City of Flagstaff
Treatment Facilities Master Plan

Owner: City of Flagstaff (City)
Engineer: Hazen and Sawyer (Hazen)

The City of Flagstaff is seeking professional engineering services for development of a treatment facilities master plan (TFMP) to address near and long-term management of wastewater and biosolids produced at the Rio de Flag Water Reclamation Facility (RDFWRF) and the Wildcat Hill Water Reclamation Facility (WHWRF).

SCOPE OF SERVICES

Engineer shall perform the following tasks.

TASK 100 – PROJECT MANAGEMENT & MEETINGS

110 – Project Management

Hazen shall perform various project management and monitoring activities associated with the project. Specific project management services include development of a Project Management Plan, development of project progress reports to be included with monthly invoices, development of applicable formats and standards, coordination and collaboration with the City's staff, and management of individual project team resources to assist in a project delivery consistent with the City's specific needs.

120 – Progress Meetings

Hazen will conduct regular progress meetings with the City's staff to collect relevant information, receive guidance on the evaluation efforts, discuss issues and concerns, and monitor the progress of the work. Progress meetings may be replaced or combined with project Workshops when appropriate. Hazen will be responsible for developing the meeting agenda and discussion materials. Following each progress meeting, Hazen shall develop meeting minutes, including relevant action items, for distribution to the City's staff at least ten (10) days prior to the next progress meeting.

Hazen shall meet virtually with City of Flagstaff Capital Engineering staff member, Mac McNamara, Senior Project Manager, as needed to coordinate capital projects currently in process and planned.

130 – Project Workshops

The project workshops will provide the City's staff the opportunity to review and provide input to intermediate work products as they are developed.

The following workshops are envisioned for the TFMP project:

1. Kickoff Workshop - the first project meeting will be a "Kickoff Workshop" to discuss the planning goals and objectives, planning process, work plan, and schedule. Hazen will request and obtain at that time, if possible, relevant planning data for use in process evaluations, condition assessments, biosolids and effluent management review, and other tasks as appropriate.
2. Facilities Condition Assessment

3. Flow and Load Projections, and Regulatory Trends
4. Biosolids Disposal, Beneficial Use, and Treatment Recommendations
5. Alternative Wastewater Treatment Evaluation
6. Program Assessment
7. SCADA/Controls Evaluation
8. Draft Treatment Facilities Mater Plan

Hazen will prepare up to two (2) presentations to the Water Commission and two (2) presentations to Flagstaff City Council, as needed, to relay the results of the work and recommendations of the TFMP.

140 – Quality Management

Hazen shall provide quality management reviews throughout the duration of the project. Each deliverable will be reviewed by senior engineering or professional staff for quality and consistency. Internal QC review comments shall be tracked and shall include a comment resolution step to confirm that all comments have been properly addressed.

150 – Project Control and Reporting

Monthly invoices will be prepared and submitted to the City in an approved format. Monthly project status reports will be prepared and submitted to the City along with the monthly invoices. These reports will include summary of services completed since the previous report, current project schedule and budget status, project issues, and potential change logs.

160 – Project Closeout

During the project study phase close-out, Hazen will resolve final invoices to the City, consolidate and archive project files, and meet with the City to review the project performance and achievement of project objectives.

Task Series 100 Assumptions:

- Project duration is 12 months
- Hazen will host up to six (6) progress meetings, which shall be held virtually via MS Teams and be of 1-hour duration
- Hazen will host up to eight (8) workshops, which shall be held in-person in Flagstaff and be no more than 4-hour duration
- Hazen will participate in up to two (2) Water Commission meetings
- Hazen will participate in up to two (2) City Council meetings

Task Series 100 Deliverables:

- Project Management Plan in electronic PDF format
- Progress Meeting Agenda and Meeting Minutes (up to 6) in electronic PDF format
- Workshop Agenda and Meeting Minutes (up to 8) in electronic PDF format
- Monthly Invoices and Summary Reports (12) in electronic PDF format
- Presentations to Water Commission or City Council (up to 4) in electronic PPT format

TASK 200 - EVALUATIONS AND TECHNICAL MEMORANDA

A complete series of evaluations were completed as part of the 2018 Biosolids Master Plan. Each major evaluation resulted in a technical memorandum (TM) summarizing the findings and recommendations for future maintenance. Hazen shall review these evaluations and update them based on data provided by the City. In addition, Hazen shall develop a recommended path forward for upgrading all components as the facilities are improved and capacity is increased.

