CITY OF ALBANY
CITY COUNCIL AGENDA
STAFF REPORT

Agenda Date: October 7, 2024
Reviewed by: NA

SUBJECT: Watershed Management Plan Update (CIP No. 30001) Informational Presentation and Status Update

REPORT BY: David Lam, Associate Engineer
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SUMMARY

City Council awarded Contract No. C24-32 to Wood Rodgers to help the City develop an update to the City's Watershed Management Plan (WMP) on June 3, 2024. An updated WMP will provide an updated list of drainage improvements, cost estimates, and explore funding mechanisms to meet the requirements for operating and maintaining the City's aging stormwater infrastructure. The purpose of this agenda item is for Council to receive an informational presentation on the purpose and extent of the Watershed Management Plan Project (Project) and allow Council to provide feedback and guidance.

STAFF RECOMMENDATION

That the Council receive a presentation regarding the Watershed Management Plan update and provide feedback on the Watershed Management Plan Project.

BACKGROUND

The City of Albany can be divided into five watersheds extending from the Berkeley Hills and draining into the San Francisco Bay. Most of the City's storm drain system was built in the 1920's and 1930's in conjunction with the development of the residential neighborhoods. The City's drainage system consists of approximately 12 miles of storm drain pipeline and 2.5 miles of culverts. The system of inlets, pipes, junctions, and culverts conveys stormwater to one or more of five creeks within the city limits – Cerrito Creek, Codornices Creek, Marin Creek, Middle Creek, and Village Creek.

During the development of Albany through the 1950's, portions of the City's creeks were placed in culverts, buried, and built over, resulting in the separation of the waterways from wildlife. Outside of culverting creeks, significant portions of Albany roadways were also developed without including storm drainage infrastructure despite those same roadways increasing the amount of run-off, resulting in major corridors operating as overland flow channels during the rainy season.

A Watershed Management Plan (WMP) is a tool to assist the City in making informed decisions related to its drainage infrastructure and waterways by assessing existing conditions, identifying deficiencies, and prioritizing improvement opportunities in the context of limited city resources. The City last prepared a WMP in October 1998. Several of the improvement projects identified in the 1998 WMP have been constructed, while more work remains to be completed as systemic conditions have changed. In the ensuing years, the City has continued to operate the storm drain program at 1990s funding levels by primarily targeting basic maintenance services and isolated repairs to individually reported locations of concern.

In November 2020, Council adopted the Capital Improvement Plan (CIP) for FY2019/20 to FY2023/24, and appropriated budget for the first three fiscal years of the five-year CIP. This included CIP Project No. 30001 for a Watershed Management Plan Update. The project includes a stormwater system assessment and master plan with a hydraulic model and capacity analysis.

In February 2024, staff released a Request for Proposals (RFP) for the update of the 1998 WMP. The City received three (3) proposals by the March 11, 2024 deadline. The proposals were reviewed by a four-person selection panel consisting of three members of Public Works staff and one member of Community Development staff. After reviewing the written proposals and conducting in-person interviews with each of the three firms, the selection panel unanimously agreed that Wood Rodgers best understood the requirements and was the best qualified firm to prepare the WMP update. Because the proposals exceeded the original amount appropriated for the effort in the CIP, staff negotiated with Wood Rodgers on a refined scope of work and updated budget by identifying certain "core tasks" that would be vital to a functional Watershed Management Plan update. These core tasks were incorporated into the scope of Contract No. C24-32, which Council awarded to Wood Rodgers on June 3, 2024 in the not-to-exceed amount of $481,708.00. Additional funds were appropriated to the project from NPDES (National Pollutant Discharge Elimination System) Storm Water Fee and Measure F Street & Storm Drain Improvements Tax funds (Resolution No. 2024-38).

DISCUSSION

As described in the June 3, 2024 staff report for the approval of Contract No. C24-32, the scope of the WMP update consists of the following tasks:

- Public meetings to address City stakeholder concerns and priorities;
- Desktop data review and a storm drain inventory update;
- Storm drain condition assessment;
- Installation of flow monitors to collect in-situ flow data for one rainy season;
- Hydraulic modeling calibrated with flow data collected from flow monitors;
- Evaluation of the effects of climate change;
- Identifying existing deficiencies and prioritizing a list of improvement projects;
- Financial analysis of the needs, funding gaps, and potential funding sources;
- Preparation of an updated Watershed Management Plan summarizing the findings from the previous tasks.

The proposed scope provides a framework for Wood Rodgers to begin work on the core tasks aimed at addressing the needs of the City's stormwater infrastructure.

As a key component of the WMP is addressing the needs of the local community, the scope proposed at least 5 public meetings to solicit feedback from residents and stakeholders as well as give status updates to the Council. This agenda item is the first of the planned meetings.

The purpose of this agenda item is for the Council to receive an informational presentation on the purpose and extent of the Watershed Management Plan itself, provide an overview of the tasks anticipated in completing the Plan, and provide a forum for feedback on the Project.

SUSTAINABILITY AND SOCIAL EQUITY CONSIDERATIONS

The Watershed Management Plan (Project) supports the City's General Plan focus on mitigating environmental hazards with flood risk and includes an evaluation of the impacts of climate change on the watershed. The Project will provide a framework for the City's activities in sustainably maintaining and improving the environmental health of the City's waterways.

Watershed impacts from climate change have the potential to have a disproportionate impact on residents living in lower-lying areas of Albany. The Project encourages a systematic, data-driven, and equitable City-wide assessment to be integrated into the City's watershed management practices and future projects.

CITY COUNCIL STRATEGIC PLAN INITIATIVES

This project supports the Council's Strategic Plan in the areas of advancing climate action and adaptation (Goal 1), promoting streets that support safety & transportation mobility options (Goal 3), increasing City revenue to sustain City Services (Goal 5), and increasing public health, safety, and resiliency (Goal 6).

Included in this project is an evaluation of the effects of climate change with the intention to deliver projects adapted to anticipated increases to storm intensity. Management of stormwater is a large part of supporting transportation mobility for varied weather conditions. To support these efforts, this project includes seeking funding opportunities for storm drain permit implementation and asset preservation. Finaly, maintaining a healthy storm drainage system is vital in helping to reduce the risk of flooding. This reduces water-borne pollution, promotes pedestrian pathway and bicycling accessibility, benefiting community health through two different approaches.

FINANCIAL CONSIDERATIONS

There are no financial actions recommended at the time of this report.

Attachments

1. Scope of Services for Contract No. C24-32 with Wood Rodgers for WMP Update
2. Wood Rodgers WMP Update Informational Presentation

WOOD RODGERS

May 28, 2024

David Lam, PE
Associate Engineer
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510-559-4270

Re: City of Albany, Professional Engineering Services for Watershed Management Plan

Dear Mr. Lam

Wood Rodgers, Inc. (Wood Rodgers) is pleased to provide our services for the City of Albany Watershed Master Plan. We understand that the services to be provided will be in phases. The following revised scope will be for Phase 1.

Task 1 – Project Management

Wood Rodgers' project manager will perform project management activities throughout the entire duration of the project.

Task 1.1 Project Work Plan

Wood Rodgers will use the proposal developed for this project as the basis to develop a detailed project work plan as the communication tool with the project team, City, and other stakeholders. The detailed work plan include:

	**Meetings and Presentations** | Wood Rodger will maintain a constant and clear channel of communication by hosting bimonthly status meetings.
	**Risk Management |** Risk management is perhaps the most integral part of the Wood Rodgers' project management approach. The premise behind risk management is to identify scope, schedule, and cost related risks early, to identify means and methods to manage specific risks and lastly to identify the entity or person who will most likely be responsible for implementing any risk mitigation strategy. This will be accomplished through the development of a Risk Management Matrix.
	**Schedule Management |** The Wood Rodgers' project manager will prepare and maintain a critical path method (CPM) schedule, presented in a Gantt chart format, using Microsoft Project software. Each task and project milestone in the Scope of Work will be included in the schedule, so that the progress of each task milestone can be monitored.
	**Cost Management |** All charges to the project will be monitored and controlled to assure that costs are kept within budget limitations. Wood Rodgers' computerized BST10 enterprise system

	will be utilized to monitor and control budgets on a task-by-task and consultant/subconsultant basis. Monthly invoices will be prepared and submitted to the City.
	**Progress Reports |** Monthly progress reports will be prepared and submitted to the City. Progress reports will cover work and tasks performed during the pay period, work forecast for the pay period to come, overall project progress, and identification of issues needing discussion and resolution.
	**Quality Assurance/Quality Control |** Wood Rodgers will perform Quality Assurance/Quality Control (QA/QC) on the project. A project-specific QA/QC Plan will be prepared that will be administered by a quality manager. The quality manager is a senior-level experienced engineer who will provide independent review and approve all deliverables before they are submitted to the City.

Deliverable(s): Meeting Notes | Project Schedule | Monthly Progress Reports

Task 1.2 Kick-off Study

Prior to commencing any work, the Wood Rodgers' Team will meet with the City and any other stakeholders to kick off the project. The purpose of this kickoff meeting is to clearly define the goals of the project, to establish an understanding of the City's needs, to determine the standards and policies that apply to the project, and to refine the project's scope of work and budget. The meeting will also include an initial effort to collect data and to comprehend the City's understanding of the drainage system.

Deliverable(s): Kickoff Meeting Notes

Task 1.3 Public Meetings

Wood Rodgers will attend public, City Council and other meetings as requested and will prepare presentation materials. We will prepare presentation materials containing technical information, findings, and recommendations. The presentation materials will be developed by our landscape architects with graphical illustrations to express visual ideas, convey messages, educate the audience, and promote the project recommendations. We will use the materials to conduct up to five presentations to stakeholders as requested by the City.

