (CSSC) was built to protect drinking water from Lake Michigan for the City of Chicago and to build a better transportation waterway to move goods from the Great Lakes to the Mississippi River system and the Gulf of Mexico. However, in recent times, shipping volumes continue to decline while Chicago has become the major North American rail hub. Stormwater and flood management has become a major issue addressed through the CAWS system over the last 100 years. The goal of the barrier is to separate the two water systems with the primary goal of keeping AIS from entering each system. In doing so, it impacts the original purpose of the CAWS system, affecting water quality, transportation and stormwater. You can't address the carp issue without affecting these other issues. However, the system will change in the near future even if separation is not considered. The goal is to encourage the development of a coordinated approach to all of these challenges.

The reviewers noted that even if this project occurs, there are other vectors for carp (and other AIS) to enter the Great Lakes system. However, currently, the CAWS is the easiest and most likely point of entry into the system.

The peer reviewers concluded that there is a need to provide different messages to different people that reflect their needs and concerns as part of the broader vision. But, one reviewer did not support the concept of differing messages to different people. A reviewer supported looking at a new land ethic and moving away from engineered systems to more naturalized systems. "We messed with Mother Nature before and now we need to become more naturalized again, but that is not a simple issue."

The HDR Team made a presentation showing maps of the CAWS and identifying a suite of potential barrier locations. [A representative map is included as an attachment to this report.] The presentation showed how combinations of barrier locations would be required to 'disconnect' the CAWS from multiple connections to Lake Michigan. Brief explanations of the impacts each barrier location on the system were presented. The complexity of the overall system and the fact that it acts as a network was apparent. A change to any one component of the network has direct impacts on all other components.

There is a need for arrows on the maps that show the direction of water flow (including major inputs). There is also a need for individual maps that show the different options.

Why put Lake Calumet on the canal side (on some alternatives)?

If an inland port is built, this is a place to turn around a lake carrier (to be discussed later during transportation section).

Why are there no barriers on the Skokie River side? That is a potential risk because the lagoons are a bait bucket vector.

There are many bait bucket vectors. It is less of a risk than other locations.

There is a need to show more options to the Advisory Committee. Three may not give them an adequate sense of the options. The project team will need to show that some of them were readily viewed as not being viable.

Some reviewers thought the 4/5 option is best. Can see that barrier 20 has a lot of potential benefits as well. Goes beyond what a lot of people are thinking about but also is far more extensive than is currently envisioned in the near term.

Someone might look at this and say "you didn't look at some things that would be eliminated anyway." You need to show that you looked at many different alternatives and not just three. Some will be out of the running anyway, but you need to show that you looked at them. You don't have to do a comprehensive analysis, but just explain why some options were not examined in more detail. This will help in showing that the location selections are not arbitrary.

Consider blocking the CAWS at Lockport. What about it?

This has been reviewed, but the complexities of the system make this extremely difficult.

It is very likely that the message is going to be unpopular, but everyone needs to know that we have really thought it through. While there will be three final options, there will not be a preferred alternative. One reviewer felt that: "Not having a preferred alternative is a subtlety that misses the point. The argument won't be around which set of barriers to choose. That is an insiders game. The argument will be about whether we need to take this kind of action at all."

There is a need to look at social and other costs and benefits. Who will be affected?

Day One Transportation

The HDR Team gave a presentation on transportation trends that may affect what can be done with transportation challenges on the CAWS associated with separation. In general, there is a need for more data on transportation. The team outlined a series of options and issues facing transportation in the Chicago region. The widening of the Panama Canal may increase container traffic going through the canal and to the Port of New Orleans. This offers an opportunity to develop an "omni port" in Chicago where cargo in containers can be moved from barges on the Illinois River side to lake freighters or rail cars on the lake side near Lake Calumet.

A reviewer noted that we need to have a focus group to find out what's shipping within the CAWS and that the project team should inform the Corps what information is needed so that they can look at it as part of that effort. It won't help the project team, but will be helpful to the overall process.

It was noted that expectations from the projections indicate that water transportation will increase. The recent trends indicate that it is decreasing.

Reviewers asked whether the projections are overly optimistic. It seems as though the impacts of this port concept will be marginal. It would incubate only an incremental bump in container traffic, but it may be of value.

