

MARIN COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

East and West Creeks Restoration Project

Request for Qualifications and Proposal

For

Engineering and Environmental Services

February 28, 2025



Mandatory Pre-Proposal Site Visit On

MARCH 11, 2025 at 10 a.m.

Electronic Proposals Due On

March 25, 2025 by 4 p.m.

Submit Electronic
Proposals to Judd Goodman
Judd.Goodman@marincounty.gov

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1. INTRODUCTION

The Marin County Flood Control and Water Conservation District (District) is seeking qualifications and proposals from qualified Consultants and/or Consultant teams to provide land surveying, right of way mapping, environmental document, regulatory permitting support, design, and sediment characterization services for the East and West Creeks Restoration Project located in Tiburon, California.

A vicinity and location map for the project site is shown in **Figure 1**.

The District is requesting a (1) Letter of Interest, (2) Statement of Qualifications (SOQ), (3) Project Approach, (4) Scope of Work, and (5) Sealed Cost Proposal, from experienced and well qualified consultants to perform environmental and engineering services for the East and West Creeks Restoration Project. The District intends to enter into a Professional Service Agreement (PSA) with the top qualified firm to provide services for the project as described in the scope of services. It is understood that the breadth of services required to complete the project runs the spectrum of civil engineering, environmental, and landscape architecture disciplines. The consultant will be required to obtain all environmental permitting for the project. The District will evaluate each firm's submittal in response to this request and determine the most qualified firm to complete the project.

Proposals submitted in response to this RFQ/P will be used as a basis for selecting the Consultant for this project. The Consultant's SOQ will be evaluated and ranked according to the criteria provided in **Section 5** "Evaluation Criteria," of this RFQ/P.

Addenda to this RFQ/P, if issued, will be posted on the COUNTY OF MARIN website at: <https://www.marincounty.org/depts/pw/bids-and-proposals>. It shall be the Consultant's responsibility to check the COUNTY OF MARIN website to obtain any addenda that may be issued.

Proposals shall be submitted electronically in PDF format with the firm's name included in the file name; file size shall be limited to 20 GB. The Consultant's attention is directed to **Section 4** "SOQ and Proposal Requirements." The complete package shall be emailed to the email address below prior to **4:00 P.M., March 25, 2025**. The email heading shall read **"SOQ and Proposal for East and West Creeks Restoration Project."**

Judd.Goodman@marincounty.gov

Proposals received after **4:00 P.M., March 25, 2025** will be considered nonresponsive. An acknowledgement email will be sent to you when your proposal has been received. If you do not receive an email indicating "Received" by March 27, 2025, then it is your responsibility to follow-up with the project director, Judd Goodman, to confirm receipt. If you do not obtain a "Received" email and also do not follow-up, staff is not required to consider your submission.

Any proposals received prior to the time and date specified above may be withdrawn or modified by written request of the Consultant. To be reconsidered, the modified proposal must be received prior to 4:00 P.M., March 25, 2025.

Unsigned SOQs and proposals or those signed by an individual not authorized to bind the prospective Consultant will be considered nonresponsive and rejected.

This RFQ/P does not commit the DISTRICT to award a contract, to pay any costs incurred in the preparation of a proposal for this request, or to procure or contract for services. The DISTRICT reserves the right to accept or reject any or all proposals received as a result of this request, to negotiate with any qualified Consultant, or to modify or cancel in part or in its entirety the RFQ/P if it is in the best interests of the DISTRICT to do so.

The prospective Consultant is advised that should this RFQ/P result in recommendation for award of a contract, the contract will not be in force until it is approved and fully executed by the DISTRICT.

All products used or developed in the execution of any contract resulting from this RFQ/P will remain in the public domain at the completion of the contract.

The anticipated consultant selection schedule is as follows:

Timeline of Events
Release of RFP February 24, 2025
Mandatory pre-proposal site visit Tuesday March 11, 2025 at 10 AM Pacific Time
Deadline to submit Questions. March 14, 2025 – No Later than 4 PM Pacific Time
Responses to Questions March 20, 2025
Proposal Submission Deadline Tuesday, March 25, 2025 – No Later than 4 PM Pacific Time
Evaluations and Identification of Selected Consultant Thursday, April 10, 2025 (Tentative)
Tentative Board Award Date June 2025
Tentative Contract Start Date July 2025

Any questions related to this RFQ/P shall be submitted in writing to the attention of Judd Goodman via email at Judd.Goodman@marincounty.gov.

No oral questions or inquiries about this RFQ/P shall be accepted.

Pre-Proposal Site Visit

The meetup location for the mandatory pre-proposal site visit will be at the intersection of East Creek and Cecilia Way (near 300 Cecilia Way, Tiburon, California). Attendees are expected to provide their own vehicular transportation. The purpose of the site visit is to acquaint prospective bidders with the existing conditions of the site, the layout and access, and the surrounding area. The site visit should last around 1 hour. **Only bids from bidders who attend the site visit will be accepted.**

2. BACKGROUND

Portions of East and West Creeks are prone to flooding in Tiburon's Bel Aire neighborhood during severe storms. The District hired Geomorph Design Group to prepare the "Preliminary Flood Risk Reduction Alternatives" for East and West Creeks dated July 18, 2023 (Study); which is the basis for the project design. The selected Alternatives are the Medium Plan 3-2 for West Creek and the Medium Plan for East Creek. The Study is provided in **Attachment 1**.

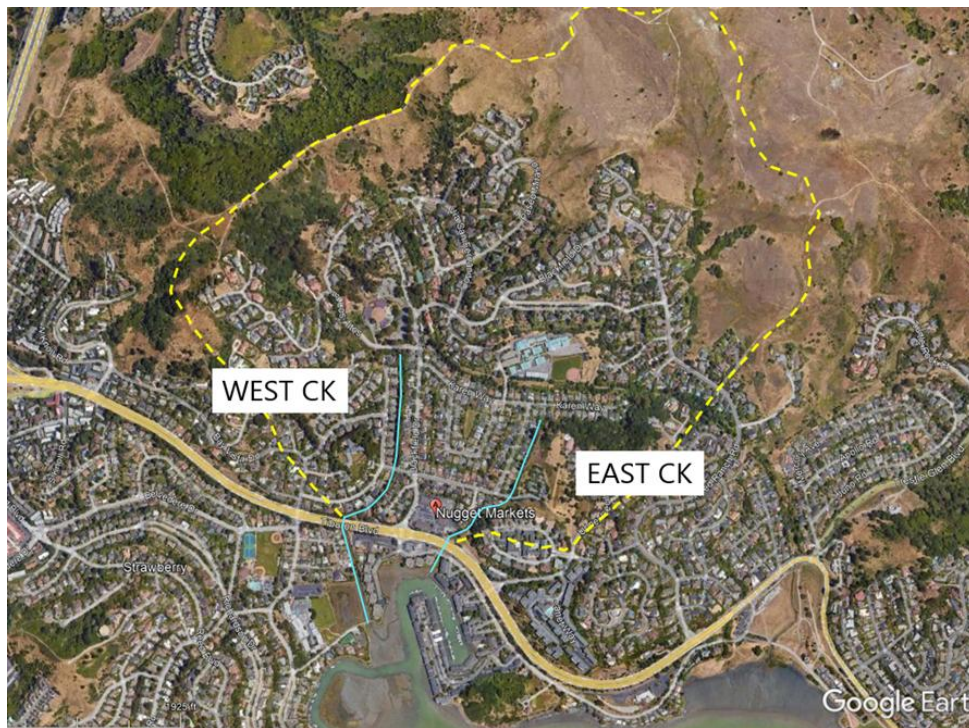


Figure 1. East and West Creek Restoration Project Area

East Creek Improvements

Excavate the 1,320-foot-long channel reach to restore adequate width and depth, sloped at 0.3% minimum slope from the Karen Way culvert outfalls, through the Cecilia Way box culvert, to the grouted concrete channel invert at the Richardson Bay Sanitary District (RBSD) Sanitary Sewer crossing.

Optional work:

- Reconstruct the top of bank flood barrier at 100, 106, and 112 Leland Way. (200 LF)
- Establish an in-channel sediment basin immediately downstream from the Karen Way culvert outfalls
- Consider effects of Sea Level Rise needs.

West Creek Improvements

Remove approximately 100 CY of rock and concrete rubble accumulated in places along the length of the channel bed for 300-feet along Lower West Creek and 650-feet along Upper West Creek. Excavate along these reaches for minor bank shaping and biotechnical erosion protection.

Remove 4 trees (#1 through #4) and stabilize and improve the affected creek bank with vegetated rock slope protection (1.25H:1V).

Remove the existing channel-spanning concrete storm drain outfall and restore adequate width-and-depth channel upstream and downstream from the replaced outfall with minimized rock lining and biotechnical bank erosion protection measures.

Optional work:

- Construct 152 LF top of bank flood barrier at 125 and 131 Blackfield Drive (Station 9+11 to 10+63).

Environmental

The following species may be affected by the project: longfin smelt, green sturgeon, Pt Reyes salty bird's-beak, and bats. Biological investigations should evaluate the potential presence of these species and other species of concern.

Locations of excavations within the project area may require archeological investigations to evaluate if native American remains are present. It is anticipated that coordination with local tribal representatives will be required.

The anticipated CEQA Environmental Document for this project is a Mitigated Negative Declaration.

3. SCOPE OF WORK

The DISTRICT is interested in contracting for engineering, California Environmental Quality Act (CEQA) compliance, and environmental permitting services for the East and West Creeks Restoration Project. The Consultant shall comply with all insurance requirements of the DISTRICT, included in the Sample Professional Services Contract in **Attachment 3**.

Services to be Provided:

This Scope of Services is to design and permit the East and West Creeks Restoration Project. The Consultant selected shall provide all services to complete the Project. This scope of services includes the following tasks:

1. Existing Condition Characterization
2. Conceptual Design
3. Environmental Planning and Permitting
4. Plan Set, Specifications, and Cost Estimate (PS&E)
5. Project Management
6. Construction Support

TASK 1: EXISTING CONDITION CHARACTERIZATION

The Consultant will sufficiently characterize existing conditions at the project site and compile information necessary for design. This characterization will include review of existing documents and technical studies.

Task 1.1 – Document Review

The Consultant will perform a desktop review of readily available and relevant studies, models, maps, permits, and records of the Project and its study area. Relevant documents for review include, but are not limited to, the following:

- a) **Attachment 1** – Preliminary Flood Risk Reduction Alternatives, July 2023
- b) **Attachment 2** – Preferred Alternative Exhibits
- c) HEC-RAS Calculations for East Creek existing condition
- d) HEC-RAS Calculations for West Creek existing condition
- e) HEC-RAS Calculations for East Creek preferred alternative
- f) HEC-RAS Calculations for West Creek preferred alternative
- g) Record Drawings for Cecilia Way Culverts, Karen Way Culverts, Tiburon Boulevard Culverts (Caltrans)

Deliverable: Succinct summary of data reviewed with description of the items (e.g., title, format, page numbers, content) and key takeaways as it relates to the project design.

Task 1.2 – Technical Studies

Following document review, the Consultant will complete technical studies, surveys, and analyses necessary to characterize existing conditions for design and environmental clearance purposes. At a minimum, these studies will include: topographic survey; right-of-way mapping; utility mapping; geotechnical investigation; and environmental studies (e.g. field work in support of biological assessment and wetland delineation).

Environmental Studies – The Consultant shall conduct biological surveys of the project site, perform biological surveys, and prepare a Biological Assessment for the project. The Consultant shall also prepare a wetland delineation in accordance with the US Army Corps of Engineers requirements.

Geotechnical Investigation – The Consultant shall collect in-stream sediment samples to be used for disposal characterization and for sediment transport evaluation. Consultant shall perform additional sampling and evaluation as necessary to support the design.

Topographic Survey – The Consultant shall be responsible for any field topographic surveying and utility mapping needed to support the HEC-RAS modeling, and preparation of plans and estimates. The Consultant will perform topographic site surveys to develop base maps that include site topographic one-foot contours, and surface features such as storm drain, channels, curbs, gutters, trees, sidewalks, fences, drop inlets, catch basins, manhole structures, utility covers, and other features sufficient for the design. The horizontal and vertical control shall be based on the California State Plane Zone III coordinates and the North American Vertical Datum of 1988 (NAVD 88). The Consultant will locate record information (monuments, set property corners, etc.) to map the existing right of way limits for the Project.

Utility Map - The Consultant shall compile available data of all utilities within the Project area. Consultant shall request digital linework from each utility owner (e.g. sanitary sewer, water, electric, gas, and communication). The Consultant will locate, survey, and map all utilities using appropriate techniques (e.g., electromagnetic field induction, Ground Penetrating Radar, and/or potholing). The Consultant will survey large utilities, primarily sewer and storm drain, and record pipe depths to invert, pipe materials, and diameters. It is assumed that the Consultant will provide traffic control assistance if necessary. It is assumed the Consultant will compile the utility map in plan view after receiving data based on data requests. Utilities will be mapped in plan view, and elevation data will be obtained. The data will be used in later Tasks to show utilities in profile and cross sections. The utility map will be combined with the ROW and topography to create one base map for the project.

Deliverable: Project Basemap (in PDF and Autodesk Civil 3D Format) with topography, ROW, culverts, and utilities. All technical studies prepared in Draft and Final versions in PDF format, as well as GIS format data for all environmental study exhibits.

TASK 2: CONCEPTUAL DESIGN

Following characterization of existing conditions (Task 1) the Consultant shall perform work necessary to complete a hydrologic and hydraulic (H&H) study, evaluate the design, and develop a 30-percent design plan.

