IMPLEMENTING ENVIRONMENTAL COMMITMENTS AND REQUIREMENTS INTO DRILLED SHAFT AND PILE TEST PROGRAM FOR FINAL DESIGN AND PROGRAM DELIVERY OF THE CONTROVERSIAL MINNESOTA/WISCONSIN ST CROIX RIVER BRIDGE PROJECT.

LESSONS LEARNED FOR DESIGN PLAN DELIVERY OF ENVIRONMENTAL CONSTRUCTABILITY.

Dwayne Stenlund (612-810-9409, dwayne.stenlund@state.mn.us) CPESC. Transportation Specialist Senior 4, Minnesota Department of Transportation, Office of Environmental Stewardship, 395 John Ireland Blvd., MS 620, St Paul, MN 55155 USA

ABSTRACT

The drilled shaft and pile test program was let for construction activities in May 2012 to collect soil bearing data for bridge pier location and ultimate design of a new river bridge crossing. This involved installing multiple sized metal shafts up to 140 feet below the surface elevation of the river in two locations. The scope of work was to expedite a 2013 project letting of a bridge within a scenic and wild designated river.

All construction projects that disturb an acre or more of land, or is part of a common plan of development, must follow the Environmental Protection Agency (EPA) permitting process. The EPA can delegate the National Pollutant Discharge Elimination System (NPDES) permit to the individual state. In Minnesota, a Storm Water Pollution Prevention Plan (SWPPP) must be developed by the land or project owner and the contractor implements the plan. A significant design issue was how to incorporate various river work permits, storm water discharge permits and all the environmental commitments into bid documents and construction plans. The construction program utilized the SWPPP to incorporate all the environmental requirements of pollution controls on land and water, wildlife, decontamination, navigation, cultural and natural resources. The construction plan ultimately contained 11 sheets, only one of which was the SWPPP narrative, plus hundreds of typical contract specification pages.

This paper describes the regulatory issues, environmental impacts prevention and construction process plan development for drilled shaft and pile test program within the St Croix river for completing engineering studies of foundation design. Implementation of the environmental commitments were developed using the NPDES Construction Storm water pollution prevention discharge permit framework that incorporates plan narratives, detail drawings for contractor installation of best management practices and rapid plan amending methods based on field conditions. Lessons learned in the drill and test shaft operations are being applied to the actual bridge construction plan for contractor implementation.

BACKGROUND/SCOPE OF WORK

The placement of the new road crossing project over a national wild and scenic river was and remains contentious since the 1980’s. The ultimate river crossing project was authorized by an act in Congress (Figure 1). The stated purpose was to improve various road connections and transportation reliability between Minnesota and Wisconsin (Figure 2). Many reviews and documents have been produced that describes in detail various issues that culminated in the re-evaluation of the 2006 Supplemental Final EIS for the project. More information can be found at: http://www.dot.state.mn.us/metro/projects/stcroix/documents.html

The supplemental final EIS identified many environmental issues and constructability concerns. Potential environmental impacts include wetland encroachment, river bank/flood plain damage, wildlife disturbance, natural mussel community damage, zebra mussel spread, emerald ash borer introduction, aquatic habitat filling with sediments, and vegetation impacts. The potential pollutants generated from the construction program include river sediments, drill polymer and mineral slurries, concrete materials, refueling operations (spills), equipment fluids, porta-potty material loss, grinding and cutting products, metal welding slags, and trash.

In addition to the typical requirements associated with construction within Federally listed outstanding valued resource waters, the Minnesota Department of Transportation agreed to additional constraints and multiple mitigation items (see Appendix 1 within the http listed document for a complete list). The following agencies have issued for the bridge (see Appendix 2 for a complete list):

1. United State Corps of Engineers
2. US Coast Guard
Implementation of these environmental commitments were developed using the Minnesota EPA delegated NPDES Construction Storm water pollution prevention discharge permit framework that incorporates plan narratives, detail drawings for contractor installation of best management practices and rapid plan amending methods based on field conditions. Each permit authority action items were referred to and documented using narratives and photos of proposed and actual procedures.

Figure 1. Bridge Graphic (artist rendering) with 5 extradosed (cable stays and post tensioned box girder) bridge piers

Figure 2. Map of test shaft and pile load test program areas, and mussel restriction mooring area. The test shaft and pile test areas were selected outside of proposed bridge foundations.
PRECONSTRUCTION BEST MANAGEMENT PRACTICES (BMPS)

The following BMPs and example project narratives were developed to ensure project commitments within the St Croix River:

Preconstruction Meeting

In order to ensure compliance to all permits and environmental commitments, all contractors and subcontractors were required to attend a pre-construction meeting with presentations from all MNDOT specialty offices relating to waste disposal, cultural resources, erosion control, wetland delineation, wildlife, water quality, and state agency representatives that have regulatory oversight on the project.

