

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

**Peer Review Session Two**

August 31, 2011

On August 31<sup>st</sup> 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
- Identify concerns that may be raised by others, and
- Validate the process being undertaken.

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 Review Team consisted of the same individuals that were convened for the first review session in May, 2011.

They are: **Frank Beal**, Executive Director of Metropolis Strategies (formerly Chicago Metropolis 2020); **Josh Ellis** of the Metropolitan Planning Council (MPC); **William Testa** who sits on the boards of the Illinois Council on Economic Education, Chicago Council on Global Affairs and the Economic Development Council of Chicago; **Dr. Charles Melching**, Professor of Civil and Environmental Engineering at Marquette University; and, **Dale Bryson** the former Director of EPA's Region 5 water division.

Matt Doss (representing GLC and the Cities Initiative) along with Jim Ridgway, John Bona and Jodi McCarthy from ECT were also in attendance.

One notable key point emerged that needs to have further discussion with the sponsors.

**Most reviewers felt that the effort as outlined wasn't "envisioning a waterway system for the 21<sup>st</sup> century", but rather achieving separation while attempting to maintain the status quo with respect to water quality, flooding and transportation.**

Additional key points that emerged during the discussions that took place are shown below.

- No major concerns were expressed on economic analysis
- The analysis should identify which options provide the highest degree of security against AIS movement. Or if they are truly equal in protection make that point clear.
- The effort needs to be realistic about the declining use of shipping
- The transportation analysis should consider other options other than barge to move materials
- It was agreed that past case studies are to be used for the AIS benefit analysis
- Water quality should be added as a benefit category
- The analysis should discuss possibilities for using new approaches that will reduce flooding and improve water quality.

### Format

The meeting began with a brief review of the project's purpose and the role of the Peer Review. 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 reviewed.

Peer review team members were encouraged to actively interact with the presenters to question assumptions, provide input and make suggestions. Members were reminded that comments made would all be attributed to "the review team" – not to individual members – to promote an open and candid dialogue.

The following pages present a compilation of notes taken over the day-long 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.

### Opening Comments

The Great Lakes Commission (GLC) and the Great Lakes and St. Lawrence Cities Initiative (Cities Initiative) shared their appreciation for the time and contributions of this group. They are happy with the outcome of the previous peer review meeting. They continue to be amazed at how complex the issues are. As work proceeds new challenges continue to emerge. The HDR project team has narrowed down separation alternatives to three options for the combination of barrier locations from the original 20. The team has been developing timing, phasing, environmental impacts. They now need to analyze the cost / benefit and create a credible accounting of long term benefits and how to quantify those benefits. They want to make sure that benefits stated are credible

The final advisory committee meeting will be in October and the "preview" meetings start in 2 weeks (more informal meetings to acquaint people with the process / project) and there will be a series of public meetings in Chicago, Toronto, and Indiana. There is a series of Great Lakes meetings in Detroit in October and GLC will be presenting at that conference as well. The GLC and Cities Initiative are looking to keep the public and stakeholders engaged in the process. They will be looking to finalize the report and get out very early in 2012.

*The peer review team asked who is the target audience for the effort is and what do they hoped this audience takes away.*

Elected officials are one of the audience groups as they will make decisions, as well as a broader affected stakeholder groups (shipper, taxis, etc) that will be affected. People concerned about Asian carp and aquatic species getting into Lake Michigan are also an audience. The funding organizations felt that they now need credible information since there has been a calling for separation due to AIS movement issues.

*The peer review team asked what about the USACE?*

The team has been coordinating with them to make sure information is usable by them as they will have funding / permitting / other types of roles in the project. It is important that our study is useful for them.

*USACE takes 4-5 years, and the study shows gap in the timeline, is that accounting for the long USACE timeframe? Will this study be able to complete those tasks that the USACE are conducting more quickly?*

The aim is to provide credible issues and costs to the USACE. The Corps is providing interim products - such a study that identifies AIS that may be introduced into system. There are 40 or so species they have identified and this type of data is important because they are showing a broader range of issues, but their timeline is lengthy.

*The peer review team noted that the notebook provided needed additional detail concerning infrastructure costs and wondered if it is realistic to get credible numbers to fill in these blanks.*

The HDR team members indicated that they are currently producing those types of estimates. But they also noted that it is important to note that USACE may have different estimates. This study is speeding the USACE study up. The team has been working with them, and they are warming up to the idea that we are taking the some of the heat for them. HDR is making the economic analysis per the USACE standard, so this project can help them to move more quickly forward.

The HDR team has taken a commercial assessment of market and enhanced the methodology of the USACE (adding value). Infrastructure has a great deal of fidelity and detail in the HDR analysis. The USACE scope is much larger and we should respect their extended timeline.

It was noted that the project is utilizing existing data, while the Corps has to take the time to collect new data.

*The peer review team asked if cost estimates would soon be available.*

HDR indicated they would have additional cost data before October and will show preliminary numbers in September and adjust as necessary per peer review comments.

*The peer review team asked what would dictate the approach that would be taken. Is the goal to take the path of least cost mitigation, least political sensitivity, or another?*

*One peer review member noted that when realistically quantifying water quality mitigation costs, costs for the changes needed within the waterways to keep things from becoming anoxic will not be known for quite some time, so the costs used in this analysis will need to be conservative.*

*Some Peer Reviewers expressed concern about the title that had the word "envisioning" in it as some of them feel that what came through in the study was that limited to building on the "status quo" and accepting many of the "givens". Some of the reviewers felt that if the project is going to sell the public and elected officials on a "vision", it needs to show them something that is different and what we should "envision" what the CWS could be. They were disappointed by the continuation of building things as they currently are planned and wonder what can we do different to make things better.*

*One reviewer tempered the concept by suggesting that the project is a bitable chunk of what could be envisioned in the 21<sup>st</sup> century.*

*A reviewer felt that this report shows a way to stop invasives and then mitigate the damages from what has to be done. Envisioning a CWS system that is better is the same study, but in the reverse order by doing all the mitigation items first and putting in the barriers last. If we are talking about separation as long term solution, this may be a better solution. This study shows separation as first thing done, and then we fix up all other things.*

*A reviewer felt that the reason for urgency to get the barriers in is to protect from AIS.*

The HDR team pointed out that they had generated 100+ pages of a market assessment, and have had a response from the AC that envisioning any future is not a part of the study and this study needs to deal with mitigating impacts. The HDR team has made attempts at making the transportation infrastructure flexible. There has been no response from the AC as additional transportation types have been added as a part of this report since they don't feel is feasible.

*The peer reviewers reminded the team that their charge was to envision improved transportation, water quality, and stormwater while providing a barrier to AIS movement. They felt the project was providing the barrier and addressing the problems the barriers created to the other areas.*

*A reviewer asked: "Isn't some of that in tone and presentation?"*

*At least one reviewer felt that the Commission and Great Lakes Cities have learned a lot through the development of the study, and they should look back and see if they can say that goals may not have been realistic and be willing to reframe the goals of the project. It is okay to admit that this cannot be all done at the same time and that it cannot be done in the order that was originally proposed. Separation may need to be the last step as opposed to the first.*

### HDR Presentation - Progress since last meeting

A copy of the Review Materials provided to the Peer Review Team is included as **Attachment 1** to this report.

The team has incorporated comments from last peer review and addressed them as well as possible. The team is in the process of developing what the report will look like (through an outline format) and there are writers and assignments in place to make the study look good and understandable. Alternative write-ups are difficult to put into a format.

