

E Scope of Work

Understanding

The Fort Bragg Municipal Improvement District (MID) wants to develop a wastewater collection system master plan to understand and plan its future capital improvement and anticipated system capacity needs. Part of this effort will include evaluation of existing information, development of data to support the master planning effort, completing various studies to further understand how the collection system is functioning, and developing risk-based capital improvement priorities and budgets that optimize MID’s infrastructure investment while maintaining desired service levels and reliability for its customers and stakeholders. The existing system (Figure E-1) is mostly composed of older infrastructure that is reaching or is beyond its anticipated useful life

and requires strategic investment for renewal and replacement. In addition, there are large undeveloped properties within MID. While there is little anticipated growth in the short term, it will be important to understand the current capacity of the existing system, the potential expansion considerations in the future, and how they relate to National Pollutant Discharge Elimination System (NPDES) permits. Key objectives for this study include:

- Measure and characterize collection system I&I issues through a flow monitoring study.
- Identify, inspect, and characterize the condition of critical areas of the collection system through closed-circuit television (CCTV) and visual inspection.

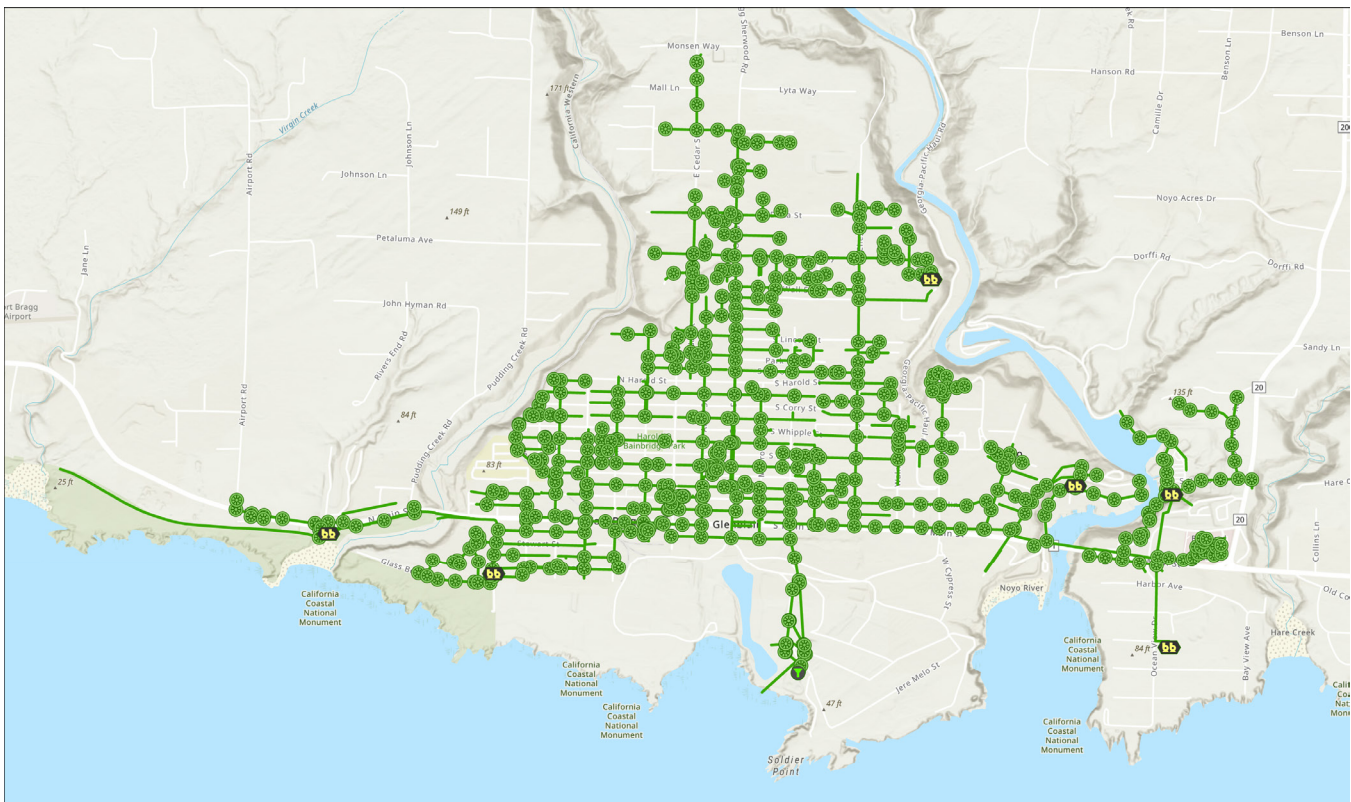


Figure E-1 - City of Fort Bragg Sewer System

We have already developed the collection system geographic information system (GIS) data layers and built the preliminary hydraulic model; therefore, we can hit the ground running and continue our master planning focus that we have established with the City’s water distribution system master plan.