(1701) ENVIRONMENTAL PROGRAM DELIVERY

The provisions of MnDOT 1701 Laws to be Observed are supplemented with the following:

Contractors shall be given an opportunity to attend project specific environmental delivery compliance training to better understand environmental compliance requirements that are included as part of this contract. The pre-bid Environmental Training will be in conjunction with a PRE-LETprevState_08744 vậnchantage as outlined in S-3. The training will consist of an approximately 4 hour commitment and will be provided by MnDOT and Regulatory Agency staff. Training will consist of a project overview, an overview of project specific environmental commitments and documents, NPDES rules and regulations, USACE rules and regulations, Public Waters work permits, water appropriations, decontamination protocols, plan content, example past means, methods and amendment processes, and general goals of the construction activity when working within the St Croix river complex. This is to ensure contractor awareness of compliance costs and incorporation of best management practices when working within a federally designated wild and scenic river.

Contractor’s personnel that are encouraged to attend the pre-bid training include the Project Manager and Environmental Compliance Officer. Other contractor personal invited are contractors’ lead staff preparing the bid, potential project construction supervisors overseeing the work of the prime contractor and all subcontractors, proposed environmental quality control managers or proposed erosion control supervisor (if different from the contractor Project Manager or Environmental Compliance Officer), proposed specialty contractors supervisors performing specific work of coffer placement and removals, tremie placement, drill shaft material processing and barge management officers. Each contractor is limited to 6 personal to this training session.

After the Contract award the Project Manager, the Environmental Compliance Officer, all supervisors of subcontractors or supervisors of individual work activities will attend a similar Environmental Training session provided by MnDOT. A written test will be provided to the individuals at the class and score of 70 percent on the test is considered a passing score. Failure to achieve a passing score will require retaking the test until a passing score is obtained. All other personnel working on the project will be required to take a similar but condensed version of the Environmental Training prior to working on the project.

SWPPP Training

The MPCA as the EPA delegated authority for NPDES permit issuance requires training to meet permit requirements. The training is composed of three types: SWPPP Design, Construction Site Management, and BMP Installation. As part of the SWPPP, the MNDOT must identify a person knowledgeable and experienced in the application and the implementation of the SWPPP. This is the MNDOT project engineer. In addition, the permit requires the owner to develop a chain of responsibility with all operators on the site to ensure that the SWPPP will be implemented and stay in effect until the construction project is complete. This is done though the contract with prime contractor who controls the work of the subcontractors.

The contractor identified a University of Minnesota certified Erosion Control Supervisor. The erosion control supervisor was a duly authorized representative of the prime contractor for all permit compliance issues and was contractually required to work with the Project Engineer. To ensure common knowledge transfer and permit requirements, the contract special provisions required everyone with project authority had to attend additional project specific training prior to commencement of work within the St Croix River. Permit specialists from various agencies presented project requirements.

Erosion Control Supervisor

The erosion control supervisor is a contract requirement, provided by the prime contractor to oversee their work, the work of subcontractors they hired, implement a quality assurance and control program, implement the SWPPP and installation, inspection and maintenance of the environmental commitment management practices. The Erosion control supervisor was required to inspect the entire operation daily as part of the quality assurance program. Example language from the contact are as follows:

The Contractor shall be aware of environmentally sensitive areas such as wetlands, mussels habitat and bald eagle nests and shall take precautions in order to prevent the incidental introduction of invasive species. The mussels must be relocated before the start of construction activities in that area.
A2 During Construction

The Contractor shall implement the Project's Storm Water Pollution Prevention Plan. The Contractor shall schedule and install temporary and permanent sediment and erosion control measures, construct ponds and drainage facilities, finish earth work operations, place topsoil, establish turf, and conduct other Contract work in a timely manner to minimize erosion and sedimentation.

All exposed soil areas with continuous positive slopes that are within 200 feet of a public water shall have temporary or permanent erosion protection within 24 hours after the construction activity in that portion of the site has temporarily or permanently ceased and connection is established to the public water. All other positive slopes to constructed surface waters, such as permanent storm water treatment ponds, curb and gutter systems, storm sewer inlets, temporary or permanent drainage ditches, or other storm water conveyance systems, shall have temporary erosion protection or permanent cover for the exposed soil areas as soon as practicable but no later than 14 days after construction activity has temporarily or permanently ceased in that area. For those drainage areas that have a discharge point within 1 mile and flows to an impaired or Special Waters shall have temporary erosion protection or permanent cover for the exposed soil areas as soon as practicable but no later than 7 days after construction activity has temporarily or permanently ceased in that area. Impaired and Special Waters are defined as those listed and referenced in the NPDES Permit.

Positive slopes adjacent to public waters and wetlands will be stabilized at the close of each day when weather forecasts for rain that evening, and/or overnight including weekends. Once work is completed it will be stabilized permanently as soon as practical but no later than seven days.