Task 2.1 – Hydrologic and Hydraulic Study

The Consultant shall perform hydrologic and hydraulic (H&H) analysis for existing and post-project conditions to evaluate channel capacity. This analysis should consider design storm events (e.g., 2-year, 10-year, 25-year and 100-year return periods), tide levels of interest, sea level rise, roughness coefficients for varying levels of maintenance, sediment transport, and low flow conveyance. The methodology, parameter assumptions, and results of the H&H Study shall be documented in a technical memorandum. Hydraulic modeling shall be performed using HEC-RAS software. Report will include channel profiles and cross sections depicting various flow scenarios as generated by HEC-RAS.

Deliverables: One draft and one final H&H Technical Memorandum in PDF format, incorporating County review comments. Electronic transmittal of all Technical Memorandum and support documents including operable HEC-RAS files. Provide memorandum certifying compliance with the QC Plan (Task 5).

Task 2.2 – 30-Percent Design

The Consultant will advance the design, determined in **Task 2.1**, to a 30-percent design level. This first phase of design includes refining the preferred concept into drawings to begin developing an initial cost estimate, permitting strategies, and the needs for further environmental assessments. The 30-percent plan set will include:

1. Layout plan showing:
 - a. Areas of debris/sediment and tree removal
 - b. Areas of channel widening
 - c. Potential mitigation planting areas
 - d. Temporary access roads
 - e. Callouts to other improvements (e.g. check valves, flood walls, etc.)
 - f. Identify utility conflicts and right of way constraints.
2. Typical Sections.
3. Profile showing existing thalweg, proposed flowline, tops of bank, and HGL.

The 30-percent design will be presented at one public community meeting. It is assumed: the design plan set will be provided in both PDF and Autodesk Civil 3D format; and horizontal and vertical datums shall be based on the California State Plane Zone III coordinates and the North American Vertical Datum of 1988 (NAVD 88).

Deliverable: 30-percent plan set and construction cost estimate. One presentation at a public community meeting. The plan set submittal will be provided in PDF format,

Autodesk Civil3D format (*.dwg), and one hardcopy (to scale). Provide memorandum certifying compliance with the QC Plan (Task 5).

TASK 3: ENVIRONMENTAL PLANNING AND PERMITTING

The Consultant will prepare environmental documents that satisfy the California Environmental Quality Act (CEQA) and, on behalf of the District, will coordinate with permitting agencies and obtain all regulatory permits necessary to construct the Project. The Consultant will coordinate with the lead federal agency conducting the National Environmental Policy Act (NEPA) compliance.

Task 3.1 – CEQA

The Consultant will prepare a Project Description (PD) to allow CEQA analysis to begin and work with the District to determine the most appropriate CEQA path. Most likely, the project will be a Mitigated Negative Declaration (MND), but the Consultant will prepare an Initial Study (IS) following the Marin County Environmental Impact Review Guidelines and in accordance with CEQA guidelines. The selected consultant will then prepare any necessary technical reports and documentation to complete CEQA analysis and compliance, in addition to the deliverables listed below. The Consultant, with input from the District, will choose the best determination/document type to meet all CEQA requirements. Determination/document types include: a categorical exemption; an Initial Study with Negative Declaration or Mitigated Negative Declaration (IS/ND or IS/MND); or an Environmental Impact Report (EIR).

This task assumes: the Consultant will budget for an IS/MND; allow four (4) weeks for District staff to review draft CEQA documents. Consultant will prepare all the noticing, coordinate public distribution of the draft CEQA document, compile public comments, handle communication with the State Clearinghouse (SCH); and the Consultant will draft responses to comments and make sure all documents uploaded to the SCH are compliant with Section 508 of the Rehabilitation Act. District will pay all CEQA fees.

Deliverables: CEQA Kick-off and Prep Work (Site Visit, Document Review, and Preparation of Technical Reports, as needed); Draft and Final Project Description.

Task 3.2 – Environmental Permitting

The Consultant will: attend meetings and in some cases prepare to present in coordination with the District with all applicable permitting agencies who have authority over and interest in Project activities; prepare and submit permit applications; update draft permit applications based on agency feedback; prepare all necessary supplemental documents to support permitting; and represent the District in negotiating mitigation requirements as appropriate. Supplemental documents may include a wetland delineation report, vegetation/habitat data, habitat impact analysis, and biological assessments. All data collected shall be provided to the District. Applicable permitting agencies may include, but are not limited to:

- U.S. Army Corps of Engineers (USACE) - Sections 10 and 14 (33 U.S.C. 408) of the Rivers and Harbors Act of 1899, and 404 of the Clean Water Act, with following consultations
 - National Marine Fisheries Service (National Oceanic and Atmospheric Administration NOAA Fisheries)
 - U.S. Fish & Wildlife Service (USFW)
 - State Historic Preservation Office (SHPO)
- San Francisco Bay Regional Water Quality Control board (RWQCB)
- California Dept. of Fish & Wildlife (CDFW)
- San Francisco Bay Conservation & Development Commission (BCDC)

A Habitat Mitigation and Monitoring Plan (HMMP) may be needed if jurisdictional waters or wetlands will be impacted by Project construction. The HMMP will outline the proposed mitigation approach, including the conceptual habitat restoration design (based on the Project's 60-percent design plans), mitigation work plan, maintenance plan, and ecological monitoring plan. The HMMP will follow current USACE South Pacific Division HMMP guidelines and contain the following components: a summary of maintenance activities, including irrigation (if necessary), invasive plant species control, and replanting of dead or missing vegetation; a schedule for implementing maintenance activities; a quantifiable plant palette selected for planting; metrics to be used in assessing successful establishment of vegetation; annual performance criteria, including percent cover, percent survival of plants, and target percent coverage; final success criteria; and contingency measures to be implemented in the event that annual performance criteria or final success criteria are not attained.

It is assumed: the District will pay permit fees and that the consultant will attend up to five (5) meetings with regulatory agencies. The District will have four (4) weeks to review all prepared documents which will be signed by the District Director. The Consultant will use the District's geospatial data contract deliverables guidelines for all GIS work, contained in **Attachment 4 – Geospatial Contract Deliverables Guidelines**.

Deliverables: Draft and final permit applications; supporting biological studies, as required; Draft and Final HMMP (if needed). All applications, maps and exhibits will be provided in electronic format (PDF, Word, GIS, DWG, etc.).

TASK 4: PLAN SET, SPECIFICATIONS, AND COST ESTIMATE (PS&E)

This task is to develop the plan set, specifications, and engineer's cost estimate for the project design.

Task 4.1 – Basis of Design Memorandum

The Consultant will develop a basis of design memorandum and submit it for District review before developing 60-percent design documents, unless the District approves otherwise. The report will provide the details necessary to complete the design consistent with required standards, site-specific constraints, and right of way needs. The basis of design report will include a summary of design objectives, applicable guidance and reference material, and design criteria based on the standards and site constraints identified. The report will take into consideration elements crucial for design and project implementation.

Deliverable: Draft and Final Basis of Design Memorandum.

Task 4.2 – 60-Percent Design

The Consultant will incorporate feedback from the 30-percent design and the Basis of Design Memorandum to refine plans to the 60-percent level. The Consultant will document responses to 30-percent design comments, indicating how each comment is addressed. At the 60-percent design level, the Consultant will produce plans, estimate, and calculation package, consistent with the Basis of Design report and developed with sufficient detail to solidify the primary concept of the project. The Consultant will contact utility companies if relocations or new service are considered. Subject matter experts on the Consulting team will review the 60-percent plans and calculation package to verify compliance with design recommendations provided in the technical studies performed in **Task 1** and the basis of design report. The Consultant will route the 60-percent design to all reviewing entities within and outside of the District and primary project team. Prior to finalizing the 60-percent design, the Consultant shall provide quality management/assurance peer review of all deliverables.

Plan set – The 60-percent plan set will include:

1. Title Sheet
2. General Notes
3. Existing Conditions Map and Survey Control.
4. Typical Cross Sections
5. Layout Plan and Profile
6. Staging, Stockpile and Temporary Access
7. Construction Details
 - a. Temporary Cofferdam and Diversion Details
 - b. Rock Slope Protection Details
 - c. Grading Details
 - d. Utility Adjustment Details
8. Truck Routes
9. Construction Area Signs
10. Erosion and Sediment Control Plan
11. Planting and Irrigation Plans

12. General Cross Sections

The Consultant will coordinate utility location and relocation needed with appropriate entities. The design plan set will be provided in PDF, Autodesk Civil 3D (*.dwg), and one hardcopy format (to scale); and horizontal and vertical datums shall be based on the California State Plane Zone III coordinates and the North American Vertical Datum of 1988 (NAVD 88).

Cost Estimate – The 60-percent engineer's cost estimate will include: basis of unit costs; detailed breakdown for all line-item costs and how they were derived; and time of year assumptions for construction. The Consultant will: arrange for the estimate to be reviewed by a construction contractor or experienced construction management specialist, as part of the task budget; and provide the cost estimate in MS Excel format.

Calculation Package – The 60-percent calculation package will: be consistent with the Basis of Design Memorandum, unless District approves otherwise; include any structural, geotechnical, earthwork, hydrology and hydraulic calculations; and include facts and figures to support permit approvals. It is assumed the Consultant will provide the calculation report in MS Word and PDF format.

Deliverables: 60-percent construction plan set, cost estimate, and calculation package. Documented responses to all 30-percent design comments. Draft exhibits for each property where temporary right of way is needed for access. The plan set submittal will be provided in PDF format, Autodesk Civil3D format (*.dwg), and one hardcopy (to scale).

Task 4.3 – 90-Percent Design

The Consultant will incorporate feedback from the 60-percent design to refine to the 90-percent level. The Consultant will document responses to 60-percent design comments, indicating how each comment is addressed. At the 90-percent design level, the Consultant will produce a PS&E and calculation package developed with sufficient detail to: complete design of all improvements, specifications, and cost estimates; resolve all issues with agencies including utilities; and provide a bid package essentially complete and able to be fully interpreted by a contractor, with the exception of a date for advertisement and bid opening. Upon finalizing the 90-percent design, the Consultant shall provide evidence of compliance with the Quality Control Plan for all deliverables. 90-percent Design deliverables will, as a minimum, be the same as for the 60-percent Design, except more refined.

Specifications – The 90-percent specifications will be complete and include: construction staging and methods; sequencing; work window restrictions; instructions for mobilization, staging, equipment access, erosion and sediment control; plant palette requirements; and other relevant instructions for a contractor to build the project. Consultant will provide the specifications in MS Word format.

The Consultant will identify and provide exhibits for temporary access where necessary to construct the project. Assume an allowance for 6 exhibits.

Deliverables: 90-percent construction plan set, specifications, cost estimate, and calculation package. Documented responses to all 60-percent Design comments. Final exhibits for each property where temporary right of way is needed for access. The plan set submittal will be provided in PDF format, Autodesk Civil3D format (*.dwg), and one hardcopy (to scale). Provide memorandum certifying compliance with the QC Plan (Task 5).

Task 4.4 – 100-Percent Design and Bid Package Preparation

The Consultant will incorporate feedback from the 90-percent design to refine to the 100-percent level. The Consultant will document responses to 90-percent design comments, indicating how each comment is addressed. At the 100-percent design level, the Consultant will produce a PS&E developed with sufficient detail to: construct the Project; resolve all issues with agencies including utilities; and provide a bid package complete and able to be fully interpreted by a contractor. Prior to finalizing the 100-percent design, the Consultant shall provide quality management/assurance peer review of all deliverables. The 100-percent PS&E will be stamped by the Consultant's engineer-of-record for the Project, a California Licensed Civil Engineer leading and working directly leading the project.

100-percent design deliverables will be the same as for the 90-percent design, except more refined and will include a construction bid document package. The Consultant shall assist the District in response to questions that may arise during the bid phase.

Bid Document Package – The Consultant will assist the District to prepare a final bid construction package for competitive solicitation. In addition to the final 100-percent PS&E, this will include: a memorandum describing detailed and specific recommendations for additions or modifications required with the bid document language to comply with FEMA, State, and Local procurement requirements; and a memorandum summarizing projected construction management services (e.g., resident engineer, on-site biological surveys, noise monitoring, SWPPP compliance services, materials testing, encroachment permits, and any anticipated fees).

Deliverables: 100-percent (signed and stamped) construction plan set, specifications, cost estimate, and calculation package. Documented responses to all 90-percent design comments. Bid document package. Response to questions during the construction bid phase. The plan set submittal will be provided in PDF format, Autodesk Civil3D format (*.dwg), and one hardcopy (to scale).

Task 4.5 – Stormwater Pollution Prevention Plan Preparation

The Consultant shall prepare a stormwater pollution prevention plan (prepared by a QSD) and provide Data Entry services to upload the project into the Water Boards' SMART System and file the Notice of Intent.

Deliverables: Project specific SWPPP in PDF format, plus two hardcopies in binders for field use during construction.

TASK 5: PROJECT MANAGEMENT

The Consultant shall provide project management and coordination necessary to complete the scope of work. This shall include the following:

- Routine Coordination
- Monthly Invoicing
- Quality Control Program

Routine Coordination – The Consultant's Project Manager will perform routine coordination with District staff, subconsultants, and its internal team to complete the scope of work. Regular progress updates will be provided to the District's project manager. The frequency of these email updates will be biweekly. The Consultant will communicate: the work items performed since the prior update; budget, schedule, and work progress; and a discussion of upcoming activities scheduled to occur in the subsequent work period. Deviations from the initial project schedule will be discussed and corrective measures implemented to the satisfaction of the District.

Monthly Invoicing - At the end of each month, a monthly invoice will be provided, which will include billing for the month, project billing total to date, remaining budget and a breakdown of the budget, expenditures, and remaining budget per task. Regular coordination with District accounting and other staff, as appropriate, is included as a part of this task.