- Support the City's on-going discussions and negotiations with River Watch.
- Understand MID's collection system vulnerability to potential seismic activity in the area.
- Characterize geotechnical and climate change factors and their impact on capital planning.
- Develop a capital planning process that MID can sustain into the future.
- Identify and update essential data, analysis tools, models, and spatial information to support ongoing and future planning.
- Coordination with the water and sewer line extension projects in the industrial area north of Pudding Creek.

Approach

As we've demonstrated on the ongoing water distribution system master plan for the City, we firmly believe in the importance of a collaborative partnership between the consultant and client, capitalizing on the synergy between your local expertise and our national experience. To make sure that the project meets the City's expectations in terms of analysis depth and breadth, we propose a combination of project status meetings and follow-up meetings after key task deliverables. This approach keeps the project team well informed throughout the planning process, actively engaged in significant decisions, and make sure there are no unexpected surprises upon report delivery.

Our project approach also places a strong emphasis on the synergy between our project team's substantial experience in similar collection system planning projects and your team's in-depth institutional knowledge of your system's requirements and overarching challenges. Our extensive track record in executing collection system master plans nationwide will be instrumental in providing valuable insights to the City.

We recently converted the City's AutoCAD files for the utility system (water, sewer, and storm) and we are in the process of developing a wastewater system hydraulic model, which gives our team a unique understanding of the City's collection system. Combined with our recent water demand projection

work, there is an efficiency that directly relates to our team developing the sewer master plan. There is simply no learning curve for the HDR team as many of the water master plan elements can apply directly to the sewer master plan (for example, mapping, growth projections, and risk modeling).

We understand that the City's expects this master planning effort to produce preliminary engineering reports (PER) for funding applications. Our detailed PERs and the 10% design approach will offer the necessary level of detail for a seamless transition of key recommended projects from the planning phase to facilitate funding application and support initiation of project designs after the master plan is finished.

Based on our understanding of your project goals and objectives, our team has developed a proven approach on the following key elements detailed in Figure E-2 on the following page.

Hit the Ground Running for Flow Monitoring

Securing meaningful flow monitoring data in 2023 is not assured due to the timing of procurement; however, our team's approach gives the City the best chance of capturing adequate wet weather data this wet season (2023/2024). We have conducted a thorough assessment of the collection system and identified potential flow monitoring locations. With V&A as part of our team, we can seamlessly share this valuable information to make sure an expedited start.

Our approach to flow monitoring is to perform site reconnaissance for each of our proposed sites to assess site access and site hydraulics. We will then adjust sites, as necessary, install meters, but not activate them until we see wet weather events approaching. Once we determine we are in an appropriate wet weather period and have a high probability of collecting good wet weather event data, we will activate our meters and begin the monitoring period. We will also monitor wet weather events as the end of our monitoring period approaches to determine if it makes sense to leave meters in place if there is a high probability that a significant rainfall event can be captured. This approach has been used successfully on previous flow monitoring efforts to support sewer master plans.