Exposed soil areas do not include; stockpiles or surcharge areas of sand, gravel, aggregate, concrete, bituminous, or road bed and surfacing material. A perimeter sediment barrier may be necessary to minimize loss when these are within 200 feet of existing surface waters or the property edge.

The bottom of temporary or permanent drainage ditches or swales constructed to drain water from a construction site must be stabilized with erosion control measures for the last 200 feet, or more when conditions warrant, from the property edge or from the point of discharge to any existing surface water. Stabilization shall be completed within 24 hours after the construction activity in that portion of the ditch that has temporarily or permanently ceased. Ditch stabilization will continue concurrently with construction activities but no later than 14 days after construction activities have permanently or temporarily ceased. Any, culvert pipe or storm sewer pipe that is within the cumulative distance is not part of this distance. Ditch checks may be provided where necessary to slow water flow and capture sediment.

Temporary or permanent ditches used as treatment systems will not need to be stabilized but must provide the proper Best Management Practices for the treatment system.

Pipe outlets shall be provided with temporary or permanent energy dissipation within 24 hours of connecting the pipe to any constructed or existing surface waters.

The Contractor shall limit the surface area of erodible soil that can be exposed to possible erosion at any one time when the permanent erosion control features are not completed and operative.

All liquid and solid wastes generated by concrete washout operations must be contained and not have the opportunity to come in contact with the surface waters or ground water. This includes the ditches, slopes to ditches, curb and gutter/storm sewer systems, and ponds. Areas where there are sandy soils, karsts, and high ground water the washout facility must have an impermeable liner. Liquid and solid wastes must be disposed of properly. A concrete washout sign must be installed adjacent to each washout facility to notify personnel.

Spill kits are required to be kept at each work site and storage area. Materials and equipment necessary for spill clean-up will be kept in an enclosed trailer or shed on site. Equipment will include, but not limited to, brooms, mops, dust pans, rags, gloves, goggles, absorbent (kitty litter, oil absorbent booms and diapers, and buckets. All spills will be contained and cleaned up immediately upon discovery. Spills large enough to reach the storm water conveyance system will be reported to the Minnesota Duty Officer at 1-800-422-0798.

Wetland Avoidance

Buffer zones will be established for environmentally sensitive areas (Figure 3). Fence shall be place around such areas. Edge of wetland areas shall be fenced at a setback distance of 25-feet. In the event that work is required, including movement of equipment or supplies in or adjacent to a wetland, perimeter control BMPs shall be placed along the work limits. This may include installing portable concrete median barrier between wetland and work area if disturbance of the wetland occurs as determined by the Engineer. Contractor shall take care to not disturb wetlands outside of work limits and to keep all sediment out of the wetland areas.

(1701) LAWS TO BE OBSERVED (WET LANDS)

The provisions of MnDOT 1701 are modified and/or supplemented with the following:

If the Contractor operates the excavation and/or disposal of material off MnDOT Right of Way, the Contractor is advised of the following:

MN Statutes Sections 103G.2212 and 103G.241 stipulate that an agent or employee of another may not:

1) drain, excavate, or fill a wetland, wholly or partially; or
2) construct, reconstruct, remove, or make any change in any reservoir, dam, or the course, current, or cross-section of any public water;

unless the agent or employee has obtained a signed statement from the property owner stating that any permit or wetland replacement plan required for the work has been obtained, or that a permit or replacement plan is not required; AND this statement is mailed to the appropriate office with jurisdiction over the wetland or public water prior to initiating the work.

The "Landowner Statement and Contractor Responsibility For Work in Wetlands or Public Waters" can be found at: http://www.bwsr.state.mn.us/wetlands/forms/Contractor_Responsibility.doc . The Contractor shall provide the Engineer with a copy of the completed "Landowner Statement and Contractor Responsibility for Work in Wetlands or Public Waters" for the excavation and/or disposal site prior to initiating the work.

---

**Eagles and Animal Protections**

**Bald Eagles and Nests**

MnDOT has acquired a Project-wide Programmatic Agreement with the US Fish and Wildlife Service for protection of bald eagles and eagle nests. The Contractor shall abide by the provisions agreed upon in the permit. For each tree/site with an eagle nest, a fence shall be installed with a 100 foot radius around the tree/location (Figure 4). The fence shall be maintained and not breached during the project. At the end of the project, fences around trees with eagle nests shall be removed.

Prior to engaging in any tree or structure removal activities, the Contractor’s Contract Environmental Compliance Officer shall survey the trees and/or structures per the requirements of the Programmatic Agreement and to determine if any large bird nests are present. If nests are discovered, the Contractor’s Contract Environmental Compliance Officer shall work with the MnDOT to determine what actions are required in accordance with the provisions of the Migratory Bird Treaty Act.