*A reviewer recommended not using the large fold out charts that were part of the material sent to the review team in the final report.*

It was pointed out that there will be several versions of the report, a very technical version and a shorter public version without all the technical detail. The technical report will have a huge appendix and detailed information will be available. The HDR team has had discussions with AIS experts to get a handle on the risks, what is the possibility for the AIS to become established, and how this would be quantified for the report. This task has been a huge challenge. The HDR team has also talked to author of the USACE white paper. They will look further into quantifying the potential for that risk because currently there are no values associated with AIS. The USACE is currently conducting an AIS study in which they are going through similar Mississippi basin habitats. If there is an overlap in community types, then they will look at the similar Great Lakes Basin communities and evaluate (but this is several years away from being completed).

Finally, the HDR team has come up with 3 different barrier alternatives. The team has received information pertaining to barge origin / destination data, but it is not the original comprehensive data set they requested as it is not available to the public since the USACE has been prohibited to distribute to public. The USACE cannot share data from commercial interests and there is also an upcoming congressional mandate.

*A reviewer noticed that in handout materials it states that there are 263 combined sewer outfalls, but he has been told it is more than 400 by MWRD. Which is correct?*

An HDR team member responded the 263 may be those that outlet to the project area, but the MWRD has more in their system that they maintain that are not tributary to the study area. The HDR team will confirm the correct number of outfalls.

### HDR Presentation and Peer Review Team Discussion of Barrier Options

Reference is made to the Preliminary Barrier Locations Map provided in the Review Materials (Attachment 1).

HDR Team - In past few months the team has tried not to focus so much on technically feasible options, but instead worked to frame options that do the most informing for the agencies and general public. Three alternatives have been selected; near lake (5 barriers), down river (single barrier), mid system (4 barriers). These scenarios are looking at a range of single barrier versus multiple barrier options to help get a clearer picture of the different issues that will come with each type of system. The impacts, mitigations, and costs will

be more obvious in terms of feasibility since the alternatives are on extreme sides of the spectrum from each other.

**Near Lake Option** – An advantage is that it is easier to mitigate for water quality, but stormwater and flood control are more difficult to deal with as they are losing outlets to lake. Transportation also has some issues.

**Down River Option** – There are significant impacts for all aspects and significant mitigation required.

The GLC and Cities Initiative felt it was important to look at this option since the public will question why it was not considered, and since the study will not be identifying a preferred option they want to inform the public as much as possible.

*The reviewers asked: Which combo gives best and widest range of AIS control? Where is greatest degree of security and it would it be useful? An overtopping evaluation is good, but we need to expand on it.*

HDR – Which direction of flow is worse? Some in this region may say river to lake is worse, but other people downriver would say the opposite. These concerns need to be weighted in the report equally.

*Reviewers felt there was a need to evaluate AIS probability between the lake and river for each barrier location. They also felt that since “overtopping” was a given for very large storm events the need to locate a “kill box” for the lock locations needs to be better articulated. Which way are the AIS going to travel and how would that transfer be stopped during an overtopping event? This needs to be better explained. If alternatives are structured to each provide identical AIS risk this should be so described.*

HDR noted that the near lake option can effectively seize the transportation system in the city, while the downriver alternative has less of an effect on existing transportation.

## **Near Lake**

### **North Shore Channel and Chicago Lock Timeline**

HDR Team - The existing electric barrier stays in place and AIS best management practices would continue on as well as some additional items that may need to be done (such as education and outreach). This timeline shows that a barrier would be implemented as quickly as possible, the lock and gate operations would stay as they currently are for the first 5 years and then the locks would be closed until other mitigation elements are in place (shown by the light gray bar). TARP is anticipated to be completed in 2029 (as shown by McCook reservoir timeline) and the barrier can be constructed sooner and the system kept closed. The final construction piece would be to open gates at 19 and 3. A flood tunnel would need to be built and an additional storage facility located somewhere by McCook to get stormwater out of the system.

*A reviewer asked about an existing quarry that is owned privately near McCook, this may be more cost effective to use than vacant land because it is already excavated rather than constructing a new reservoir for this project.*

The HDR team said they are choosing things for this study that are engineering oriented with factors they can control, and there was a history associated with that particular site that made it unattainable in the past .

*A reviewer expressed his frustration that 2029 is locked in concrete and it is accepted as a given. Dealing with the quantity of water in the combined sewer system is because of issues with the district: I&I is lousy and the region is behind on regulations for I&I. The Rouge project in Michigan has demonstrated that taking an existing system and making it offline to eliminate peak flows is very effective, but the district in this region has refused to implement that. He feels that we shouldn't accept what the district says, but instead explore those types of alternatives.*

HDR indicated that the team had to choose a singular management tool to cost and evaluate since they cannot control MWRD.

*The reviewer felt that the issues with MWRD need to come through in the report.*

*Another reviewer noted that most interceptors in the regional system do not belong to MWRD, but are privately owned (laterals). This issue can be politically sensitive and may not be feasible. But EPA has told MWRD they need to get on the backs of the municipalities to get on the backs of the residents.*

*A reviewer felt that the region is suffering from decisions made 20 years ago. Other communities have "bitten the bullet" to reduce I&I.*

HDR staff pointed out that ordinances have been written to help address these issues, but they have not passed the council.

*A reviewer felt with time, when you take stormwater out of the combined sewers, you will help solve many of the volume issues.*

*Another reviewer felt that the team has chosen very expensive engineering alternatives rather than picking potentially politically difficult options, when an expensive project may be very politically difficult in this type of economic climate.*

*A reviewer asked: "Are they considering pumping Lake Michigan water into the system and sending it back through the North Shore channel? This should be looked at."*

HDR Team members then spoke to the transportation aspects. In terms of transportation, there is a recreational and tour boat component since they would need to be lifted and disinfected. This includes dry dock and maintenance facilities

*A reviewer asked: "What percent of river and lake tours go through the locks?"*

HDR Team: A vast majority of them move both ways and go through the locks as a part of the tour. There is a proposed dry dock as a part of the project that was originally not there before.

*A reviewer asked for clarification on movement of base flow. When the barrier is put in place between now and 2029, it seems that it will allow movement of base flow through the barrier, but he was under the understanding that there was to be no flow.*

HDR will review.

HDR expressed concern that the timeline is extremely difficult to present, and they would like to hear suggestions on how to improve relaying this information.

HDR staff stated that if we look at the timeline over the next 20 years, the taxi and waterway industry is increasing, and the current proposal shows existing facilities being upgraded to accommodate the existing traffic. If you assume there is any growth in the industry, these proposed facilities will not be feasible with the barriers in the near lake location..

*A reviewer asked if building dry docks is a cost of the project.*

HDR staff stated that the project proposed to replace existing dry dock capabilities on each side of the barrier so boats have access like they currently have. They are mitigating for the existing capacity, not future.

*A reviewer asked if you mitigate the dry dock owner that you would put out of business by constructing this new facility.*

HRD staff said there is an opportunity for the government to step in and cooperate with the private industry.

*A reviewer pointed out that facilities can be considered an opportunity as well. It's a good thing and can be promoted and presented as one.*

*Another reviewer asked is this a public cost? Why not a private entrepreneur?*

HDR responded that they have not determined the percentage split between private and public, but the team is just counting it as a cost to the project at this point without costs assigned to a specific group.

*A reviewer asked to see a timeline with associated risk of flooding as was shown in the previous meetings.*

The HDR team pointed out that new direction given to the team was that flooding cannot get worse, so that is why the charts are as they are since the flooding risk is constant.

*A reviewer felt that the charts should show risk and include AIS movement, flooding, etc with different charts for each barrier.*

*A reviewer asked: "Are these actually real world timeframes?"*

HDR responded: Yes, these are preliminary design and construction timelines, but it does not include permitting.