Quality Control – The Consultant shall implement a Quality Control Program to ensure correctness in the project calculations, plans, specifications, and estimates. It shall be the responsibility of the Consultant's Project Manager to ensure the QC Program is being followed by certifying that the procedures are being followed. The Program shall be subject to the review and approval of the District. A memorandum certifying compliance with the QC Plan and evidence of compliance will be submitted for each deliverable. The Consultant shall complete the A-E Contractor Statement of Technical Review to satisfy the certification requirement, as provided in **Attachment 5**.

Deliverables: Meeting Agendas, Meeting Notes, Monthly Invoices, QC Program

TASK 6: CONSTRUCTION SUPPORT

The Consultant shall provide construction support services as requested by the District. The consultant should anticipate the following requests:

1. Respond to Requests for Information (RFIs) from the Contractor.
2. Review material submittals and provide plant inspections.
3. Respond to requests for field meetings (assume 4 meetings).

4. SOQ AND PROPOSAL REQUIREMENTS

These guidelines are provided for standardizing the preparation and submission of statement of qualifications (SOQs) and proposals by all bidders. The intent of these guidelines is to assist Consultants in preparation of their SOQ and proposals, to clarify the review process, and to help assure consistency in format and content.

Proposals shall contain the following information in two electronic PDF files, as noted.

1. Letter of Interest (1-Page Max)

The letter of interest shall be addressed to:

Marin County Flood Control and Water Conservation District
Attn: Judd Goodman
3501 Civic Center Drive, Room 304
San Rafael, CA 94903

The letter shall be on Consultant's letterhead and include the Consultant's contact name, mailing address, telephone number, facsimile number, and email address. The letter will address the Consultant's: understanding of the services being requested; key reasons for why they should be selected; and any other pertinent information the Consultant believes should be included. All addendums received must be acknowledged in the letter.

The Consultant shall provide a brief statement affirming that the proposal terms shall remain in effect for ninety (90) days following the date proposal submittals are due.

The letter shall be signed by the individual authorized to bind the Consultant to the SOQ and proposal.

2. Executive Summary (1-Page Max)

The executive summary should concisely state the Consultant's case for selection as it relates to the Evaluation Criteria, per **Section 5**.

3. Qualifications and Experience

1. Summary of Qualifications (2-Page Max)– This narrative should discuss the Consultant's interests, abilities, and qualifications related to this solicitation.
 - a. Include examples: knowledge, expertise and/or experience with other related work.
 - b. Must meet minimum qualifications, including having qualified professionals to perform each task.
 - c. Include experience performing the identified tasks, particularly for creek design and environmental permitting.

2. Project Descriptions and References (6-Page Max)- Provide examples of successful completion of projects with references from work completed. The District will only consider submittals from Consultants that demonstrate they have successfully completed comparable projects. These projects must illustrate the quality, type, and past performance of the project team. Submittals shall include a description of a minimum of three (3) projects within the past five (5) years, which include the following information:
 - Project name and owner
 - Contracting agency Project Manager and contact information
 - Consultant contract amount
 - Consultant Project Manager and contact information
 - Consultant Team Members Involved
 - Project construction completion date
 - Project construction cost
 - Project objective, description, and outcome
3. Resumes (16-Page Max/ 2-Page Max per person)- Provide resumes for key team members. Resumes shall show relevant experience for the Project's Scope of Work, as well as the length of employment with the proposing team. Key members, especially the Project Manager, shall have significant demonstrated experience with this type of project, and should be committed to stay with the project for its duration.

4. Organization and Approach

1. Organization Chart - Describe the roles and organization of your proposed team for this project in an organization chart. Indicate the composition of subconsultants and number of project staff and offices available, as it relates to this project. Indicate the main point of contact.
2. Approach Statement - Describe the team's technical and management approach in up to two pages. Explain how this approach distinguishes your team and/or is well suited for this Project. Deviations from the scope of work included in this RFQ/P (Section 3) should be clearly explained.
3. Scope of Work - Include a detailed Scope of Work describing all services to be provided. Describe project deliverables for each phase of your work. Assume this proposed Scope of Work would be included in the contract.
4. Schedule of Work – Provide a detailed schedule for all phases and tasks of the project, including time for reviews.

5. Conflict of Interest Statement

The proposing Consultant shall disclose any financial, business, or other relationship with the COUNTY OF MARIN or the DISTRICT that may have an impact upon the

outcome of the contract or the construction project. The Consultant shall also list current clients who may have a financial interest in the outcome of this contract or the construction project that will follow. The proposing Consultant shall disclose any financial interest or relationship with any construction company that might submit a bid on the construction project.

6. Litigation

Indicate if the proposing Consultant was involved with any litigation in connection with prior projects. If yes, briefly describe the nature of the litigation and the result.

7. Contract Agreement

Indicate if the proposing Consultant has any issues or requires changes to the proposed Professional Services Contract (**Attachment 3**) or Geospatial Contract Deliverables Guidelines (**Attachment 4**). The DISTRICT reserves the right to reject any proposed changes.

8. Cost Proposal

The Consultant shall provide a cost proposal for the stated Scope of Work, with hourly rates indicated. **The Consultant shall provide a Cost Proposal in a separate electronic PDF file from the Statement of Qualifications.** The filenames should begin with “Cost Proposal” and “SOQ”, respectively, followed by the Consultant name. Both files should allow for read receipt.

5. EVALUATION CRITERIA

No.	Evaluation Criteria	Weight
1	Completeness of Response	Pass/Fail
2	Conflict of Interest Statement	Pass/Fail
3	Qualifications & Experience	50
4	Organization & Approach	50
	Subtotal:	100

The District may elect to hold interviews for a short-list of the Consultants. The in-person interview would allow for further evaluation of the same criteria.

Attachment 1
Preliminary Flood Risk Alternatives
East & West Creek
Dated July 18, 2023



Looking upstream to East Creek from near STA 1+50' to RBSD sanitary sewer pipe crossing (December 16, 2022).

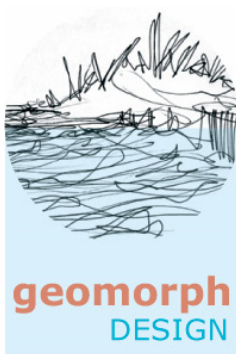
Preliminary Flood Risk Reduction Alternatives

Marin County Flood Control & Water Conservation District Zone 4

East Creek & West Creek

Tiburon, California

July 18, 2023



Prepared by:

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Engineer/Geomorphologist
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1. Introduction

This preliminary Tech Memo report documents Geomorph Design Group's (GDG's) Task 2 and Task 3 work re. flood risk reduction design alternatives for East Creek and West Creek in Tiburon, CA (Marin County Flood Control & Water Conservation District Flood Zone 4).

In Task 2, GDG used the new existing conditions hydraulic models developed in Task 1, to evaluate potential flood risk reduction benefits of implementing certain sets of roadway and utility crossing infrastructure modification or replacement projects.

In Task 3, GDG built upon the Task 2 findings to assemble sets of flood risk reduction measures as preliminary recommended "Minimum", "Medium", and "Maximum" flood risk reduction alternatives for each creek. Planning-level implementation cost estimates are presented for each alternative to facilitate alternatives analysis by the Flood Zone 4 Advisory Board, beginning with a presentation of these materials at the scheduled July 25 Advisory Board meeting.

1.1 Background

In Summer 2022, the Marin County Flood Control & Water Conservation District (District) furnished the original HEC-RAS models prepared by Kamman Hydrology & Engineering, Inc. for East Creek and West Creek. According to the available model documentation, the original East Creek model was produced using March 2017 survey data, and the West Creek model was produced with a combination of 2006 and 2008 survey data. GDG used the original models with minor adaptations in August 2022 to generally evaluate effectiveness of potential flood risk reduction measures for presenting findings and recommendations to the Zone 4 Advisory Board in September 2022. Simulations with those original models indicated that the effectiveness and sustainability of potential in-channel flood flow capacity improvements depends substantially on the configuration of roadway and utility crossing infrastructure features owned and operated by key stakeholders, including Town of Tiburon, Cal-Trans, and Richardson Bay Sanitary District (RBSD).

The Advisory Board directed District staff to develop "design alternatives" for each creek, ranging from Minimum Plan (i.e., repeat channel clearing and other maintenance measures similar to *status quo*) to Maximum Plan (e.g., heavy-equipment implemented channel enlargement combined with modification or replacement of certain key roadway and utility crossing infrastructure features).

To develop these design alternatives for Advisory Board consideration, GDG began with Task 1 work in December 2022 to survey new channel cross-sections at key locations for updating

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the original existing conditions hydraulic models. See the Task 1 Tech Memo and Task 1 Survey Maps documenting the new updated existing conditions models.

Task 2 work used the updated existing conditions hydraulic models to evaluate the effectiveness of modifying or replacing certain of the roadway and utility crossing infrastructure features (culverts, bridges, sanitary sewer pipeline crossings) as a first design alternatives screening step, in coordination with stakeholders.

Task 3 work used detailed hydraulic model plan simulations to develop preliminary recommended "Minimum", "Medium", and "Maximum" Plans for both creeks. In July 2023, these will be presented to the Advisory Board in a customized "cost-benefit" framework for the Board's evaluation and decision-making to guide future Zone 4 flood risk reduction work.

Task 2 Existing Conditions East Creek Crossing Infrastructure

Crossing	Stakeholder	Description
Greenwood Cove Dr	County of Marin	Two 60" CMP culverts slip-lined with 52" HDPE plastic pipes all or part of the approx. 280-ft-long distance from the north edge of Greenwood Cove Drive to outfall in Richardson Bay (Photo 1)
SR 131 (Tiburon Blvd)	CalTrans	Two approx. 120-ft-long 66" RCP culverts extending from the vertical concrete headwall at north edge of Tiburon Blvd to two 36" RCP risers between Tiburon Blvd and Greenwood Cove Drive (Photo 2)
Grouted Rock Channel	RBSD	Approx. 180-ft-long grouted rock rip-rap lined channel transitioning from the grouted section at the overhead sewer crossing downstream to the Tiburon Blvd culvert headwall (Photo 3)
Sanitary Sewer Crossing	RBSD	Overhead sewer pipeline crossing with narrow, elevated grouted rock channel section (4.7' invert) (Cover Photo, Photo 4)
Cecilia Way	Town of Tiburon	Approx. 30-ft-long 5'x10' concrete box culvert (6.9' culvert invert) with approx. 25-ft-long 10-ft-wide open concrete rectangular channel transition upstream and overhead sanitary sewer pipe crossing (Photo 5) (Photo 9)

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Photo 1. East Creek. Looking downstream to the original double-barrel 60" CMPs outfalling in Richardson Bay near Station - 3+95' (January 19, 2023).



Photo 2. East Creek. Looking downstream from right bank of the grouted rock channel to the vertical concrete headwall inlet to the State Route 131 66" RCP "double-barrel" at Station 0+00' (December 16, 2022).



Photo 3. East Creek. Looking downstream from Control Point 1 near Station 1+55' to Lower East Creek. The grouted rock-lined channel extends from the sanitary sewer crossing near Station 1+80' to the State Route 131 "double-barrel" culverts headwall seen in background of view at Station 0+00' (December 16, 2022).

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Photo 4. East Creek. Looking from left bank to right bank along the sanitary sewer crossing near Station 1+80' and narrow grouted rock channel with 4.7' invert on the pipeline section (December 16, 2022). See also cover photo.



Photo 5. East Creek. Looking downstream from inlet to the 10-ft-wide open concrete box culvert and overhead sanitary sewer pipe crossing to 5'x10' Cecilia Way concrete box culvert downstream in background of view (August 3, 2022).

Task 2 Existing Conditions West Creek Crossing Infrastructure

Crossing	Stakeholder	Description
SR 131 (Tiburon Blvd)	Cal-Trans	Two approx. 180-ft-long 60" CMP culverts extending from the vertical concrete headwall at north edge of Tiburon Blvd to constructed natural open channel downstream from Tiburon Blvd (Photo 6)
Cecilia Way	Town of Tiburon	Approx. 50-ft-long 5.3'x11.4' concrete box culvert (5.4' culvert invert) with narrow natural channel transitioning into culvert inlet (Photo 7)

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Photo 6. West Creek. Looking from left bank to outlet of two 60" CMP culverts (in foreground) outfalling to open natural channel downstream from Tiburon Boulevard (August 3, 2022).



Photo 7. West Creek. Looking upstream to outlet of the Cecilia Way 5.3'x11.4' concrete box culvert (August 17, 2022). Note there is about 2-3 ft of fine sediment deposited within the downstream part of the culvert but much less sediment deposited in the upstream part of the culvert. This is the natural, unmaintained condition.

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Photo 8. East Creek. Looking upstream to the outlet of culverts originating at or upstream from Karen Way (December 16, 2022). This is the maintained condition following channel maintenance dredging completed in October 2022. Note sedimentation near the culvert outfalls that occurred during November and December rainstorms.



Photo 9. East Creek. Looking upstream to the outlet of Cecilia Way culvert (December 16, 2022). This is the maintained condition following channel maintenance dredging completed in October 2022. None or negligible sedimentation occurred downstream from Cecilia Way culvert during November and December rainstorms.



Photo 10. East Creek. View of the East Creek culvert outfalls in Richardson Bay near Station -3+95' (see also Photo 1). The original double-barrel 60" CMPs appear to have been slip-lined with 52" HDPE plastic pipe culverts (January 19, 2023).

2. Task 2 East Creek Crossing Infrastructure Survey Notes

On December 16, 2022, GDG surveyed East Creek crossing infrastructure from the State Route 131 culvert headwall (at Station 0+00') (Photo 2) to the upstream end of Upper East Creek at the culvert outfalls downstream from Karen Way (near Station 15+00') (Photo 8).