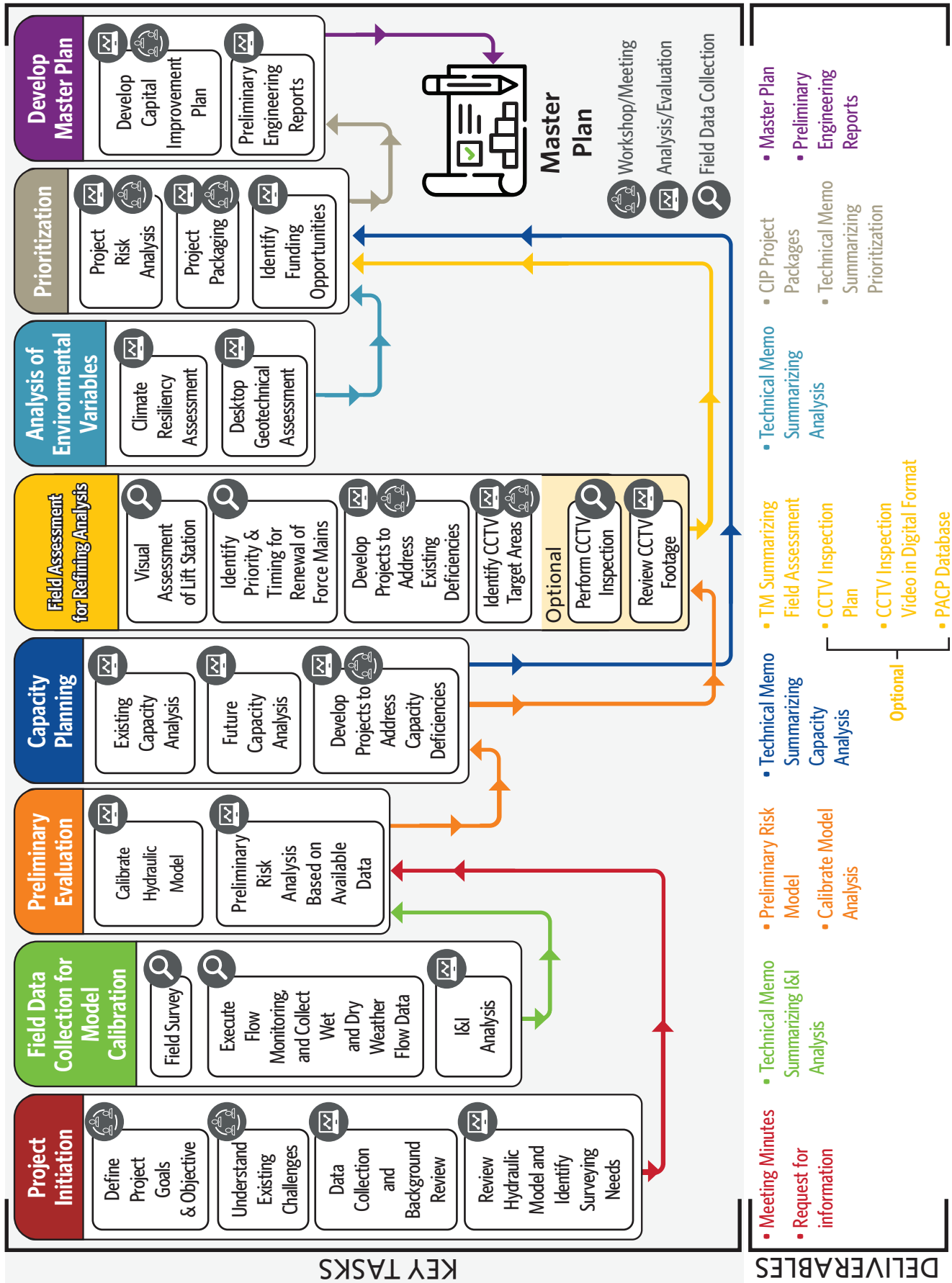


Figure E-2. Work Plan

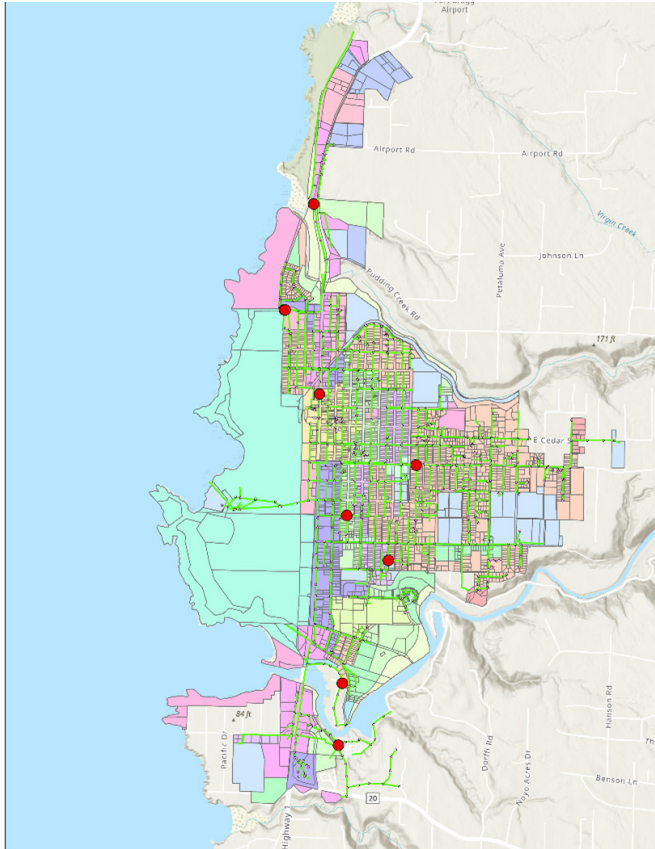


Figure E-3. Flow Monitoring Locations

Use Institutional Knowledge

One of the most important aspects of planning is having a clear understanding of existing issues of the City and accounting for future plans into the planning process. HDR has extensive experience executing improvement projects for the City's water and wastewater infrastructure. For summarized overview of projects recently completed by HDR for the City, refer to the Figure E-4.

A truly integrated collection system master plan identifies sustainable and affordable technical, financial, and managerial solutions that simultaneously address multiple challenges. This approach will help optimize operations while prioritizing strategies that return the most for your investment. Costs and risks are minimized to produce a responsible and credible management plan that stakeholders can support.