Deliverable(s): Up to five presentations and materials

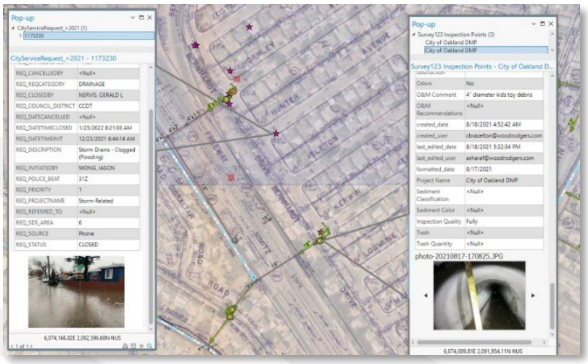
Task 2 – Field Data Gathering and Condition Assessment

Task 2.1 Updated GIS Inventory

Wood Rodgers will collect and compile data to support the project in an easily accessible, easily linkable, and easily understood geodatabase. Wood Rodgers will implement an innovative predictive inspection approach to strategically select inspection sites and minimize inspection efforts. The resulting findings will inform condition assessments and identify opportunities for improving maintenance activities.

Task 2.1.1 – Data Collection and Review

Wood Rodgers will collect and review the City's GIS geodatabase, parcel data, easements, historical flooding information, record drawings, maintenance documents, latest hydrologic and hydraulic data, land use, general plan, relevant reports, studies, plans, and supporting data to sufficiently update the City's drainage facility.



Wood Rodgers will also collect as-builts, survey, and the latest standards from Caltrans and other agencies to supplement missing data or "gaps" in the geodatabase. This information will be converted into the geodatabase. Data gaps will be documented on a map where necessary data is missing. The map will serve as a basis for determining which missing data is essential, and for prioritizing field inspection.

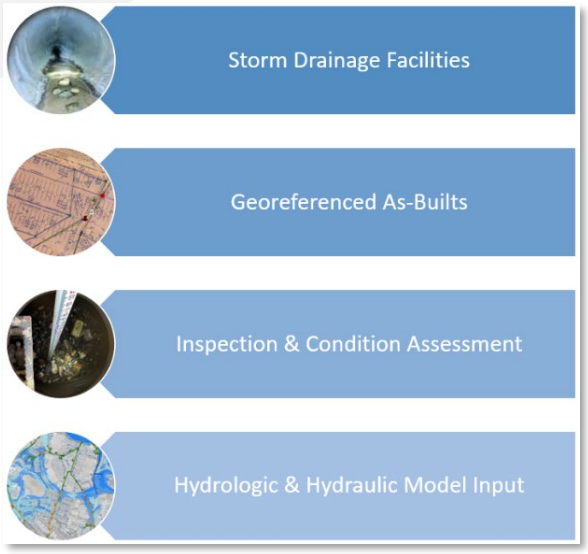
Work orders from operations and maintenance activities and anecdotal flooding incidents will be collected to verify flooding locations and extents, and to understand drainage facility operation issues.

Planned and existing capital improvement projects, green infrastructure facilities, low impact development (LID) projects, and existing full trash capture devices will be collected to assess the hydraulic impacts or benefits.

Wood Rodgers will review the collected data in the geodatabase and document on a map where necessary data is missing. For example, modeling a storm drain system will require the storm drain type, the storm drain diameter/dimensions, the storm drain length, and upstream and downstream inverts. The missing data will be noted. The map will serve as a basis for determining which missing data is essential.

Deliverable(s): Updated geodatabase | Data gap maps

Task 2.1.2 – Geodatabase Refinement



Wood Rodgers proposes to refine/design a geodatabase and to use it as the central repository for the City's supporting data and results. Wood Rodgers has successfully used this approach for drainage master plan studies performed for public agencies throughout the Bay Area. This approach has improved quality, reduced redundancy, improved efficiency, and improved accessibility.

Wood Rodgers proposes to refine and enhance the City's geodatabase to include comprehensive stormwater features, and hydrologic and hydraulic parameters for inventory, inspection, condition assessment, and modeling and reporting tasks. The geodatabase will be used to store and manage stormwater facility information; to identify missing information; to prioritize data collection, inventory, and condition assessment; and to facilitate geodatabase to modeling software import and export processes. This approach reduces the City staff's reliance on modeling software.

Wood Rodgers will review the City's existing geodatabase and recommend necessary refinement to capture all storm drain facility properties and conditions to be inspected. The refinements will be based on a comprehensive geodatabase with related tables and domain values that have already been designed and are being used for drainage systems in Valley Water, Alameda County, Marin County, the City of Berkeley, and the City of Oakland. Wood Rodgers modified the Esri file geodatabase using the Esri Local Government Information System Model as the basis, and then

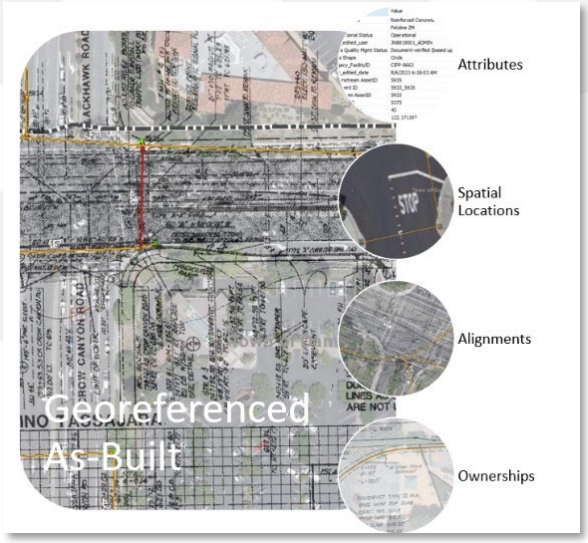
supplemented it with drainage feature datasets such as field surveys, topography, drainage facility (including storm drains, maintenance holes, pumps, open channels, structures, etc.), georeferenced as-built drawings, parcel maps, streets, municipal boundaries, photographs from field visits and inspections with photo locations, watersheds, land use data, soil data, and hydrologic and hydraulic parameter data.

Deliverable(s): Refined City's and reconciled geodatabase

Task 2.1.3 – Desktop Asset Inventory

Wood Rodgers will complete drainage facility properties in the geodatabase with record drawings and as-builts prior to field inspection. This has been proven to be the most cost-effective approach in other drainage studies and assessment projects when combined with limited field inspection data to provide a more complete inventory of pipe systems. This approach will also provide sufficient resolution and accuracy for the capacity and condition assessment. Based on Wood Rodgers' master plan experience, we will perform this task for **3 miles** of drainage facilities or approximately 20% of the City's total drainage facilities to sufficiently capture missing information.

Wood Rodgers will georeference record drawings and as-builts and use existing survey data (if any) to complete the geodatabase inventory of the City's systems. We will use NearMap, the City's latest ortho imagery, and Google Street View to locate facilities and to create or refine existing geometry. This approach provides horizontal accuracy between 1 and 3 feet, which is sufficient to determine maintenance hole, catch basin, and outfall structure locations and to estimate the connecting storm drain lengths. The latest LiDAR data will be used to determine the facility rim or ground elevations. Recent LiDAR data typically has sufficient point resolution and vertical accuracy (typically less than 3 inches) to determine elevations. The LiDAR derived facility rim or ground elevations will be used in conjunction with inspection data to verify the as-built data.



The spatially rectified facilities will be used in conjunction with the georeferenced as-builts to readjust storm drain alignments, and to identify other paved-over facilities, such as junction boxes and transition structures. The georeferenced as-builts will also be used to record storm drain materials, diameter/dimensions, lengths, and upstream and downstream inverts (both original and converted NAVD88 datum).

Wood Rodgers will flag facilities that do not have the appropriate public ROW or easements to the best of our ability.

The geodatabase will include an inventory of all the storm drains, grade breaks (storm drain invert slope changes), maintenance holes, outfalls, junction boxes, and transition structures.

Deliverable(s): Georeferenced as-builts for 4 miles of drainage facility | Updated geodatabase

Task 2.2 Condition Assessment

Task 2.2.1 – Storm Drain Condition Assessment

Maintenance and structural condition assessments for storm drain systems are the processes of inspection and systematic defect categorization. It is one of the processes in an asset management approach to prioritize operation and maintenance activities.

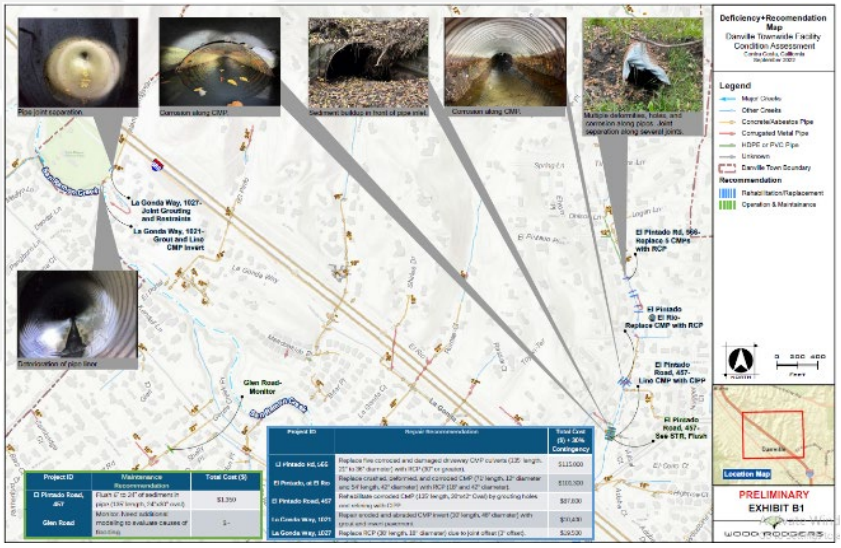
Wood Rodgers will use the Environmental Protection Agency (EPA) asset management guidelines and National Association of Sewer Service Companies (NASSCO) pipeline assessment condition grading system code to provide a standard condition rating system for each component.

The ratings will then be used to develop recommendations for maintenance, rehabilitation and replacement projects.

Deliverable(s): Condition assessments for 50 inspected sites | condition assessment findings | Updated geodatabase.