The discussion of transportation raises the issue about what the study is really about. Is it taking on too much? Adding transportation is taking on another assignment that may be too much for what is needed. Building off of that, a reviewer asked whether this port concept is something that needs to happen absent construction of barriers. Is this part of the big picture?

*Further, the question was raised regarding whether we are looking to **grow** waterborne transportation or **maintain** the existing system? How do we convince commercial interests that we can do something different/better than what they have now? If there is going to be growth in shipping, do we need to get ready for it? Is the "omni port" approach the best approach? As one reviewer stated "Growing the transportation system is only a benefit if the ultimate goal of AIS risk mitigation is met first."*

It is critical that the private sector participate in the costs of the port/harbor development and financing. It would also require subsidies to develop. There are winners and losers out there. Generally, the winners are not here just yet; in contrast, the losers are already here, although some can be part of the winners if they position themselves correctly.

One reviewer was disappointed that there was not a lot more information and discussion about recreational boating.

The HDR team asked who they should contact in the shipping community.

The reviewers mentioned Mark Biel with the Chemical Industry Council of Illinois regarding shipping trends and the Chambers of Commerce. These groups are just now starting to think about visioning. This had not happened absent the AIS debate. There are opportunities now to look at a vision for where water traffic moves from this point. As it is, there is competition for a declining market on the river.

Other general comments made by the peer review team concerning transportation included the following.

The "omni port" approach does not appear to help with the four-day "black hole" rail congestion problem. This problem is too big to be addressed by a barge-to-carrier port. The carrier market would have real problems with any of the alternatives. The terminal operators like what they have, but may be interested in seeing public investment.

In general, the reviewers thought that the transportation and port/harbor recommendation was overly aggressive and promotional. Is this all about invasive species or a new Burnham Plan for the Chicago region? If you know transportation is important to Chicago and that it is "broken," this may be the way to go, but currently, rail is the driver for the region's transportation system. If we transfer goods to water, but still have rail congestion, are we really improving transportation? The public sector in Illinois is not paying attention to the region's transportation assets. Chicago is focused on rail and truck. Waterborne transportation is just a small part of the region's transportation.

One reviewer stated: "Water borne freight is a tiny fraction of what is transported by rail and truck in the region. You could increase by a factor of 10 the amount of water-borne traffic and no one would notice. Truck and rail infrastructure could absorb all of the water-borne freight."

Day One Economic Analysis

HDR made a presentation on the approach for developing a cost-benefit analysis for the impacts of the project. A key issue will be identifying and quantifying costs and benefits attributable to the separation project distinct from the costs and benefits of projects that are required by other regulations or that will occur regardless of whether separation is implemented.

The peer reviewers noted that HDR presented an interesting approach to economic modeling.

HDR noted that they are at the infancy of sustainable return on investment economic analysis, so the template for doing this is not yet set.

Peer reviewers noted that it is important to develop the logic structure surrounding this analysis; otherwise it will appear to be disjointed. Be sure to quantify input data and assumptions, look at the probability ranges of impacts, and reflect uncertainty.

HDR presented a table identifying certain items and categorized each as a cost or benefit. The initial structure identified more costs than benefits as of now. There is always frustration on the benefits side of the equation because the costs are always broken down to specifics, but the benefits are less amenable to being broken out because they are harder to pin down and therefore tend to be lumped together.

An example is addressing degraded water quality. The benefits are not necessarily quantifiable, but they are listable.

Stopping the movement of AIS into the Mississippi River basin is a huge benefit, but we need to be more specific. A huge benefit can be quantified by showing what won't need to be done if AIS movement is prevented. This can be examined by looking at the "what if" that has already happened to show costs on both sides of the divide.

The issue of whether freeing up water diversion allowed under the Supreme Court consent decree can be considered a benefit was discussed at some length.

Peer reviewers felt that there were differing opinions within the "public" on how the "freed up water" would be distributed. Some think that freeing up more water for use in the western suburbs is a benefit. But other interests in the Great Lakes region may not see continuing a diversion that is currently half for use as drinking water and the other half for navigation/waste assimilation as a benefit. They might prefer to see the benefit of freeing up the allocation for return to the Great Lakes.