On January 19, 2023, during a low, low tide, GDG surveyed the East Creek culvert outfalls in Richardson Bay (Photo 1) (near Station minus 3+95') about 400 feet downstream from the culvert inlets at Station 0+00'. According to Cal-Trans as-built design plans furnished by the District, the State Route 131 "double-barrel" culverts were originally 60"-diameter corrugated metal pipes (CMPs) that were later upgraded to the current existing 66"-diameter reinforced concrete pipes (RCPs). Near Station -1+20' the 66" RCPs join with separate culverts run the approximately 275-foot remainder of the distance under Greenwood Cove Drive right-of-way and the easement to the Richardson Bay outfalls (Photo 2).

These downstream culverts were also originally 60"-diameter CMPs. At the outfall they were measured to be 52" thick-smooth-walled HDPE plastic pipes (PPs) (Photo 10). It has not been confirmed if the 60" CMPs were slip-lined with the 52" PPs all the way upstream to the junction with the 66" RCPs, or if there are remainder segments of the original 60" CMPs downstream from the Cal-Trans Right-of-Way.



Photo 11. Looking downstream to the grade-controlling channel-spanning concrete stormwater outfall forming a headcut-step on Upper West Creek near Station 11+60' (January 19, 2023).

Cecilia Way East Creek culvert was surveyed by Kamman Hydrology & Engineering (KHE) in March 2017 for producing culvert geometry contained in the original East Creek existing conditions HEC-RAS model. GDG used these culvert geometry data for the new updated existing conditions model.

3. Task 2 West Creek Crossing Infrastructure Survey Notes

On January 19, 2023, GDG GPS-surveyed Lower West Creek culvert inlet and outlet invert elevations of the approx. 180-ft-long double-barrel 60"-diameter CMP State Route 131 culverts (Photo 6), including the inverts and limits of the sackrete-lined 90-degree bending transition structure upstream from the culvert inlets.

Cecilia Way West Creek culvert was surveyed by Kamman Hydrology & Engineering (KHE) in March 2006 or 2008 for producing culvert geometry contained in the original West Creek existing conditions HEC-RAS model. GDG used these culvert geometry data for the new updated existing conditions model, after adjusting the elevations up approximately 2.3 feet to best-fit adjust the original models to NAVD88 elevation datum (see Task 1 Memo for more information).

GDG GPS-surveyed the bed elevations from the downstream end of the Tiburon Boulevard culverts (near Station minus 1+80') to the upstream end of Lower West Creek (near Station 5+80'), and Total Station-surveyed new channel cross-sections and channel bed and bank features in Upper West Creek including multiple flow-blocking in-channel trees, and the channel-spanning concrete stormwater outfall apron forming a headcut-step near Station 11+60' (Photo 11).

See Tech Memo 1 and Task 1 survey data maps for more complete information about the December 2022 – January 2023 surveys and development of the adapted original and updated new existing conditions models.

4. Task 3 Hydraulic Model Evaluation – East Creek

To evaluate flood risk reduction measures for East Creek, the model-computed 50-year flood water surface elevations (WSEs) are compared to the in-model designated "levee" flood elevations at selected floodprone locations (model cross-sections). The selected floodprone locations for East Creek are upstream from Cecilia Way Culvert:

- Cross-Section 17 (Station 8+16') near the property line between 100 and 106 Leland Way. The designated "levee" elevation indicating the initiation of potential damaging flooding set in the model at the surveyed 12.28-ft (NAVD88) top of bank elevation formed by the redwood tree burl.
- Cross-Section 18 (Station 8+81') near the property line between 106 and 112 Leland Way. The designated "levee" elevation indicating the initiation of potential backyard

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flooding set in the model at the surveyed 12.01-ft (NAVD88) top of bank elevation formed by the natural ground elevation at this location.

- Cross-Section 19 (Station 9+40') near the property line between 112 and 118 Leland Way. The designated "levee" elevation indicating the initiation of potential backyard flooding set in the model at the surveyed 12.07-ft (NAVD88) top of bank elevation formed by the natural ground elevation at this location.
- Cross-Section 23 (Station 11+86') near the property line between 136 and 142 Leland Way. The designated "levee" elevation indicating the initiation of potential backyard flooding set in the model 20' landward of the top of bank fence line at Cross-Section 23 is 13.02 feet (NAVD88).

Finished floor elevations and crawlspace utilities elevations and rear yard ground elevations were not surveyed for Harriet Way, Cecilia Way, or Leland Way residential buildings for evaluating potential for structure flooding of primary and accessory buildings.

4.1. East Creek Minimum Plan. Status Quo. District continues current program of periodic as needed vegetation and sediment removal from accessible reaches and according to the current permitted extents downstream and upstream from Cecilia Way culvert. The implementation cost of the Minimum Plan is similar to the current ongoing channel maintenance and permit management cost.

At Cross-Sections 17-19:

- The Minimum Plan produces model-computed 50-year WSEs ranging from 12.49 ft to 12.55 ft for the recently maintained condition, same as the updated new existing conditions model (Plan 28).
 - *The Minimum Plan 50-year WSEs are about 0.2-0.6 feet higher than the estimated ground elevation at the initiation of backyard flooding at 100, 106, and 112 Leland Way.*
- After vegetation naturally reestablishes and sediment deposits in the channel, cyclically, and immediately prior to implementing repeat channel maintenance, the Minimum Plan "Pre-Maintenance" Condition (Plan 35) produces model-computed 50-year WSEs ranging 12.83 ft to 12.94.
 - *The Minimum Plan Pre-Maintenance Condition 50-year WSEs are about 0.6-0.9 ft higher than the estimated ground elevation at initiation of backyard flooding at 100, 106, and 112 Leland Way.*

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At Cross-Section 23:

- The Minimum Plan produces a model-computed 12.89-ft 50-year WSE for the recently maintained condition, same as the updated new existing conditions model (Plan 28).
 - *The Minimum Plan 50-year WSE is about 0.1 feet less than the estimated ground elevation at the initiation of backyard flooding at 136 Leland Way.*
- After vegetation naturally reestablishes and sediment deposits in the channel, cyclically, and immediately prior to implementing repeat channel maintenance, the Minimum Plan "Pre-Maintenance" Condition (Plan 35) produces a model-computed 13.38-ft 50-year WSE.
 - *The Minimum Plan Pre-Maintenance Condition 50-year WSE is about 0.4 higher than the estimated ground elevation at the initiation of backyard flooding at 136 Leland Way.*

Task 3 Flood Risk Reduction Alternatives for East Creek Model-Computed 50-Year Water Surface Elevations at Floodprone Locations (Red numbers indicate potential inundation.)

Plan	Scenario	#1 Replace 52" Culverts	#2 Modify SS Xing & Channel Inlet	#3 Replace Cecilia Way Culvert	50-yr WSE at Station 8+16' (CS 17) (ft) "Levee" 12.28	50-yr WSE at Station 8+81' (CS 18) (ft) "Levee" 12.01	50-yr WSE at Station 9+40' (CS 19) (ft) "Levee" 12.07	50-yr WSE at Station 11+86' (CS 23) (ft) "Levee" 13.02
29	Orig. Exist Cond				13.37	13.39	13.40	13.51
28	New Exist Cond ¹				12.49	12.54	12.55	12.89
35	"Pre-Maintenance"				12.83	12.89	12.94	13.38
28	Minimum Plan ¹				12.49	12.54	12.55	12.89
32	Medium Plan				11.89	11.96	12.00	12.51
37	Medium+1				11.84	11.91	11.95	12.48
33	Medium+3				11.68	11.76	11.82	12.41
34	Medium+1+3				11.64	11.72	11.78	12.41
38	Medium+2				11.72	11.80	11.85	12.42
39	Medium+1+2				11.63	11.72	11.77	12.38
41	Medium+2+3				11.34	11.40	11.48	12.25
40	Medium+1+2+3				11.20	11.28	11.37	12.21

¹ Post-Maintenance Condition.

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4.1.1 East Creek Minimum Plan Summary

In the first season after channel maintenance activities are completed, the *status quo* Minimum Plan produces 50-year WSEs that appear to be less than the ground elevations around the perimeter of the primary residential structures along Leland Way but may exceed ground elevations in the rear-yard area of certain Leland Way properties nearer to Cecilia Way, such as 100, 106, and 112 Leland Way, potentially producing shallow inundation as may marginally affect accessory structures.

As vegetation reestablishes and sediment redeposits in the channel after each maintenance event, the WSE-reducing benefits of maintenance dissipate. Model-simulations of “no maintenance” conditions reestablished immediately prior to implementing channel maintenance work, show that computed 50-year WSEs may cause shallow backyard inundation at 136 Leland Way and inundation depths exceeding 0.5 feet at 100, 106, and 112 Leland Way. Presumably shallow nuisance backyard flooding may occur at the intervening Leland Way properties.

These East Creek flood water surface elevations also temporarily prevent gravity runoff of on-site stormwater from these affected properties, increasing reliance on direction of stormwater runoff to the Leland Way – Cecilia Way stormwater drainage system, and mechanical pumped drains and sumps to reduce surface inundation and high groundwater levels.

For the Minimum Plan, for both the post-maintenance and pre-maintenance conditions, the computed 100-year WSEs are about 0.5 feet higher than the computed 50-year WSEs.

4.2. East Creek Medium Plan. Flood risk reduction would be improved over the *status quo* Minimum Plan, and the cycling between its “post-maintenance” and “pre-maintenance” conditions described in Section 4.1, if natural vegetation establishment and sediment deposition after channel maintenance would be delayed and/or reduced in extent.

For the Medium Plan, the District optimizes efficacy of channel maintenance by obtaining new individual project environmental permits to one-time extend the normal channel maintenance sediment removal an additional approximately 220-250 feet downstream from its current permitted limit. The one-time “dredging” work – the “East Creek Restoration Project” – would extend through the 50 and 80 Harriet Way properties to “restore” an adequate width and depth channel sloped 0.3% over the 510 feet from the Cecilia Way culvert concrete floor elevation to the grouted channel bed invert at the RBSD sanitary sewer crossing. The restored channel would not be severely deepened and widened so as to require engineered retaining walls or rip-rap slope protection. Rather, the restored channel would have natural bedrock banks and moderately sloped alluvial soil banks suitable for vegetated biotechnical bank erosion protection.

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The Medium Plan would also implement one-time removal of sediment from within the Cecilia Way concrete box culvert and the open concrete box culvert transition upstream from the culvert, and from within the tree-covered natural channel reach upstream from the concrete channel to produce “completely dredged” conditions and the maximum feasible 0.3%-sloped channel over the 1,320-foot-long reach from the Karen Way culverts, through the concrete-bottom Cecilia Way culvert, to the RBSD sewer crossing grouted rock channel section.

District would monitor vegetation establishment and sediment deposition following restoration of the “completely dredged” condition to determine if and what ongoing channel maintenance sediment and vegetation removal activities would be required to maintain plan effectiveness over time.

At Cross-Sections 17-19:

- The Medium Plan produces model-computed 50-year WSEs ranging from 12.89 ft to 12.00 ft (Plan 32).
 - *The Medium Plan 50-year WSEs are about 0.1-0.3 lower than the estimated ground elevation at the initiation of backyard flooding at 100, 106, and 112 Leland Way.*

At Cross-Section 23:

- The Medium Plan produces a model-computed 12.51-ft 50-year WSE (Plan 32).
 - *The Medium Plan 50-year WSE is about 0.5 feet less than the estimated ground elevation at the initiation of backyard flooding at 136 Leland Way.*

4.2.1 East Creek Medium Plan Summary

The Medium Plan produces 50-year WSEs less than the model-designated ground elevations at the initiation of backyard flooding along the entire length of East Creek.

The Medium Plan restores a “completely dredged” 1,320-ft-long adequate width-and-depth channel at the maximum 0.3% slope from the Karen Way culvert outfalls, through the 6.9-ft elevation concrete floor of the Cecilia Way box culvert, to the 4.7-ft elevation grouted concrete channel invert at the RBSD SS crossing.

The model-simulated Medium Plan WSEs are for completely dredged conditions immediately following the channel restoration work. If monitoring shows excessive in-channel vegetation establishment and channel sedimentation reduces the Medium Plan flood risk reduction

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below an acceptable level, the District would then consider routine periodic channel maintenance, or obtaining separate environmental permits to establish an in-channel "sediment basin" immediately downstream from the Karen Way culvert outfalls accessed via the east side access road ramp. The excavator-maintained basin would intercept the majority of the coarser fraction of sediment delivered to the reach through the Karen Way culverts to help maintain the 0.3%-sloped channel condition downstream. A sedimentation basin may have a lower average annual maintenance cost and produce less environmental disruption than reach-scale vegetation and sediment removal.

Another option for buffering the potential effects of vegetation in-channel vegetation establishment and channel sedimentation on Medium Plan performance would be installing a permanent top of bank flood barrier along the rear of 100, 106, and 112 Leland Way (see discussion in Section 4.2.2. below).

For the Medium Plan, the computed 100-year WSEs are about 0.5 feet higher than the computed 50-year WSEs.

4.2.2 Option to Restore the Top of Bank Barrier

There is an existing 345-ft-long 24"-high wood wall "flood barrier" extending along the top of bank of East Creek along the rear of 100, 106, 112, 118, 124, and 130 Leland Way. The wall appears to be more than about 20 years old. It is constructed from two horizontal courses of treated 2"x12" timber planks fixed to vertical treated 4"x4" pier posts. The pier depth and foundation type is unknown, but generally appears shallow, hand-dug. The wall may have been subsequently backfilled with soil at Cross-Sections 20, 21, and 22 (118, 124, and 130 Leland Way). The wall is in failed condition and, being discontinuous, with variable top wall elevations, it does not appear to prevent creek bank overflows. Therefore, any potential residual "flood barrier" effect of the wall was neglected in the hydraulic model computations.