*A reviewer pointed out that the charts are confusing since sometimes the lines are operational items, sometimes they are planning, and sometimes they are implementation [construction].*

With respect to scheduling, the team is assuming one massive environmental assessment and said that the cost estimates for each individual component did not include massive NEPA costs.

## **Near Lake**

### **Calumet River Timeline**

HDR Team - This timeline shows the same AIS adaptive management as previously shown. The thing driving the timeline on this chart is the additional flood mitigation elements that need to be in place as well as some transportation mitigation. Operations would continue "as is" through year 15. TARP is not a time constraint in this timeline, but there are reservoirs proposed (the flood reservoir is put in for security purposes at this time until further engineering could be completed needed for the AIS movement risk)

*A reviewer asked: AIS boat disinfection is not in place now?*

The HDR team is suggesting that this is done as a non-project cost since it should be done now. But boat transfer over the barrier is included in the cost, these costs are for people who are docking on small unmonitored docks and entering into the system. The AIS electric barrier is in place and will continue to operate, so it is not a cost to the project. The timeline also shows other AIS best practices that should be included as a part of the existing program.

*One reviewer looks at these AIS control measures as a way to envision a better system as opposed to everything hinging on the barriers.*

HDR Team stated that they envisioned flow augmentation from Lake Calumet – the team was hoping to have some flow between the river and lake to augment flow since water from the lake is a lower cost solution.

The HDR team spoke of the transportation aspects associated with this barrier location. The proposed intermodal port proposed in this timeline is a complete replacement of the existing ports in the system and constructing a port equivalent to LA's port, with rail and other transportation to it (it would replace more than 30 existing terminals). It would be a new international port. For the construction, we would need to create an island and connect to the mainland adjacent to the mouth where Calumet intersects Lake Michigan. They estimate about \$10 billion in today's costs (assuming to be built by 2025). The group suggested that the spoil from the TARP project could be utilized to build up this island. An Alternative Transportation Plan – constructs

smaller port that does not deter any current operations on the river or in the port of Chicago except for barge transfer. Have envisioned the port in here and in the previous alternative as being positioned adjacent to the barrier. Have met with organizations to discuss and confirmed that Lakers can self unload (2 berth facility) sized for 1000 ft Laker traffic. The cost could be about \$500 million. The local shipping groups feel this option is less problematic than other options. 30' deep water would be maintained on the lake side of the barrier, and the barrier would be placed exactly where transition from deep and shallow water occurs. Cost savings logistically from having to reload barges. These canals provide very large volumes of shipping, in millions of tons. They have "past the point data", 2000 to 2009; there has been a downward trend since 2006 / 2007. They cannot get data for when the barges passed, what they are hauling, and where they are coming from.

*A reviewer asked if the downward trend was because of the recession or because of different modes of transportation.*

HDR team felt that it was partially due to both.

HDR Team – This timeline shows the implementation of Green Infrastructure (GI), there is some potential storage in the Calumet / Lake Calumet system, but not enough to eliminate construction of an additional reservoir. This reservoir would still be needed to minimize flooding. The team is looking to push flow as much as possible back to the Cal Sag (Little Cal channel modification). The barrier cannot be constructed until the flood mitigations have been completed.

*A reviewer pointed out that if they were to impose a risk profile on this timeline, it would be short but very intense on the front end.*

The HDR team indicated that much of the volume of traffic through the Calumet River is going to Indiana ports, where there are 3 ports. There is a back door option in which they could dredge the Grand Calumet River, place a barrier, and allow cargo to come through the Grand Cal into the system. Have preliminarily priced that project at \$800-900 million as there are many crossings, and a project of this level may be near superfund qualified site. The team does not have a handle on how much cargo is distributed to each port. The lake surge can sometimes be so large that barges cannot operate on the lake, and this project could provide the opportunity to have another transportation option as well as allowing partnering opportunities.

*A reviewer stated that he had a job in the past with an industry along the south shore of Lake Michigan that utilized waterborne transportation. They were doing strategic plans years ago because they felt the shipping in this region was going to die. He thinks it will be impossible to get private funding. We are now trying to find things to promote the status quo, but we are not looking at just closing it off. Rail and deep water shipping are alternatives. Lack of investment, the changing nature of the movement of goods, and the promise of shipping through the St Lawrence Seaway that isn't happening are reasons that people in the industry are looking at alternatives.*

*Another reviewer felt that if the effort was a vision, and not just a mitigation document, then this backdoor option needs to be seriously considered, as it may be more conducive to achieving the project's goals than some in-river options.*

The HDR team said that when the team met with the American Waterways Operators (AWO), they were contributing information about their system.

*A reviewer asked: "What is annual revenue of operators on this waterway?"*

*Another reviewer asked: "If you can't get real numbers from the operators, can the team take general costs per ton of various materials moved and assign probable cost to this?"*

HDR indicated that they can do this.

The HDR team pointed out that there are two operational components to this transportation system - barge owners and terminals up and down the Calumet. The mid-system Lake Calumet port is a compromise between the two. There may be an opportunity for container on barge in the Great Lakes. The mid system port is a way of allowing transportation on the Calumet River to exist and build a new port smaller in scale (than the mega port previously described) and accomplish everything plus transport over barrier, but lake bound barge traffic would be severed. The barge to terminal / terminal to barge system is currently operating different types of barges on the rivers versus the lake.

*A reviewer asked: "Why not relocate the port to Indiana?"*

The HDR team said this was not evaluated because of an increased cost to transport the material by having to use rail, as well as the fact that it may not be politically good to put it in Indiana instead of Chicago.

*The reviewers felt that we can't play both sides, both political and best engineering alternative. So what is the best engineering solution?*

*A reviewer asked if there have been any thought of capturing floodwaters and reintroducing into aquifers through deep injection wells? Instead of building new reservoirs, could this be a beneficial solution.*

HDR responded that storage would still be needed because of limited pumping capabilities; and the wells would need to be very deep -- below tunnel system -- to prevent I&I and could be a major feat.

*The reviewer felt that they could take the water and distribute along system. Can potentially cost share with western suburbs who may be interested in recharging the aquifer as they are tapping the aquifer for their water supplies. He also felt that if other 'major feats' such as TARP 2 or a major port on an island in the lake are being proposed then something like this could be, also.*

## **Mid System**

### **Timeline**

HDR Team - AIS control ideas are the same as the previous timelines. This barrier allows flow from the lake to river in one direction. These permeable barriers would allow base flows. Operations would continue through a 10 year timeframe while they are completing upgrades to the North Side treatment plant. There is a secondary

period where the base flows would be sent back out to the lake as the reservoir is constructed. There are a number of options to prevent species transfer from the river to the lake. Flows would not be increased more than today. There would be overtopping only from the lake to the river in a catastrophic event. CSO's go into the waterway, but once the McCook Reservoir is finished, that is expected to occur at a very a low frequency. Up until the barrier is fully implemented and TARP is fully online, water would be passing through the barrier lakeside to riverside. Water would still be going to the lake during large events, and it is recognized that there would still be backflows to the lake.

*A reviewer asked what type of benefit would you have to just shave some flow off instead of making a big barrier.*

It was stated that one benefit is that it is stormwater (which has no carp).

*The reviewer commented that once the treatment plant is done, they should build full barrier rather than micromanage as in this scenario.*

The HDR team agreed, but additional treatment will be required of the CSO into the lake. They are permitted to discharge CSO's into the lake, and this is a much cheaper alternative than TARP.

The point of one way direction was to get as much AIS protection in place as soon as possible.