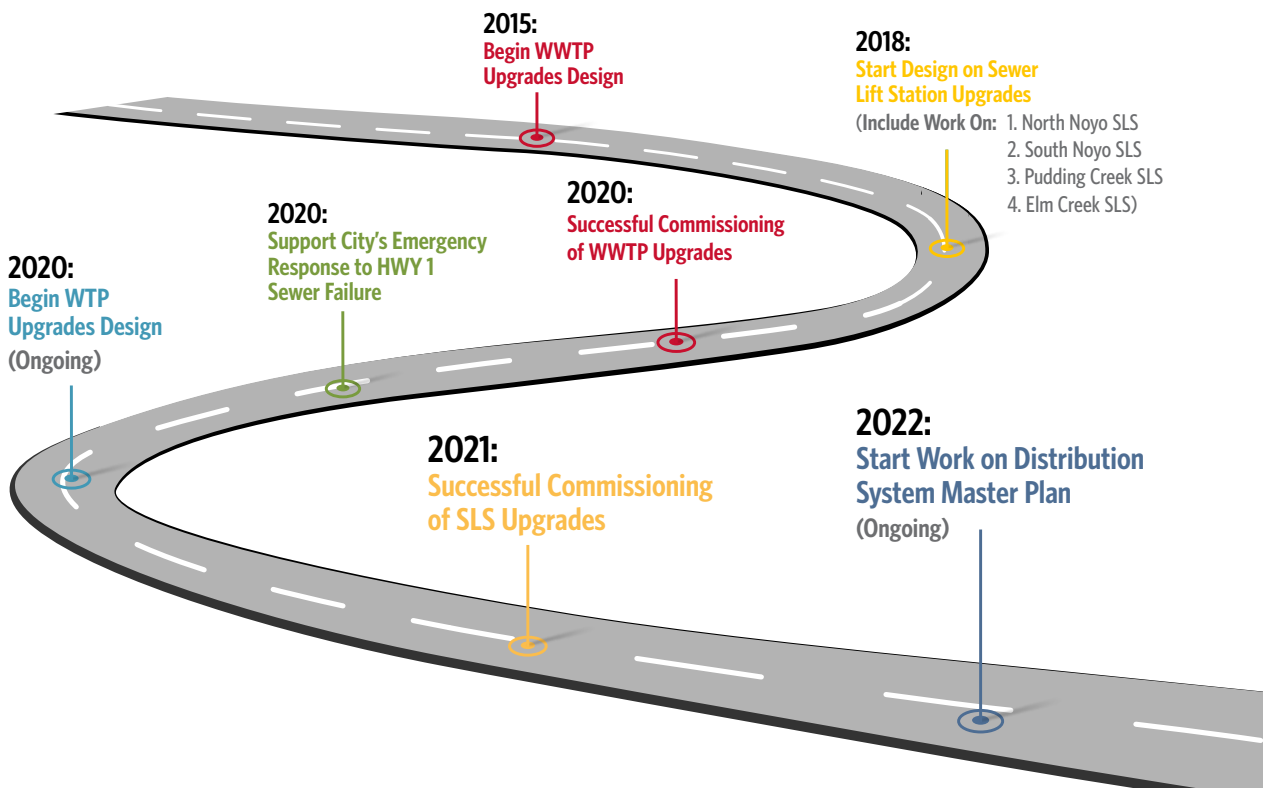


Figure E-4. HDR's History of Successful Project Delivery for the City

Scope of Work

Task 1 – Data Collection and Modeling

Subtask 1.1 – Field Survey

HDR's subconsultant will survey collection system manholes to assist in the calibration of the collection hydraulic model. Survey locations and actual effort will be identified based on review of the current hydraulic model to improve accuracy. Existing survey information will be used to the greatest extent possible.

DELIVERABLES:

- Survey data: Raw data points and processed data.

ASSUMPTIONS:

- This task is budgeted with up to 10 days of field surveying.
- Traffic control is not included in this budget.

Subtask 1.2 – Flow Monitoring

A wet weather flow monitoring of the collection system will involve the installation, operation, and data analysis of flow monitoring equipment within the specified system to characterize I&I issues within the collection system. Findings from this effort will be used for input into the hydraulic model and to help prioritize capital improvement projects. This task will encompass the following:

- Site assessment and verification of proposed monitoring locations
- Installation of flow meters and data loggers.
- Calibration and validation of monitoring equipment.
- Continuous data collection over an eight-week period.
- Real-time data transmission.
- Routine equipment maintenance.
- Data analysis to identify flow patterns and anomalies.

HDR will:

- Establish the baseline sanitary sewer flow at the flow monitoring sites.
- Estimate available sewer capacity.
- Isolate I&I response and perform I&I analysis.

ASSUMPTIONS:

- Flow monitoring schedule is assumed to be eight weeks.
- Eight flow monitoring locations and two rain gauges are assumed for this study. The final number, locations, and duration to be determined with input from City. A budget adjustment may be necessary to accommodate final monitoring parameters.
- Note that selected sites may need to be moved if local conditions are not suitable for monitoring (e.g. manhole depths greater than 30 feet, elevated gas levels that cannot be cleared with forced ventilation)