Task 2.2.2 – Maintenance, Rehabilitation, and Replacement Plan

Wood Rodgers will develop a maintenance, rehabilitation, and replacement plan to recommend activities and work to restore drainage facility condition and maximize their useful life for up to **10** projects. Based on Wood Rodgers' inspection and condition assessment experience in Bay Area systems, there is generally a 20 to 30% chance that the inspected facilities are in critical condition and require maintenance, rehabilitation, and replacement recommendations. Wood Rodgers will recommend maintenance activities, rehabilitation work, and replacement projects to address deficiencies in critical condition based on field assessment, remaining useful life of facilities, and cost effectiveness. When a facility is near the end of its useful life or the rehabilitation cost is greater than the replacement cost, replacement work is recommended over rehabilitation work.



The need and extent of rehabilitation and replacement work will be estimated from the inspection reports and site photos for the inspected facilities with "critical" and "poor" structural condition ratings. The inspected facilities with a "poor" rating are recommended for continued monitoring in case they become "critical." Inspected facilities with "critical" rating are recommended for improvement, either through a capital improvement or more minor rehabilitation/replacement.

Deliverable(s): Maintenance, Rehabilitation, and Replacement Plan for 13 projects

Task 2.3 Flow Monitoring Work Plan

Wood Rodgers has previously participated in regional land use calibration efforts using flow gage data involving the City of San Jose, Valley Water, and Alameda County Flood Control District, resulting in relatively uniform percent imperviousness values for corresponding land uses. We will leverage this knowledge for developed areas and combine it with data from proposed gages for open or hilly areas, which exhibit high variability in infiltration rates and interflow.

Additionally, Wood Rodgers is currently collecting and analyzing gage data for the City of Berkeley Storm Drain Master Plan. This data could be directly applicable to the City of Albany, particularly for areas discharging from Berkeley. Leveraging our expertise and ongoing efforts for the Berkeley Storm Drain Master Plan, we propose a flow monitoring work plan to only install three flow gages strategically placed at major trunk systems, considering available data, gauge constraints, existing flooding hotspots, and other relevant information.

Deliverable(s): Flow Monitoring Work Plan for three pipe/stream gages

Task 2.4 Installation of Flow Meters

Upon the City's approval of the flow monitoring work plan, Wood Rodgers will purchase, install, and monitor three flow gaging stations for two continuous wet seasons to provide validation/calibration data for the concurrent drainage system model builds. The sites will be identified in close coordination with City staff. The sites would be equipped with depth and velocity sensors for flow measurement recoding. Data processing can readily be expanded to included ongoing gaging installations in the lower Codornices Creek watershed for Berkeley, thus providing a comprehensive data set for the vast majority of the City drainage area.

Deliverable(s): Depth and flow data for three stations for two years

Task 3 – Watershed Management Plan

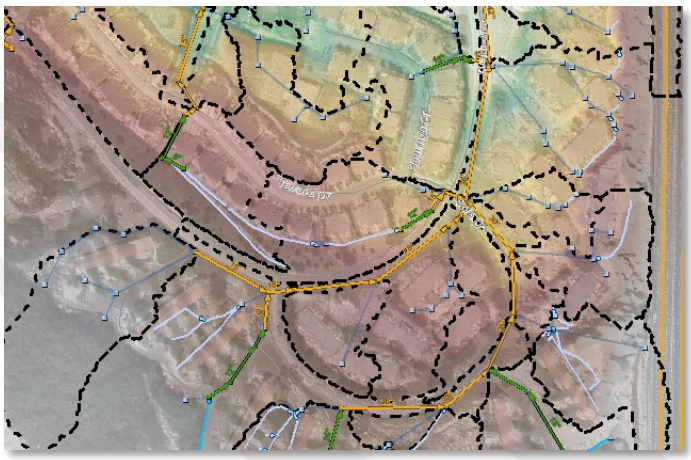
Task 3.1 System Assessment

Oversimplification of hydrology and hydraulics could cost the City 10-50% more on improvements than necessary. This is because most hydrologic methods are based on design rather than evaluation, resulting in peak flows that are too conservative. Wood Rodgers proposes developing a detailed and calibrated model to provide valuable insight into the existing capacity deficiencies, actual flood risks, and optimized solutions for improving the drainage facility capacity, leading to significant cost savings and improved outcomes for the city.

Task 3.1.1 – Catchments and Hydrologic Parameters

Catchment boundary accuracy is important for hydrologic modeling and runoff simulation for facility sizing. Wood Rodgers has developed an accurate catchment delineation tool that is being used by other public agencies like Marin County, Alameda County Flood Control District, and Santa Clara County Valley Water. The tool automates the delineation process, provides consistency, and minimizes human interpretation.

Wood Rodgers will use this customized tool to automate catchment delineation for **10 miles** of storm drain pipes. The pipe extent is determined based on the City's pipe sizes equal to or greater than 15 inches, which generally serve larger catchment areas. Pipe sizes smaller than 15 inches are generally oversized due to the City's minimum pipe size design standard of 12 inches.

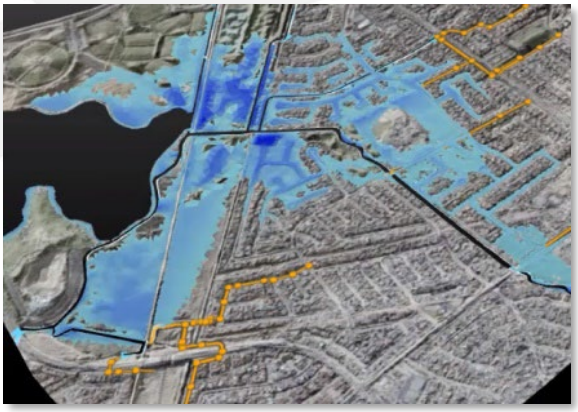


This catchment tool will include topographic resolutions, range from steep valleys and incised channels to detailed curb, gutter and street crown geometries, and also the connectivity of storm drains and channels. The tool will be used to embed storm drain and channel networks in a newly created LiDAR Digital Elevation Model (DEM), and then create sub catchments at the confluences of lateral storm drains and trunks, major trunk confluences, and upstream ends of storm drain systems.

The tool will use the latest land use and soil maps in conjunction with the catchment delineations to develop hydrologic parameters. Catchments will be developed and analyzed for existing and future general plan land use.

Deliverable(s): Catchment boundaries and hydrologic parameters for 10 miles of pipes in existing and future conditions | Updated geodatabase

Task 3.1.2 – Hydraulic 1D and 2D Models



Wood Rodgers proposes to develop a detailed and fully integrated one-dimensional (1D) model for **10 miles** of storm drain pipes equal to or greater than 15 inches, **2 miles** of open channels, and two-dimensional (2D) floodplain model. Upon the City of Berkeley's approval, we will use the model being developed for the Berkeley Storm Drain Master Plan as the basis for this project. The models will reflect the hydraulic interactions between storm drains and 2D floodplains, storm drains and open channels, and open channels and 2D floodplains. The model will have enough resolution to reflect most of the flood water performance within the drainage facilities in the City and understand and pinpoint the true capacity deficiency.

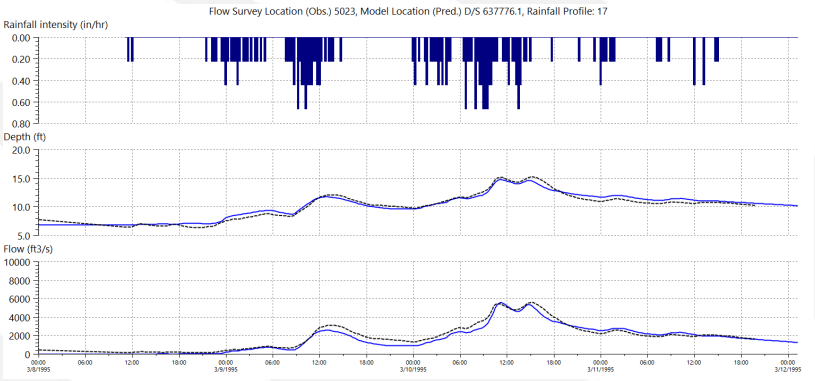
The City's drainage facilities to the east are subjected to high velocities because of the steep terrain. Wood Rodgers will model appropriate junction bend losses to reflect the hydraulic performance and deficiency of the steep storm drains which are often overlooked in simplified models. Entrance and exit losses are also crucial within the interaction of storm drains, culverts, and open channels, and will be modeled to accurately account for the hydraulic performance.

A detailed and accurate open channel model is crucial to understand the true capacity and deficiencies, and even the maintenance requirements. We will develop a detailed open channel model with the new LiDAR and construct detailed channel overbank elevation profiles to reflect accurate channel and 2D floodplain interaction during overbank flooding. The detailed open channel model can also be used to assess the frequency and extent of vegetation maintenance and the corresponding hydraulic impacts.

Wood Rodgers will develop 2D meshes to model floodplains up to a 100-year storm. A detailed flexible mesh will be developed and adjusted to capture the terrain resolution for street areas where conveyance and storage is important. The City's drainage facilities include both storm drains and street networks. The interaction between the two systems should be hydrodynamically modeled to properly assess the true combined drainage capacity. This complex calibrated (accurate), and flexible model will serve as a basis for the City for years to come.

Deliverable(s): Storm drain (up to 10 miles), open channel (up to 2 miles), and 2D floodplain hydraulic model

Task 3.1.3 – Model Calibration



A model cannot be used confidently, and proposed improvements can be grossly oversized without proper calibration. A properly calibrated hydrologic and hydraulic model will be consistent with and will match historical data, such as flow gage data, maintenance records, and anecdotal observations. The detailed models Wood Rodgers proposed in the tasks above will provide a platform to develop soundly calibrated hydrologic and hydraulic parameters that reflect the local conditions.

Hilly open space in the Bay Area typically contributes base-flow and interflow after storm events. Wood Rodgers has successfully identified and calibrated catchments with substantial base-flow and interflow using groundwater modeling features in software. With this previous experience, we will further calibrate the catchments for City's facilities to reflect the actual base-flow, interflow, and the total storm peak flow and to accurately reflect the actual performance of the flood system.