*The GLC and Cities Initiative are concerned about CSO discharges into lake and concerned about a headline that would state there is an increase to pollution to the Great Lakes because of this project. Could they justify that for a short period if they can reduce AIS transfer? The team needs to quantify the tradeoffs of this risk.*

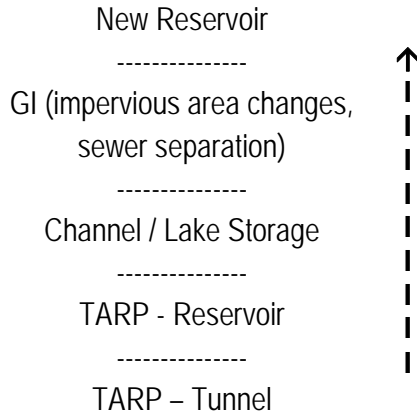
*A reviewer stated his position that CSO's guarantee damage to the lakes, where as AIS movement prevention attempts are not a guarantee of prohibiting the transfer.*

HDR Team stated that in this option, there is not a proposal for any large conveyance system, reservoir, or large gray infrastructure. The dry weather flow bypass = a one way gate. Sediment remediation may be needed on the lake side of the barrier for areas at risk of being stirred up. Transportation is mostly recreational vessels except for maintenance and dry dock facilities.

A reviewer asked: "What is the envisioned future of the power plants?"

HDR responded: "Both plants are lakeside of the barrier and they are to be phasing out. There is a consent decree that says that they will both phase out, but may still need water for cooling. The team is looking to consider bringing water from lake for this."

HDR explained that when looking at storage capacity, the team was using a 7" storm (about 100 yr event) and built their storage model as illustrated below; building the different types of available storage elements up from the TARP – Tunnel storage to a new reservoir (if needed)



The HDR staff member thinks he is hearing from group, don't do to new reservoir, but instead try to find alternatives.

*A reviewer thinks the team needs to look to use existing reservoirs or injection wells.*

*A reviewer feels GI should be at the bottom [first to be implemented] of the storage model since getting stormwater out of the system is a rapid reduction of volume and provides benefit in smaller, more frequent storms, where TARP never needs to come in to play.*

*A reviewer thought that implementing new technology that is being used around the country that is currently not used in this area is another option.*

*A reviewer asked at what scale the team felt GI would impact?*

The HDR team is looking at land uses and assigning an amount that can be captured through the plans these areas / communities would implement.

*The GLC and Cities Initiative doesn't want to overpromise the inches that would be captured by GI.*

*A reviewer commented on the 'wetness' of the collection system in Chicago saying that, due to high I&I, anything in Chicago you put into the ground will go into the system.*

## Down River

### Timeline

HDR Team - There is an interim barrier for base flows to pass through, an upgrade to all 3 treatment plants and installation of reservoirs. The need for additional flood storage in a reservoir to accommodate the 7" rainfall discussed. There will need to be some conveyance tunnel to the reservoir. The system is open to the lake and getting circulation through the system will be difficult. Source water would most likely come from Stickney. Transportation could get barges up to the barrier (have to change the operations at the lock). A port or intermodal port would be needed and there would be a lack of downstream water.

HDR would like better guidance for how far into the future you envision a modification. It is possible to get these materials to Chicago by using a different port.

*A reviewer stated that he is more concerned at looking at the need to move commodities, as opposed to how we move them since the stated goal is to improve transportation, and is not mode specific. He would hate to get bogged down with a potentially dwindling transportation sector when we should be focusing on other things. It is like putting a really expensive band aide on something that is broken instead of putting the money towards something better for the area. It is possible that by moving the port to Indiana, there could be some benefits in the region (stormwater, recreation, etc).*

*A reviewer commented that earlier discussion summed it up best when the question of what the current barge operators' margin is every year....it may be cheaper to buy them out and find alternatives.*

*Another reviewer again pointed to the goals of overall project are that we want to improve things as Chicago is a black hole for rail transportation. He sees with changes, they could impact that and those things should be said. Then they are not protecting a small niche and instead can improve the whole area.*

*Another reviewer pointed out that the amount of freight and type of freight will not be affected by this.*

HDR pointed out that the Panama Canal has created competition and new intermodal transportation. Louisiana is proposing new transfer system since they believe the Mississippi River is the highway of least cost.

*A reviewer made the analogy that when looking at better options for mass transit, we don't care what taxi drivers say. This is similar and cares about the material getting there, not how it gets there*

A HDR team member stated that if that is the case, it may be better to ship into other ports. He was pleasantly surprised by data from the USACE, and before anybody designs anything, they need a better understanding of the commodity flow of origin / destination. The team can get data, but they would need to approach each industry for the information. We have tapped into the best info the USACE has to give to us, but it is not the entire picture.

If they were to develop a port at the mouth of the Calumet and cut off, it could increase the Laker traffic.

*A reviewer asked: "Why can't we build off of the 10 year data?"*

The HDR team said that they have the tonnage data, but they don't have what is passing by (have some commodity data, but not a full picture). This data is literally counting vessels, and there is no data to let us know if it is full, empty, backhaul, etc and this information cannot come from the USACE data. The key missing

in data is exact origin and destination. In general, there does not appear to be finished products being shipped from the area.

*A reviewer spoke to the apparent inequalities of treatment of transportation issues across the alternatives by saying that in this discussion, if you put barriers up it is going to have consequences for commercial shipping. There have been 3 scenarios to accommodate them; (1) a 'superport' that could cost billions but potentially make Chicago a new center for global water transportation interchange, (2) a port to accommodate current volume in mid area for a much lesser cost that is able to accommodate the existing, but declining, volume of traffic ; and (3) basically shutting down the barge shipping activities since "the, port district is more interested in golf than shipping as congress's investment has been subpar." Treating these 3 options equally seems to be a real contribution.*

*A reviewer felt that this report needs to be clear on the cost to accommodate existing traffic.*

The HDR team said that whatever would be coming to the Great Lakes in new container traffic is small stuff. Class 1 rail companies will not allow their infrastructure to be undercut by canal. Rail is a private investment, whereas water is public.

HDR staff asked the reviewers' opinion: If we were to assume commodities were to be transferred to other modes, would there need to be some other forms of investment in rail (public) to help offset?

*A reviewer felt that he did not agree that subsidies will be needed. And rails will only do it if it makes financial sense for them to do it. Railroads are investing in other parts of country and waiting for Chicago's public money.*

### **HDR Presentation on Quantification of Benefits and Economic Analysis**

A copy of the PowerPoint Presentation made by the HDR Team covering economic analysis is provided as **Attachment 2** to this report.

General Cost Benefit Analysis (CBA) Framework – many costs to be considered and all individual mitigations will be broken out. TARP to be completed by 2029, so this is for 30 years after that and then bring back to today's dollars.

HDR indicated that the economic analysis would be conducted using both the USACE recommended discount rate of 3% and the OMB guidance rate of 7%. These two rates will allow the sensitivity of costs to rate differences to be demonstrated.

*Key reviewers agreed this is a reasonable discount rate.*

HDR still needs to confirm the USACE rate. All costs are measured against the “base case”, which is no separation with completion of the TARP reservoirs and other currently approved projects. . The Chicago Park District Marina plans to put in additional 1,200 slips (not a project cost) and recreational boaters would move to these facilities. Water quality – no additional treatment needed. Pollution Control Board and EPA are supposed to act to put stricter nutrient loading restrictions on the water treatment, but it is not yet passed. Effluent at the plant is currently below lake standards for TSS and BOD, but ammonia and toxic metal standards will be very difficult to meet.

*A reviewer felt that they can reduce those numbers if they increase pretreatment standards for heavy metals.*

The GLC and Cities Initiative wondered if pretreatment standards were modified at last minute, and the implications are that we can reduce the cost of separation, would we want to revisit that as a cost.