The contractor shall notify MnDOT if any of the following occurs during construction:

- Species are discovered that are identified in the project’s environmental documentation based on the federal or state threatened or endangered species list.
- New threatened or endangered species are listed or discovered within the project area.

---

**Figure 3. Wetland delineation map avoidance areas for contractor planning of laydown yard, river access and wildlife management.**
Native Mussels
MUSSEL RESTRICTIONS

According to the 2005 Biological Opinion issued by the USFWS, work within a 30,000 s.f. area along the Wisconsin shore under the new river bridge is restricted until native mussels (Figure 5) are relocated by MnDOT from that area (Figure 6).
Figure 6. Mussel translocation and propagation locations relative to mitigated bridge corridor.

River Access

The contractor was required to locate and obtain approvable river access and submit location for the Project Engineers acceptance (Figures 9 & 10). Two locations were selected and verified acceptable, both existing river access points. The haul road was staked to prevent accidental wetland impacts for all deliveries of materials and equipment. All river bank stabilization rock used to buttress temporary bridge platforms between land and barge conformed to USACE requirements of prewashed, clean, natural stone appropriate to the area. Prior to any movement of drill rigs, backhoes and concrete pumper trucks, tail gate discussions occurred to make sure no trees or other vegetation would be damaged to perform daily tasks. All wildlife observed using the haul roads like wild turkeys, snakes and turtles were allowed to proceed unimpeded to the maximum extent practicable.

Mooring

BARGE MOORING PLAN

The Contractor had to submit a barge mooring plan to the Engineer at least sixty (60) days before any barge mooring activity takes place. In addition, the barge mooring plan had to be reviewed by Minnesota Department of Natural Resources (MnDNR), the State of Wisconsin Department of Natural Resources (WisDNR), and the United States Fish and Wildlife Service (USFWS). The mooring plan had to include both planned locations and method to be used for the mooring operations.

Barge mooring can occur in the areas along the new river bridge and Minnesota shoreline where mussel impacts had been mitigated. Barge mooring can occur under the new river bridge along the Wisconsin shoreline after the native mussels have been relocated.

Land and Aquatic Invasives Prevention of Spread and Decontamination Protocols

The contractor shall prevent the spread of aquatic and noxious organisms using best practices developed by state and federal agencies, and MNDOT site planning by visual inspection process for all equipment in contact with river banks, surface waters and river bottom soils.

Emerald Ash borer
EMERALD ASH BORER COMPLIANCE

This Project is located, all or in part, in a county that the Minnesota Department of Agriculture has placed under an Emerald Ash Borer Quarantine. Any work for this Contract is subject to the following:

No part of an Ash (Fraxinus spp) tree from a quarantined area can be marketed to wood-using industries or individuals without an Emerald Ash Borer compliance agreement with Minnesota Department of Agriculture.

The Contractor shall not make ash or any non-coniferous (hardwood) species with bark attached available to the public for use as firewood from the quarantined area. The Contractor shall not transport entire ash trees, limbs, branches, logs, chips, ash lumber with bark, stumps and roots outside of a quarantined county without fulfilling the requirements of an Emerald Ash Borer Compliance Agreement with the Minnesota Department of Agriculture. Contact the Minnesota Department of Agriculture at (651) 201-6684 or 1-888-545-6684 or visit the Emerald Ash Borer website at: http://www.mda.state.mn.us/plants/pestmanagement/eab.aspx to find out which counties are quarantined.

The Contractor shall dispose of ash trees:
(1) In accordance with the Emerald Ash Borer Compliance Agreement, and
(2) By utilizing the ash wood chips within the construction limits for erosion control, construction exit pads or landscaping purposes.

No direct compensation will be made for compliance with these requirements.

Aquatic Invasive Species
DNR Permit Condition Number 15:
15. The St. Croix is designated as “infested” with Aquatic Invasive Species [Eurasian watermilfoil, zebra mussels, bighead carp and silver carp]. All equipment intended for use at a project site must be free of prohibited invasive species and aquatic plants prior to being transported into or within the state and placed into state waters. All equipment used in designated infested waters, shall be inspected by the Permittee or their authorized agent and adequately decontaminated prior to being transported from the worksite. The DNR is available to train inspectors and/or assist in these inspections. Refer to the attached document “Best Practices for Prevention of Spread of Aquatic Invasive Species” for details on preventing the spread of invasive species and aquatic plants. This is also available in the manual “Best Practices for Meeting DNR General Public Waters Work Permit GP 2004-0001”. See Chapter 1, page 8-9 http://www.dnr.state.mn.us/waters/waterquality/permits/gp_2004_0001_manual.html.