- Traffic control will be provided by MID where needed.
- Encroachment permits or other municipal permits are not needed or will be acquired by MID.
- Other items not included are:
 - Shutdowns, dewatering, or cleaning of structures
 - Excavations
 - Entry into manholes greater than 30 feet in depth
 - Supplied air for conditions where it is unsafe due to atmospheric conditions
 - Tasks associated with this effort may be subject to prevailing wage rate requirements. An allowance has been made for this, however the final requirements may impact the planned budget

Subtask 1.3 – Calibrate Hydraulic Model

HDR will incorporate field survey data and flow monitoring data collected from the previous tasks



into the hydraulic model for calibration and model refinement.

ASSUMPTIONS:

- Up to 40 hours are budgeted for model calibration. Additional effort may require a fee adjustment.

DELIVERABLES:

- Updated modeling/mapping of sewer collection system network.

Subtask 1.4 – Preliminary Risk Analysis & Identify Closed-Circuit Television (CCTV) Target Area

HDR will perform a preliminary risk analysis to identify CCTV target areas. This will be a desktop study that assigns a risk score to each pipe based on preliminary risk factors determines with MID. I&I findings will also be incorporated to identify the best locations to televise pipe. The proposed locations for CCTV inspection will be documented in an Inspection Plan and will be reviewed and confirmed with MID prior to initiation.

DELIVERABLES:

- Final only CCTV Inspection Plan.

Subtask 1.5 – CCTV Inspection (Optional)

It is recommended that a partial CCTV be performed but is not required for a developing an adequate capital plan. This task is for optional inspection of up to 3 miles of the City’s gravity mains to get a representative sample of the system’s. We have established a budget based on \$4 per lineal foot, which includes cleaning and inspection and characterizing the defects. This unit price does not include:

1. Traffic control
2. Root cutting
3. Reverse setups
4. Cost of water
5. Disposal

DELIVERABLES:

- CCTV inspection video in digital format.

- PACP database with operational and structural defects coded.