However, the Minimum Plan 50-year and 100-year WSEs and the Medium Plan 100-year WSEs are higher than the top of bank elevations near the base of the wall along 100, 106, and 112 Leland Way. It appears to be feasible to restore the downstream 200-240 lineal feet of the top of bank flood barrier to provide added flood risk reduction for these properties. A potential preliminary schematic design for a more permanently stable and effective version of the restored barrier would be a "waterproof fence" similar to the existing failed wood wall: two courses of double horizontal PTDF 2"x12" planks sandwiching heavy-mil waterproof membrane fixed to PTDF 4"x4" piers on 8-ft centers, set in 8" diameter drilled pier holes to minimum 6-ft below finished grade and backfilled with concrete. Actual design of an engineered District-implemented top of bank flood barrier would require topographic surveying on landward of the top of bank fencing and site-scale design evaluation. Construction of the flood barrier would require District to acquire new easements donated by the property owners for construction and maintenance as flood control infrastructure. There

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may be construction conflicts with existing trees and accessory buildings/foundations requiring customized construction or selected tree removals.

One potential advantage of adding the permanent top of bank flood barrier to the East Creek Medium Plan is the added protection buffers against effects of vegetation establishment and sediment deposition should it be determined that the Medium Plan depends on repeat channel maintenance and/or maintaining a sedimentation basin near the Karen Way culvert outfalls. Theoretically, the permanent top of bank flood barrier could replace or eliminate the potential need for repeat channel maintenance on East Creek for maintaining the lowest possible flood flow water surface elevations.

The surcharges could also likely be mitigated with relatively low-cost residential scale work to replace the existing failed 24" high wood wall flood barrier with a similar residential-scale constructed barrier, such as a similar wall, a landscape berm, seeded rope-staked coir, or waterproofing the bottom of existing accessory buildings and fencing with waterproof membrane and row of sandbags, etc.

4.3. East Creek Maximum Plan. Add to the Medium Plan one or more of the following three potential channel roadway/utility crossing infrastructure modification/replacement projects:

- #1. Replace the approximately 275-ft-long 52"-diameter culverts in the County Right-of-Way and easement between State Route 131 (Tiburon Boulevard) and the Richardson Bay outfall with 66"-diameter culverts (matching the diameter of the culverts under Tiburon Blvd).
- #2. Modify Richardson Bay Sanitary District's grouted rock-lined channel inlet at the Sanitary Sewer overhead crossing to widen and lower the channel bed, as would likely require new replacement steel-reinforced concrete abutments and foundations for the sewer pipe. Extend the "Lower East Creek Restoration Project" downstream to smoothly conform channel bed elevations with the lower channel inlet.
- #3. Replace Cecilia Way Culvert and concrete transition channel with a wider natural bottom channel formed by new pier-supported vertical concrete retaining walls clear-spanned by a new roadway bridge deck. The natural creek bottom would presumably self-set at a lower bed elevation than the existing box culvert concrete floor.

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4.3.1 East Creek Maximum Plan Summary

Hydraulic model simulations show that adding any combination of the three infrastructure upgrade projects would not substantially reduce the flood water surface elevations in the most floodprone parts of East Creek.

First, simulations show that adding any of the three infrastructure upgrade projects alone to the Medium Plan (e.g., Plan 37, Plan 33, Plan 38) would not reduce the 50-year WSE at:

- Cross-Section 23 by more than about 0.1 feet;
- Cross-Sections 17-19 by more than about 0.2 feet.

Upgrading the 52"-diameter outfall culverts to 66"-diameter culverts (Plan 37) would reduce the 50-yr WSE by about 2.3 ft immediately upstream from the culvert inlet headwall on the north side of Tiburon Boulevard. But the WSE reduction would not be substantial upstream from the elevated narrow grouted rock-lined channel inlet at RBSD sewer crossing, and diminishes to just 0.03 ft at Cross-Section 23 and just 0.04-0.05 ft at Cross-Sections 17-19.

Simulations show that the WSE reduction caused by upgrading the 52"-diameter outfall culverts to 66"-diameter culverts would extend farther upstream if the RBSD sanitary sewer crossing were also modified to lower and widen the grouted rock-lined channel inlet (Plan 39). The reduction would be improved as much as 1.7' upstream from the sewer crossing bordering 50 Harriet Way, but the reduction diminishes upstream to be unsubstantial upstream from Cecilia Way culvert, and only about 0.1 ft (0.13 ft) at Cross-Section 23 and about 0.23-0.26 ft at Cross-Sections 17-19.

Plan 40 ("Medium+1+2+3") would also replace the Cecilia Way box culvert with a wider clear-span bridge over a natural bottom channel with a lower self-setting bed elevation (i.e., implementing all three potential crossing infrastructure upgrade projects). Plan 40 includes simulation of lower bed elevations naturally establishing through upper and lower East Creek at 0.4% bed slope (increased from 0.3%) resulting from eliminating the elevated grouted channel bed at the sewer crossing and the concrete channel bed at Cecilia Way. The Plan 40 computed 50-year WSE would be reduced by about 0.3 ft at Cross-Section 23 compared to the Medium Plan (from the 12.51-ft Plan 37 Medium Plan WSE to 12.21-ft Plan 40 WSE). Plan 40 would reduce the 50-year WSE about 0.62-0.69 ft at Cross-Sections 17-19. The computed 100-year WSE would be reduced at Cross-Section 23 by about 0.4 ft at Cross-Section 23 compared to the Medium Plan (from the 12.88-ft Plan 37 Medium Plan WSE to 12.49-ft Plan 40 WSE).

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5. Task 3 Hydraulic Model Evaluation – West Creek

To evaluate flood risk reduction measures for West Creek, the hydraulic model-computed 50-year flood water surface elevations (WSEs) are compared to the in-model designated “levee” ground elevation at initiation of flooding at selected floodprone locations (model cross-sections). Preliminary hydraulic model analysis of existing conditions shows that there may be nearly floodprone locations along the left bank at upstream end of Lower West Creek, and several potentially floodprone locations along the left bank of Upper West Creek.

Model-Identified West Creek Floodprone Backyard Locations

Cross-Section	Station	Location	“Levee” Gd Elev (ft)
“X-Section 23”	Station 5+54’	Lower West Creek 10-ft landward from LB fence line at 242 Cecilia Way	9.98
Cross-Section 59	Station 8+19’	Upper West Creek Top of left bank at 113 Blackfield Drive	12.28
Cross-Section 66	Station 10+40’	Upper West Creek 10-ft landward from LB fence line at P/L btwn 137 & 131 Blackfield Drive	13.37
Cross-Section 68	Station 11+03’	Upper West Creek Top of left bank at P/L btwn 143 & 137 Blackfield Drive	13.08
Cross-Section 72	Station 12+23’	Upper West Creek 10-ft landward from LB fence line at P/L btwn 155 & 149 Blackfield Drive	14.90
“X-Section 6”	Station 13+28’	Upper West Creek Top of left bank at 161 Blackfield Drive	15.86

Lower West Creek. 50-year WSEs may exceed the ground elevations at the fence line along the rear of 242 Cecilia Way, 75 Pamela Ct, and 85 Pamela Ct, but do not appear to exceed the ground elevations at the mid-yard area or along the perimeter of the primary residential structures on those properties. According to anecdotal reports, Pamela Court residents may

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experience stormwater entering properties from Pamela Court frontage rather than Lower West Creek. Excessive stormwater on Pamela Court could result from Upper West Creek overflowing through Blackfield Drive residences onto Blackfield Drive, if the flows exceed the inlet capacity of storm drain inlets near the Blackfield-Cecilia intersection, or those inlets are blocked by debris or otherwise surcharged. Performance of the street network stormwater drainage systems was not evaluated by this study.

Upper West Creek. 50-year WSEs may exceed the ground elevations at the top of bank or fence line along the rear of several Blackfield Drive properties. Blackfield Drive property land typically slopes down from the rear yard fence line at the top of creek bank to the front yard on Blackfield Drive. Therefore, overbank flows would tend to pass through the properties onto Blackfield Drive thence be captured in storm drain inlets along the curb near the Blackfield-Cecilia intersection, if those inlets are not blocked by debris or otherwise surcharged.

West of the creek, 50-year WSEs may exceed the ground elevations at the rear of 150 Rancho Drive by about 0.1' at Cross-Section 66 (Station 10+40'), but do not appear to exceed the ground elevations at the perimeter of the residential structure. Otherwise, the ground elevations in the rear yards of Rancho Drive properties appear to have been built-up high enough above the existing grade on the utility easement access roadway to not be floodprone.

Finished floor elevations and crawlspace utilities elevations were not surveyed for Pamela Court, Blackfield Drive, or Rancho Drive residential buildings for evaluating potential for primarily residential or rear-yard accessory building structure flooding.

To evaluate flood risk reduction measures, the model-computed 50-year WSEs at selected floodprone backyard locations are compared to the designated "levee" flood elevations set in the model to represent the initiation of creek overflow at those locations.

5.1. West Creek Minimum Plan. Historically, the District has periodically removed fine gravelly-sand channel bed material from the downstream side of Cecilia Way culvert using an excavator operated from the roadway. The natural self-setting channel bed elevation on the downstream side of the culvert is about 6 ft (NAVD88), which is about 2 feet higher than the 4.1-ft concrete floor elevation of the Cecilia Way box culvert outlet (Photo 7). About 10 cubic yards (1 standard dump truck load) of gravelly sand bed material can be removed from the 12-ft-wide channel bed to produce a 2-ft-deep excavation within the 10-ft reach of the excavator bucket.

However, hydraulic model simulations show that the flood risk reduction benefits of sediment removal are more perceived than real. The model-computed 50-year WSEs are unchanged by

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the 10-CY excavation and assuming clear conditions within the culvert (Minimum Plan 0, Plan 50). This is because the conveyance capacity of the very narrow Upper West Creek is much less than the 5.3'x11.4 box culvert. Creek flow accelerates through the narrow natural channel as it falls steeply into the culvert inlet, scouring all sediment and larger debris off of the concrete channel floor to where it naturally deposits within the culvert outlet as the flow decelerates within the relatively wide culvert. The near-critical velocity flows immediately upstream from the culvert inlet prevent any culvert capacity improvements from reducing flood water surface elevations along Upper West Creek.

Moreover, the 10-CY excavation would be refilled by sediment before a 25-year or larger flood peak occurs. According to regional averages, the average annual natural supply of gravelly-sand bedload sediment delivered by the approximately 0.25-square mile West Creek watershed exceeds 100 CY/year. It may be as low as 10-20 CY in years with lower-than-average winter storm flows, but it likely exceeds 500 CY in years with 25-year or larger peak flows. Therefore, the excavation would be refilled by natural sediment transported to the culvert by the first few to several small winter storms, collectively, or by the first moderate or average annual sized storm. Certainly, it would be refilled completely during the beginning and before the peak of any flood flow that would may overbank flooding.

To reduce 50-year flood water surface elevations at floodprone locations along West Creek, channel maintenance work needs to remove blockages and produce lower bed elevations on a long reach-scale:

- #2. Remove Rubble from Lower West Creek. Remove foreign rock and broken concrete rubble pieces blanketing the Lower West Creek channel to reduce reach-scale bed elevations with hand-work and without grading the channel bed and banks or reducing stability of channel banks on private properties (see Minimum Plan 1 below).
- #4. Remove Rubble from Upper West Creek. Remove foreign rock and broken concrete rubble pieces jammed along the narrow Upper West Creek channel bed to reduce reach-scale bed elevations with hand-work facilitated by heavy equipment on the access road and erosion protection repairs with 100% biodegradable fabrics and rolls (see Minimum Plan 2 below).

No trees would be removed by the West Creek Minimum Plan 1 or Minimum Plan 2.

5.1.1 West Creek Minimum Plan 1. Remove Rubble from Lower West Creek (#2).

Theoretically, the 6-ft self-setting channel bed elevation downstream from Cecilia Way culvert is artificially high due to the prevalence of loose broken concrete rubble and foreign rock rip-rap pieces covering the width of the channel bed downstream from Cecilia Way culvert (Photo 12). Rubble and rock pieces issued out of failed bank erosion protection structures over decades has been transported by high peak flows (such as the December 31, 2005 flood)

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and deposited on the channel bed upstream from the sackrete-lined 90-degree bend, generally forming a 9-12" thick armor from Station 1+10' to Station 3+80'. If the District were to amend the current channel maintenance permit or obtain a new individual project permit to implement a one-time measure to remove all of the loose rock and rubble materials exposed on the channel bed in this reach, it would reduce the bed elevations by about 8-10" in the reach, and potentially lead to a 6" lower self-setting bed elevation at the culvert outlet.



Photo 12. Lower West Creek. Looking upstream from Lower West Creek channel bed near Station 3+00' to the broken concrete rubble covered channel bed (August 17, 2022).



Photo 13. Lower West Creek. Looking downstream from the Lower West Creek channel bed near Station 4+10' to the lightweight foreign rubble deposited upstream from the rubble covered channel bed downstream, and evidence of recent natural tendency channel bed downcutting limited by coarse foreign material on the bed (August 17, 2022).

Minimum Plan 1 simulates removal of loose concrete rubble and foreign rock rip-rap pieces from Lower West Creek between sackrete transition structure (Station 1+04') to upstream end of rubble dominated reach (Station 3+96'), specifically hand-work to remove 8-10" thickness of material from the 6-ft average width channel bed over this 300-ft-long reach (50 CY). The

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self-setting bed elevation upstream from the rubble covered reach between Station 4+00' (Photo 13) and the downstream face of Cecilia Way culvert is reduced from about 6 ft to about 5.5 ft, and the culvert depth-block is reduced from 2 ft to 1.5 ft.