Contact your regional Invasive Species Specialist for assistance at http://www.dnr.state.mn.us/invasives/contacts.html.
A list of designated infested waters is available at http://files.dnr.state.mn.us/eco/invasives/infested_waters.pdf.
A list of prohibited invasive species is available at http://www.dnr.state.mn.us/eco/invasives/laws.html#prohibited.

BARGE DECONTPATION

Barges shall be decontaminated before entering the St. Croix River according to the 2005 Biological Opinion, as amended in 2012, by the US Fish and Wildlife Service for the St. Croix River Crossing Project. The decontamination procedure shall be submitted to and approved by the USFWS at least sixty (60) days before any barge traffic will be allowed to enter the St. Croix River (Figure 7).

All construction barges and workboats must be decontaminated and remain decontaminated prior to being allowed into the St. Croix River to the proposed bridge construction site using one of the following three options:

A Cold Season Decontamination Option

Construction barges and boast must be completely lifted out of the St. Croix River and kept out of the water for at least fifty (50) hours of sub-freezing air temperatures (at or below 32°F or 0°C). Lower the barges and boats back into the water and move them to the confluence with the St. Croix River and upriver to the bridge work areas; or

B Warm Season Decontamination Option

When air temperatures are above 32°F (0°C), construction barges and boats must be decontaminated by completely lifting them out of the St. Croix River and then using one of the following procedures:

1. Power spraying the entire wetted surface of all vessels with hot water at a minimum temperature of 140°F (122°C) for 5 minutes; or
2. Power spraying the entire wetted surface of all vessels with steam at a minimum temperature of 212°F (100°C) for 5 minutes; or
3. Drying all vessels and requiring that they remain out of the water and be completely protected from rain for a minimum number of days using the following temperature/humidity guidelines
   a. If relative humidity is between 0 and 50% and air temperature reaches 41°F (5°C), then barges/boats must remain out of water for a minimum of 17 days.
   b. If relative humidity is between 0 and 50% and air temperature reaches 50°F (5°C), then barges/boats must remain out of water for a minimum of 8 days.
   c. If relative humidity is between 0 and 50% and air temperature reaches 77°F (5°C), then barges/boats must remain out of water for a minimum of 4 days.
   d. If relative humidity is between 50 and 95% and air temperature reaches 41°F (5°C), then barges/boats must remain out of water for a minimum of 77 days.
e. If relative humidity is between 50 and 95% and air temperature reaches 59°F (5°C), then barges/boats must remain out of water for a minimum of 12 days.

f. If relative humidity is between 50 and 95% and air temperature reaches 77°F (5°C), then barges/boats must remain out of water for a minimum of 6 days.

4. In addition, all barge and boat bilges shall be disinfected using a sodium hypochlorite (chlorine bleach) solution. The solution shall be mixed at a ratio of 1 part bleach per 50 parts water. Bilge surfaces, which are exposed to the river, must be sprayed with the solution. Bilge water must also be treated by pouring the solution into each bilge. Any zebra mussel veligers and adults in the bilge water will be killed (Clark 1996, Miller 1996). The solution must be properly disposed of according to the State’s Water Quality Control Agency’s regulations.

5. Following warm season decontamination, barges or boats shall be put back into the St. Croix River at the decontamination site while the river surface water temperature does not exceed 50°F (10°C). Construction barges and workboats may then be moved up into the project site.

BARGE SURFACE, SECONDARY CONTAINMENT AND BILGE WATER TREATMENT

The environmental impact statement, contract requirements and special provisions for the projects require all waters to be discharged following USFWS decontamination protocols, MnDNR and WisDNR rules and guidelines, and U.S. Army Corps of Engineers (USACE) permit requirements for aquatic invasive organism prevention, oil and solid waste discharge prevention, and maintaining current water quality of the St. Croix River.

The decontamination protocol management program developed by MnDOT, submitted to the USFWS has been accepted with no objection as of June 20, 2012. It must be followed unless the Contractor would like to submit their own means and methods with an additional 60 day USFWS review prior to any work in or near the St. Croix River.

In lieu of 3% chlorine decontamination and land sanitary disposal of chemical treatment bilge water, the Contractor is allowed to filter the bilge water using appropriate geotextile filter linear spreader bags set on the barge surface edge and discharged back into the river. In addition, all dewatering of shafts, traps, drums, and other surface containments of collected rain or river water must be treated in a similar manner after all floating debris, oils and settleable solids (bentonites, welding slag, grindings, oxidizing/oxidized iron and iron rich water, etc.) have been removed prior to final filtering. The discharge water must be monitored, with near neutral pH and visibly clear (maximum of 25 NTU above the river background NTU) qualities. No bypass or puncture holes are allowed from the filter spreader socks. St. Croix River water quality has been typically tannin-colored (yellow-brown tint), slightly acidic (6.7), and less than 13 NTU as of July 6, 2012.

MEASUREMENT AND PAYMENT

No payment will be made for the decontamination procedures or preparation of the barge mooring plan. All such costs are incidental to the project.