210 - Facilities Assessment

Hazen will review and update the following information as provided in the 2018 Biosolids Master Plan. Hazen will evaluate the condition of the existing RDFWRF and WHWRF and provide recommendations for long-term sustainability and reliable operation. Hazen will perform the following sub-tasks:

- Develop a condition assessment plan for each RDFWRF and WHWRF based on the asset registers, including identified asset risk, from the 2018 Biosolids Master Plan that will describe the methodology to be used for the facilities condition assessment.
- Conduct a facility assessment to update the electrical, mechanical, and structural condition of existing facilities and present findings in tabular format; identify potential improvements for service through year 2050.
    - Asset risk and other factors such as environmental and maintenance history will be used to identify a list of critical above-ground assets at RDFWRF for a “focused” Level 1 visual condition assessment comprising 20-25% of the assets at RDDFWRF. An inspection team shall perform visual evaluations in the field of physical condition and performance of all accessible assets on paperless forms that consist of the checklist of asset attributes to be collected or verified and guidance to assign a numeric score from 1 (excellent) to 5 (poor), based on asset condition. During site inspection, asset attributes shall be verified, electronic photographs shall be taken, and condition scores shall be assigned. The data collected for the assets shall include photographs of the assets, the inspectors’ notes, condition scores for specific attributes, and inspection checklists, and shall be stored digitally.
    - Condition assessment at WHWRF will include staff interviews and a site inspection with City staff to validate and update previous recommendations. The data collected for the assets shall include photographs of the assets and inspectors’ notes, stored digitally.
- Update the asset registry based on the results of the field condition assessment.
  Evaluate process trains for reliability, redundancy, ease of maintenance, maintenance costs, and estimated remaining "useful life", and make recommendations for improvements, if necessary. Remaining useful life of assets will be calculated based on industry best practices (e.g., WERF, AWWA, EPA), experience from local and similar projects, and on-site condition assessment. Hazen will customize the standard useful lives in the industry by weighing each of these factors in determining the remaining useful lives of the City’s RDFWRF and WHWRF assets.
- Evaluate SCADA, PLC, automation systems and associated networks for consistent, reliable operation of the RDFWRF and WHWRF via site inspection with City SCADA and I&C staff and recommend updates and upgrades.
- Include all proposed improvements in the economic and funding analysis in Task 300 and prioritize them in the CIP. A replacement schedule, as applicable, will be included in the CIP.
- Provide a summary of the potential code impacts and basis for future designs based on current building codes and regulatory compliance.

- Prepare a technical memorandum to document the evaluation of existing RDFWRF and WHWRF facilities. Incorporate the City's review comments from the draft TM and workshop in the final TFMP document.

Assumptions:

- The asset registers from the 2018 Biosolids Master Plan are complete, includes asset risk (i.e., consequence of failure and probability of failure), and will be provided by the City in editable XLS format.
- Condition assessment at RDFWRF will be a "focused" Level 1 assessment limited to assets identified as critical in the desktop evaluation.
- Condition assessment at WHWRF will include staff interviews and a site inspection with City staff to validate and update previous recommendations.
- Plant staff will be available to support facility assessments, including entering confined spaces, opening electrical panels, and exercising equipment, as necessary.
- Facilities site evaluation shall consist of no more than five (5) eight-hour days on-site; a minimum of one (1) full day at each RDFWRF and WHWRF.
- The estimated lifespans or useful lives shall be based on industry best practices (as defined by WEF and EPA) experience from local and similar projects, and the on-site condition assessment. Useful lives are enhanced or diminished by factors such as operating environment, operational history, maintenance procedures, construction quality, material quality, external stresses, among others.