Wood Rodgers will collect and quality check rain gage, stream gage, and tide gage data for one wet season for model calibration. Wood Rodgers will select a wet season with the highest peak flow out of the two seasons. Wood Rodgers will refine the model's hydrologic and hydraulic parameters iteratively using the quality checked historical recorded data to ensure accurate model performance. The intent is to refine the model parameters so that the model's depth and flow results match the historical data before further analysis is conducted using hypothetical design storms as input.

Deliverable(s): Quality checked rain and stream gage data | Calibrated models for one wet season.

Task 3.1.4 – Design Storms and Tidal Boundary Conditions

Wood Rodgers has worked with Alameda County and is working with Marin County and the Cities of Berkeley and Oakland to develop appropriate design storms for minor as well as major drainage facilities sizing, taking into account the coincident tidal water boundary in San Francisco Bay as the tailwater conditions. Given the proximity of Albany to Berkeley and the hydrologic and hydraulic similarities between the two cities, Wood Rodgers proposes to apply this knowledge and approach to the project in Albany.

The design storm developed in the Berkeley Storm Drain Master Plan will be used (with Berkeley's approval) for this project. The storms will be coupled with tide water levels to model coincident storm events. Wood Rodgers will simulate accurate coincident design storm (2, 10, and 100-year) and tide boundary combinations in the hydraulic

model to assess the drainage system capacity and deficiencies. The model results will inform which combinations cause the most flooding within the drainage systems and the corresponding improvements. The high tide (100-year) boundary condition event will also be used to determine flood control improvements necessary for coastal flooding protection.

The tide water levels to be used as boundary conditions are based on a recently completed advanced 3D model (Delft3D) of the Bay calibrated to 70 years of tide records. The 3D model accounts for the mean sea level around Berkeley, astronomical tidal effects, and storm surge.

Deliverable(s): 2, 10, and 100-year Design Storms and Tidal Boundary Conditions Simulations

Task 3.1.5 – Capacity Deficiencies

The City's drainage system performance will be evaluated with the hydraulic results developed in **Task 3.1.4**. The drainage systems within the City will be evaluated with the appropriate design storm frequencies and the resultant floodplain extents, and then categorized into 2-, 10-, and 100-year deficiencies.

Deliverable(s): Deficiency map | Updated Geodatabase

Task 3.2 Project List and Budgeting

The following tasks are proposed to develop and prioritize improvement alternatives based on flood risk, cost-effectiveness, and social equity. Financial and grant funding analyses will then be conducted to formulate a reliable financing mechanism for implementing the improvement projects.

3.2.1 Risk for Capacity and Condition Deficiencies

Wood Rodgers will conduct a prioritization of storm drainage system improvements based on modeled capacity deficiencies and inspected condition deficiencies. The practice is to maximize the involvement of City staff in all critical decisions relating to developing the Capital Improvement Plan (CIP), including selecting appropriate design and performance criteria, evaluating alternatives, and prioritizing projects.

Where numerous projects are required to address maintenance, system capacity, and condition deficiencies, we have implemented more formal risk models that quantify the likelihood of capacity exceedance/failure and the associated consequences. Projects intended to address the highest risks in the storm drainage system will be given the highest priority in the CIP. The drainage facility flood risk for each of the deficient systems is calculated using the following formula:

Flood Risk = Likelihood x Consequence

The calculated flood risks provide standard and quantifiable values to assist the City with prioritizing improvement projects for both condition and capacity deficient drainage systems. Wood Rodgers will use this risk model to calculate flood risks for the major deficient drainage systems in the City.

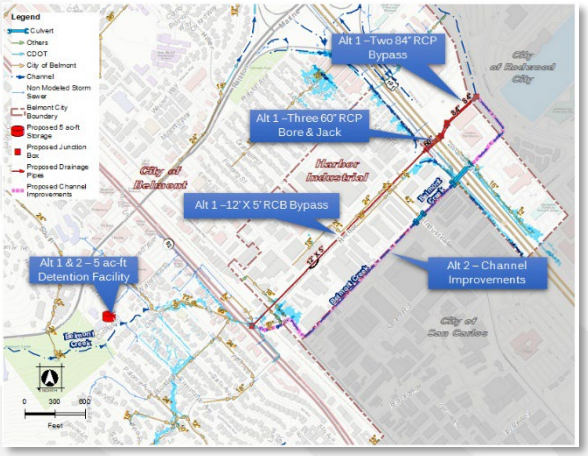
Deliverable(s): Project flood risk for 3 major systems

3.2.2 Improvement Alternatives and Costs

Wood Rodgers will develop improvement alternatives and cost estimates to address capacity and condition deficiencies. Once the risk of the deficiencies is determined, Wood Rodgers will develop up to **two** conceptual capacity alternatives for **three** major systems of deficiencies (as appropriate). Alternatives will vary per drainage system and may include new or upsized storm drainage pipes, diversions, detention, floodwalls, pump station improvements, and any combinations of the facilities. Multi-benefit improvement opportunities such as regional green infrastructure,

recreation, and culvert daylighting, and innovative flood control approaches such as tree canopy runoff reduction will be emphasized when developing improvement alternatives to increase capacity, improve water quality, and incorporate social benefits and climate change resiliency.

Improvement alternatives will be evaluated for both existing and future land use conditions. The improvement alternatives will be developed based on a watershed-wide approach rather than an individual site approach. This is necessary because a comprehensive CIP must demonstrate that alleviating deficiencies in one location will not exacerbate problems elsewhere in the system.



Conceptual design figures will be developed for each selected alternative to quantify the capital, permitting, administration, and construction management costs more accurately. Additionally, research will be conducted on right-of-way and easements (provided by the City), and utility conflicts.

Based on this information, a preferred improvement alternative will be recommended for each major system of deficiencies, taking into consideration the potential benefits, preliminary costs, constraints, and input from the City.

Deliverable(s): Conceptual design figures and costs, right-of-way and easements, utility conflicts, and environmental impacts for up to 3 projects

3.2.4 Improvement Prioritization

Wood Rodgers, in collaboration with the City and community stakeholders, will develop a capital improvement plan (CIP) to determine locations, schedules, and resources (land, labor, capital) for improvement projects. The improvement projects developed in **Task 3.2.2** will be prioritized using the flood risks developed in **Task 3.2.1**, life-cycle cost analysis, social equity benefits, environmental benefits, constructability, and funding availability.

Recommended Improvements	Annualized Flood Risk ($)	Annualized Project Life Cycle Cost ($)	Annualized Risk/ Annualized Project Life Cycle Cost	Prioritization Ranking
Middlefield Road	5.02 M	0.72 M	7.0	1
El Camino Real / Alto Lane	2.63 M	0.49 M	5.4	2
Arbor Road	1.01 M	0.35 M	2.9	3
Chrysler Drive	0.31 M	0.11 M	2.8	4
O'Brien Drive	0.09 M	0.06 M	1.5	5

A life-cycle cost analysis will be developed to calculate the total cost of improvements over their expected service life spans. It includes the costs of planning, constructing (capital), operating, and maintaining the facilities.

Wood Rodgers' consideration of **equity** as part of project prioritization would leverage a program that was developed for the diverse communities in the City of Oakland. The equity framework consists of six themes that cover broad areas of people's lives, including: 1) economy; 2) education; 3) public health; 4) housing; 5) public safety; and 6) neighborhood and civic life.

The right-of-way and easements, utility conflicts, and environmental impact investigations developed for the improvements will also be considered for prioritization.

Each of the components used in the prioritization process will be assigned with a weighting factor based on the City's and community stakeholder input. The improvement projects with higher combined scores will be recommended over those with lower scores for CIP implementation. The project priority rankings and project costs will be used collectively to categorize improvement projects into 5-year (urgent), 10-year, and 30-year (low priority) planning-level capital improvement projects based on the City's existing or planned financial resources.

Deliverable(s): Prioritized 3 capital improvement projects | CIP implementation schedule

Task 3.2.5 – Financial Analysis

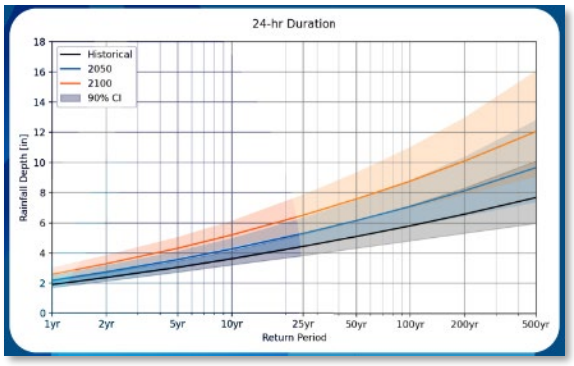
Our team member, SCI, will begin with an analysis of the City's current funding mechanisms and municipal code; as well as associated current and future revenue needs identified in previous tasks.

Next, a variety of potential funding mechanisms will be evaluated, for capital improvement projects developed within the Watershed Management Plan including special taxes (e.g., parcel taxes, user taxes, transient occupancy taxes, sales taxes), Proposition 218 balloted property-related-fees, non-balloted property-related fees, benefit assessments, regulatory fees, new development fees, service fees, and other non-balloted fees and revenues such as state and federal funding sources.

Each potential source will be studied and evaluated along with important attributes such as potential revenue generation, political viability, legal rigor, sustainability, legislative factors, costs of implementation and administration, future reliability, timeline, and compatibility with other funding mechanisms. This task will provide the City with all options, including balloted (fees, assessments, or special taxes) and several non-balloted options. Likely a portfolio approach to funding will be recommended. Impacts to both City and private property owners, debt proceeds and service payments, and recommended reserves will be evaluated.