The costs associated with TARP and how to include them in the economic analysis were discussed – interactively – between HDR staff and reviewers.

TARP may be a cost because of a change in the base case, but that is unclear. The drivers are different. There may be costs associated with the incremental cost of meeting Great Lakes water quality guidelines. This may require substantial investment (e.g., a second tunnel) to deal with needs on the north side from having to meet Great Lakes water quality guidelines.

One reviewer noted that there is a "mix of causes and effects" listed rather than specific "benefits and costs" in some of the areas that were identified. For example: constructing the barrier is a cause; reduction of invasives is an effect.

Other general comments made by the peer review team concerning the economic analysis included the following:

The value (benefit or cost) of construction as measured by jobs created should be kept out of the analysis. This is a separate issue.

Why is property value a cost and benefit?

It depends on what happens in different areas.

Is it desirable to have common planning horizon targets?

Yes. Our planning timing horizon is linked to TARP.

The benefit of keeping AIS out is priceless.

Is the cost of a new port really a cost associated with separation? In the opinion of one reviewer it was not enhancing transportation per se. It did, however, enable new cargoes in the future. With or without the separation project, the shippers should be planning for the future of shipping. This project could help in setting the right conditions. Without the barrier can't you build a modern port that is prepared for the future of shipping? The answer is yes.

Don't bury the costs of the port and don't overstate the benefits

A number of questions were posed, mostly directed to the current transportation constraints and the ability of a new port to address those constraints. If you construct barriers, will it lead to more cargo on barges?

No but a new port could be designed in preparation of additional containerized shipping.

If the port traffic moves from overland shipment to CAWS system are modal diversions to increase traffic in the waterways considered a benefit? To whom? What about the costs to carriers who lose the cargo shipment on rail or truck? There may be winners and losers. Will there be a single cost or benefit or will it be broken down because there are winners and losers?

Does everyone have the same vision of the goals of the project?

Day Two Additional Information

Peer review team member Dr. Charles Melching made a presentation on work he has done to model the operation of the CAWS. The presentation focused on the large-scale physical constraints of the CAWS and the resulting backflows to Lake Michigan. The model (and supporting data) concludes that the transport capacity of the CAWS is insufficient to transport the peak flow from a major flood (without relief to Lake Michigan). He also noted that stormwater infiltration enters the shallow groundwater but then leaks into local sewage collection systems. Green infrastructure may not reduce inflow into these systems. Backflows into Lake Michigan are not affected by outflows at Lockport because the downstream portions of the CAWS

do not have sufficient conveyance capacity to rapidly pass the peak flows. He described the great complexity associated with the system that will be difficult to manage with new barriers. Small changes in the system will likely have anticipated and unanticipated effects.

One reviewer stated that a cynical regulator might think that MWRD has been saying that the system is too complicated to implement minor changes and thereby claiming that they can't do anything about the continued dissolved oxygen and bacteria excursions. He wondered why MWRD isn't trying to do things that have been done in other areas of the Great Lakes region.

The discussion continued on the complexities that are related to that question.

Day Two Water Quantity -- Water Storage and Conveyance

HDR Team members made a presentation on the hydraulics of the CAWS, focusing on the size of peak flows, the areas with flooding concerns, and the areas that will drain combined sewer overflows (CSO) to both the CAWS and Lake Michigan. During many (smaller) rainfall events combined sewers overflow either to the CAWS or to the completed portion of TARP.

The HDR team and reviewers discussed at some length the schedule for TARP completion and the impact it will have on the magnitude, frequency and location of CSO discharges. With TARP (as *intended*) fully complete, the system designers predict that less than one CSO event per year will take place. Currently, there are limited CSOs going to the lake annually, which only occur during backflows. However, because of conveyance problems, TARP (as *expected*) may result in up to 10 CSOs per year. Depending on the separation alternative, some portion of this CSO will be discharged to Lake Michigan.

The discussion then focused on three questions: 1) How much additional treatment is expected to be required on CSOs discharged to Lake Michigan; 2) How much additional treatment is expected for CSOs that remain in the Mississippi watershed; and 3) What portion of the treatment costs is caused by the separation project and should therefore be considered a "project cost."