*The reviewer felt that any changes could be months or years down the road, it is impossible to tell. The baseline will stay as is for now, but can be modified as needed in the future.*

The HDR team stated that cost adjustment could be done easily. The strategies are designed to minimize effects of the mitigation required.

*A reviewer felt that the team has to be very specific to what they call “mitigation” and what they are not calling mitigation since there will be impacts to small groups.*

The HDR team will call it out, but asked is mitigation a good term?

*The reviewer felt that it was okay, but we need to acknowledge that there are small groups / people that will suffer as part of this (e.g.. dry dock owners in Indiana).*

The HDR team spoke to Transfers – if all freight goes to truck, lost jobs from shipping will move to trucking. Overall, we are concentrating on the user's cost for shipping.

*A reviewer asked: “Is there a way to measure the employment?”*

HDR responded that CBA analysis won't specifically measure employment, but they could do based on the revenue industries. It is implicitly in there, but not specifically.

*A reviewer asked HDR to define “effect on social welfare.”*

HDR said that it is the impacts on users across the area. Cleaner world, less invasive species, etc translated into dollars. Basically considering if investments are making the world a better place. Monetizing effects when they can. When some impacts can't be quantified, the report will still speak to these impacts in the narrative and while they won't be in the numbers, it will be in the discussion. Water quality is one that is difficult to

quantify and can often be shortchanged. The HDR team has been struggling with placing a number on some of these items and those numbers becoming scrutinized.

*A reviewer felt strongly that articulating that this study is not focusing on jobs to the groups will take considerable tact since they are highly focused on.*

HDR spoke to changes in property values with barge operators, some terminals will be affected as it will cost more to ship from their terminal and the property values would go down, but HDR thinks this effect on property values would be already accounted for in the increased shipping costs from their terminal. There is the possibility that some locations could also be a benefit if abandoned and turned into mitigation area...but don't want to double count benefits or costs. From a public policy standpoint, reimbursement may be given, but it is not factored into this analysis.

*A reviewer felt that the team needs to come up with other examples of what areas have aspects that are difficult to quantify and show the public that reviews this report how "double counting" was eliminated...but that costs were appropriately assigned.*

HDR wanted the reviewers to understand that they can't take all commodities and evaluate them at the same unit cost (as was done in the DePaul Study).

HDR asked: "How does group feel about the DePaul study?"

*Reviewer: The author is credible, but it was done in haste and commissioned by chemical industry council as a response to the Taylor study for talking points to the press.*

*Reviewer: That study didn't look at a variety of things, it undersized infrastructure costs, and it didn't look at AIS movement impacts in long term.*

*Reviewer: They minimized AIS effects.*

HDR said that the Taylor study focused only on goods movement and that the goods would move by water until they reached the barriers and then would travel through a different mode of transportation for the last 25 or so miles. The study didn't look at any trans-loading costs over the barriers. The Lynn Muench (AWO) study said that infrastructure is not able to handle this in the short run and it will kill the barge industry. The USACE study is not done yet, but the numbers are very high. Potentially 800+ or thousands of trucks a day would be required to take the amount of load from barge shipping.

*A reviewer pointed out that rock salt goes onto a truck at the end anyway to take it to its final destination, and these estimates are assuming that it is taking it from the pile to the final destination instead of offloading at the barrier and driving to the final destination. The final destination is what needs to be known since the major amount of cost is offloading to the truck. Even though it may*

*take multiple trucks to carry the load on one barge, the 10 extra miles for these trucks to reach their final destination is minimal compared to shipping costs (other studies don't address this properly).*

HDR spoke to quantifying the costs associated with AIS transfer between watersheds. They pointed out that quantifying this requires many factors. They are consulting subject matter experts. The group feels putting a single number out there could potentially blow credibility since there is no number out there currently.

The GLC and Cities Initiative is concerned that a cost estimate of the impact of AIS movement may become the focal point of the study and don't want to distract from the broader point and purpose of study.

HDR said that one potential way to do the AIS cost benefit estimate is quantify all other impacts and then put these impacts into context of what has happened historically (zebra mussels) and try to put forth reasonable case studies of what could happen (how much it would cost) if something were to occur. Zebra mussels impact on Great Lakes was in the 300 to 500 million dollar range, then use that figure as a benchmark (consider also other AIS—e.g., lamprey, etc). Doing detailed analysis with this has produced a very large range, which is very hard to agree upon. Case studies could also have a large range of arguments, but 40 species are additive and that could show different ranges.

*A reviewer said that most of the other things have costs and benefits.*

HDR staff replied that this is true, but we are just trying to get back to where we are today, making sure that we don't worsen conditions. The concern is that when HDR runs the numbers, the number for AIS control is a very large benefit compared to others, and that is the number that is the most controversial. GI shows that there are benefits as well, but the costs associated with these improvements are not often the same as the amount taken to build the infrastructure.

*A reviewer thought that HDR needs to add water quality into the charts since it benefits not just the Great Lakes, but other regions.*

*Another reviewer again pointed out that the root of the problem is that we are not improving and envisioning, but we are instead getting back to where we are today.*

*Many of the reviewers have come to the realization that the main area we are getting benefits from is the area that is the most controversial and can be scrutinized the most. Basing the benefits of separation on an area that is not as easily quantifiable is unsettling.*

*Reviewers generally agreed that the scenario type of methodology is a more reliable form of analysis. Want to emphasize that we are protecting both the Great Lakes and Mississippi basins. In the report they can put those on separate bars on the chart to illustrate that it is a benefit for both basins.*

It was suggested that the team – and any interested peer review members -- have a discussion with GLC and Cities Initiative leadership to discuss how to address this item. The team needs a holistic view of the cost / benefit for a waterway and its functions. Water quality, transportation, and flooding will need to be explained.

*At least one reviewer opted that the GLC and Cities Initiative should change the title of the report to fit what it is currently stating. If they change the main goal to AIS control, then the other 3 (water quality, transportation, flooding) would be sub goals to keep the status quo.*

*Another reviewer thinks that there are many benefits that are minimized in this type of discussion. The Midwest / Chicago area is so far behind the rest of the country, and the district is getting a new look on how to address these issues. Opening up the waterways for use to the public and getting in compliance with the Clean Water Act are huge benefits that should be accounted for.*

Discussion continued on the “goal” of the effort as embodied by “Envisioning” in its title. Individual reviewer comments are summarized below:

*During flooding, water quality and flood control that occur during the smaller events are a large benefit that needs to be quantified.*

*I react negatively to the “do no harm” approach, and feel that envisioning is a different project.*

*Truly envisioning means everything is on the table, and that is not what was done.*

*I think what the group is saying is that we are over promising in the title and the first few pages.*

*We should acknowledge that this report was based on AIS control and use it as a baseline for future studies.*

*Envisioning can be a biteable chunk, it doesn't have to be utopia. It can be phased as well.*

*But at what cost? It means improving things over the status quo. The question isn't just the title, but what are they actually doing to improve and envision?*

*The “superport” is example, a way to envision and solve AIS issues above and beyond. This type of approach needs to be taken with each of the goal elements, and they need to have a “superport” for GI and stormwater elements as well.*

HDR expressed a need for clarification from their client on the direction to proceed. This information is out there, but what do we do about it? Do we just restate the ideas of others? The marching orders were to deal with AIS movement, and the team is torn on how to integrate these comments. What direction does the team take from here?

Are we looking at separation and looking at outcomes, or are we looking at doing all the things and then separation as an auxiliary outcome?