Deliverables:

- Updated asset registry in electronic XLS format
- Draft Facility Condition Assessment Technical Memorandum in electronic PDF format

220 - Waste Load Review and Projections

Hazen will review and update the following information as provided in the 2018 Biosolids Master Plan. Hazen will summarize past and current waste load trends and project future waste load quantities for years 2024 - 2050. Hazen will perform the following sub-tasks:

- Collect existing historical facility influent data (City-supplied data), utilizing at a minimum data from 2012 to current, and waste load summaries generated by other sources to-date. The City may choose to collect and analyze current sample influent data to verify historical data.
- Evaluate the influent data to derive (current) annual average loadings for flow, biochemical oxygen demand (BOD) (including Soluble), chemical oxygen demand (COD) (including Soluble), total suspended solids (TSS), alkalinity, nitrogen, ammonia, nitrate and nitrite, Total Kjeldahl Nitrogen (TKN), phosphorus, sulfur compounds, and associated flow and load peaking factors for maximum month, peak week and peak day.
- Evaluate and include in projected future waste loads the impacts of current un-sewered population and the result of water conservation and lower flows.
- Project future facility influent loadings based on projected domestic, City-supplied commercial and industrial loading data and summarize by flow, BOD (including Soluble), COD (including Soluble), TSS, alkalinity, nitrogen, ammonia, nitrate, nitrite, and TKN by annual average, maximum month, peak week and peak day loads for years 2030, 2040, and 2050. Projections will include secondary solids from the RDFWRF, as well as both secondary and primary solids from the WHWRF. City-provided estimates of septage, FROG, and food waste will be incorporated.

- Summarize the findings in a draft TM for the City's review and incorporate the City's comments in the TFMP document.

Assumptions:

- City will provide population data and projections for the planning horizon, including identification of un-sewered population.
- City will provide the most recent three (3) years of daily flow/load records along with operations data (monthly reports) from 2012 to current.
- City will provide one (1) week of hourly flow data from the maximum month of flow from the past year.

Deliverables:

- Draft Waste Load Review and Projections Technical Memorandum in electronic PDF format

230 - Current and Potential Future Regulatory Requirements

Hazen will summarize and define the current and potential future regulations that may affect operations at the City's water reclamation facilities. Hazen will perform the following sub-tasks:

- Review the current effluent discharge operating permit, currently proposed regulations, and how they may affect the future operations.
- Summarize current and anticipated future permit conditions in tabular format with descriptions.
- Provide guidance on necessary process improvements needed to meet requirements throughout the planning period (2024 - 2050).
- Summarize the findings of these sub-tasks in a draft TM for the City's review and incorporate the City's comments in the final TFMP document.

Deliverables:

- Draft Regulatory Requirements Technical Memorandum in electronic PDF format

240 - Process Treatment Capacity Evaluation

Hazen will review and update the following information as provided in the 2018 Biosolids Master Plan. Hazen will develop long-range process treatment alterative(s) at the RDFWRF and WHWRF to meet the regulatory requirements identified in Task 230 and meet operations treatment goals. Hazen will perform the following sub-tasks:

- Perform computer simulation modeling, using the City's current BioWin models, of the liquid process stream and wastewater treatment process using facility operating records for calibration. Request testing, as needed, to validate existing model calibration.
- Prepare a solids mass balance using the results of the modeling effort.
- Determine the firm hydraulic and solids loading capacity and peak capacity of individual treatment processes using the results of the process models (summarize in tabular format); include redundancy and reliability information/requirements.
- Identify any issues related to water conservation at the facilities (i.e., decreasing flows and increasing loads).
- Identify process deficiencies for the various influent load and regulatory scenarios.
- Prepare a draft TM that describes the findings of this evaluation and incorporate the City's review comments in the final TFMP document.

Assumptions:

- Existing BioWin models are calibrated and no additional calibration effort will be required.

Deliverables:

- Updated BioWin models
- Draft Process Treatment Capacity Evaluation Technical Memorandum in electronic PDF format

250 - Hydraulic Capacity Evaluations

Hazen will review and update the following information as provided in the 2018 Biosolids Master Plan. Hazen will review, validate, and update the existing City hydraulic model for the RDFWRF and WHWRF to reflect current conditions and potential hydraulic limitations based upon the information developed in the Tasks above. Hazen will perform the following sub-tasks:

- Evaluate and validate the existing hydraulic model, determine locations of flow restrictions, and recommend corrective measures to these flow restrictions.
- Include any new process flow elements as a result of the alternative analysis.
- Include all sub-systems impacting the hydraulic and solids loading profile (i.e., equalization basin, internal recirculation systems, etc.).
- Prepare a draft TM that describes the findings of this evaluation and incorporate the City's review comments in the final TFMP document.