Hydraulic model simulations of Minimum Plan 1 (Plan 46) indicate that the 50-year WSE would be reduced by up to about 0.25 feet along the length of Lower West Creek, diminishing to about 0.2 ft (0.18 ft) at Station 5+54', about 60 feet downstream from the Cecilia Way culvert. Minimum Plan 1 does not change the computed water surface elevations in Upper West Creek due to the narrow channel accelerated flows immediately upstream from the culvert inlet, as discussed above.

5.1.2 West Creek Minimum Plan 2. Also Remove Rubble from Upper West Creek (#4) There are numerous smaller deposits of loose foreign rock and broken concrete rubble jammed in the narrow Upper West Creek channel bed. Theoretically, if District were to remove those rubble deposits, combined with the 50 CY of rubble removal on Lower West Creek, the flood WSE reduction realized by Minimum Plan 1 would extend upstream through the narrow channel upstream from the culvert.

Minimum Plan 2 simulates hand-work-only removal of rubble from Upper West Creek channel bed and minor local hand-work bed and bank erosion protection to repair bank surfaces disturbed by the rubble removal. Specifically, removing an 8-12" thickness of rubble and foreign rock on the channel bed where it occurs, and assumes the channel bed elevation with self-set about 6-8" lower in intervening areas. Ground disturbance caused by removing tightly jammed rubble deposits may require removal of 0.5-1.5-ft thicknesses of bank material 3-4-ft high above the channel bed, to reshaped the lower bank in places, as would be restored by placement of 100% biodegradable erosion protection fabric and rope-staked *carex*-seeded coir logs.

Work may be expedited using an excavator operated from the top of bank access road to bucket materials out of the creek. Hand-workers would place the materials by hand into the bucket, and the excavator would place them in trucks on the access road for off-haul and disposal. The plan simulates minor channel restoration work extending about 400 ft from Cecilia Way culvert inlet area upstream to Station 11+03' (Cross-Section 68). Hand-work to remove average 9" average thickness of material from 3-ft average width channel bed and 9" average thickness over 3-ft-high bank segments comprising approximately 125 lineal ft of the total 400-ft-long reach (45 CY).

Hydraulic model simulations of Minimum Plan 2 (Plan 47) indicate that the 50-year WSE would be reduced by up to about 0.2 feet along the length of Upper West Creek, increasing locally to about 0.4 feet at Cross-Section 68 (Station 11+03'). However, the improvements would not reduce the WSE upstream from the existing channel-spanning concrete

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stormwater outfall apron near Station 11+39', because the weir crest type grade-control formed by that outfall controls the WSE profile upstream.

Task 3 Flood Risk Reduction Alternatives for West Creek Model-Computed 50-Year Water Surface Elevations at Floodprone Locations (Red numbers indicate potential inundation.)

Plan	Scenario	50-yr WSE at Station 5+54' (XS-23) (ft) Left Levee 9.98 ft	50-yr WSE at Station 8+19' (CS 59) (ft) Left Levee 12.28 ft	50-yr WSE at Station 10+40' (CS 66) (ft) Left Levee 13.08 ft	50-yr WSE at Station 11+03' (CS 68) (ft) Left Levee 13.85 ft	50-yr WSE at Station 12+23' (CS 72) (ft) Left Levee 14.90 ft	50-yr WSE at Station 13+28' (XS-6) (ft) Left Levee 15.86 ft
44	Orig. Exist Cond	9.99	11.85	13.16	13.43	14.52	15.84
45	New Exist Cond	9.92	12.77	13.49	14.20	15.26	16.54
50	Minimum Plan 0	9.92	"	"	"	"	"
46	Minimum Plan 1	9.74	"	"	"	"	"
47	Minimum Plan 2	9.74	12.56	13.32	13.80	"	"
49	Maximum Plan Min-1	9.72	"	"	"	"	"
51	Maximum Plan Min-2	9.73	"	"	"	"	"
52	Maximum Plan Min-3	"	"	"	"	"	"
48	Medium Plan 1	9.74	"	"	13.55	14.07	15.78
53	Medium Plan 2-1	"	"	"	"	"	"
54	Medium Plan 2-2	"	12.47	13.29	13.54	14.06	"
55	Medium Plan 2-3	"	12.41	13.27	13.52	"	"
56	Medium Plan 2-4	"	12.16	13.21	13.49	14.04	"
57	Medium Plan 2-5	"	"	13.17	13.47	14.03	"
58	Medium Plan 2-6	"	"	"	"	"	"
62	Medium Plan 3-1	"	11.81	13.11	13.44	14.02	"
63	Medium Plan 3-2	"	11.70	13.10	"	"	"
64	Maximum Plan Med-1	9.71	"	"	"	"	"
65	Maximum Plan Med-2	9.74	11.67	13.10	"	"	"
66	Maximum Plan Med-3	9.71	"	13.09	"	"	"

5.1.3 West Creek Minimum Plan Summary

Minimum Plan 0 is not recommended because the flood risk reduction benefits are insignificant.

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Minimum Plan 1 is not recommended because the benefits do not extend upstream from Cecilia Way where most of the floodprone locations occur.

Under Minimum Plan 2, District would obtain new individual environmental permits and implement one-time hand-work to remove about 100 CY of foreign rock and concrete materials accumulated in places along the length of the channel bed in an approximately 300-ft long of Lower West Creek and an approximately 400-ft-long reach of Upper West Creek. Minimum Plan 2 would achieve a modest flood risk reduction benefit, generally reducing the 50-year flood flow water surface elevation by about 0.25 ft. The relatively inexpensive maintenance work would also naturalize West Creek. No tree removals are part of Minimum Plan 2.

Minimum Plan 2 would lower the 50-year WSE at 3 of the 5 floodprone locations identified along Upper West Creek, but the computed WSE at 4 of the 5 locations would remain higher than the surveyed ground elevation at the top of bank, indicating overflow from the channel left bank onto Blackfield Drive properties.

5.2. West Creek Medium Plan.

To further reduce computed 50-year WSEs at all of the 5 identified floodprone locations, District would need to implement additional, more expensive channel conveyance capacity measures along Upper West Creek. District would obtain new individual environmental permits to implement certain of these additional measures along with the Minimum Plan 2 measures, as a single, stand-alone creek restoration project:

- #5. Remove Concrete Stormwater Outfall. Removing the existing grade-controlling channel-spanning concrete stormwater outfall apron near Station and replacing it with an adequate width and depth rock-lined channel and associated biotechnical bank erosion protection upstream and downstream would reduce 50-year WSEs upstream from Station 11+39' including floodprone locations near Station 12+23' and Station 13+28'.
- #6. Remove In-Channel Trees. Removing certain in-channel trees that detailed hydraulic modeling shows would reduce 50-year WSEs at floodprone locations throughout the reach by reducing blockage of creek flows.
- #7. Stabilize Creek Banks to Enlarge Channel at Removed In-Channel Trees. Removing stumps of removed channel bank rooted trees will destabilize the channel bank. Repairing the bank with more steeply sloped, possibly physically stabilized bank materials such as rock rip-rap placed by an excavator in certain places where hydraulic

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modeling shows enlarging the channel would reduce 50-year WSEs at remaining floodprone locations.

Inventory In-Channel Trees Upper West Creek

#	Station	Cross-Section	Bank	Species	Diam	Notes
1	6+91'	54	LB	poplar	40"	Non-native tree
2	7+17'	56	RB	poplar	2 x 24"	Non-native tree
3	7+31'	57	LB	poplar	30"	Non-native tree
4	7+77'	58	LB	eucalyptus	46"	Non-native tree
5	8+53'	60	LB	poplar	28"	Non-native tree
6	10+40'	66	RB	redwood	60"	Cluster at top of bank
7	10+63'	67	LB	willow	30"	Native tree
8	11+34'	69	RB	willow	48"	Native tree

Task 3 Flood Risk Reduction Alternatives for West Creek

Plan	Scenario	#1 Upgrade SR 131 Culverts	#2 Remove Rubble Lower Ck	#3 Replace Cecilia Way Culvert	#4 Remove Rubble Upper Ck	#5 Remove Concrete Outfall	#6 Remove In-Ch Trees
44	Adapted Original Exist Cond						
45	Updated New Exist Cond						
50	Minimum Plan 0						
46	Minimum Plan 1						
47	Minimum Plan 2						
49	Maximum Plan Min-1						
51	Maximum Plan Min-2						
52	Maximum Plan Min-3						
48	Medium Plan 1						
53	Medium Plan 2-1						#1
54	Medium Plan 2-2						#2
55	Medium Plan 2-3						#2-#3
56	Medium Plan 2-4						#2-#4
57	Medium Plan 2-5						#2-#5
58	Medium Plan 2-6						#2-#6
62	Medium Plan 3-1						#2-#4
63	Medium Plan 3-2						#1-#4
64	Maximum Plan Med-1						#1-#4
65	Maximum Plan Med-2						#1-#4
66	Maximum Plan Med-3						#1-#4

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Photo 14. West Creek. Looking upstream from the channel bed near Station 7+60' to the left bank in-channel tree, Tree #4 (46"-diameter eucalyptus), surveyed on Cross-Section 58 at Station 7+77'. Tree #4 was topped approximately 10 years ago. Model simulations show that removal of Tree #4 reduces the computed 50-year flood water surface elevation by 0.4' upstream near Station 8+19' (August 17, 2022).

5.2.1 West Creek Medium Plan 1. Remove Concrete Stormwater Outfall (#5). Medium Plan 1 (Plan 48) simulates (adding to Minimum Plan 2) removal of the existing grade-controlled channel-spanning concrete stormwater outfall with an adequate width and depth rock-lined channel with a lower bed elevation.

Model simulations suggest that the length of the constructed channel should extend about 160 feet from near Station 10+63' to near Station 12+23' in order to adjust to the elimination of the concrete grade control structure formed by the outfall. The portion of the constructed channel near the outfall would need to be rock-lined to handle the turbulent mixing of flows, but the remainder of the constructed reach may be erosion-protected with seeded 100% biodegradable erosion control fabrics and rolls. The existing 24" RCP stormwater outfall would be retrofitted to discharge nearer the direction of West Creek flow rather than perpendicular to West Creek flow. Eliminating the concrete-reinforced headcut and plunge pool would reduce turbulence, energy losses, and bank erosion at this location. Plan 48 simulates assumed natural channel bed level adjustment upstream from removed outfall. Model simulations show that additional bank grading and may be needed extending upstream from Station 12+23' to near Station 13+19' (or 260 linear feet in total) in order to complete the channel conveyance improvements far enough upstream to substantially reduce flood WSEs near Station 13+28'. Medium Plan 1 completes naturalization of Upper West Creek up to near Station 13+20'.

Hydraulic model simulations of Medium Plan 1 (Plan 48) indicate that the 50-year WSE would be reduced by up to 1.2 feet near Station 12+23 about 85 feet upstream from the removed concrete outfall. Medium Plan 1 produces 50-year WSEs below the bank overflow thresholds everywhere in Upper West Creek except near Station 8+19' and Station 10+40' downstream

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from the concrete outfall. Plan 48 produces 50-year WSEs about 0.25 ft higher than the top of bank at Station 8+19' (Cross-Section 59) and Station 10+40' (Cross-Section 66).

Further reducing WSEs at Cross-Sections 59 & 66 would require, at a minimum, removing selected in-channel trees downstream from those cross-sections (#6), and possibly additional work to enlarge the channel near the removed trees by stabilization of the bank where the tree stumps are removed (#7).

5.2.2 West Creek Medium Plan 2. Also Remove In-Channel Selected Trees (#6). Medium Plan 2 simulates (adding to Medium Plan 1) removal of in-channel trees in different combinations determined by hydraulic modeling to reduce the computed 50-year WSE at floodprone locations along Upper West Creek. Site inspection and surveying indicated there were eight in-channel trees with the potential to obstruct flood flows and increase flood water surface elevation. These trees were precisely surveyed and built into the hydraulic model as dimensional flow obstructions where they occur on model cross-sections:

Model evaluation procedure for tree removals:

- Medium Plan 2-1 (Plan 53). Simulates removal of Tree #1 only. Simulations indicated that removing Tree #1 produced a negligible reduction in the 50-year flood WSE. Therefore, removal of Tree #1 was not included in the remaining simulations.
- Medium Plan 2-2 (Plan 54). Simulates removal of Tree #2 only. Simulations indicated that removing Tree #2 reduced the 50-year WSE by about 0.1 feet near Station 8+19'. Removal of Tree #2 was retained in the remaining simulations.
- Medium Plan 2-3 (Plan 55). Simulates removal of Tree #2 and Tree #3 (2 trees, all non-native), indicating an additional 50-year WSE reduction of 0.06' near Station 8+19'. Removal of Tree #3 was retained in remaining simulations.
- Medium Plan 2-4 (Plan 56). Simulates removal of Tree #2, Tree #3, and Tree #4 (Photo 14) (3 trees, all non-native). Plan 56 produces a total 50-year WSE reduction of 0.4' near Station 8+19', reducing the computed 50-year WSE to less than the overbank flow threshold. Removal of Tree #4 was retained in remaining simulations.
- Medium Plan 2-5 (Plan 57). Simulates removal of Tree #2, Tree #3, Tree #4, and Tree #5 (4 trees, all non-native). Plan 57 produces a total 50-year WSE reduction of 0.15' near Station 10+40', and does not reducing the computed 50-year WSE to less than the overbank flow threshold there. Removal of Tree #5 was retained in remaining simulations.