Subtask 1.6 – Identification of Gravity Pipe Improvements

Once the CCTV inspection has been completed, HDR will evaluate the results to identify improvements to the collection system gravity pipes. HDR proposes to use decision support modeling software (e.g. Innovyze InfoAsset Planner, Aquanuity AquaTwin Asset) to develop the risk model and decision logic for identifying rehabilitation and replacement recommendations. This software works with the existing GIS and CCTV data to assign a risk score for each pipe and identify the desired renewal recommendation based on decision logic and planning-level cost information. HDR will use their in-house version of the software so there is no need for MID to purchase it, however, the modeling results will be provided for future use. The risk modeling will assign a risk score to each pipe based on likelihood and consequence of failure factors established with MID. In addition, a capital improvement decision model will be developed that identifies the best option for renewal based on MID established decision criteria and expected cost information. This will generate a prioritized list of capital improvement and reinspection recommendations for the entire collection system. MID can use this list to determine the investment vs risk level that best meets their needs.

To develop these models, HDR will work with MID to determine the required criteria. HDR will conduct two workshops with MID to develop the risk model, and one workshop to determine the renewal decision logic. Once this is established, HDR will calibrate and run the models and review the results with MID. We will validate the results by reviewing individual recommendations with the City toto establish that they are appropriate and adjust the model if needed. This will provide a prioritized list of recommendations for the gravity pipelines.

DELIVERABLES:

- Integrated gravity sewer decision support model results.
- Risk and capital improvement recommendations incorporated into GIS.

- Draft and final technical Memo summarizing field assessment.
- Recommendations for gravity pipe reinspection.
- Plan for an on-going condition assessment cycle.

ASSUMPTIONS:

- Six, two-hour virtual workshops will be conducted with the City.
- Sufficient information will be available to determine sewer main installation dates. If not available, MID will advise on the appropriate approach to identify pipe age.
- Current construction costs (past three years) of rehabilitation projects will be used to forecast program costs, if available.
- Where rehabilitation method costs are not available, HDR will utilize professional experience to develop costs.
- Escalation factors for future years will be based on Engineering Consumer Price Index (CPI).

Subtask 1.7 – Visual Assessment of Lift Stations

HDR will perform a visual assessment of the six lift stations, which are part of the collection system. The visual assessment will be performed over two-day sites tour with City staff. The gathered information will be used to augment desktop-based assessment of the lift stations to memorialize the condition of the lift stations. During the site tour, the City will share any known issues and background information about the lift stations to help plan for existing deficiencies.

To prioritize capital improvement recommendations generated from the visual assessment, HDR will develop a desktop risk assessment to assign a risk score to each station. This will be based on available data including available flow data, lift station location and position in the collection system. Each station will receive a risk score which will be considered in for prioritization of recommended improvements.

ASSUMPTIONS:

- A minimum of two City staff familiar with the lift stations shall accompany HDR staff on the site tours. HDR will interview the two City staff during the tours.

- This task is based on a visual assessment and staff interviews by two HDR staff members: a process engineer and an electrical engineer.
- This task does not include any budget for performance or destructive testing, or structural analysis.

DELIVERABLES:

- Write-up section in the overall field assessment TM.

Subtask 1.8 – Priority and Timing for Renewal of Force Mains

HDR will identify priority and timing for renewal of force mains. A substantial portion of the City's force mains is comprised of Techite pipe. Techite is a failure prone material, which often ruptures catastrophically. It usually does not exhibit visual evidence of imminent failure; therefore, there is no reliable field assessment to assess condition. This task will be a desktop-based assessment to evaluate the force mains, identify rehabilitation or replacement options, and determine priority and timing for renewal.

HDR will perform a desktop-based assessment to evaluate the network of force main, which is Techite, then evaluate priority and timing for renewal of the force mains.

DELIVERABLES:

- Write-up section in the overall field assessment technical memo

Task 2 – Analyzing Environmental Variables

Subtask 2.1 - Existing and Future Capacity Planning and Planning for Capacity Deficiencies

HDR will determine the current system's capacity and estimate future capacity needs using data collected during and before the preliminary evaluation phase. HDR will use the experience gained from the water distribution system master plan to gain efficiencies in the developing criteria to evaluate existing system capacity and needs. Once the baseline capacity is established, HDR will collect and analyze available planning/development data or reports to estimate future capacity requirements. After future capacity requirements are quantified, HDR will work with



the City to develop projects to plan for mitigating potential capacity deficiencies.

DELIVERABLES:

- Draft and final TM in PDF format summarizing capacity analysis.