Deliverable(s): PowerPoint Presentation | Financial Analysis Plan

Task 3.3 Climate Resiliency



The success and longevity of capital projects requires resilience and adaptation to extreme events that are becoming more frequent and intense in a changing climate. A first step in informing adaptation is an assessment of the storm drain system's ability to respond to these extreme events when they occur. Wood Rogers will assess the storm drain's performance with adjusted hydraulic and hydrologic boundary conditions to account for:

- Increased precipitation intensity for storm events
- Sea level rise and storm surge

- Potential reduction in storm sewer capacity due to increased infiltration from rising groundwater in response to sea level rise

Pathways will serve in an advisory role for the climate resiliency assessment and provide input on the use of best available science and future climate projections. For example, Pathways and LBNL's completed Extreme Precipitation Study provides locally relevant future precipitation information based on climate scenarios adopted by the IPCC for the 6th Assessment Report, including a high global emissions scenario (SSP5-8.5) and a more moderate emissions scenario (SSP2-4.5). This study can help the City understand how intense short-duration and intense long-duration storms may change as the climate continues to warm.

To address coastal hazards that can coincide with extreme precipitation events, Pathways can advise on appropriate tidal boundary conditions to use for hydraulic modeling and more qualitative assessments that consider both sea level rise and storm surge. The coastal boundary conditions will rely on the data sources highlighted in the Flood Risk and Sea Level Rise Adaptation Report, and the State of California *Sea Level Rise Guidance 2024 Science and Policy Update*, currently in draft and expected to be finalized by the Ocean Protection Council in June 2024. Pathways also completed existing and future condition mapping of the existing and future groundwater table in response to rising sea level rise, with coverage of the City Albany [1]. This information can be incorporated in the hydrologic and hydraulic modeling.

Wood Rogers will use the future condition precipitation, coastal, and groundwater information to evaluate system sensitivity to a plausible range of events to identify the key thresholds for increased localized and system-wide flood risk in both the near-term and long-term. In the near-term, increasing extreme precipitation may be the primary driver of localized flooding, with more widespread flooding occurring when extreme precipitation is coupled with elevated coastal water levels. However, as sea levels and the groundwater table rise, system-wide impacts could occur during moderate precipitation events. Understanding the conditions and thresholds that may trigger localized and/or system-wide flooding will assist the City in identifying near-term capital improvement projects and future adaptation strategies that can minimize the impacts of climate change. Climate resilience performance criteria will be developed to help quantify the resilience of the current storm drain system to climate change.

Wood Rodgers would model the existing drainage facilities in the climate change scenarios and quantify the capacity or level of service reduction. We will also model the proposed improvements identified in **Task 3.2** in the climate change scenarios and propose additional improvements necessary to address the deficiencies found in the climate change modeling conditions. The design criteria for additional improvements would consider factors such as project lifespan, asset criticality, project adaptability, environmental constraints, costs, and the City's risk tolerance.

Deliverable(s): Sea Level Rise & Precipitation Intensity Adjustments | Two Climate Change Modeling scenarios | Existing facilities capacity reduction | Additional improvements in climate change scenario

Task 3.4 Report

Documentation provided to the City will include a summary report and appendices documenting the storm drain inventory and condition assessment, design standards, hydrologic and hydraulic model development, capital maintenance and improvement plan, and financial analysis and grant funding. The appendices will include all the previously developed technical memoranda, documenting criteria, data sources, regulatory requirements, verification, database, condition assessment, hydrologic analysis, hydraulic analysis, calibration, reconciliation, and all

[1] https://www.sfei.org/projects/shallow-groundwater-response-sea-level-rise

necessary maps. Wood Rodgers will use a user-friendly and graphical presentation approach to convey complex information throughout the documents.

Wood Rodgers develops Master Plan Reports concurrently with the development of the study and provides draft copies throughout, in order to provide the client with the ability to provide input as it is developed.

Deliverable(s): Draft and Final Master Plan Report

The estimated fees are based on negotiated rates to be utilized for the scope of work identified above. The estimate fees and rates are confidential, and client will not disclose. Wood Rodgers proposes to perform the above-identified scope of work on a T&M basis for a total estimated fee of **$441,708 T&M**.

Attached is **Exhibit A,** the Wood Rodgers standard hourly rate schedule for time and material work, and **Exhibit B**, the Cost Estimate for the Albany Watershed Management Plan Phase 1.

Sincerely,

Dan Matthies
Vice President, Wood Rodgers, Inc.

EXHIBIT A

WOOD RODGERS

OAKLAND FEE SCHEDULE

CLASSIFICATION	STANDARD RATE
Principal Engineer/Geologist/Surveyor/Planner/GIS/LA* II	$345
Principal Engineer/Geologist/Surveyor/Planner/GIS/LA* I	$305
Senior Engineer/Geologist/Surveyor/Planner/GIS/LA* II	$285
Senior Engineer/Geologist/Surveyor/Planner/GIS/LA* I	$275
Project Engineer/Geologist/Surveyor/Planner/GIS/LA* II	$255
Project Engineer/Geologist/Surveyor/Planner/GIS/LA* I	$240
Engineer/Geologist/Surveyor/Planner/GIS/LA* II	$230
Engineer/Geologist/Surveyor/Planner/GIS/LA* I	$220
Assistant Engineer/Geologist/Surveyor/Planner/GIS/LA*	$190
Designer	$105
Senior CAD Technician/Graphics Designer II	$210
Senior CAD Technician/Graphics Designer I	$195
CAD Technician/Graphics Designer	$175
Project Coordinator	$185
Administrative Assistant	$165
Construction Manager	$345
1 Person Survey Crew	$250
2 Person Survey Crew	$360
3 Person Survey Crew	$460
Consultants, Outside Services, Materials & Direct Charges	Cost Plus 10%
Overtime Work, Expert Witness Testimony and Preparation	Rate Plus 50%

*LA = Landscape Architect

Blueprints, reproductions, and outside graphic services will be charged at vendor invoice. Auto mileage will be charged at the IRS standard rate, currently 67 cents per mile.

Fee Schedule subject to an escalation rate of 3.5% at the beginning of every calendar year starting January 1, 2025.

City of Albany Watershed Management Plan

OCTOBER 7, 2024

David Lam, PE, City of Albany – Project Manager
Cheng Soo, PE, Wood Rodgers – Project Manager
Camila Correa, PE, Wood Rodgers – Deputy Project Manager

WOOD RODGERS

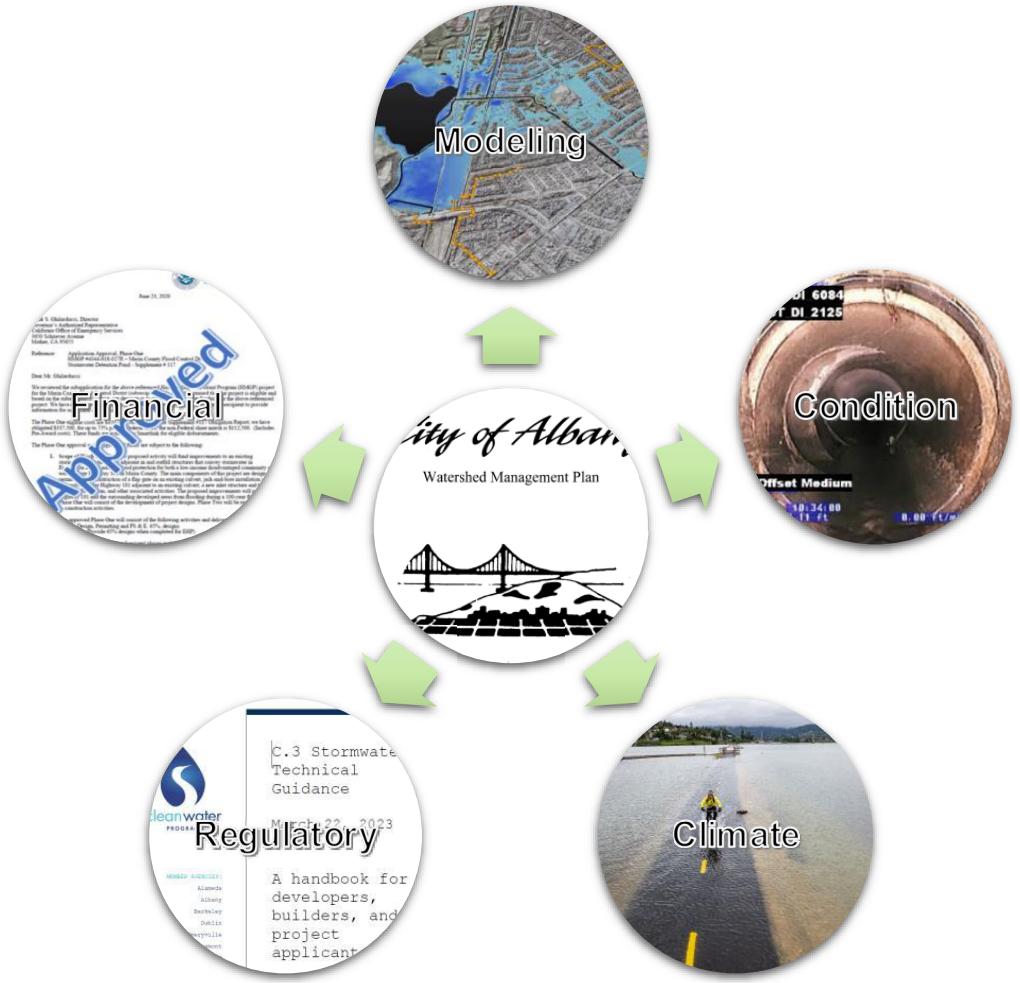
AGENDA

- **Introductions**
- Data Collection
- Condition Assessment
- Capacity Assessment
- Condition + Capacity Improvements
- Financial Analysis
- Public Outreach
- Final Report
- Schedule