For example document of decontamination protocols available to the contractor, visit the MN DNR at: http://files.dnr.state.mn.us/rlp/permits/lsp/lsp-training-manual.pdf

Amending the Pollution Prevention Plan

Site Management Work Plans

The Contractor will submit in writing, a site management work plan detailing proposed means, methods and maintenance protocols for erosion control, sediment control, and water quality management measures and a schedule indicating starting and completion times for each construction operation working in the St Croix River and watershed. Included in the submitted site management work plan shall be best management practices for managing all expected chemicals and potential pollution generating activities including but not limited to the following Site Plan items:

1. Refueling Management Plan, for on shore, coffers and on barge
2. Spill Response Management Plan for all activities on shore, coffers and on barge
3. Coffeer installation and removal plan that addresses sediment control measures and hydraulic hammer fluid management
4. Drill shaft sediment and drill fluid management plan that addresses total containment of all chemicals, sediments and slurry waters (Figures 12 &14)
5. Concrete Management Plan that describes all operations for all scoped work to prevent discharge or loss of cementitious liquid and solid materials to the river (Figure 13)
6. Dewatering Management Plan that describes measures for discharging visibly clean water that is no more than 25 NTU above the background receiving waters and is neutral pH.
7. Barge and all other equipment, products and materials decontamination and cleaning management plan that recognizes and incorporates appropriate USFWS decontamination of aquatic invasives protocols, Wisconsin and Minnesota Departments of Natural Resources requirements.
8. Barge mooring plan anywhere on the river that follows all regulations
9. Developing a daily Environmental Quality Assurance Program with an Erosion Control Supervisor to ensure that chemical management is incorporated into the work.
10. Dust prevention plan
11. Coffer pumping plan
12. Water access plan
13. Haul road plan
14. Laydown/Staging area plan
15. Chemical management plan (Figure 11)
16. Barge surface work plan (Figure 8)

Contractor was not able to start work in the affected areas until the schedule, site management plans and Quality Assurance Program had been accepted by the Engineer, and begun only after acceptance along with all materials, equipment and labor to deliver the site management work plan activity were available/installered on site.

**Working Over Water**

All work over the river requires a contractor submitted work site management action plan for every pollution generating activity or actions that could impact environmental commitments (Figure 14). The goal was total site management where nothing left the work barge surface. This was accomplished by deploying multiple and redundant management practices that included sealing all barge gaps with ice/water roofing membranes, barge edge sealed bumpers, compost filter logs, plastic and metal secondary containment systems, floatation containment booms and tethering systems. All liquids, solids and unused chemical materials, drill sediments, concrete products were stored under plastic until used, or placed in hopper barges for later processing and approved disposal.
Good housekeeping practices require daily monitoring, and consisted of work requirements for chemical containment, spill prevention and recovery, refueling, solid waste and trash/debris management, and sanitary waste management.

1. Chemical containment and spill pollution prevention:
   a. When chemicals are not needed, they shall be stored at staging areas and locked at the end of each work day.
   b. Gasoline, oil, paint, solvents, and other chemicals necessary for construction are not allowed to contact the ground surface, be exposed to groundwater or released to a surface or groundwater.
   c. Hazardous material shall be returned to the hazardous material storage area and locked at the end of each day.
   d. Temporary sanitary facilities shall be located at least 25 feet from drainage inlets and 200 feet upgrade from streams and wetlands and anchored to prevent tipping.
   e. The contractor shall provide tanks or barrels to collect liquid byproducts that pose a pollution hazard.
   f. The pollutants shall be removed from the site on, at most, a weekly basis and disposed of in accordance with state and local regulations.
   g. All stationary equipment (non-vehicle) with the potential to leak fluids or due to refueling operations shall have secondary containment that prevents the discharge of fluids to ground or surface waters.
h. Chemical spills of any kind (oil, fuel, fertilizer, etc.) must be cleaned up and removed from the site immediately. If drips and leaks are discovered, the soils must be managed by the contractor according to MPCA rules. Spills equal to or greater than 5 gallons must be reported to the state duty officer. The contractor must have a spill kit on site at all times.

j. Any fuel or chemical tank stored on the project area must be protected by a soil berm or have a negative gradient to any water resource area, as per U.S. Army Corps of Engineers 404 Permit, a contingency plan must be created by the contractor in the event of a spill or leak of any chemical, including petrochemicals, deemed harmful to the environment, and have on hand the materials necessary to capture and contain said chemicals. All fuel or chemical tanks must also have secondary containment installed and maintained by the contractor.

2. Fueling:
   a. Fuel trucks will be used primarily for refueling in this area. Storage tanks in excess of 1,000 gallons will not be used.
   b. Absorbent materials shall be available in the fuel truck for use in cleaning up small spills.
   c. Education on spill response procedures shall be provided by the contractor.