Subtask 2.2 – Climate Resiliency Assessment

To gain efficiencies - prior to starting this task - HDR will review the climate resiliency assessment performed for the distribution system master plan and solicit City’s input to better focus this assessment. HDR will review the Fort Bragg Municipal Improvement District’s (MID’s) General Plan (inland and coastal) Element 7 Safety and other Emergency Contingency Planning documents provided by the City.

HDR will evaluate how anticipated climate change impacts risks and vulnerabilities of the wastewater system and consider disaster mitigation strategies and other environmental factors impacting the MID’s wastewater resiliency planning. HDR will evaluate the following factors:

- Current risks from precipitation and runoff, tides including storm surge, tsunamis, coastal bluff erosion, and fire.
- Impacts of climate change, including increased precipitation and runoff, sea level rise on tidal elevations, coastal bluff erosion, groundwater increases, and increases in extreme heat and fire risk.

HDR will document the results of the findings in a TM. The TM will include the system’s vulnerabilities to climate change for two planning horizons: anticipated to be 2050 and 2070. The goal of the analysis will be to identify changes in risks to the system in light of climate change, such that projects can be identified within the master plan to align with long-term climate resilience goals.

HDR will attend one workshop/call with the City to discuss the climate risks and vulnerabilities that have been identified.

DELIVERABLES:

- Draft and final TM in PDF format summarizing climate resiliency assessment.

ASSUMPTIONS:

- The City will provide general plan and emergency contingency planning documents to review within 20 days of notice to proceed.
- Up to 3 HDR staff will attend one remote meeting up to 2 hours in length with the City to discuss the climate risks and vulnerabilities.
- Adaptation strategies and cost estimates will not be developed as part of this scope.
- The evaluation will be developed based on publicly available data and data provided by the City. Numerical models will not be developed as part of the climate assessment.
- One round of revisions.

Subtask 2.3 – Desktop Geotechnical Assessment

To gain efficiencies - prior to starting this task - HDR will review the geotechnical assessment performed for the distribution system master plan and solicit City’s input to better focus this assessment. As part of this task, HDR will review publicly available information on historic seismic data, review published flood maps, and records of historical pipe repairs. The desktop assessment will help identify areas of concern related to geotechnically sensitive areas and environmental factors. Additional testing may be performed for quantitative analysis of soils. Soils testing is not included in HDR’s scope.

DELIVERABLES:

- Draft and final TM in PDF format summarizing desktop geotechnical assessment.

Subtask 2.4 – I&I Analysis

Following the flow monitoring activities, an analysis of the data will be completed to provide a Flow Monitoring and I&I analysis final report. Key activities to complete this task are:

Data reduction to 15-minute intervals. The data set will include the following information:

- Average dry weather flows.
- Rain data from installed rain gauges and Weather Underground Public Weather Stations.

- Flow data (level, velocity, and flow).
- Baseline flow data.
- Daily flows (average, maximum, and minimum).
- Daily rain at each flow meter location.

The flow monitoring report will include the following information:

- A summary of the flow monitoring equipment used.
- Location maps with address, pipe size, manhole identifier number, flow channel condition, site schematics, and photographs.
- Flow monitoring data with tabular outputs of depth, velocity, and flow rate and hydrographs of depth, velocity, and flow rates for each flow meter.
- I&I Analysis: Average dry weather flows curves will be determined, and rain-dependent.
- Infiltration and inflow (RDI/I) response will be isolated during wet weather rainfall events. Analysis will include developing synthetic I&I hydrographs for each flow monitoring site and applying the synthetic hydrographs to a 10-year, 24-hour design storm.

DELIVERABLES:

- Draft and final TM in PDF format summarizing I&I analysis.
- Flow monitoring data in spreadsheet format.

Task 3 – Capital Project Planning

Subtask 3.1 – Project Risk Analysis

Once the individual asset-specific analyses have been completed and capacity recommendations have been identified, HDR will prioritize the results in preparation for development of the CIP. HDR will conduct a two-hour workshop MID to develop a prioritization approach that incorporates the condition-based needs and capacity needs for the various types of infrastructure studied. This approach will leverage the risk modeling completed in previous tasks and assign a project prioritization score to each recommendation. HDR will conduct another

two-hour workshop to review the results and get additional input from MID. The results can then be used to guide the sequencing of capital work.