Purposes of Watershed Management Plan

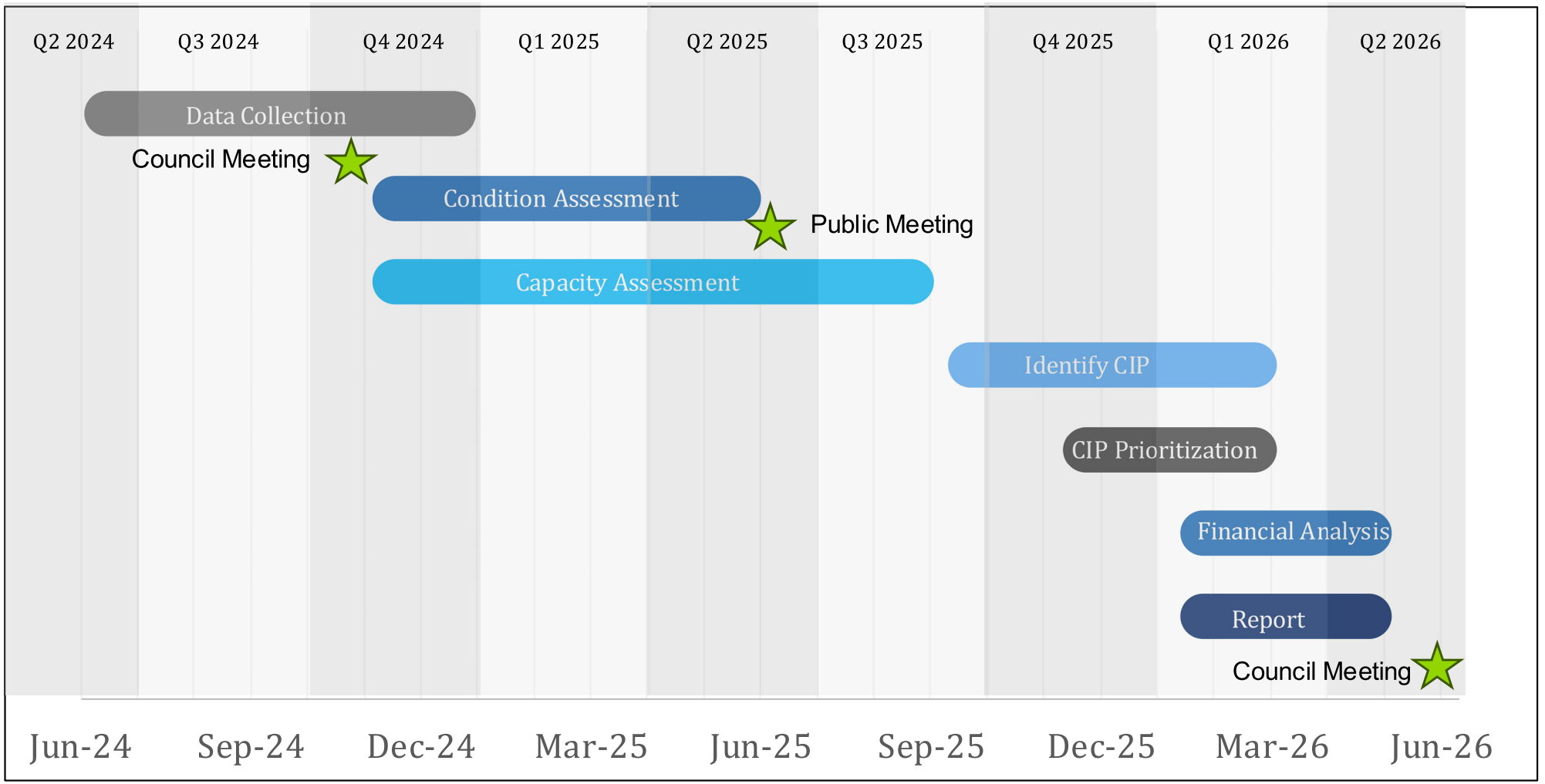
1. Update the inventory of storm drain system assets
2. Assess assets' conditions and functionality
3. Update maintenance and inspection plans to restore asset conditions and functionality
4. Develop and prioritize improvement projects to mitigate flooding
5. Identify opportunities for watershed restoration, waterway quality improvements, runoff reduction, and green infrastructure implementation
6. Identify funding needs and grant opportunities

Comprehensive Watershed Management Plan



- Comprehensive hydraulic modeling of all City watersheds
- Coordination with City of Berkeley (WR) and City of El Cerrito studies (S&W).
- Condition assessment of stormwater assets
- Climate change adaptation analysis
- Strategies for meeting updated regulatory requirements
- Detailed financial analysis

Schedule & Public Meetings



AGENDA

- Introductions
- **Data Collection**
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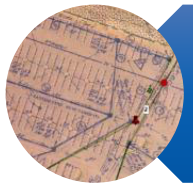
Data Collection | GIS Database

Storm Drainage Facilities



Georeferenced Plans

Condition Assessment

Historical Information

Data Collection | Plan

Attributes

Spatial Locations

Alignments

Data Collection | CCTV

Project: CLEVELAND AVE

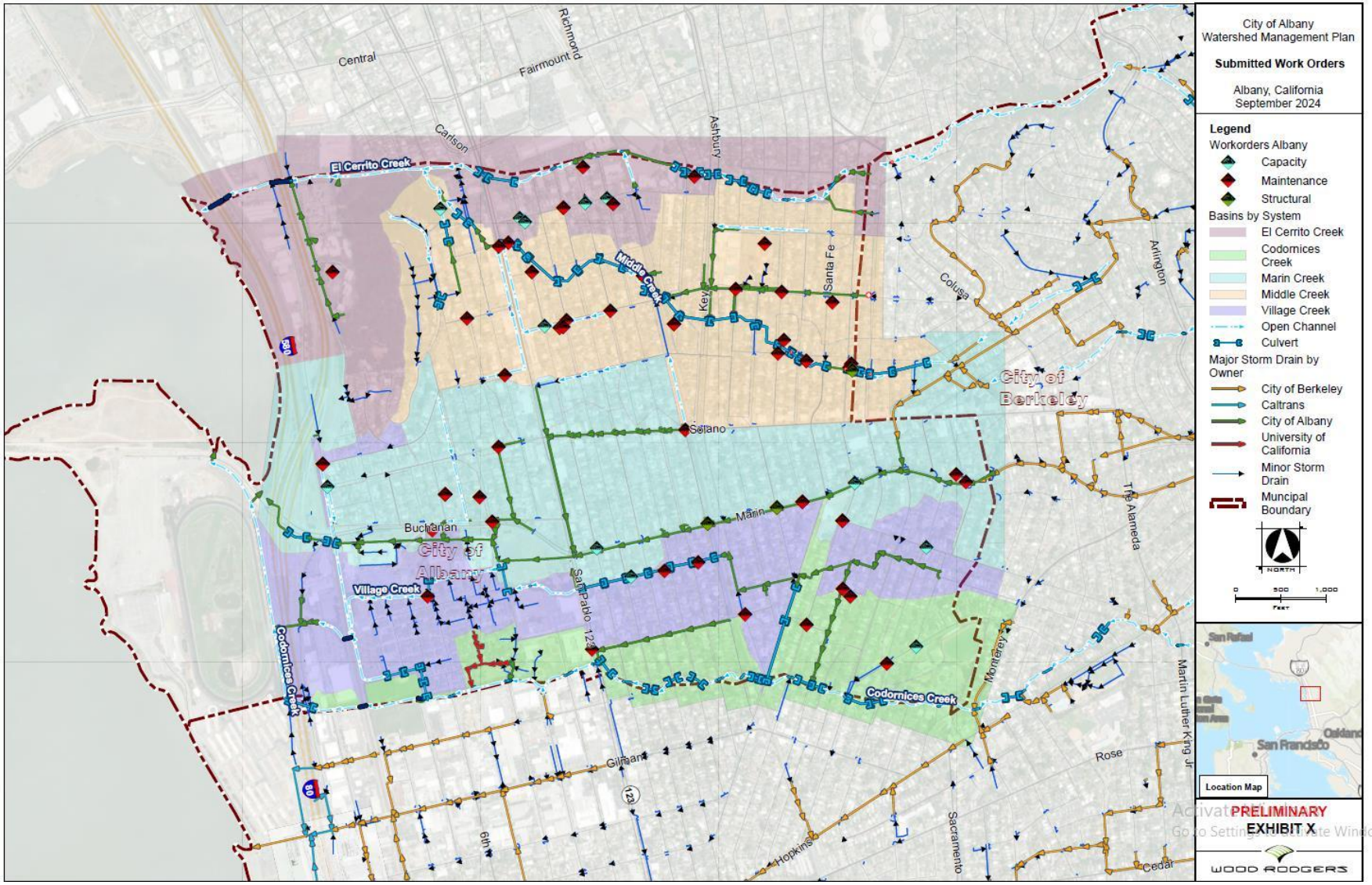
Date: 7/6/2015 10:52:00 AM
Street: CLEVELAND AVE
Length Surveyed: 213
Pacp Quick Overall Rating: 514G
Height (Diameter): 18
Street: CLEVELAND AVE

Pipe Segment Reference: CER03-001_CER0[illegible] 004
Upstream MH: CER03-001
Downstream MH: CER03-004
Direction of Survey: Downstream
Material: Reinforced Concrete Pipe

Distance	Fault Observation	Time	Picture
0.0	Manhole Remarks: CER03-001	25	
0.0	Water Level Percent: 5	35	
0.0	Obstacle Rocks Position: 5 To 7 Cont Defect: S01 Percent: 30 Maint Weight: 4	01:13	
138.5	Broken Soil Visible Position: 2 To 5 Joint Remarks: REBAR VISIBLE Struct Weight: 5	06:21	
191.2	Obstacle Rocks Position: 5 To 7 Cont Defect: S01 Percent: 30 Maint Weight: 4	08:08	

CCTV

Data Collection | Service Request/ Work Order



Data Collection | Service Request/ Work Order

- Workorders Albany (1)
  - Storm Drain Maintenance
- Muncipal Boundary (1)
  - Albany
- World Imagery (19)
  - World Imagery
  - World Imagery
  - World Imagery
  - World Imagery