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- Medium Plan 2-6 (Plan 58). Simulates removal of Tree #2, Tree #3, Tree #4, Tree #5, and Tree #6 (5 trees, 4 non-native). Tree #6 is a redwood tree cluster rooted on the top of the right creek bank. Simulations show that removal of Tree #6 would not reduce model-computed 50-year WSEs.

Hydraulic model simulations of selected grouped tree removals show that removal of Trees #1, #5, and #6 would not produce a substantial flood risk reduction, but removal of Trees #2, #3, and #4 (Medium Plan 2-4) would produce a substantial reduction in the computed 50-year WSEs along Upper West Creek, up to about 0.4 feet at Station 8+19'. Medium Plan 2-4 would produce 50-year WSEs below the top of bank everywhere except Station 10+40' (Cross-Section 66).

5.2.3 West Creek Medium Plan 3-1. Also Stabilize Creek Banks to Enlarge Channel at Removed In-Channel Trees (#7). Medium Plan 3-1 (Plan 62) simulates (adding to Medium Plan 2) excavator-implemented rock rip-rap bank stabilization work in the vicinity of removed stumps of Trees #2, #3, and #4 (three trees located 60 ft apart at the rear of 101 and 107 Blackfield Dr) to repair bank damage caused by tree stump removal and at the same time enlarge the channel to improve flood flow conveyance through the narrow channel leading into the Cecilia Way culvert. Model simulation of Plan 62 shows that compared to removal of Trees #2, #3, and #4 alone, additional rock bank stabilization work to build a steep 1.25H:1V rock-lined slope in the approx. 90-ft-long reach (3 tree/stump removals spaced 60 ft apart, with 15-ft-long grading transitions on both ends), would reduce computed 50-year WSEs by up to 0.4 feet in Upper West Creek. However, Plan 62 would reduce computed 50-year WSE only 0.06 ft at Station 10+40' (Cross-Section 66). The computed 50-year WSE at Cross-Section 66 (13.11 ft) would still be 0.03 higher than the 13.08-ft surveyed top of bank elevation there.

5.2.4 West Creek Medium Plan 3-2. Also Remove Tree #1 and Stabilize Bank in Vicinity of Remove Tree #1 Stump. Medium Plan 3-2 (Plan 63) simulates (adding to Medium Plan 3-1) also removing Tree #1 at Station 7+01' (20 ft downstream of removed Tree #2) and excavator-implemented rock rip-rap bank stabilization work in the vicinity of removed stumps of Trees #1. The Plan 63 computed 50-year WSE at Cross-Section 66 (13.10 ft) would still be 0.02 higher than the 13.08-ft surveyed top of bank elevation there. Compared to Medium Plan 3-1, the flood risk reduction benefits of Medium Plan 3-2 are not substantially improved. However, combining Tree #1 and bank grading repair with the Medium Plan 3-1 work is sensible and probably practically necessary for preventing Tree #1 bank area being subject to increased bank erosion pressure. Therefore, Medium Plan 3-2 is recommended.

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5.2.3 West Creek Medium Plan Summary:

Under the recommended Medium Plan 3-2, District would implement the hand-work channel maintenance work of recommended Minimum Plan 2:

#2. Remove Rubble from Lower West Creek.

#4. Remove Rubble from Upper West Creek.

And these other in-channel flood flow capacity improvements:

#5. Remove Concrete Stormwater Outfall. Replace outfall with rock-lined channel, and light grading and minor biotechnical bank erosion protection work in places over approx. 260-ft channel length downstream and upstream from the outfall to correct the channel geometry altered by the outfall grade control.

#6. Remove In-Channel Trees. Removing Trees #2, #3, and #4 (3 trees, all non-native).

#7. Stabilize Creek Banks to Enlarge Channel at Removed In-Channel Trees. Stabilizing creek banks at removed stumps of Trees #2, #3, and #4 with steeply-sloped rock rip-rap placed with an excavator to widen the channel. Considering the work required to stabilize the bank near removed Tree #2 stump (Station 7+17'), it appears it would also be necessary, practically, to also remove Tree #1 (Station 6+91'), its stump, and stabilize the bank uniformly leading into the Cecilia Way culvert inlet.

Medium Plan 3-2 is a thorough creek naturalization project that restores adequate width, depth, and slope channel for reasonably optimizing creek flow conveyance in West Creek. Medium Plan 3-2 pre-empts future work requirements for removing the concrete outfall as it continues to degrade, and emergency maintenance work to clear debris blockages and repair bank erosion when large in-channel trees are wind-thrown.

Other measures, such as top of bank flood barrier walls or landscape berms may be needed to increase the floodprone top of bank elevation near Station 10+40' (Cross-Section 66) to produce equivalent 50-year flood protection level throughout Upper West Creek. According to the spatial resolution of the hydraulic model, the Medium Plan 3-2 computed 50-year flood would overflow an approximately 5-ft-long top of bank segment between Station 10+35' and Station 10+40' with a maximum flow depth of 0.02 ft (1/4-inch). This may be considered di minimis and equivalent to 50-year level flood protection.

The Medium Plan 3-2 computed 100-year flood would overflow an approximately 60-ft-long top of bank segment between Station 9+90' and Station 10+50' (primarily along the rear of 131 Blackfield Dr) with a maximum flow depth of 0.26 ft (3 inches).

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Both the 50-year and 100-year surcharges could be mitigated with a minor top of bank flood barrier such as an approximately 85-ft-long waterproof fence installed and maintained by District with top elevation uniformly sloped from the 13.99-ft surveyed top of bank elevation at Station 10+63' (Cross-Section 67) to the 13.23-ft elevation at Station 9+78 (Cross-Section 64), or extending 67 more feet downstream (152-ft-long total) to the 13.38-ft surveyed top of bank (existing sandbag levee) at Station 9+11' (Cross-Section 62).

Actual design of an engineered District-implemented top of bank flood barriers would require topographic surveying on landward of the top of bank fencing and site-scale design evaluation. Construction of an engineered flood barrier would require District to acquire new easements donated by the property owners for construction and maintenance as flood control infrastructure. There may be construction conflicts with existing trees and accessory buildings/foundations requiring customized construction or selected tree removals.

Both surcharges could also likely be mitigated with relatively low-cost residential scale work undertaken by the Owners, such as a landscape berm, seeded rope-staked coir-log, or waterproofing the bottom of existing fencing with waterproof membrane or row of sandbags, etc.

The potential for the surcharges to be mitigated by capital improvement projects to replace/upgrade the Cecilia Way and Tiburon Blvd culverts is evaluated in Section 5.3 West Creek Maximum Plan.

5.3. West Creek Maximum Plan.

Six potential Maximum Plans for West Creek were evaluated by model-simulating the potential flood risk reduction benefits of adding capital improvement projects to replace/upgrade existing West Creek roadway and utility crossing infrastructure to the recommended Minimum and Medium plans. There are three potential combinations of the two infrastructure upgrades projects on West Creek:

1. (Only) Upgrade SR 131 Tiburon Boulevard Culverts. Upgrading the Tiburon Blvd culverts from 60" CMP to 66" RCP culverts.
2. (Only) Replace Cecilia Way Culvert. Replacing Cecilia Way culvert with a wider or same-width channel formed by new pier-supported vertical concrete retaining walls clear-spanned by a new, thinner profile roadway bridge deck and same roadway elevation.

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3. (Both) Upgrade Tiburon Blvd Culverts and Replace Cecilia Way Culvert. Upgrading the Tiburon Blvd culverts from 60" CMP to 66" RCP culverts and replacing Cecilia Way culvert with a wider or same-width channel formed by new pier-supported vertical concrete retaining walls clear-spanned by a new, thinner profile roadway bridge deck and same roadway elevation.

Each of these three potential combinations were combined with the recommended West Creek Minimum Plan (Minimum Plan 2) and the recommended West Creek Medium Plan (Medium Plan 3-2), producing 6 potential Maximum Plans for model evaluation:

1. Maximum Plan Min-1: Maximum Plan Min-1 (Plan 49) combines upgrading Tiburon Boulevard culverts (only) with Minimum Plan 2. Plan 49 produce a 0.3' WSE reduction immediately upstream from Tiburon Boulevard. The reduction dissipates to 0.2 ft about 250 ft upstream, then diminishes rapidly. The reduction at Station 5+54' 60 ft downstream from Cecilia Way culvert is only 0.02 ft. Maximum Plan Min-1 (Plan 49) would reduce the 50-yr WSE immediately upstream from Cecilia Way culvert by about 0.01 ft, but not in the floodprone Upper West Creek locations upstream from the culvert. Maximum Plan Min-1 is not recommended.
2. Maximum Plan Med-1: Maximum Plan Med-1 (Plan 64) combines upgrading Tiburon Boulevard culverts (only) with Medium Plan 3-2. Plan 64 would produce would produce the same 0.3' WSE reduction immediately upstream from Tiburon Boulevard that dissipates to 0.2 ft about 250 ft upstream. The local WSE reduction does not appear to substantially affect flood risk reduction to the properties in that vicinity. Maximum Plan Med-1 is not recommended.
3. Maximum Plan Min-2: Maximum Plan Min-2 (Plan 51) combines replacing Cecilia Way culvert (only) with Minimum Plan 2. Plan 51 would reduce the computed 50-year WSE as much as 0.5 ft immediately upstream from and within 40-50 feet from the Cecilia Way culvert inlet, but there would be no reduction in the floodprone Upper West Creek locations. Maximum Plan Min-2 is not recommended.
4. Maximum Plan Med-2: Maximum Plan Med-2 (Plan 65) combines replacing Cecilia Way culvert (only) with Medium Plan 3-2. Plan 65 would not substantially reduce model-computed 50-year WSEs at floodprone locations along Upper West Creek. Maximum Plan Med-2 is not recommended.
5. Maximum Plan Min-3: Maximum Plan Min-3 (Plan 52) combines both infrastructure upgrade capital improvement projects with Minimum Plan 2. Plan 52 produces the same relatively large WSE reductions immediately upstream from both culvert inlets as the individual crossing upgrades would. These reductions only occur over a short distance upstream from the inlets and do not appear to produce meaningful WSE

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reductions in floodprone locations along West Creek. Maximum Plan Min-3 is not recommended.

6. Maximum Plan Med-3: Maximum Plan Med-3 (Plan 66) combines both infrastructure upgrade capital improvement projects with Medium Plan 3-2. Plan 66 produces relatively large WSE reductions immediately upstream from both culvert inlets, but does not produce meaningful WSE reductions in floodprone locations along West Creek. Maximum Plan Med-3 is not recommended.

Model simulations show that upgrading the Tiburon Blvd and/or Cecilia Way culverts would not achieve meaningful flood risk reduction on West Creek, in combination with either the recommended Minimum Plan 2 or Medium Plan 3-2 channel improvements.

Although none of the six potential West Creek Maximum Plans are recommended, Maximum Plan Med-3 is cost estimated for the purposes of the alternatives analysis.

Although modeling simulations show that improvements to the existing Cecilia Way and Tiburon Blvd culverts are not necessary, any future work required to upgrade those culverts at the end of their engineering lifespan should be undertaken with an up-to-date evaluation of then-existing conditions and hydraulic design to optimize flood risk reduction on West Creek.

Notably the existing West Creek 60"-diameter CMP culverts appear to be in poor condition due to corrosion and may be nearing their engineering lifespan. Presumably they were installed by Cal-Trans at the same time as the original East Creek 60"-diameter CMP culverts. Cal-Trans replaced the East Creek CMP culverts with upgraded 66"-diameter RCP culverts in [year]. Should Cal-Trans elect to repair the West Creek 60"-diameter CMP culverts by slip-lining with smaller diameter plastic pipes, this should be carefully evaluated to ensure the smaller diameter culverts do not cause increased flood water surface elevations at floodprone locations along Lower and Upper West Creek.

6. Task 2 Conclusions

Model simulations of combining capital improvement projects to upgrade existing roadway and utility crossing infrastructure to otherwise maintenance-optimized flood risk minimized conditions on East and West Creek shows that none of the existing infrastructure substantially increases flood risk:

1. East Creek Tiburon Boulevard Culverts. Model simulations show that upgrading the 66"-diameter RCP East Creek Tiburon Blvd culverts would not achieve meaningful flood risk

Preliminary Flood Risk Reduction Alternatives

Flood Zone 4: East & West Creek

July 18, 2023

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reduction. The 66" RCP culverts join to existing 52" HDPE plastic culverts running under Greenwood Cove Drive to the Richardson Bay outfall.

2. East Creek Greenwood Cove Drive Culverts. Model simulations show that upgrading the 52" HDPE plastic culverts to 66" RCP culverts matching the existing Tiburon Boulevard Culverts would reduce the 50-year flood water surface elevation immediately upstream from the culvert inlet headwall north from Tiburon Boulevard adjacent to the pump station by about 2.3 feet. The WSE reduction diminishes rapidly upstream within the length of the existing grouted rock-lined channel due to the acceleration of Lower East Creek flows into the narrow, elevated grouted channel inlet at the RBSD sewer crossing section.
3. East Creek RBSD Sanitary Sewer Crossing. Model simulations show that the potential benefits of culvert upgrading would extend farther upstream if the RBSD sanitary sewer crossing were also replaced to lower and widen the grouted rock-lined channel inlet, in combination with reconstructing the downstream grouted rock-lined channel, the WSE reduction would be substantial in Lower East Creek but not at the floodprone locations along Upper East Creek.
4. East Creek Cecilia Way Culvert. Model simulations show that also replacing or upgrading the Cecilia Way culvert in combination with the Medium Plan, Greenwood Cove Drive culvert upgrading, and sewer crossing replacement, and rock-lined channel reconstruction (Medium Plan +1+2+3), would reduce flood WSEs at floodprone locations on Upper East Creek by as much as 0.3 feet. However, it is not clear that the WSE reduction would substantially reduce potential flood damages in the rear-yard areas of the affected Leland Way properties.
5. West Creek Tiburon Boulevard Culverts. Model simulations show that upgrading the 60"-diameter CMP West Creek Tiburon Blvd culverts would not achieve meaningful flood risk reduction. The WSE reductions occur within 200-250 feet upstream from the culvert inlet and do not appear to reduce risk of flood damage at floodprone locations on Lower or Upper West Creek.