DELIVERABLES:

- Workshop minutes in electronic format.
- Project prioritization scoring factors and results.
- Draft and final TM in PDF format summarizing the prioritization analysis and results.
- Prioritization scoring factors and scores for each recommendation.

ASSUMPTIONS:

- Two two-hour workshops are budgeted under this task.
- Up to two HDR team members will attend each in-person workshop. Other team members may participate via web-conference.
- City staff will be readily available and able to participate.

Subtask 3.2 – Project Packaging

Once the prioritization is completed, HDR will evaluate the results to determine how to package the recommendations into projects. Many of the recommendations will be too small to be completed as single project and will need to be packaged together into larger efforts to be cost efficient. HDR will develop an initial packaging of the recommendations and review the results with MID in a two-hour workshop to obtain comments and feedback. The packaging will use the existing risk analyses, and project prioritization scores to determine sequencing.

DELIVERABLES:

- Workshop minutes in electronic format.
- Draft and final CIP project packages, including project data and documented packaging strategy.

ASSUMPTIONS:

- Four (two-hour) in-person workshops are budgeted under this task.



- Up to two HDR team members will attend each workshop.

Subtask 3.3 – Identify Funding Opportunities

HDR will identify project funding opportunities and funding streams. To gain efficiencies - prior to starting this task - HDR will review funding opportunities developed for the water distribution system master plan and solicit City’s input to better focus this effort. Our team will identify ideas to make the most of available funding while lessening federal compliance requirements. This will help reduce overall project costs and administrative requirements. Under this task, potential funding sources will be explored include:

- State Revolving Fund (SRF)
- Department of Water Resources (DWR)
- United States Department of Agriculture (USDA)
- Water Infrastructure and Finance Innovation Act (WIFIA)

Task 4 – Collection System Master Plan

Subtask 4.1 – Develop Capital Improvement Plan

The results for this task will be documented in the project planning report. This report will be provided to the City for review and comment.

The report will include a 10-year capital improvement program (CIP). The CIP recommendations will be prioritized based on project prioritization and packaging performed in Task 3. The recommendations will be categorized to identify actions to take immediate action (e.g. within the next two years, in the near-term (within the next five years) and long-term (five to ten years).

HDR will develop the CIP considering resource and funding constraints and overall CIP funding strategies or policies that MID requires.

The sequencing will incorporate inflation and escalation to capture future cost increases.

HDR will conduct a workshop with the City to review the report and discuss the comments. The results of this workshop and comment review will be incorporated into the final version of the report.

DELIVERABLES:

- Draft and final Project Planning Report in PDF format.
- Workshop agenda and minutes.

Subtask 4.2 – Preliminary Engineering Reports

HDR will prepare preliminary engineering report for up to three projects identified by in Subtask 4.1. The preliminary engineering reports will include:

- Purpose
- Background
- Alternatives Analysis
- Engineer’s Opinion of Probable Construction Cost (EOPCC)
- 10% Design Drawings
- Recommendation

ASSUMPTIONS:

- The EOPCC will be a Class 4 estimate, which HDR uses at the preliminary design level. It will be prepared by using take-offs from figures, if available, and limited vendor quotes. This estimate will require a contingency of up to 30%.

DELIVERABLES:

- Draft and final preliminary engineering reports.

Subtask 4.3 – Collection System Master Plan and Presentations

After reviewing the existing studies to gain a clear understanding of the City’s planning needs and work described in tasks above, HDR will prepare a complete collection system master plan.

HDR has also budgeted attendance and presentation at up to three City Council meetings, including preparation of staff reports, meeting notes that incorporate City comments, and recommendations to Council regarding the adoption of the Final Collection System Master Plan.

DELIVERABLES:

- Draft Collection System Master Plan Report in PDF format, which includes information on the existing

conditions and constraints of the system, with copies of all data in an appendix.

- Final Collection System Master Plan Report in PDF format, including other deliverables (listed above) and three bound hard-copy reports.

Task 5 - Project Management and Quality Control

This task includes the management activities needed for on-time and on-budget project completion, and resources to address the City's concerns. HDR will prepare invoices and progress reports monthly. The monthly progress reports will summarize budget and schedule status in measurable terms. Other activities include coordination with the subconsultants, scheduling of staff, and coordinating the quality assurance effort.

DELIVERABLES:

- Schedule.
- Monthly status reports.
- Monthly invoices in PDF format.

ASSUMPTIONS:

- Project management is expected to occur over a 18-month period.