Workorders Albany - Storm Drain Maintenance

Problem_Notes	Storm drain didn't drain properly. Flooded area creating a lake. SE storm drain
ObjectID	183
X	-122.288017
Y	37.894751
WorkorderID	17073
Problem_Description	Storm Drain Maintenance
Address_Number	1450 Portland Ave
Drainage_Related	Maintenance
City	Albany
State	CA
County	Alameda County
Location_Notes	<Null>
Country	United States
Year	2021
Date_ Expected	12/14/2021
Production_Code_Desc	<Null>
Intersection	FALSE
Priority	<Null>
Production_Code	<Null>
Facility	Albany Public Works
Contact	<Null>

AGENDA

- Introductions
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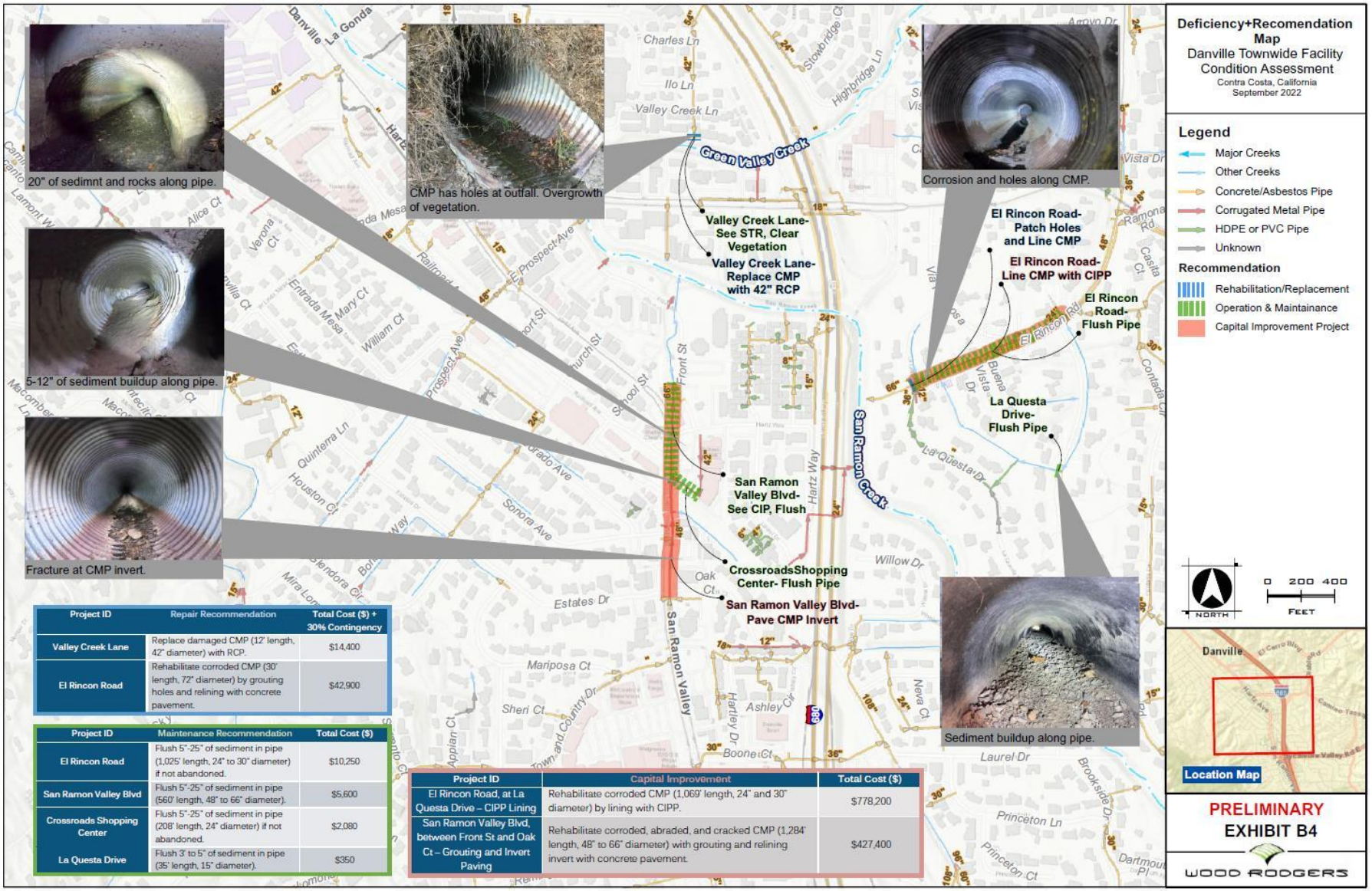
Condition Assessment | Maint./Rehab./Replace



Project ID	Repair Recommendation	Total Cost ($) + 30% Contingency
Valley Creek Lane	Replace damaged CMP (12' length, 42" diameter) with RCP.	$14,400
El Rincon Road	Rehabilitate corroded CMP (30' length, 72" diameter) by grouting holes and relining with concrete pavement.	$42,900

Project ID	Maintenance Recommendation	Total Cost ($)
El Rincon Road	Flush 5"-25" of sediment in pipe (1,025' length, 24" to 30" diameter) if not abandoned.	$10,250
San Ramon Valley Blvd	Flush 5"-25" of sediment in pipe (560' length, 48" to 66" diameter).	$5,600
Crossroads Shopping Center	Flush 5"-25" of sediment in pipe (208' length, 24" diameter) if not abandoned.	$2,080
La Questa Drive	Flush 3' to 5" of sediment in pipe (35' length, 15" diameter).	$350

Project ID	Capital Improvement	Total Cost ($)
El Rincon Road, at La Questa Drive – CIPP Lining	Rehabilitate corroded CMP (1,069' length, 24" and 30" diameter) by lining with CIPP.	$778,200
San Ramon Valley Blvd, between Front St and Oak Ct – Grouting and Invert Paving	Rehabilitate corroded, abraded, and cracked CMP (1,284' length, 48" to 66" diameter) with grouting and relining invert with concrete pavement.	$427,400

AGENDA

- Introductions
- Data Collection
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- **Capacity Assessment**
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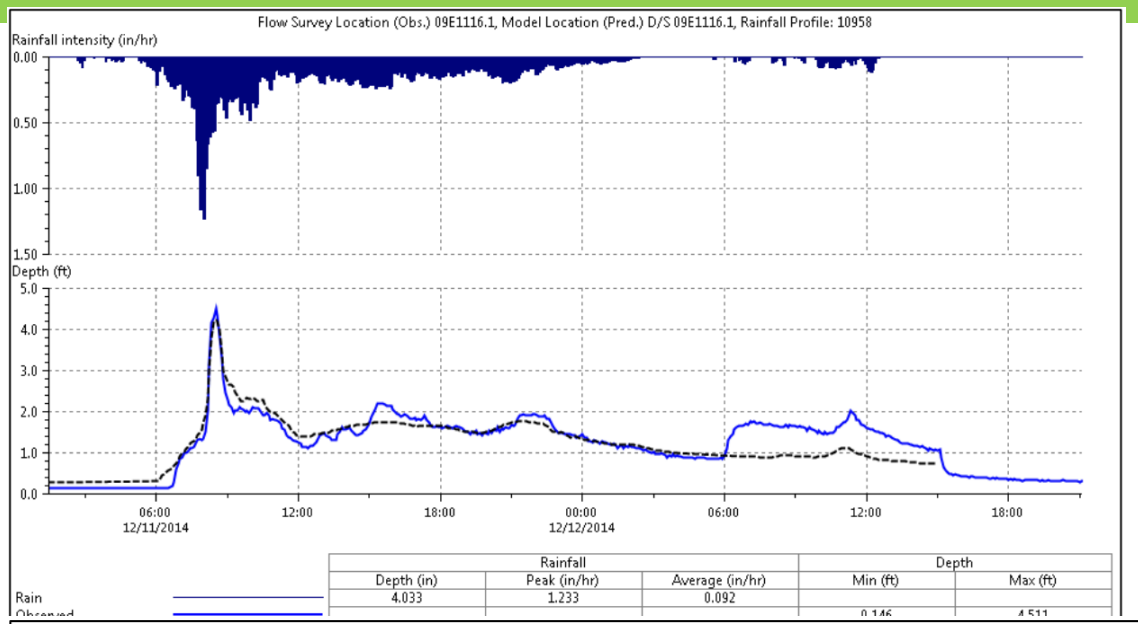
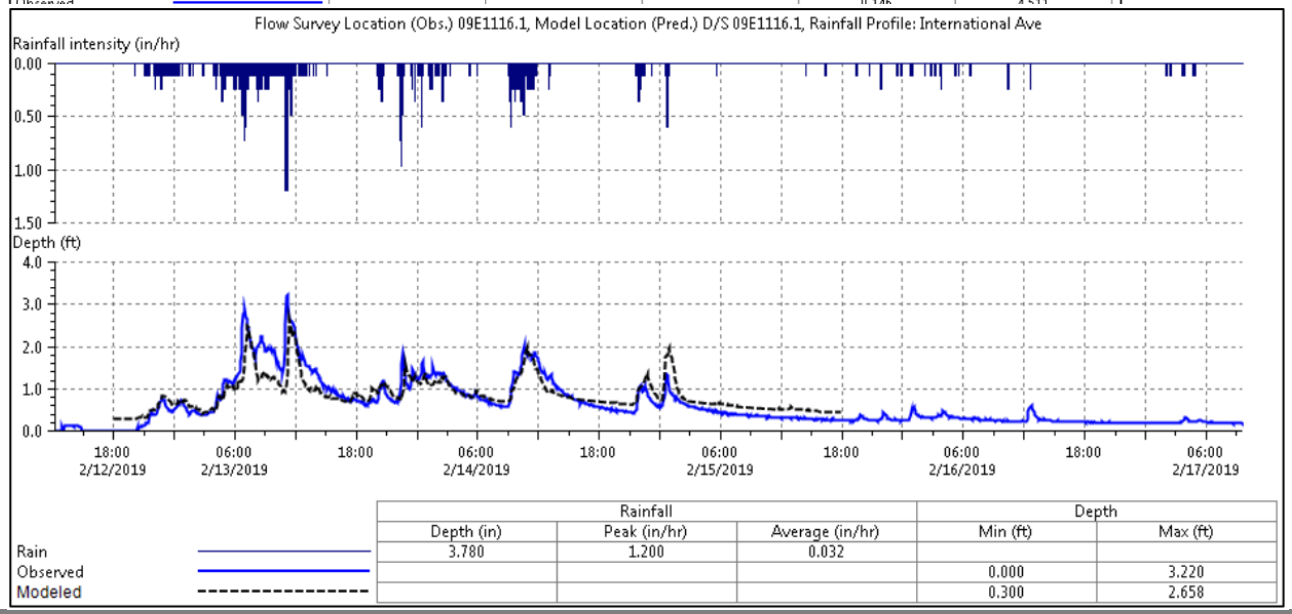
Capacity Assessment | Hydrologic + Hydraulic Modeling