Assumptions:

- City will provide existing hydraulic models in editable format.
- City will provide record drawings for both RDFWRF and WHWRF.
- City will provide flow data from SCADA during field investigations of hydraulic elevations and control points.
- City will provide survey of hydraulic control points at both RDFWRF and WHWRF.

Deliverables:

- Draft Hydraulic Capacity Evaluation Technical Memorandum in electronic PDF format

260 - Alternative Process Evaluation

Hazen will develop alternative(s) for meeting the process capacity assessment, regulatory requirements, and potential advanced wastewater treatment needs developed in the previous tasks. Hazen will perform the following sub-tasks:

- Evaluate up to five (5) applicable treatment technologies, including conventional treatment, membrane bioreactors, or other applicable treatment alternatives for discharges and/or potential reclaimed water application(s) at WHWRF via desktop analysis and shortlist three (3) for additional modeling. Evaluate one (1) treatment technology alternative at RDFWRF. Consideration should be given to effluent nitrogen limitations, contaminants of emerging concern (CEC's), endocrine disruptors (ED's), per- and polyfluoroalkyl substances (PFOS/PFAS) and other compounds of concern.
- Evaluate treatment facilities for potential opportunities and uses regarding indirect potable reuse and Advance Water Purification.
- Evaluate the need for increasing capacity of the existing WHWRF and RDFWRF facility processes with other applicable technologies versus the feasibility of upgrading/expanding.
- Evaluate and provide up to three (3) technology and cost comparisons for the WHWRF solids disposal methods (if applicable). Previous studies may be utilized as a reference.

- Develop treatment scenarios for achieving various effluent qualities based on the potential regulations discussed in Task 230 (i.e., effluent nitrogen limitations).
- Develop up to three (3) recommended improvement alternative(s) at WHWRF and one (1) at RDFWRF, including process flow diagrams (PFDs) to appropriate level of detail, and concept site plans for the identified treatment scenarios, to sufficiently verify footprint/space requirements and establish AACE Level 5 cost estimates. Cost estimates shall include capital, operation, and maintenance, as well as City's supplied legal and administrative costs for the alternatives identified. Capital and life-cycle cost analyses will be used to compare costs for the recommended alternatives.
- Prepare detailed phasing plan for the recommended improvement alternative(s) that includes key decision points to meet future capacity needs.
- Prepare a draft TM that describes the alternative(s) and incorporate the City's review comments in the final TFMP document.

Assumptions:

- A desktop analysis of five (5) different process train alternatives will be considered for evaluation at WHWRF, and three (3) process train alternatives will be shortlisted for additional modeling. One (1) process train alternative will be evaluated at RDFWRF.
- Cost estimates for up to three (3) alternatives at WHWRF and one (1) alternative at RDWRF shall be developed and accuracy shall comply with Level 5 standards as defined by the Association for Advancement of Cost Estimating International (AACE), which are appropriate for preliminary-level planning work.

Deliverables:

- Draft Alternative Process Evaluation (RDFWRF and WHWRF) Technical Memorandum in electronic PDF format

270 - SCADA/Controls Evaluation

Hazen will assess the SCADA system and its components for the purpose of evaluation. Hazen will perform the following sub-tasks:

- Verify existing network documentation to the actual network through visual assessment, interview with city SCADA staff and review of communication configuration within the PLC programming. This network assessment shall be documented in the form of a block network diagram. Recommendations of improvements to the network will be prioritized and included in the final report.
- Verify control cabinets at the two facilities comply with the current City of Flagstaff Specification and Standard as they exist at the time of the Assessment. Including Programming standards. Current specifications and standards shall be discussed with SCADA Staff before and during the Assessment. This Control and Programming assessment shall identify control cabinets or SCADA nodes/devices that do not met the Standard or specifications. Recommendations of improvements to control cabinets and SCADA nodes/devices will be prioritized and included in the final report.
- Review the City's current equipment, programming, and alarm Tag naming conventions. Hazen will review Tag naming assessment and make recommendation for naming configurations methodology, and improvements as needed. Recommendations of improvements to the Tag naming conventions will be included in the final report.
- Review the City's SCADA alarm generating philosophy and methodology. This assessment shall identify a prioritized list of recommendations to include aligning system alarms with specifications and standards and potentially identifying future system alarms required by Operations and

Maintenance staff. Recommendations of improvements to the SCADA alarm system will be included in the final report.