*A reviewer felt that we need to work backwards, in order to effectively separate, we would need to do a, b, c, and all the other mitigation strategies to get the proper state of nature, and end result would be separation.*

The GLC and Cities Initiative feels that one objective is to take the information and put into USACE GLMRIS study, but the bigger purpose is to inform the public as to what would need to be done to separate, including impacts, costs, etc. Our problem is that we have added the additional hurdle of improving all features (transportation, flooding, and water quality).

*A reviewer thought that it is an arbitrary 5 year deadline to install the barriers as the USACE won't be able to build these in 15-20 years. Instead, mitigation could be done in interim.*

HDR said that the 5 year deadline helps to lay out timeframe for discussion since the longer you wait to put in a barrier, the higher risk of AIS movement there is.

*A reviewer pointed out that the schedule for TARP has been held firm in the planning assumptions, but they don't have an enforceable schedule. A driving force that makes this not work is flooding, and that cannot be completed without TARP.*

A reviewer asked if the primary goal is to impede AIS movement, then you are stating that you are willing to sacrifice other things.

HDR replied that those are political judgments; our job is to present the decision makers with the data so they can make that judgment.

*Reviewers felt the need to have meeting among HDR, GLC Cities Initiative and peer review representatives either via phone or in person since decisions on goals/approach will affect the work product.*

HDR felt that even if a barrier goes in tomorrow, there will need to be vigorous AIS prevention. In the long term, can they continue to rely on non-structural approaches vs. nonseparation?

*A reviewer felt that it needs to be stressed that the phasing of barriers and other improvements is important as it affects the risks. He was thinking risks are more based on timing of the projects as opposed to location. Now that we have chosen 3 options that best illustrate varying impacts, and that these 3 options have generally equal AIS movement risk while the other risks fluctuate, it would have been interesting to look at timing with different phasing options (i.e. barrier installed at end and what do you have to do to keep AIS out).*

HDR commented that some timelines do address this as some of the elements do need to be implemented prior to the barrier.

*Reviewers felt that we need an approach that helps the readers to understand relative risks of timing*

HDR noted that ancillary benefits can be captured, and we can get all of these without a barrier.

HDR postulated that for transportation, it should be done on its own by its own merit. For example, why not a super port on its own instead of as a part of this project?

*A reviewer responded that it's because the market is choosing to abandon this method.*

The consensus of all at the meeting seemed to go with case study approach for AIS benefit quantification and move the project forward. Need to acknowledge the USACE approach, but it will take years to get their data.

*A reviewer felt that the correct approach depends on the audience, but that this approach is more understandable for general audience and the public.*

HDR said that as the USACE models further develop, the analysis will need to have compilation of impacts on whether separation will hinder or help habitat for other invasives.

HDR said that there is a quantifiable cost to degradation to the transportation element.

Other port authorities will pick up the slack, and the client needs to look at if they want to divert the tonnage per year as he thinks there is some viability since barge transport is by nature decaying with no mitigation or mitigation is to put them out of business and buy them out.

*A reviewer asked as to AIS movement prevention – What is on that bar and what are the benefits?*

HDR responded reduction in ecosystem costs that one invasive species would inflict (damage of AIS movement) through historical data and reasonable judgment. This estimate would be conservative and say it considers only one AIS, but the benefit could be cumulative across many AIS. The final report would point out that the USACE has identified 40 potential AIS and one could be catastrophic (thus, separation is like an insurance policy). An invasive, like Asian Carp, could create hazards to people, fishing industry, degraded aesthetics, recreation, etc. We do have numbers associated with zebra mussels and sea lamprey, damages, efforts to fight, and other costs, and these are costs that would be avoided in the future.

*A reviewer noted that zebra mussels would not have blocked the barriers, so we cannot talk about the damages of them in the lake since they were already there.*

HDR explained that they are just using them as an example of what an invasive can do. A list of costs and benefits is in the workbook for everyone to review. These line items do includes O&M.

*A reviewer commented that the cost of things drift upwards; and asked if the team was doing something to make them more credible?*

HDR responded that there is some contingency, stripping out and doing a distribution with a risk range. The ones included now are conservative.

*A reviewer asked if it was correct to list stormwater management as a cost. He felt that storm water management is a requirement across the country and because the CAWS area is behind in complying with current requirements it should not be a cost of this separation project*

HDR responded that this may need to change based upon discussions today. Costs were built up to provide situation were flooding impacts are no worse than today.

*A reviewer asked if internal plumbing is required to get a sewer to TARP standards will it be included as a baseline cost.*

HDR Team responded that, yes, it is in baseline.

*A reviewer asked: "In 9a (water quality mitigation improvement), are you only talking about pathogen of bacteria. Are they going to do any analysis of metals, or other water quality factors?"*

HDR responded: No, they do not plan to include these other costs.

*A reviewer asked: "Do we know barge is safer than everything else?"*

HDR responded: Yes there are statistics on it and they are accepted.

HDR asked the reviewers about sedimentation and the need to remove it. If it's not disturbed and if flows aren't increased, maybe we do not need to plan on removal?

*A reviewer suggested talking to Dr Garcia at the University of Illinois for his study at Bubbly creek. There is no way for some sediments to get out of North Branch now, but may be moved downstream if the Chicago River Controlling Works are opened up and flows and sediment can move into the lake.*

## Wrap-Up Discussions

On behalf of GLC and the Cities Initiative, Matt Doss thanked all for coming today. As new thoughts come down once notes are distributed, please make sure to include these new thoughts. These are some summary comments:

- Biggest take away message – There is a disconnect between “envisioning” and the big goals, and where we are now at achieving separation and getting back to the base scenario (status quo) in terms of flooding, water quality, and transportation. We need to either reconcile that or pull back and review the scope. Are we accommodating the status quo or taking it further to envision a new and better system?
- Some reviewers feel we should admit some of our goals aren’t achievable, and the analysis doesn’t show which options minimizes AIS movement risk, then the other 3 (flooding, water quality, and transportation) risks should be evaluated in relation to that.
- In a similar theme of envisioning, in this report as it is now we are merely accommodating the status quo as opposed to different approaches to managing things.
- The analysis doesn’t identify which options provide the highest degree of security against AIS movement.
- Right now, improvements are all contingent on the construction of the barriers, is this consistent with envisioning a better CWS?
- There are other options to moving materials, and we may not have to focus on keeping status quo.
- There is difficulty in evaluating the best engineering solutions versus the best political solutions
- The peer review team feels that we need to be realistic about the declining use of shipping, and we need to think about how much we want to mitigate for transportation impacts.
- Should look at quantifying the job impacts
- The group agreed that past case studies are to be used for the AIS benefit analysis
- How do we fully capture non-AIS related benefits of separation?
- We need to add water quality as a benefit category
- We need to look for ancillary benefits as opposed to just the base case
- Is there a middle ground between envisioning and separation?
- We need to discuss, before preview meetings, the question of “envisioning” versus the “do no harm” approach

*Reviewer: There is nothing wrong with the report focusing on getting back to the base case, but then we need to state it properly. If we do need to envision and improve, then we need to come up with better options for each scenario. He is also concerned about the graphical representations in the report and suggests getting some specialists to help convey the message graphically.*

*Reviewer: Capturing stormwater is different than managing stormwater. How do we quantify it? Is it by reducing flood risk, or looking at different stormwater management systems?*

*A second reviewer responded: Reducing flood risk.*

HDR's transportation team asked: Are we going to do a cost benefit analysis of full cargo diversion of the 15 m tons per year? None of the cases require it at this point. Divert 8 million tons south of Lockport? What is vision for 21st century for transportation? They are asking for some guidance from the GLC.

Consensus: No major concerns expressed on economic analysis.

*Reviewer: Will they be open to reconsidering 5 year deadline for putting in barriers since it may have more impacts / costs for mitigation?*

*Reviewer: Is this product the GLC's voice?*

GLC/Cities Initiative are not looking for an opinion, but instead an objective analysis of alternatives and costs / benefits associated.