3. Solid waste/trash and debris management:
   Solid waste shall be collected and stored in appropriate containers and properly disposed of on a regular basis. Containers shall be covered to prevent wind from blowing the waste around or off the site. No materials shall be buried on site. MPCA disposal requirements will be followed for all solid waste.

4. Sanitary/septic waste management:
   Contractor shall provide portable toilets and anchor them to prevent tipping. A licensed sanitary waste management contractor will collect all sanitary waste from the portable units at a rate necessary to maintain designed function.

5. Hazardous Material Management:
   Contractor shall follow all recommended directions and precautions according to manufacturer/supplier of hazardous materials. Hazardous material that is encountered on the site during construction shall be handled according to abatement plans for project. Storage of hazardous materials shall not occur in the construction area.

6. Spill kits are required to be kept at each work site and storage area. Materials and equipment necessary for spill clean-up will be kept in an enclosed trailer or shed on site. Equipment will include, but not limited to, brooms, mops, dust pans, rags, gloves, goggles, absorbent (kitty litter, oil absorbent booms and diapers, and buckets). All spills will be contained and cleaned up immediately upon discovery. Spills large enough to reach the storm water conveyance system will be reported to Minnesota Pollution Control Agency at 1-800-422-0798.

Dewatering and Water Quality Monitoring

This work involves dewatering the construction work area, including cofferdams, after substantial storm events and/or as necessary during construction activities, as well as barge dewatering and decontamination of barges as necessary. Dewatering the construction area shall be accomplished in a manner which is in compliance with the National Pollution Discharge Elimination System (NPDES) Permit Part IV. Contractor shall submit Dewatering Plans to the Minnesota Pollution Control Agency (MPCA), MnDNR, and WisDNR for review per 401 certification. The dewatering plan includes commitments for tracking collected chemicals (drill slurries, suspension agents, tremie concrete, river water), pumping protocols, chemical treatment, residual detection, monitoring and documentation of discharge.

CONSTRUCTION ACTIVITY REQUIREMENTS
Dewatering or basin draining (e.g. pumped discharges, trench/ditch cuts for drainage) related to the construction activity that may have turbid or sediment laden discharge water must be discharged to a temporary or permanent sedimentation basin on the Project site whenever possible. If the water cannot be discharged to a sedimentation basin prior to entering the surface water, it must be treated with the appropriate BMPs, such that the discharge does not adversely affect the receiving water or downstream landowners. The Permittee(s) must ensure that discharge points are adequately protected from erosion and scour. The discharge must be dispersed over natural rock riprap, sand bags, plastic sheeting or other accepted energy dissipation measures. Adequate sedimentation control measures are required for discharge water that contains suspended solids.

A preliminary work plan for dewatering shall be furnished to the Engineer for approval. If turbidity due to dewatering cannot be acceptably controlled during construction, the Contractor shall immediately suspend dewatering operations until the issue is resolved. The Contractor shall change construction operations until satisfactory results of 25 NTU above the background receiving waters are obtained (Figures 16, 17, & 18). Failure to acceptably control turbid water discharge or failure to cease operations if conditions specified are exceeded will result in a $1,000 per calendar day deduct until corrective actions are successful.

The bilge or hopper discharge, if any, shall be treated per Cofferdam dewatering treatment requirements.

COFFERDAM DWATERING
Cofferdams shall be dewatered into in-barge settling tanks or dumpsters.
In-barge settling tanks shall be placed or constructed on a barge. Water flow from the dewatering of the cofferdams shall be pumped into the settling tanks. Two or more tanks shall be used in series. Flocculants shall be used in the second tank to increase the effectiveness of the settling. Once treated to no more than 25 NTU above river
baseline NTU’s and 7.0 pH +/- 1.0 pH (measured hourly until data indicates no change) water will be discharged back to river. Tanks shall be cleaned out when more than one-third (1/3) filled with silt. Release rate will be controlled such that the required settlement is achieved. The release rate will be dependent upon the tank size used by the Contractor.

**BARGE DEWATERING**

**A. Invasive Species and Barge Decontamination**

State law prohibits the transport of water from infested waters, except by permit. The DNR Permit authorizes work in infested waters and requires that all equipment, used in state waters that are known to contain aquatic species and that are designated as infested waters, shall be inspected by MnDOT or its contractors and adequately decontaminated prior to being transported (Figure 19). The DNR is available to MnDOT site inspectors and may be able to assist in these inspections.

A list of designated infested waters by county can be found at: http://files.dnr.state.mn.us/eco/invasives/infested_waters.pdf

The following construction equipment shall be decontaminated prior to use in the St. Croix River: barges, pumps, hoses, excavator buckets, floating silt curtains, any equipment that has direct contact with the St. Croix River, and sediment/settling tanks. Other equipment may require decontamination as directed by Engineer.