- Verify the Facility SCADA HMI is implemented within the Water Services specifications and standards. Hazen will assess the SCADA HMI and identify a prioritized plan to upgrade and update the software, hardware, operating system, and physical location of the SCADA HMI. Recommendations of improvements to the SCADA HMI will be included in the final report.
- Verify the historian and reports is implemented within the Water Services specifications and standards. This data and reporting assessment shall include a list of prioritized recommendations for improvements needed in reports and data and develop an implementation plan to address missing reports and data. Hazen shall identify opportunities to automating the generation of these reports.
- Summarize these assessments in a draft TM for the City's review and incorporate the City's review comments in the final TFMP document. Summary will include:
    - SCADA Network Architecture Map
    - Prioritized improvement plan to areas of non-compliance
    - Control Cabinet assessment summary
    - PLC Programming standard summary
    - Prioritized improvement plan for control cabinets, PLC programming of non-compliance, and updated standards
    - Current Tag naming assessment summary
    - Prioritized improvement plan for tagging naming standard and needed improvements throughout the system.
    - SCADA System Alarm Assessment summary
    - Prioritized improvement plan for alarming and updating the City Alarm Strategy and philosophy standard
    - SCADA HMI assessment summary
    - Prioritized improvement plan for SCADA HMI standards, updating software and other SCADA HMI improvements
    - SCADA Data and Reporting summary
    - Prioritized improvement plan for SCADA historian and reporting structure

Project workshops will provide the City's staff the opportunity to review and provide input to assessments as they are developed. The following workshops are envisioned as part of this task:

- SCADA Network Assessment; duration up to four (4) hours
- SCADA Control and Programming; duration up to four (4) hours.
- Up to two (2) SCADA Tag Naming Assessment workshops; duration up to four (4) hours each
- Up to two (2) SCADA System Alarm Assessment workshops; duration up to two (2) hours each
- Up to two (2) SCADA HMI Assessment workshops; duration up to four (4) hours each
- Up to two (2) SCADA Data and Reporting Assessment workshops; duration up to two (2) hours each.

Assumptions:

- Hazen will conduct up to five (5) days of site visits to document all nodes in the treatment system to perform a SCADA Network Assessment and Control and Programming Assessment.
- The SCADA Network Assessment will include a visual review of nodes on the system, review of existing network documentation and review of PLC communication configuration within the PLC code. A node shall include major SCADA equipment including PLC(s), Remote Input/Outputs, OIT(s), HMI workstation. Peripheral equipment are not included.

- All programs for Program standards review will be provided by the City. Programming standards review will include review of PLC programming only.
- City shall provide copies of standards and specifications for control cabinets, PLC, OIT, HMI and tagging. If no standards are available Hazen will make recommendations of industry best practices.
- All documented tag lists from equipment, programming (PLC, OIT, and HMI), and alarm tag will be provided by the City for Hazen in a complied .csv digital format.
- City shall provide copies of documented PLC programs and configurations.
- City shall provide copies of documented OIT programs and configurations.
- City shall provide copies of documented HMI programs and configurations.
- Hazen will host up to ten (10) workshops, which shall be held virtually and be no more than 4-hour duration

Deliverables:

- Workshop Agenda and Meeting Minutes (up to 10) in electronic PDF format
- Draft SCADA/Controls Evaluation Technical Memorandum in electronic PDF format

280 – Staffing and Training Needs

Hazen will develop a TM to address staffing levels and training plan based on industry standards. Existing operations, future treatment alternatives, and future treatment capacity shall be considered. Hazen will perform the follow sub-tasks:

- Evaluate and verify the existing staffing levels meet the needs of existing operations, if not provide recommendations of staffing levels based on industry standards.
- Evaluate and provide recommendations on staffing levels for treatment alternatives that may be implemented in the future. As appropriate phased staffing level implementation shall be based on selected treatment alternatives and additional capacity of all processes.
- Staffing level recommendations shall also include needed experience and/or expertise (i.e., operations, mechanical, electrical, SCADA, etc.).
- With the staffing challenges for these positions, alternative options may be necessary. Provide recommended alternatives to in-house staffing, such as instrumentation, SCADA, automation, and/or on-call contract services, and associated costs for these services.
- Provide training recommendations for the needed expertise to properly run and operate the City's treatment processes (i.e., operations, mechanical, data analytics, vibration analysis, Citect, electrical, PLC, etc.)
- Prepare a draft TM that describes the City's staffing needs and incorporate the City's review comments in the final TFMP document.

Assumptions:

- Starting point of evaluation will be current organizational chart and job descriptions.
- Staffing levels will be evaluated for existing operations, three (3) process train alternatives at WHWRF, and one (1) alternative at RDFWRF.
- Up to two (2) alternatives to in-house staffing will be evaluated.
- Operations is defined as staff required for process monitoring, maintenance, and laboratory analysis.

Deliverables:

- Draft Staffing and Training Needs Technical Memorandum in electronic PDF format

TASK 300 – FUNDING AND FINANCING

Hazen will prepare a TM with recommended funding and financing options for upgrading and increasing the capacity of the treatment facilities and/or its individual components based on the City's unique financial characteristics. Hazen shall perform the following sub-tasks:

- Research and identify grant opportunities that may be applicable to design and construction of future treatment upgrade projects identified in the TFMP.
- Identify what phases of projects (planning, design, construction) can be captured within the City's existing and future utility rate structure.
- Identify and explore the benefits and drawbacks of alternative funding options such as Public Private Partnerships, bonds, special taxes, grants, and any other currently available funding sources.
- Prepare a draft TM that describes the City's staffing needs and incorporate the City's review comments in the final TFMP document.

Assumptions:

- Funding support includes guidance and review of up to two (2) applications developed by the City for this project. City will write the grant application(s).

Deliverables:

- Funding and Financing Technical Memorandum

TASK 400 - TREATMENT FACILITY MASTER PLAN

Hazen shall prepare a Treatment Facility Master Plan document presenting and summarizing the results of the investigations, evaluations, and recommendations developed in the preceding tasks. The TFMP shall include explanatory text, illustrative figures, and data tables to summarize the recommendations for improvement. Hazen will perform the following sub-tasks:

- Prepare a draft outline of the TFMP and review the draft with the City's personnel.
- Prepare a Draft TFMP report for the RDFWRF and WHWRF following ADEQ facility planning requirements and any pertinent (e.g., AWWA, WEF) industry good practice guidelines/requirements. This report shall take into consideration current and future projects, phasing as appropriate, project grouping to get an economy of scale, and scheduling to meet the treatment and capacity needs for the City's treatment facilities.
- Incorporate the City's review comments and prepare a Final TFMP including an executive summary.
- Develop a recommended capital improvement plan (CIP) based on the results of hydraulic modeling scenarios, facilities evaluation, and other analyses conducted in previous tasks. Included will be a recommendation of phased approach to treatment improvements throughout the planning period and identification of potential key decision points and response strategies to address alternative regulatory requirements. Hazen shall identify possible flexibility for future regulatory changes including total dissolved solids (TDS), nitrogen, phosphorus, and trace constituent removal. A proposed schedule of the asset condition-driven rehabilitation and replacement (R&R) upgrades and the recommended technology improvements will be integrated into the CIP. All CIP items will be prioritized and tabulated, with costs, into a comprehensive implementation plan.

Assumptions:

- Content from technical memoranda developed in Tasks 200 and 300 will be updated and included in the body of the TFMP, superseding the previous working documents delivered to the City.
- Any models, spreadsheets, and any other supporting data shall be provided to the City and shall become the property of the City of Flagstaff.
- Cost estimates' accuracy shall comply with Level 5 standards as defined by the Association for Advancement of Cost Estimating International (AACE), which are appropriate for preliminary-level planning work.
- Capital Improvement Plan format shall consist of a project list with individual project sheets. Each sheet shall include a brief discussion of background and purpose of the project, project description, and cost estimate summary, including project triggers where applicable.