Reviewers noted that it may be problematic for this study to raise the issue by saying TARP will not function as it is intended. Conveyance issues may be a local issue and that need to be addressed, and associated costs should not be attributed to the separation project. One reviewer stated "It may be appropriate for the study-report to state that TARP must meet the Federal and State requirements for the control of CSOs and that the cost of achieving those requirements is not a cost that should be attributed to the separation project."

The project likely will assume that local projects will be implemented and that the quantity and number of locations of CSOs will decrease. Guidance is needed on whether we should follow TARP as *intended* or TARP as *expected*.

After some discussion, there was consensus that both (TARP as intended and as expected) need to be shown, but that we should make clear that conveyance problems (for which local communities are responsible) will result in a TARP-as-expected scenario. That is to say, if the local conveyance system is sufficient to deliver all of the excess stormwater to the larger TARP tunnels, overflow occurrences will be very rare – as intended in the TARP design. This clarification will ensure that stakeholders recognize that failures in the existing collection system rather than the separation will cause the additional untreated CSOs to Lake Michigan.

TARP is expected to overflow less than once a year. Many professionals working around metropolitan Chicago believe that even when completed, CSOs will occur more than 10 times per year. The additional occurrences are a result of constrictions in the local collection systems. The GLC/Cities Initiative wants to assure that any additional cost to improve those collection systems is not assumed to be a cost of separation. The cost of meeting TARP goals (getting from TARP as expected to TARP as intended) remains a cost of compliance with the Clean Water Act. There is additional local investment needed to transport excess sewage flows to TARP, where they become MWRD's responsibility. These costs are not associated with, and should not be "charged to" separation.

Reviewers felt that the limitations of TARP as expected need to be disclosed in a manner that ensures that CSO impacts and mitigation costs are not perceived by the public as a cost of separation. Do not relegate TARP as expected to merely a footnote. There is a need to present it as a scenario.

There needs to be full disclosure of TARP's limitations. This will get the conversation going early on the issue of the system's limitations. The separation report needs to say that there may be additional mitigation costs related to separation that are due to TARP not acting as intended. Cost-benefit analysis – for separation -- should not take these costs into account.

CSO impacts will be different if barriers are installed soon, as opposed to when TARP comes fully online in 2029. If the barriers are constructed now, it increases the frequency of lakeside CSOs. If separation waits until 2029, we will increase the risk of AIS movements, but decrease the frequency of CSOs.

Water quality-related discussions at this time are summarized below.

The reviewers felt that there is a messaging issue for the Great Lakes. There is a wide disparity between the level of water quality protection offered in Chicago by MWRD and the requirements imposed on the rest of the region. The CWA requires fishable, swimmable waters. States must review and update standards every three years. Guidance under the CWA calls for less than four CSOs per year. Illinois is not addressing any of these federal requirements. The Illinois Pollution Control Board is considering this, but that

may continue to delay a decision. Until then, however, the decision of locations for separation should not be delayed until these requirements are imposed. Also, the cost of compliance with the CWA should not affect the decision of the separation location.

There are risks of water quality violations (as a result of CSOs) and risks of flooding. Flooding is considered an immediate threat to life and thus will be given priority in this project. Barriers 4/5 are likely to be the best option for controlling flooding, but will lead to a larger combined sewer area draining to the lake with more frequent overflow events. Barriers 18/19 increase the risk of flooding, but decrease the frequency of CSOs to Lake Michigan.

One reviewer stated that there is no enforceable schedule for TARP. Completion will not happen until a regulatory schedule is in place.

GLC and HDR representatives pointed out that in a macro political sense, separation likely will require federal funding.

Because of this, reviewers stressed that we need to come up with a plan that is acceptable to the Great Lakes region as a whole. The region will be amenable to a substantial federal commitment to control AIS. What about the other costs? If funding to deal with AIS is provided, the region will likely expect additional funding to address the other affected areas.

Should the federal government pay Chicago to do what they should have been doing anyway (i.e., CSO control and disinfection of treated effluent)? Does the Great Lakes region benefit because of lower risk of AIS movement? Should GLC/Cities Initiative work with suburban communities to identify their needs and input? The MWRD charter is to protect the drinking water source for the Greater Chicago area.