*A reviewer believes the report is going to state an opinion since it is a policy document. Would they want to make the case that MWRD is poorly managed and needs to be restructured?*

*A reviewer commented on MWRD: In the past decisions were made and they were sacrificing water quality and using the river as dumping ground as to not have to directly discharge into the lake. Now the focus is to use waterways for other uses and is evolving. We need to ride the trend, and we can have those improvements without having to separate.*

*A reviewer wanted to make it clear that the Mississippi River Basin is just as important as the Lake Michigan watershed.*

The GLC/Cities Initiative opinion is that separation is the best prevention for AIS movement in both watersheds, but all stakeholders need to better understand the impacts, costs and benefits. The study is to give preliminary answers to these questions given that non-structural methods are not a long term solution to AIS movement. They don't want the result of the project to be viewed as opinion, but rather factual engineering findings. They want to find a way to accomplish physical separation of the basins without doing any harm.

*A reviewer asked if all were comfortable with the choice of the 3 options, any comments?*

The group is concurred with the options and locations.

*One reviewer asked for more analysis with the same locations; assuming that the barrier goes in later at an appropriate time when it won't increase flooding, impact water quality, etc, and cost / benefit analysis of those scenarios.*

It was stated that all current scenarios do not increase flooding and do not impede water quality (not sending CSO and treatment to lake without full TARP implementation).

The GLC/Cities Initiative believes that ultimately the decision makers will pick the option that makes the most sense, and there may be some very near term things that can be done toward implementation of the option. It is likely that the discussion will turn towards what the appropriate timing will be and that people need to be reminded that this will take a long time, but we need to be very vigilant to keep AIS out (such as carp) before these improvements are done.

HDR felt that there is a need for an emergency response plan in place and need to note it in report.

*A reviewer said that he envisioned this plan to be like Chicago Climate Action Plan that makes incremental progress towards the main goal. He feels mitigation steps towards separation would be the same as this plan.*

*A reviewer asked if the plan would have an implementation element.*

The GLC/Cities Initiative at this time feels that it will only identify the participants.

*A reviewer opted that if partners and funders buy into the different mitigation elements, the foundations can begin to set aside money for implementation to continue it moving along.*

The GLC/Cities Initiative hopes to keep all parties on board in moving forward. The main goal is to inform public discussion and let people know the impacts of separation.

*In closing, a reviewer commented that he is impressed with the complexities of the issue and impressed by way that CLC and the Cities Initiative has worked with their consultants to think through the numerous different dimensions. Framing the results is the difficult task that remains.*

## 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. Each of the reviewers provided additional thoughts upon reflecting on the effort.

These are provided below.

### *Reviewer One:*

*One thing that comes through in these review sessions is the interconnectedness of the systems, and the necessity of dealing with the issues as a systems opportunity. The CAWS relates to recreation, to commerce, to water quality, to water quantity, to flooding, and so on and so forth. You can't just construct a few barriers without addressing the full range of issues. You need to tell that story as effectively as possible. Since the various sub-systems are the "responsibility" of numerous different governments, and agencies within those governments, no one is articulating the public interest as it relates to the CAWS.*

*The summary suggested that there were no real issues with the economic analyses. I think that is true with respect to the suggested methodology. However, the devil is in the details. I don't think you can do a credible cost benefit analyses on water transport until you have the origin and destination data. For example, a comparison of barge costs from Lockport to the Port of Indiana with truck costs to the same port only makes sense if you know the cargo and the final destination. If the final destination is rock salt for Chicago, then trucking it from a port south of Lockport to Chicago might be cheaper than trucking it from Indiana. You can't just compare truck costs with barge costs.*

*In this same vein, the study has to ask the question as to whether or not the goal is to provide material to end users or to protect the interests of barge companies.*

*Because this is an engineering study, and one committed to completing a cost-benefit analysis, I fear that there is a bias toward engineering solutions that can be costed. As was suggested at the meeting, why not buy out the barge companies rather than build a barge transfer system. The answer, I fear, is that it is possible to cost a transfer station and we don't know how to cost a business purchase. The same is true for dealing with storm water. I thought I heard a bias toward more large scale retention systems (TARP II?) rather than a bias toward more aggressive use of natural systems of retention and use of I & I efforts because the latter were too "political". They are also more difficult to cost than another tunnel and quarry system.*

*The key point you make about "envisioning a waterway system for the 21st century" is correct, but I worry it will be misinterpreted. I know that we used the vision word a lot because it was in the title. However, I would not want the clients to feel that this was a "soft" approach we were recommending because it was too hard to do the "hard" job of a cost benefit analysis. When I think*

*of envisioning, I think of scenario planning, a technique developed by Royal Dutch Shell and used widely by large corporations and some large government agencies (the Department of Defense.) What Royal Dutch Shell and others have concluded is that when you are dealing with large, complex socio-political problems; long time horizons; and high costs (like building a billion dollar drilling rig) you can not use traditional planning and engineering techniques to develop an answer. You need to develop reasonable scenarios, based on existing conditions and emergent trends (like the change of leadership at MWRD, or the consistent decline in barge traffic, and so on.). This is all hard work that requires research, but is very different kind of work than engineering analysis. In other words, don't leave the impression that envisioning is a bunch a people sitting around a crystal ball coming up with nifty ideas.*

*Finally, I feel that the study is well down its path, and that doing a different approach is beyond the scope and cost of the project. I accept that, so the issue is what is the best way to present the terrific material that has been collected. My simplistic answer is to tell stories, paint pictures, acknowledge that we don't know what the future is going to be like, that 50 years is an eternity in a dynamic environment, and that we need a public debate about the possibilities, and that your value system would insist on a future that protects our water systems from invasive species, among other things. If there was a cost-benefit analysis for the Interstate Highway system, or the 1893 World's Fair, or for the building of the transcontinental rail system, no one remembers it today, and it was not what inspired people to act.*

**Reviewer Two:**

*I totally agree with Reviewer One's excellent comments. I want to add on to his point dealing with cost-benefit analysis. As we all know it is always very difficult to determine a monetary value of environmental benefits. Therefore cost-benefit discussions have pages and pages of discussion on costs with an impressive array of dollar amounts. When it comes to the discussion on benefits it tends to be short and very general and then maybe have some "guestimate" dollar amounts. That often results in the economic environmental benefits getting short shrift in any subsequent discussions. I hope that will not be the case in this final report. The environmental problems from AIS are real and very costly to society. Somehow that has to come through in the discussion using real world examples such as the economic damage from zebra mussels, etc. to demonstrate the benefits of preventing the movement of AIS in to and out of the Great Lakes.*

*Reviewer One made some brilliant comments in his discussion of scenario planning. It may not always be possible to use traditional planning and engineering techniques to develop an answer. You need to develop reasonable scenarios, based on existing conditions and emergent trends (like the change of leadership at MWRD, or the consistent decline in barge traffic, and so on.). This is all hard work that requires research, but is very different kind of work than engineering analysis. In other words, don't leave the impression that envisioning is a bunch a people sitting around a crystal ball coming up with nifty ideas. " I totally agree with his astute comments!*

*And again I fully endorse what Reviewer One said in his final. His "simplistic answer" captures exactly what I have been wrestling with on how to portray this very complex separation issue.*