The decontamination procedure shall be submitted to and approved by the USFWS at least sixty (60) days before any barge traffic will be allowed to enter the St. Croix River.

**Material disposal plan**

**HAZARD MATERIAL MANAGEMENT**

Contractor shall follow all recommended directions and precautions according to manufacturer/supplier of hazardous materials. Hazardous material that is encountered on the site during construction shall be handled according to abatement plans for project. Storage of hazardous materials shall not occur in the construction area.

If the Contractor operations involve the excavation and/or disposal of material off MnDOT Right of Way, the Contractor is advised of the following:

MN Statutes Sections 103G.2212 and 103G.241 stipulate that an agent or employee of another may not:

1) drain, excavate, or fill a wetland, wholly or partially; or

2) construct, reconstruct, remove, or make any change in any reservoir, dam, or the course, current, or cross-section of any public water, unless the agent or employee has obtained a signed statement from the property owner stating that any permit or wetland replacement plan required for the work has been obtained, or that a permit or replacement plan is not required; AND this statement is mailed to the appropriate office with jurisdiction over the wetland or public water prior to initiating the work.

The "Landowner Statement and Contractor Responsibility For Work in Wetlands or Public Waters" can be found at: http://www.bwsr.state.mn.us/wetlands/forms/Contractor_Responsibility.doc . The Contractor shall provide the Engineer with a copy of the completed "Landowner Statement and Contractor Responsibility for Work in Wetlands or Public Waters" for the excavation and/or disposal site prior to initiating the work.

**Implementation During Construction**

Contractor successfully implemented and amended the water quality and environmental plan developed within the SWPPP framework system. Novel practices implemented including using ice and water shield membrane typically use for roof underlayment, sealed platforms, tethering methods, containment and chemical treatment of drill shaft slurries, and zebra mussel inspections and decontamination. The practices used are shown within Figures 9 to 19.
Figure 9. Stabilized river access and pre-inspected materials as part of the decontamination protocol.

Figure 10. One of many temporary bridge systems for equipment and material movements from land to water. Concrete pumper truck used to move large volumes of concrete to the drill and test shafts.
Figure 11. Total material control redundancy of barge work surface and hopper barge drill slurry containment.

Figure 12. Radius containment of drill shaft sediments and liquid slurries for temporary disposal into the hopper barge.
Figure 13. Concrete containment management system for filling test shafts after rebar placement.

Figure 14. Photo-documentation of work surface area during sediment drill and coring.
Figure 15. Development of photo-example work methods for current and future guidance of river work operations.

Figure 16. Routine water quality sampling up and down stream, and within work area. Typical turbidity of river varied between 3 and 13, with a pH between 6.5 and 7.0.
Figure 17. Flocculent application and mixing method of 600,000 gallons of collected drill shaft slurries.

Figure 18. Results of discharge water from hopper barge after flocculent treatment and overnight settling. Discharge met contract target of no more than 25 NTU above river background.
Figure 19. Final Decontamination of work barges using 140 degree Fahrenheit water, applied for 10 or more seconds after scraping. All 5 surfaces in contact with the river water were decontaminated. All bilge water was drained if detected. Barge decontamination took place at river dock wall access and filtered through compost filter logs prior to re-entry into the river.

CONCLUSION

The preconstruction and implementation practices listed above provided a framework for meeting regulatory and SFEIS commitments for both the project engineer and contractor. Using the SWPPP framework of incorporated written procedures, BMP details and plan installation locations was much easier than relying on large volumes of written commitments in separate documents. While the SFEIS document is required reading by both the project engineer and the contractor, the actual document is not included within the bid package. Even if the SFEIS were included in the bid package but not expressly addressed within the contact and plan sheets (such as pay items and plan locations), it is possible that environmental and mitigation commitment items could of been missed.

One potential downside of using the SWPPP to incorporate the environmental requirements and obligations is agency enforcement of these items, or agencies overstepping statutory authority. While it is clear that the SWPPP must address certain EIS findings related to the EPA Clean Water Act (Construction General Permit, Section 3.7), it is not clear how the protection of other environmental regulations fits within a discharge of storm water pollution prevention framework. Until another framework for delivering environmental commitments is developed, the SWPPP remains the best tool available for direct communication to contractors bidding the work.

BIOGRAPHICAL SKETCH

Dwayne is a certified professional in erosion and sediment control, has a Masters Degree in Plant Biology, and holds an adjunct teaching position at the University of Minnesota in the Biosystems and Agricultural Engineering Department. He has worked in this capacity for the Minnesota Department of Transportation, Office of Environmental Stewardship for more than 18 years and is involved with storm water quality design, construction environmental commitment implementation and post construction maintenance. He has presented extensively over the United States on storm water management techniques, and yearly at the International Erosion Control Association Conference.