Deliverables:

- Outline of Treatment Facility Master Plan in electronic PDF format
- Draft Treatment Facility Master Plan in electronic PDF format, including executive summary, recommended 5- and 10-year capital improvement plan, and technical memoranda as appendices
- Comment log summarizing City review comments and their disposition
- Six (6) printed copies and one (1) editable version of the Final Treatment Facility Master Plan with an executive summary, recommended 5- and 10-year capital improvement plan, and technical memoranda as appendices
- Any models, spreadsheets, and any other supporting data in editable format

ALLOWANCE

The scope, level of effort, and associated cost for additional engineering services, including but not limited to survey and geotechnical services, will be as determined and agreed upon by the City and Hazen before the work is performed.

City will make any pertinent survey information in the City's records for the WHWRF and RDFWRF site available. However, Hazen may provide, if needed, through qualified subconsultants, survey services to support the field investigation and conceptual design. Survey services may include verification of horizontal and vertical control on existing structures and pipelines and confirmation of elevations of weirs and other critical hydraulic controls

SERVICES NOT INCLUDED IN SCOPE OF WORK

The following services have not been included in this scope of work. These services may be provided under additional task order(s) if deemed necessary by the City, and only after approval in writing:

- Public outreach efforts.
- Meetings with regulatory or permitting agencies.
- Calibration of existing BioWin models, incl. development and execution of a sampling protocol.
- Coordination and participation in visits to sites using proposed technologies.
- Design, permitting, or construction phase services for improvements recommended through the course of the study.
- Grant writing services.
- SCADA Equipment Assessment
- CMMS and GIS Assessment

KEY PERSONNEL

Name	Role	Phone	Email
Hazen			
Curt Courter	Principle in Charge	480-465-4504	ccourter@hazenandsawyer.com
Andrea Odegard-Begay	Project Manager	214-682-4996	aodegardbegay@hazenandsawyer.com
Katie Vanyo	Comprehend Task Lead	480-417-5664	kvanyo@hazenandsawyer.com
Doug Kobrick	Explore Task Lead	480-465-4506	dkobrick@hazenandsawyer.com
Stantec			
Rob McCandless	Principle in Charge/ Converge Task Lead	480-687-6105	rob.mccandless@stantec.com
Naho Garvin	Project Manager	801-617-3215	naho.garvin@stantec.com