Adding a 100 square mile watershed back to Lake Michigan with associated runoff—how will that affect water quality in the lake? Will having the North Shore Channel go to the lake increase water quality treatment needs?

The interim and final products need to lay out the issues in a manner that allows the Advisory Committee to clearly identify the costs and opportunities of each alternative. Separation will not solve all problems, so each alternative must provide sufficient context to understand what the problems and impacts are, and which are related to separation and which are not. The messages conveyed on the options may emphasize different issues depending on which audiences are being addressed (e.g., a Great Lakes regional audience vs. a Chicago-area audience) and their respective concerns.

There is a need to include a scenario that presents the lowest risk of AIS transfer. What level of risk is acceptable? It is OK to put out straw man scenarios to show that GLC/Cities Initiative have examined a wide range of options?

Consider a one-barrier scenario where you cut off the CAWS at the confluence of the Cal-Sag Channel and the CSSC. This creates a total separation between the systems with a single barrier, with the need for upgraded treatment all the way to the lake. It would minimize AIS risk.

There is a question regarding whether the states would want to open up issues related to the consent decree related to diversion of Lake Michigan water. This has been a source of significant litigation caused by the creation of the canal in the first place. It is unclear what impact separation would have on the legal issues surrounding the consent decree. It was noted that the study effort did not intend to address the consent decree, diversion or related issues.

Day Two Water Quality and River Ecology

The HDR team gave a presentation outlining baseline conditions and potential ecological impacts of the different barrier alternatives being examined. There was discussion of using effluent to supplement flows for water quality to prevent stagnation.

A question was raised regarding how much increased treatment would be necessary.

The HDR team stated that the need for additional treatment will have to be addressed and that if you add flow, it's not much more cost to add oxygen which would be helpful to water quality.

Reviewers raised the question of the need for additional treatment to remove nutrients-nitrogen and phosphorous- to better protect water quality in the almost stagnant waters and because of the impacts of nutrients all the way down to and including the Gulf of Mexico.

While stagnant water may be a problem, one of the biggest ecological impairments is physical. There have been improvements in habitat over time and these changes would likely be part of a broader effort to increase ecological habitat.

Days One and Two General Peer Review Comments

- *Need to determine if there is a difference in water quality requirements for effluent discharge into the two watersheds (Lake Michigan vs. the Chicago River).*
- *Some reviewers found the AIS separation project and CAWS improvement aspects difficult to conceptualize as a single comprehensive evaluation. They asked "What is it that you are taking on with the study? It seems like it takes on too much." There was*

also a fundamental question/confusion about whether this is an AIS study or a CAWS improvement study (water quality, stormwater management, transportation, recreation, etc.).

- *There seemed to be a sense of puzzlement for some reviewers on the framework for mitigating major impacts. There is little understanding regarding the cost-benefit analysis framework and how to grapple with the no-net impact case. The cost-benefit framework needs to be better developed and explained.*
- *Reviewers saw that there were two kinds of costs that are being addressed: TARP completion costs, which are distinct from separation costs; and costs associated with putting treatment plants on the lake side of barriers, requiring increased treatment to meet Lake Michigan standards (lake discharge vs. river discharge standards).*
- *There was general agreement that a variety of things will have to be done in the CAWS, or that should be done, regardless of whether separation is implemented. The costs for these actions should not be counted as part of the costs of separation.*
- *There was substantial discussion about how to consider, present and reflect costs associated with ensuring that TARP performs as intended, vs. how it currently is expected to perform. There was agreement that we should be clear and honest in noting that TARP currently is not expected to perform as intended, but that the costs required for it to perform as intended are NOT costs associated with separation. It was suggested that our options assume that TARP will not perform as intended.*
- *The question was posed on whether we should let CSOs and associated costs drive the location of the barriers. Barrier 4/5 likely is best to minimize the risk of flooding, but will be most costly for mitigating CSOs. Conversely, barriers 18/19 increases the risk of flooding but reduces costs associated with CSO mitigation.*
- *The report and the options it presents can't solve all the problems that confront – or will confront – CAWS, but it should be clear about the issues.*

Follow Up Comments

Each of the members of the Peer Review Team was provided a draft copy of the above summary for their review and comment. Their relevant comments on the discussions during the two days have been incorporated above. Some of the reviewers provided additional thoughts upon reflecting on the effort.

