Memorandum

From: Scott Bell, Hans Holmberg, Dave Dilks, Amanda Flynn
To: Fox River Study Group Board of Directors

Date: February 26, 2014
Project: Fox River Implementation Plan
CC:

SUBJECT: Summary of Decisions and Directions from First FRIP Workshop on February 20, 2014 (DRAFT).

This memo pertains to LimnoTech’s work on the Fox River Implementation Plan (FRIP), being conducted on behalf of the Fox River Study Group (FRSG). On Thursday, February 20, 2014, LimnoTech and the FRSG conducted a workshop at the Fox Metro Water Reclamation District in Oswego, Illinois. This memo summarizes LimnoTech’s understanding of the key decisions and directions arising from that workshop.

There were four main topics discussed at the workshop:

- Preliminary water quality target review
- Water quality model review
- Watershed model review
- Control measures

Each of these topics was accompanied by material presented separately and each topic was discussed during and following the presentation. This memo is organized by those topics.

Preliminary Water Quality Target Review

The discussion of water quality target review was led by Hans Holmberg. The key decisions and directions, related to this topic, for moving forward on the FRIP are:

- The FRIP will present annual load targets, based on consideration of both critical conditions as well as seasonal variation (i.e., the annual load targets will not be based solely on the most conservative, low-flow, summer condition).

- At this time, we do not plan to assess dissolved oxygen (DO) sags resulting from wet weather in the FRIP, mainly because a time-variable water quality model is not available to do so. Based on prior discussion with the Illinois Environmental Protection Agency (IEPA), we understand that they will be considering this issue and getting back to the FRSG in the future.

- In evaluating the effect of load control alternatives on water quality, DO will be the primary water quality target, but total phosphorus and chlorophyll-a (as an indicator of algae growth) will be tracked and reported for alternatives.
• The FRIP will include sensitivity analyses to assess potential changes to critical (low flow) receiving water conditions under future conditions.

• The FRIP will include an adaptive management approach, including long-term monitoring.

• If the modeling for the FRIP indicates that attainment of current water quality standards for DO are infeasible, LimnoTech and the FRSG will engage in a discussion of site-specific criteria with IEPA, which will likely also include U.S. EPA.

**Water Quality Model Review**

The discussion of LimnoTech’s review of the QUAL2K water quality model was led by Dave Dilks. The key findings, decisions and directions, related to this topic, for moving forward on the FRIP are:

• Overall model development by the Illinois State Water Survey (ISWS) was sound:
  - Model objectives were clearly stated.
  - Data needs were identified prior to model application and a high quality monitoring program was designed and implemented.
  - Model acceptability criteria were not developed, but this is rarely done and is not a significant flaw.
  - External forcing functions were based on sufficient data.
  - Model coefficients determined during calibration are consistent with the scientific literature.
  - Model calibration is not as good as could be hoped for, but likely as good as can be obtained while using acceptable model coefficients, given the calibration data.
  - Model simulations of future scenarios were conducted in a reasonable manner, although a linkage between NPS load reductions and resulting algae/DO was not assessed.

• Given the available resources and objectives, the selection of QUAL2K was appropriate, although the use of a steady-state model does present some limitations, including:
  - It cannot directly address the impacts of non-point source (NPS) pollutant loads.
  - It cannot simulate transient, wet weather effects.

• LimnoTech recommends continued use of the QUAL2K model for development of the FRIP, with the following notes:
  - Future water quality modeling with QUAL2K will be done in a way to simulate the effects of NPS load reductions on sediment oxygen demand (SOD) and sediment-nutrient flux.

LimnoTech will work out the additional details for simulation of the effects of NPS load reductions on sediment oxygen demand (SOD) and sediment nutrient flux, and discuss with ISWS.
Watershed Model Review

The discussion of LimnoTech’s review of the HSPF watershed models was led by Amanda Flynn. Due to the complexity of HSPF, a more in-depth review of the HSPF models was required than what was necessary for the QUAL2K model. Ten of the 33 individual models were reviewed in detail, with less detailed reviews performed on the other models. The key findings, decisions and directions, related to this topic, for moving forward on the FRIP are:

- Problem identification and model selection were both addressed and performed in a standard and robust manner.
- LimnoTech identified several minor errors or omissions in the models, which were discussed with ISWS and subsequently addressed by them.
- Two major issues were identified, which should be taken into consideration in future model use:
  - The method used to specify effective and ineffective impervious land cover in urban land segments (urban high density – UHD and urban low-medium density – ULM) is different than we have observed previously and different from the approach recommended in the HSPF manual. This results in higher than expected sediment and TP load contribution from these urban land use areas, unless the model output are post-processed to account for it. This issue affects approximately 11% of the land area of the Fox River watershed and must be accounted for in future use of the model.
  - Phytoplankton and benthic algae were not calibrated in the models, which affects the delivery of total phosphorus to the tributary outlets.
- LimnoTech recommends continued use of the HSPF models for development of the FRIP, with the following notes:
  - The two major issues noted above will either be corrected in the model or the model output will require additional post-processing before use with a stand-alone spreadsheet tool.
  - The HSPF models will be used for simulation of loading based on land use and physical conditions in developing the FRIP; the effects of NPS control measures including crop practices, storm water best management practices (BMPs) and green infrastructure, will not be simulated using the HSPF models.
  - As an alternative to simulating NPS control measures in the HSPF models, predicted model loads will be used in conjunction with a stand-alone spreadsheet tool to calculate the effect of control measures on load reduction.
  - A remaining question to be resolved has to do with the delivery of pollutant loads from the land surface, post-controls, to the mouths of tributaries. This will likely be done using a delivery ratio or similar simplified approach, but the details of this need to be worked out as we moved forward with Tasks 5 and 6.
Control Measures
A brief discussion of considerations related to NPS control measures and dam impoundments, as related to developing water quality improvement alternatives for the FRIP, was led by Scott Bell. The two main areas that require further discussion between LimnoTech and the FRSG are:

• NPS control measures – It is expected that NPS control measures will be a component of the pollutant load reduction alternatives that are formulated and evaluated during FRIP development. These measures include, but are not necessarily limited to, crop practices, green infrastructure and storm water BMPs. It would be useful to know in advance whether the FRSG or stakeholders have preferences about particular types of practices or biases against certain types. It was decided that:
  o The FRSG will discuss this matter at an upcoming meeting.
  o LimnoTech will have further discussions with the FRSG on this matter.
  o LimnoTech will compile lists of potential control measure that could be considered and provide the lists to the FRSG to facilitate discussion.

• Dams and impoundments – Because of the apparent effect of dams on water quality in the Fox River, there are actions that should be considered for inclusion in the development of water quality improvement alternatives including dam removal and possibly including dredging, aeration and other recurring maintenance activities. It would be useful to know in advance whether the FRSG or stakeholders have preferences about any of these actions. It was decided that:
  o The FRSG will summarize its understanding of the likelihood of removal of the various dams to LimnoTech, as well as any other information it has related to dam removal on the Fox River.