

## Scope of Services

### Project Description:

This project involves the evaluation and upgrade of the Flint Water Plant (FWP) to provide continuous water supply service to the City of Flint (Flint) and its customers. The FWP was extensively renovated in the early 2000's to provide a redundant supply to the Detroit Water and Sewer Department's (DWSD) single 72-inch treated water transmission main. Improvements installed during the renovation included: traveling screens, ozone disinfection, rapid mix units, flocculation basins, plate settlers, softening units, PSF recarbonation systems, complete filter system rehabilitation, clarification residuals disposal, lime sludge pumping system, chemical storage and feed systems, laboratory facilities, operations room and SCADA system. Maximum day design capacity was 36-mgd.

These improvements were designated as Phase I and were developed to provide; 1) redundant water supply using the Flint River as its source, 2) designs were to account for future treatment of Lake Huron water and 3) were to be economically expandable to provide continuous service with either Flint River or Lake Huron as a primary water source. Phase I improvements were constructed in five separate contracts, referred to as Segments 1 – 5. Since the completion of Phase I improvements, the plant has been periodically operated, usually for about a two-week period and without softening, and the water discharge back to the river. The last plant run was in XXXX.

In 2003, Flint was experiencing substantial rate increases from the DWSD. It was reasoned that a Phase II study was prudent to evaluate the feasibility of upgrading the FWP into a fully functioning treatment facility using the Flint River as the primary water source. The Phase II report was completed in December 2003 and defined the following improvements.

- 1) Convert two existing silos for bulk soda ash storage and install pneumatic fill lines.
- 2) Install two gravimetric soda ash feeders.
- 3) New disinfection system in the filter effluent prior to Reservoir No. 3. This also includes THM and bio-film evaluations.
- 4) Install lime sludge thickeners, plate presses and bunker storage for softening residuals.
- 5) Replace existing low service pump Numbers 4 and 6 with new 15-mgd and 20-mgd pumps and 480V motors.
- 6) Replace existing high service pump Numbers 1 and 2 with new 10-mgd and 20-mgd pumps equipped with medium voltage inverter duty motors and variable frequency drives. High service pump numbers 7 and 8 motors will be replaced with medium voltage inverter duty motors and variable frequency drives. Suction piping on existing 6-mgd pump will be altered.
- 7) Replace existing switch gear with new code compliant electrical equipment.

- 8) Install primary overload protection at electrical substation.
- 9) Add additional carbon dioxide, oxygen and nitrogen chemical storage tanks and associated equipment.
- 10) Provide auxiliary power to maintain plant operations at limited capacity during power failures.
- 11) Evaluate the use of Dort reservoir for intermediate storage.
- 12) Implement security recommendations.
- 13) Complete the SCADA system.

Recently Flint has joined the Karegnondi Water Authority and plans to supply Lake Huron water to its customers. The use of Lake Huron as a water source will significantly modify the above outlined improvements since softening will not be required. However, due to contractual relations with the DWSD, Flint is investigating the need to place the FWP into operation using the Flint River as a primary source for approximately two years and then converting to lake water when available. During this two year period, Flint possibly might supply water to Genesee County provided that it can be proved the FWP can treat and supply 40-mgd. This new operational scenario along with the reduction in maximum day capacity to 18-mgd creates the need for a modified plan that balances the short and long term needs for Flint.

### **Project Tasks**

This work has four primary tasks that must be performed in order to develop a cost effective plan for the Flint long and short term needs. Task 1 is a plant test run is scheduled for this summer to test the plant systems and hydraulic capacity. Task 2 would be the development of a preliminary engineering report (PER) outlining a short term and long term planning document to place the plant into service with Flint River as the source and later with lake water. Task 3 would be fast track design of the immediate improvements and while Task 4 would be design to meet long term needs.

#### **Task 1 Plant Test Run**

- 1) Meet with FWP staff and other stakeholders as necessary to review current condition of the water plant facilities and equipment. Develop a preliminary list of issues or concerns that will impact the planned test run.
- 2) Obtain copies and review existing Phase I documents as provided by Flint. Recreate design calculations, such as plant hydraulic headlosses, as needed to develop plant test run parameters.
- 3) Perform plant site visit with FWP staff to ascertain the condition of the facilities and equipment.

- 4) Develop plant test run protocol for submission to MDEQ.
- 5) Meet with MDEQ representatives to review and discuss test run protocol. Incorporate MDEQ comments into final plant test run protocol
- 6) Provide assistance to the FWP staff on implementing the test run protocol.
- 7) Collect data and information generated during plant test run. Evaluate the plant and unit systems performance for water quality and hydraulic capacity.
- 8) Meet with Flint staff, MDEQ and other stakeholders as necessary to discuss plant run findings and present conclusions and recommendations. Prepare and submit interim report to City of Flint outlining conclusions and recommendations from the plant test run.

#### Task 2 Preliminary Engineering Report

- 1) Using the interim report as reference in the preceding section, develop conceptual plan for both short and long term improvements.
- 2) Attend frequent meetings with Flint utility staff to discuss and review potential and recommended improvements to meet the needs for interim and long term water supply needs.
- 3) Define the finished water quality parameters and goals.
- 4) Develop plans for temporary facilities as needed, such as lime sludge disposal, to minimize cost for the interim period.
- 5) Prepare a PER to define the basis of design for the needed improvements along with an opinion of probable construction cost referenced to a specific ENR Index value..
- 6) Submit a final draft of the PER to Flint for review.
- 7) Attend a meeting with Flint staff and the MDEQ to finalize the PER.
- 8) Incorporate review comments into PER and deliver final to Flint.

#### Tasks 3 & 4 Final Design and Construction Phase Services

- 1) Final design parameters will be determined during the PER task, however the following target goals are presented for consideration at this time and should be considered as a minimum:
  - a) Minimum Day Demand – 10-mgd  
Average Day Demand – 12-mgd  
Maximum Day Demand – 18-mgd (Do we need to include DWWS demands?)

- b) Turbidity – 0.10 NTU
  - c) Hardness – 80 to 100 mg/l as CaCO<sub>3</sub>
  - d) Cryptosporidium – 3-Log Inactivation
  - e) Giardia – >3-Log Inactivation
  - f) Viruses – >4-Log Inactivation
  - g) Taste and Odor – Eliminated with pre-ozonation
  - h) Trihalomethanes – Less than 80 µg/l
  - i) HAA5 – Less than 60 µg/l
- 2) Final scope of long term improvements will be determined during the PER. The following improvements have been previously presented and are referenced for review and consideration and do not represent the final scope of these tasks.
- a) Oxygen and nitrogen chemical storage.
  - b) Post chlorination and zebra mussel control.
  - c) Electrical and SCADA improvements.
  - d) Clarification residuals disposal.
  - e) Low and high service pump station improvements.
  - f) Plant security issues.
  - g) Auxiliary power generation.
  - h) Improvement of Ct values for regulatory compliance.
- 3) Final scope of short (interim) term improvements will be determined during the PER. These listed improvements will be needed for treatment of Flint River water but not used for Lake Huron water. The following have been previously presented and do not represent the final scope of these tasks.
- a) Soda ash feed equipment.
  - b) Converting existing bins for soda ash storage.
  - c) Lime sludge processing and disposal.
  - d) Filter transfer pumping station and Dort Reservoir.

- e) UV inactivation facilities.
  - f) Emergency interconnect with GCDC-DWWS.
- 4) Services will include final design, plans, contract documents, bidding assistance, contract administration and construction phase services as defined in final scope of services.

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