These are provided below.

Reviewer #1:

Everyone involved in this study has been told that the ultimate goal is preventing AIS movement between basins through the vector that is CAWS, and failing that, to reduce the risk of AIS movement as much as possible. Whether a proponent, opponent, or neutral/skeptic, that's the project that the stakeholder group has agreed to participate in.

The results – the scenarios – that were shown to us, certainly reduced risk, but did not eliminate the CAWS as a potential vector. Instead, they were chosen because they made the most sense from a transportation or a water management perspective. There was no scenario presented that 100% impeded AIS movement, even at the expense of substantial transportation and water management costs or harm, but I think for the validity of the study and for the stakeholder group to mean anything substantial, such a scenario must be presented, even if it is summarily rejected.

If shown scenarios that do not fully impede AIS movement, separation proponents will potentially deem the study a failure. At the same time, separation opponents will wonder why X, Y, Z costs must be paid in the transportation or a water management sectors for a non-solution to AIS. If the solution to AIS movement doesn't actually solve AIS movement, why do anything?

I am fully willing to believe that the risk of AIS movement cannot be reduced to zero without substantial cost or harm, and concede that some level of risk would likely need to continue to exist in order to prevent mass flooding and other problems. But I am also not a diehard separation proponent. Proponents in particular need to be asked questions along the lines of the following, and ultimately, GLC and GLSLCI and the stakeholder group should probably answer these as well:

- *What costs/harm are acceptable in exchange for reducing AIS movement risk to 0%?*
- *What costs/harm are acceptable in exchange for reducing AIS movement risk to only in storm of X magnitude/frequency, what about Y magnitude/frequency?*
- *If, in order to prevent AIS movement during a storm, one had to poison outflow to the lake, what would be the acceptable magnitude/frequency of that storm?*

Those are tough questions, and much harder to answer than ones being faced by opponents, which boil down to whether or not their baseline condition will be harmed or improved by efforts to reduce or eliminate AIS risk.

Reviewer #2:

Local conveyance problems of the trunk sewers feeding to the TARP drop shafts and deep tunnels probably are only half (or even less than half) of the hydraulic problems that will result in TARP not performing as intended. The conveyance limitations of the deep tunnel system itself are more likely to cause the TARP system to yield more overflows than intended. These conveyance limitations are similar to the hydraulic limitations of the CAWS itself, which was presented on May 10th. How can the high inflows to the deep tunnels on the north side of Chicago get 30 to 40 miles downstream to the McCook Reservoir fast enough so that the tunnels still have space for later inflows and CSOs can be avoided? Further, because of the direction of storm movement in the

Chicago area, the downstream portions of the TARP Mainstream tunnels will start filling earlier than the upstream (north side) areas blocking the north side flows from getting to McCook. The deep tunnel modeling project, which the University of Illinois is doing for the MWRDGC, seeks to develop a means for the storage and conveyance in the TARP system to be optimized so that the number and volumes of CSOs can be minimized. However, because of the distance from the north side to McCook Reservoir, CSOs more frequent than intended are likely in the region of the North Shore Channel and North Branch Chicago River that will discharge to Lake Michigan post-separation under Scenario 4/5. Without separation these post-TARP completion CSOs might not result in backflows to Lake Michigan, thus, the cost to bring these to Lake Michigan standards could be a cost of separation.

The new water-quality standards, proposed by the Illinois Environmental Protection Agency, which the Illinois Pollution Control Board (IPCB) is considering for the CAWS, would not meet the Lake Michigan water-quality standards except in that they would require disinfection at all the Water Reclamation Plants. Thus, regardless of the final decision of the IPCB it is likely that there will be a difference in the water-quality standards between water going to Lake Michigan and water going toward the Illinois River. The reason for the difference in water-quality standards is the result of known habitat limitations of the CAWS (such limitations are recognized by the CWA as reasons for reduced water uses). Such habitat-based differences in water-quality standards are not unique to Illinois in the Great Lakes region. The entire Kinnickinnic River in Milwaukee and the lower Milwaukee River are subject to variance standards in terms of dissolved oxygen (DO) and fecal coliforms because of habitat limitations. Similarly, Cuyahoga River and other rivers in Ohio draining to Lake Erie are designated Modified Warmwater Streams or Limited Resource Waters both of which have lower DO standards than for the General Use Waters of the State of Ohio. Thus, the cost of meeting Lake Michigan standards is a cost of separation.