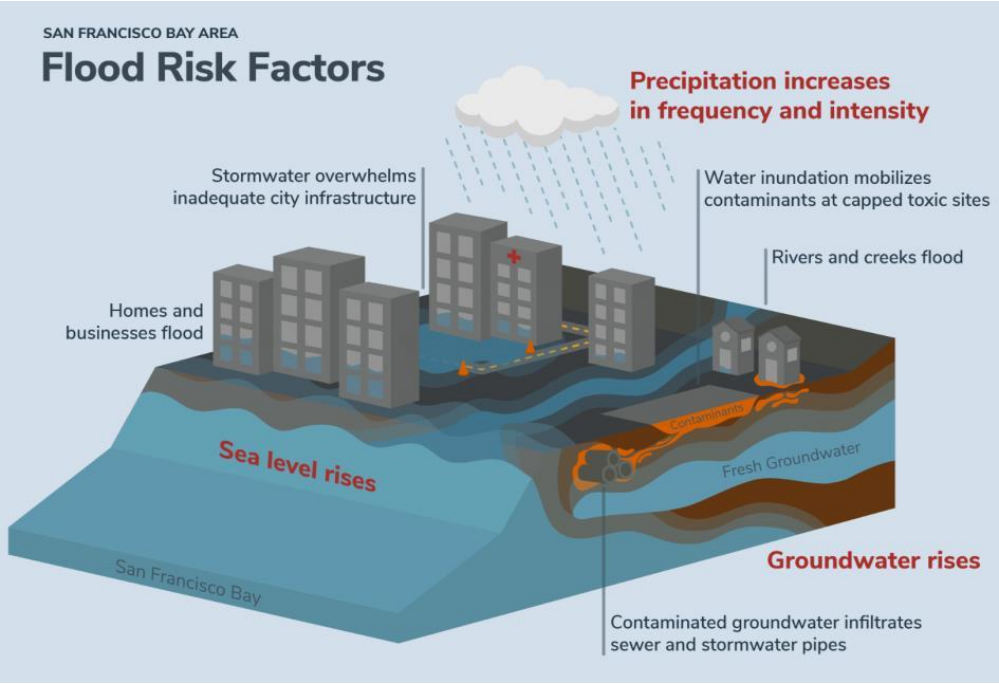
Capacity Assessment | Model Calibration

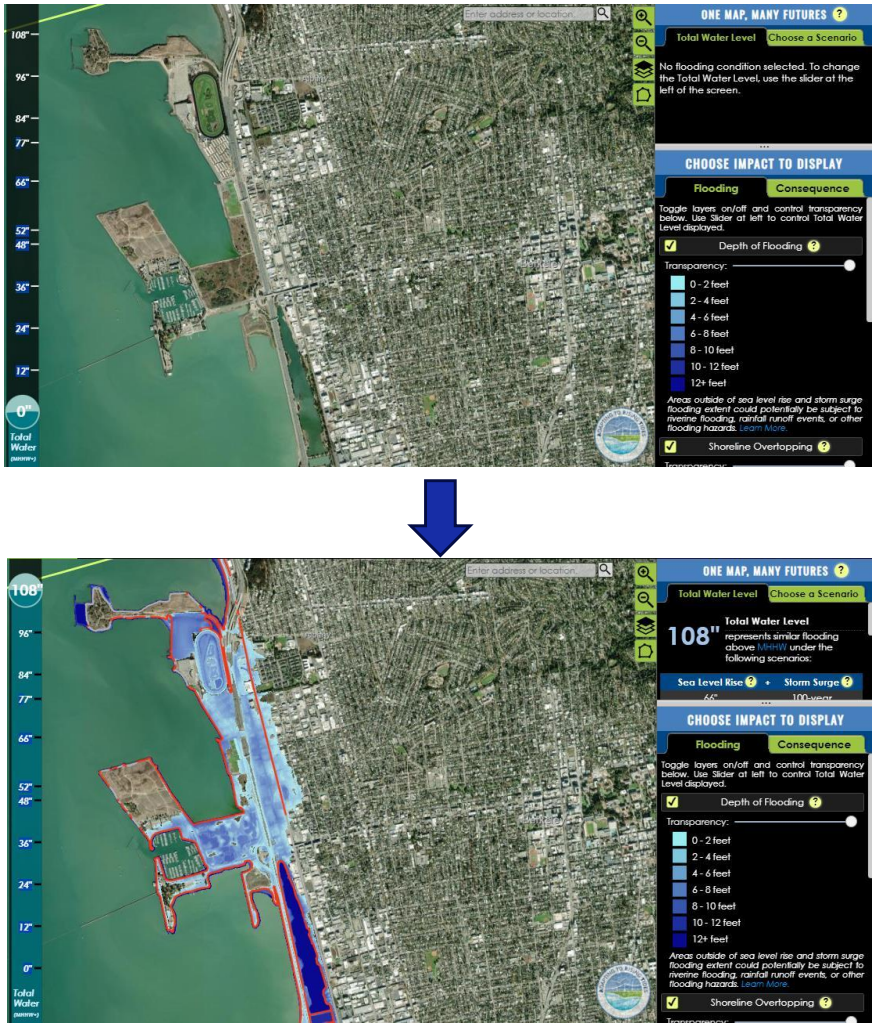




Capacity Assessment | Pipe + Green Infrastructure

Capacity Assessment | Climate Change





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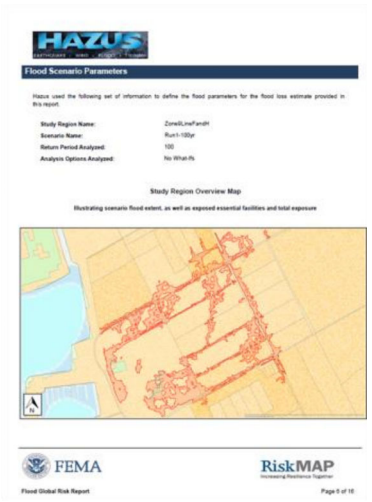
Improvements | Risk-Based Prioritization



Deficient System	Likelihood (%)	Design Storm (year)	Consequence* ($)	Annualized Risk[17] ($/year)
Mid… R…				
El C… Rea… L…				
Arbo…				

Recommended Improvements	Annualized Flood Risk ($)	Annualized Project Life Cycle Cost ($)	Annualized Risk/ Annualized Project Life Cycle Cost	Prioritization Ranking
Middlefield Road	5.02 M	0.72 M	7.0	1
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Improvements | Other Prioritization

AGENDA

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Financial Analysis | Cost vs. Revenue

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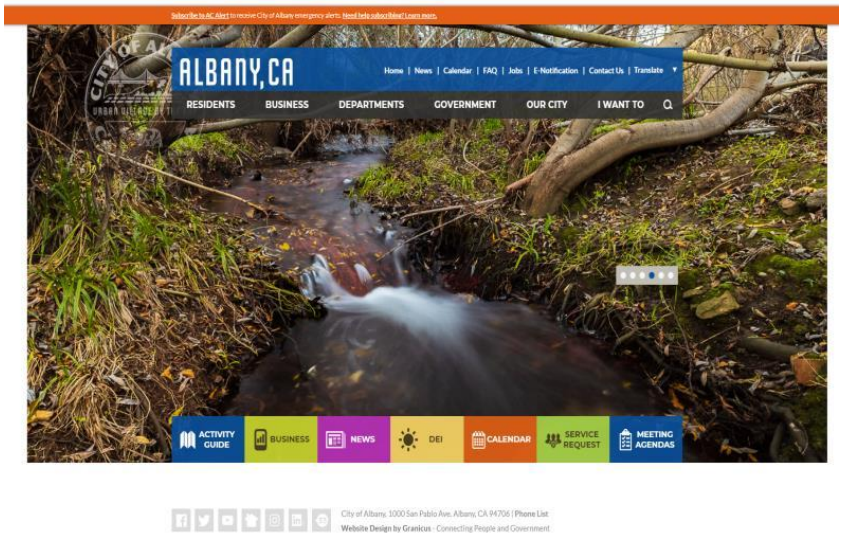
- Final Report

Public Outreach | Approach

Website

Flyers

Community & Council Meetings



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Final Report

Drainage System	Rainfall (in/year)	Drainage Area (ac)	Design Storm (year)	Total Catchment Runoff (cfs)	Outfall Peak Flow (cfs)	Floodplain (ac)	Annualized Flood Risk ($/year)
Bernhardt Drive	20	74	2	30	22	0.5	197,000
			25	74	35	4.4	
			100	96	38	7.8	

Deficient System	Proposed Improvements	Capital Costs ($)	Total Project Capital Cost ($)	Project Life Cycle Costs ($)	Annualized Project Life Cycle Cost ($)
Bernhardt Drive - Alternative 1	1,680 LF of 6'x4' RCB	4,510,000	4,702,000	4,872,000	206,000
	370 LF x 25 LF UPRR easement	92,000			
	Outfall structure	100,000			

Contact Info

David Lam, PE

DLam@albanyca.org

Additional Resources:

https://www.albanyca.org/departments/public-works/operations-maintenance/storm-drains/watershed-management-plan