No.	Task List	Curt Courter *Hazen Principal in Chage* $280/h	Wendell Khunjar *Technical Advisor & QA/QC* $280/h	Andrea Odegard-Begay *Project Manager* $260/h	Katie Vanyo *Comprehend Phase Task Lead* $240/h	Pouya Shahsana *Structural Engineer* $210/h	Alec Hanson *Facility Assesment* $180/h	Lindsey Bennet *Process Modeling* $180/h	Riley Murnane *Principle Engineer* $180/h	Jacob Mitten-Thomsen *Assistant Engineer* $145/h	Doug Kobrick *Explore Phase Task Lead* $280/h	Chris Currier *Construction Cost Estimating* $240/h	Jason Joynes *Staffing Analysis and Training* $185/h	Troy Walker *Membrane Bioreactor Operations* $280/h	Klint Fletcher *SCADA Evaluation and Standardization* $280/h	Jason Hoyt *SCADA Evaluation and Standardization* $240/h	Adam Butts *I&C Engineer* $240/h	Rob McCandless *Converge Phase Task Lead* $285/h	Kevin Daniels *Implementation* $210/h	Heather Tugaoen *Regulatory Outlook* $210/h	Steve Winfree *Solids Handling* $260/h	Kenny Chen *Implementation* $210/h	Kahao Lim *Implementation* $180/h	Carol Malesky *CIP Development and Financing* $280/h	Amy Broughton *Funding* $260/h	Kyleen Marcella *Advanced Treatment* $210/h	Corey Callaway *Electrical* $210/h	Johnathan Muthart *SCADA/I&C* $210/h	Chris Machado *Technical Advisor & QA/QC* $285/h	Naho Garvin *Stantec Project Manager* $210/h	TOTAL HOURS	LABOR FEES	EXPENSES	TOTAL
TASK 100 – PROJECT MANAGEMENT & MEETINGS		**6**	**40**	**108**	**40**	**0**	**0**	**0**	**0**	**12**	**8**	**0**	**0**	**8**	**22**	**0**	**0**	**48**	**45**	**9**	**6**	**0**	**12**	**0**	**6**	**8**	**0**	**0**	**64**	**42**	**438**	**$ 121,980**	**$ 5,400**	**$ 127,380**
110	Project Management	6		6														6												6	18	$ 6,210		$ 6,210
120	Progress Meetings			6	2					12	2							6	9	9											46	$ 9,830		$ 9,830
130	Project Workshops			72	30						6				6			24	36		6		12		6						198	$ 48,960	$ 5,400	$ 54,360
140	Quality Management		40											8	16			12								8			64		108	$ 41,260		$ 41,260
150	Project Control and Reporting			22																										24	46	$ 10,760		$ 10,760
160	Project Closeout			2	8																									12	22	$ 4,960		$ 4,960
TASK 200 - EVALUATIONS AND TECHNICAL MEMORANDA		**0**	**40**	**48**	**36**	**48**	**120**	**120**	**0**	**212**	**24**	**50**	**80**	**8**	**80**	**340**	**273**	**18**	**112**	**40**	**28**	**50**	**418**	**0**	**0**	**0**	**62**	**62**	**0**	**0**	**2229**	**$ 477,730**	**$ 10,600**	**$ 488,330**
210	Facilities Site Evaluation/Reliability Criteria			6		48	120			40		18	40				48		26				26				18	18			408	$ 79,980	$ 10,600	$ 90,580
220	Waste Load Review and Projections			6						4								4	34				70								118	$ 23,020		$ 23,020
230	Current and Potential Future Regulatory Requirements			6						4										40											50	$ 10,540		$ 10,540
240	Process Treatment Capacity Evaluation		20	6	12			60		4								4	20				50								156	$ 35,760		$ 35,760
250	Hydraulic Capacity Evaluations			6						4								2	32				132								176	$ 33,190		$ 33,190
260	Alternative Process Evaluation		20	12	24			60		140	24	32						8			28	50	140				44	44			606	$ 123,720		$ 123,720
270	SCADA/Controls Eval									4					80	340	225														649	$ 158,580		$ 158,580
280	Staffing and Training Needs			6						12			40	8																	66	$ 12,940		$ 12,940
TASK 300 – FUNDING AND FINANCING		**0**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**36**	**148**	**0**	**0**	**0**	**0**	**0**	**192**	**$ 50,740**	**$ -**	**$ 50,740**
310	Evaluate Funding and Financing Opportunities			2														2						18	80						102	$ 26,930		$ 26,930
320	Funding and Financing TM			2														2						18	68						90	$ 23,810		$ 23,810
TASK 400 - WASTEWATER TREATMENT MASTER FACILITY PLAN		**0**	**0**	**12**	**12**	**0**	**12**	**56**	**0**	**100**	**0**	**0**	**0**	**0**	**12**	**56**	**0**	**10**	**14**	**32**	**14**	**18**	**18**	**0**	**18**	**0**	**22**	**18**	**16**	**16**	**456**	**$ 93,710**	**$ 2,000**	**$ 95,710**
410	Draft Plan			8	8		8	40		60					8	40		8	6	24	6	18	18		16		20	16	16	16	336	$ 69,980		$ 69,980
420	Final Plan			4	4		4	16		40					4	16		2	8	8	8				2		2	2			120	$ 23,730	$ 2,000	$ 25,730
ALLOWANCE																																		$ 30,000
TOTAL:		**6**	**80**	**172**	**88**	**48**	**132**	**176**	**0**	**324**	**32**	**50**	**80**	**16**	**114**	**396**	**273**	**80**	**171**	**81**	**48**	**68**	**448**	**36**	**172**	**8**	**84**	**80**	**80**	**58**	**3315**	**$ 744,160**	**$ 18,000**	**$ 792,160**