Reviewer #3:

I think the framing still needs work. The starting point is constructing barriers to manage AIS. That is a good goal. Constructing barriers has impacts beyond the management of AIS. Will those impacts create benefits (beyond the principal purpose of AIS management) If the barriers cause negative things to happen, how can you ameliorate those negative things and what is the cost of amelioration.

When I read this summary and remember the conversation I begin to forget the premise, which is that I want to manage AIS and I have already decided to do so by constructing barriers. OK, that is a good starting point. My ultimate goal is NOT one of improving transportation, stopping flooding, improving water quality, enhancing supplies, and so on. Those are responsibilities of other institutions and organizations that already exist and are having various levels of success in doing their jobs. It is legitimate to ask if my barriers will make their jobs harder or easier.

It gets tricky, of course. Who is "in charge" of these things? Who speaks for commercial shipping? The State, the Corps, the barge operators, customers, and so on. I could make the argument that

we should phase out water-borne commerce and put an end to its slow death. Organized interests make the opposite point.

Because of the multiplicity of actors and dearth of clarity about our goals with respect to each issue, you end up trying to put yourself in their shoes. Who speaks for water quality? MWRD, U.S.EPA, Ill. EPA, the Sierra Club? You find yourselves trying to put together comprehensive plans for all these sub-systems, even though the responsible parties have been unable to do so themselves.

Reviewer #4:

The issue of property value is one of whether and how changes in property values are treated within the cost-benefit framework in response to "separation" and its attendant environmental benefits and costs. As of now, the comment on same is not accurately reported in the May 19 text. Correctly: changes in property values to reflect costs and benefits are often a useful and legitimate tool in cost-benefit analysis. Changes in property value often reflect the capitalized lifetime value of costs or benefits. However, care should be taken to avoid double counting of costs and benefits. In particular, and for example, if (e.g. recreational) costs of degraded water are counted once, then they should not be counted again in their affect on (lower) property values. Similarly, for example, if greater water quality is counted once as a benefit (e.g. in contingent valuation or survey), then they should not be counted again in enhanced property values (unless these benefits accrue to different parties).

There is a logical difficulty in how to treat the "new port" within the cost benefit framework. If the port is compensation to shipping interests, then it is a cost (for damages otherwise realized), and these costs should be made explicit. If instead, the port is self-funding and a good idea in and of itself, then it would seem to fall wholly outside of the cost-benefit framework of separation. Indeed, there may be many such ideas that are beneficial within the scope of transportation and recreation within the CAWS study area. Why focus on this one? To do so will strain credibility—perhaps of the entire study.

With regard to TARP and the interaction of CSOs and flooding with separation barriers; I agree that the additional costs associated with separation are not "separation's fault" because TARP may not function as intended. However, I do not know that you can leave the associated costs out of cost-benefit analysis.

Timing of barrier installation is everything. If you really believe that TARP will not and cannot be completed in a timely fashion, then you have no choice but to honestly enumerate the (added) costs of a separation barrier attendant to an unfinished TARP. Such costs would figure on the high side since they occur in the near future (e.g. they are not discounted very heavily). Alternatively, to plaintively bemoan that these costs should not be counted as a cost of separation, and to exclude them from the main scenarios, the study would be dishonest. That is because the barriers' immediate implementation would end up being very costly in its impacts. Such an approach is also

inconsistent in the sense that the study now claims to perform a holistic C-B of the CAWS basin. That is, by addressing all CAWS-related issues ranging from transportation to recreation, you are committing to compensate or "make whole" all of the major interests.....in other words to count them as costs. But if so, it would be inconsistent (and perhaps arbitrary and biased) to treat differently those interests that would be harmed by flooding, etc., from early installation of a separation barrier.