**Reviewer Three:**

*I agree with the other reviewers that the report should not be oversold as "envisioning"; the limits of the study focus should be acknowledged up front. Namely, that the working assumption is that separation is the only realistic approach to AIS mitigation, and that barriers are the interim engineering solution in the medium term (though long run re-engineering and other green modifications to our waste systems should be the ultimate goals that obviate even the need for barriers). However, I don't think that the report needs to be apologetic about its "envisioning" terminology. The report envisions feasible and cost effective pathways to achieving separation. It lights the way, and moves the ball forward in discussion by illustrating the positive cost-benefit outcomes of separation, which are arrived at through specific engineering solutions and which impose no major trade-offs that would achieve AIS goals only at the expense of the other major uses of the waterway. Time and resources of the project preclude full assessment and "visioning" of boosting the other social goals of the waterway--transportation and recreation, and ultra-improved water quality. Yet it is "envisioning" nonetheless. One can acknowledge that other studies may find ways to improve the other uses of the waterways in the future; the report believes that the separation avenues laid out will not be incompatible with those.*

*A few specifics:*

*The discount rate that is standard by the ACE was agreed on by the committee. Some will argue that benefits should be discounted by a higher rate. However, the low rate of return to capital that we are witnessing over the past 10 years in the Western Hemisphere suggests that higher discount rates are more and more dubious. That is, alternative uses of funds (versus the waterway improvements) will not likely achieve very high returns; hence the low discount rate is appropriate.*

*While I and the committee have not apparently read the previously prepared alternative studies of the Cost-Benefit ilk that estimate the costs of transportation disruption (if barriers are imposed), I think that we were emphatic that these 9 previous economic evaluations) were deeply flawed in their methods. I can see that, with the release of your report, these other (competing) studies will be trotted out, and presented to the public in a journalistic way that suggests that "there are many opinions". Accordingly, this report's analysis should probably spend some time and ink to disparage these reports as honorable but preliminary and deeply flawed.*

**Reviewer Four:**

*Envisioning vs. mitigating and the relationship to quantifying AIS associated costs*

*Option 1) If the goal of this project is to lay out options for reducing the risk of AIS movement by building a physical separation between the basins, with corresponding strategies for mitigating*

*possible negative effects in water quality, stormwater, etc., then I don't think you need to worry about trying to assess AIS costs, only the mitigation costs. You're saying that preventing AIS movement is of the utmost importance, that it is your goal, and that you are willing to pursue it even at the risk of imposing negative consequences on water quality, stormwater, etc. (albeit, some of those can be mitigated). It is my belief that the client believes reducing the risk of AIS movement is of singular importance (as informed by environmental ethics more than economics), that this goal is a "given," and that they would be willing to pursue it even at the expense of these other issue areas (i.e. "We will solve this problem no matter what it costs"). To go back to the point made by Reviewer One when the folks planning the Interstates, World's Fair, and continental railroad decided to do those things, it's because they believed that they were fundamentally important, and some harmful consequences were worth it (displacing landowners, for example). I continue to believe this what the client actually wants, and if so, they should say it. This is still "envisioning" – but it's envisioning an end to AIS movement.*

*Option 2) If the goal of this project is to envision the waterway system for the next century, trying to make everything about it better, then I think reducing the risk of AIS movement is one goal in competition with an array of other goals, and now you have to weigh the full set of costs and benefits against each other in all these other areas of concern. The danger here is that the costs associated with AIS movement, and the danger they present, and thus the benefit of prevention, may very well not be greater than the costs associated with altering the status quo in all the other issue areas. There are trade-offs inherently involved.*

*These seem to me to be two distinct projects. What we currently have is somewhere in the middle.*

#### *Political solutions vs. engineering solutions, inertia on "big ideas"*

*Akin to some of Reviewer One's comments, there has been a distinct bias toward engineering solutions throughout, with the argument that some things are just too political and cannot be controlled. All of this is going to be equally politically charged. Purchasing existing reservoirs, land swaps, buy-outs, etc., are all legitimate options consistent with the goals of the project, but seem to be getting dismissed. Additionally, some of the new "big ideas" we discussed (some of which are included in the non-engineering solutions), like well injections or the backdoor port in Indiana seem to have been marginalized as options as well, based on the argument that they would be "major undertakings." At the same time, a second TARP system and an island port in the lake have both been suggested... and would both be major undertakings. We can't let inertia get the better of us here. If this is a vision, and there are some big ideas and non-engineering ideas that would be consistent with reaching the client's goals, they need to be included.*

#### *Improving transportation vs. protecting barge owners*

*These are not the same thing. The focus should be on how we can best move commodities through the region, given changes in the waterways. The work to date proposes a series of investments whose only guaranteed benefit is mitigating negative responses from the barge owners as much as possible. I don't see a scenario other than the status quo that barge owners will like, so it would behoove the team not to constrain themselves to make the barge folks happy.*

**Reviewer Five:**

*I agree that the project scope definition was a key point that emerged during the meeting that needs to have further discussion with the sponsors."*

*Regarding the issue of Lake Michigan water diversion, I do not think it is likely that the other Great Lakes States will just stand back and let Illinois continue to take 3200 cfs from Lake Michigan annually if the separation allows, for example, the runoff from the North and South Branches and the treated effluent from the North Side Water Reclamation Plant to flow to the Lake and decrease the diversion (for the Mid-System Alternative). I have spent nearly 20 years working on Lake Michigan Diversion issues, first as a U.S. Geological Survey staffer supporting the U.S. Army Corps of Engineers and the 3<sup>rd</sup> and 4<sup>th</sup> Lake Michigan Diversion Review Committees and then as a member of the 5<sup>th</sup> and 6<sup>th</sup> Lake Michigan Diversion Review Committees, and I am sure that the other Great Lakes States would file to keep this water in the lakes and not let Illinois continue to divert the same amount. Part of the Supreme Court's view was that the diversion of runoff and effluent was needed to keep the Lake clean, and, thus, Illinois was allowed to divert this water. However, if the diversions are not to keep the Lake clean, but merely for water supply in northern Illinois they would probably eventually be subject to the terms of the Great Lakes Compact. So, I really do not think Illinois would get a water supply benefit, on the other hand the Great Lakes would get the benefit of more water returned to the Lakes. However, the benefit of additional water reaching the Lakes would be hard to quantify.*

*Some discussion of the extreme difficulty of estimating the costs for the additional flood mitigation and water-quality improvement measures must be included in the report. We do not really have a clear picture of the post-TARP reservoir completion flood risks and, especially, the post-TARP reservoir completion water quality in the CAWS (these estimates should be available next year in Marquette's GLMRIS study for the Corps). Thus, estimating the facilities necessary to maintain flood risks and water quality in the CAWS to these unknown post-TARP reservoir completion conditions is an extreme SWAG. This needs to be made completely clear up-front in the report, so that people do not get the idea that somehow the Corps could estimate these things right now, as some of the Peer Review Team members wondered during our August 31 Review Meeting.*

*Regarding the concept of injecting excess runoff into deep wells to replenish the aquifers, whereas this approach may have some value toward restoring water levels in aquifers the injection rates that are likely to be feasible will have little effect on flood volumes. The rates at which you can push water into aquifers is far, far smaller than flood runoff rates. Aquifer replenishment also would require substantially treated water before injection. Aquifer replenishment probably is a worthwhile goal, but it is not a flood reduction method.*

*Solving actual flooding issues is going to require some hard engineering solutions. Green Infrastructure and/or "natural systems of retention" generally are considered to be effective in reducing the volume of runoff for storms of two year return period (i.e. storms that occur once on average every two years) or less. Thus, these systems are great for helping reduce raw annual*

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*pollutant loads and the total amount stored in and pumped out of TARP over a typical year, but they would not provide much flooding relief for downtown Chicago in a large storm for the Near Lake Alternative even with TARP fully on line because of difficulties in getting high flows from their source areas to the TARP reservoirs (TARP conveyance issues) and also the conveyance limitations of the waterways.*