Preliminary Flood Risk Reduction Alternatives

Flood Zone 4: East & West Creek

July 18, 2023

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Photo 14. Upper East Creek. Looking from Cecilia Way to the upstream end of the right bank concrete transition channel wall about 30 feet upstream from the Cecilia Way culvert road crossing (August 17, 2022). The stormwater drain hole in the wall discharges creek flow onto the street during routine or average annual high creek flows. Blocking the drain hole combined with surface drainage improvements for directing the concrete swale flows to existing storm drain inlets near the Cecilia-Leland Way intersection should be considered.

6. West Creek Cecilia Way culvert. Model simulations show that replacing or upgrading the West Creek Cecilia Way culvert, alone, or in combination with upgrading the Tiburon Blvd culverts would not achieve meaningful flood risk reduction on Upper West Creek, either in combination with Minimum Plan 2 or Medium Plan 3-2 channel improvements. The WSE reductions occur within 40-60 feet upstream from the culvert inlet and do not appear to reduce risk of flood damage at floodprone locations along Upper West Creek.

Still, for review and consideration by the Advisory Board, preliminary planning-level implementation cost estimates are developed for "Maximum Plans" that would combine replacement of the existing crossing infrastructure with the recommended Medium Plans for each creek.

7. Task 3 Preliminary Recommended Flood Risk Reduction Alternatives

According to the detailed hydraulic modeling evaluations documented in Section 4 and Section 5, a "Minimum", "Medium", and "Maximum" flood risk reduction design alternative is recommended for each creek:

	Minimum Plan	Medium Plan	Maximum Plan
East Creek	"Minimum Plan"	"Medium Plan"	"Medium Plan +1+2+3"
West Creek	"Minimum Plan 2"	"Medium Plan 3-2"	"Maximum Plan Med-3"

Summaries of each alternative are on the following pages. Also see Figures 1-6.

Preliminary Flood Risk Reduction Alternatives

Flood Zone 4: East & West Creek

July 18, 2023

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EAST CREEK

Preliminary Recommended Flood Risk Reduction Alternatives

Minimum Plan	Medium Plan	Maximum Plan
"Minimum Plan" (Plan 28) Figure 1	"Medium Plan" (Plan 32) Figure 2	"Medium Plan + 1+2+3" (Plan 40) Figure 3
<i>Status Quo.</i> District continues current program of periodic as needed vegetation and sediment removal from accessible reaches and according to the current permitted extents downstream and upstream from Cecilia Way culvert.	District obtains new permits to one-time extend channel maintenance 220-250 feet downstream from its current permitted limit. The one-time project would "restore" an adequate width and depth channel sloped 0.3% from the Cecilia Way culvert concrete floor to the grouted channel bed invert at the RBSD sanitary sewer crossing.	Same as Medium Plan.
	One-time sediment removal from within Cecilia Way concrete box culvert, open concrete box culvert transition upstream and from within the tree-covered natural channel reach bordering 100, 106, and 112 Leland Way.	Same as Medium Plan.
	<u>Plan Option:</u> Also restore the downstream 200 lineal feet of the top of bank flood barrier to provide added flood risk reduction for 100, 106, and 112 Leland Way.	Same as Medium Plan.
		Also: (1) District upgrades the 52"-diam. outfall culverts to 66"-diam. culverts; (2) RBSD modifies the sanitary sewer crossing to lower and widen the grouted rock-lined channel inlet; and, (3) Town replaces the Cecilia Way box culvert with a wider clear-span bridge or open bottom culvert with natural self-setting bed elevation.

Preliminary Flood Risk Reduction Alternatives

Flood Zone 4: East & West Creek

July 18, 2023

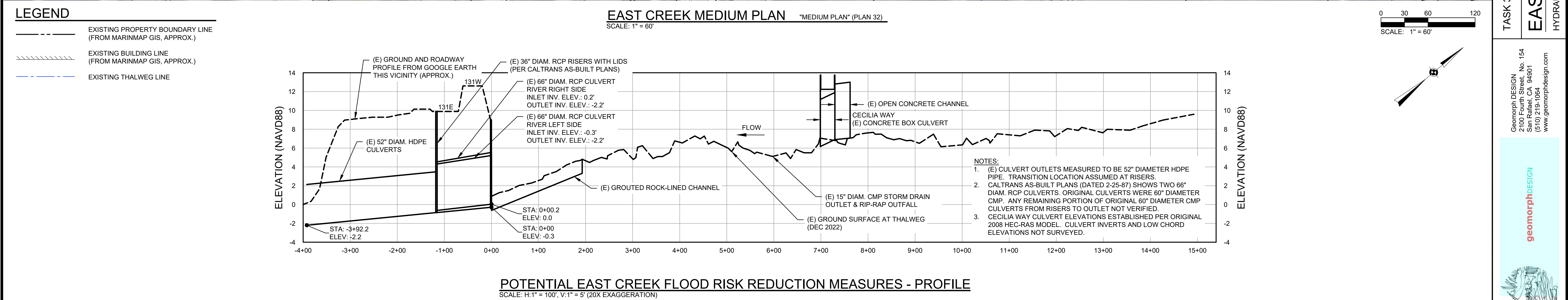
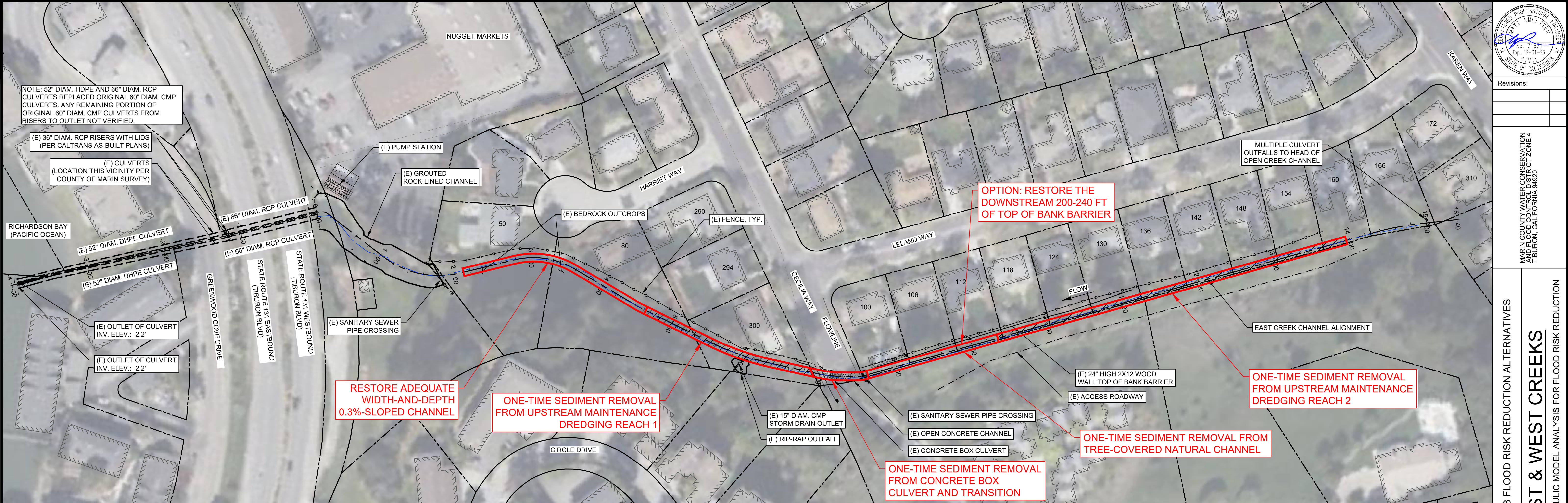
Page 35 of 35

WEST CREEK

Preliminary Recommended Flood Risk Reduction Alternatives

Minimum Plan	Medium Plan	Maximum Plan
"Minimum Plan 2" (Plan 47) Figure 4	"Medium Plan 3-2" (Plan 63) Figure 5	"Maximum Plan Med-3" (Plan 66) Figure 6
District would obtain new permits and implement one-time hand-work to remove about 100 CY of foreign rock and concrete materials accumulated in places along the length of the channel bed in an approximately 300-ft long of Lower West Creek and an approximately 400-ft-long reach of Upper West Creek, including minor bank shaping and biotechnical erosion protection in Upper West Creek.	Same as Minimum Plan 2.	Same as Medium Plan 3-2.
No tree removals.	Remove 4 Trees (#1, 2, 3, 4)	Same as Medium Plan 3-2.
	District would also remove the existing channel-spanning concrete storm drain outfall and restore adequate width-and-depth channel upstream and downstream from the replaced outfall with minimized rock lining and biotechnical bank erosion protection measures.	Same as Medium Plan 3-2.
	District would also remove the tree stumps from Trees #1,2,3,4 and repair the affected creek bank with combination vegetated rock slope protection to improve channel conveyance and bank stability.	Same as Medium Plan 3-2.
	<u>Plan Option:</u> Owners or District also install approximately 150 lineal feet minor top of bank flood barrier between Station 10+63' and 9+11'.	Same as Medium Plan 3-2.
		Also: (1) Caltrans upgrades the 60"-diam. Tiburon Blvd culverts to 66"-diam. culverts; and, (2) Town replaces the Cecilia Way box culvert with a wider or same-width natural with a natural, self-setting bed elevation.

Attachment 2
Preferred Alternative Exhibit



Professional Engineer
No. 71671
Exp. 12-31-23
CIVIL
STATE OF CALIFORNIA

Revisions:

MARIN COUNTY WATER CONSERVATION
AND FLOOD CONTROL DISTRICT ZONE 4
TIBURON, CALIFORNIA 94920

TASK 3 FLOOD RISK REDUCTION ALTERNATIVES

EAST & WEST CREEKS

HYDRAULIC MODEL ANALYSIS FOR FLOOD RISK REDUCTION

Geomorph DESIGN
2100 Fourth Street, No. 154
San Rafael, CA 94901
(510) 219-1064
www.geomorphdesign.com

17 JUL 2023

Design by:
MS

Drawn by:
BRS

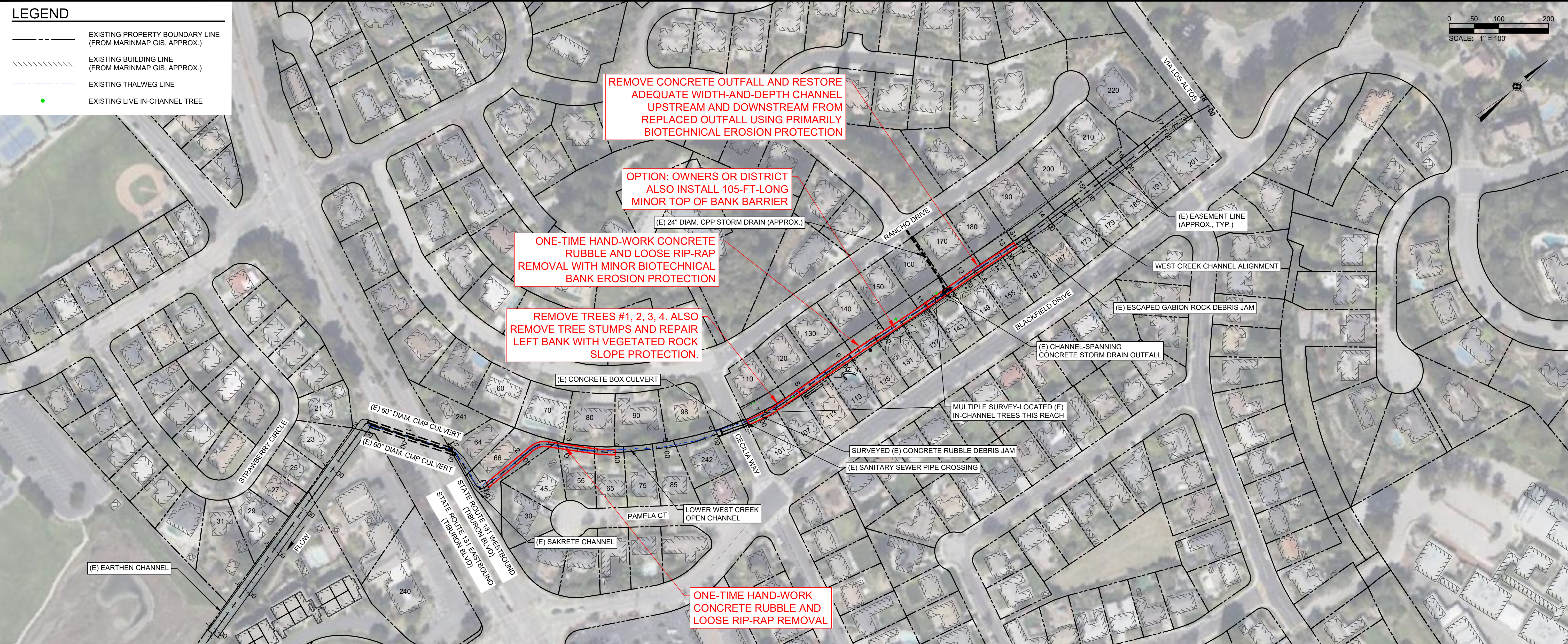
Checked by:
MS

Scale:
1" = 60', 1" = 100'

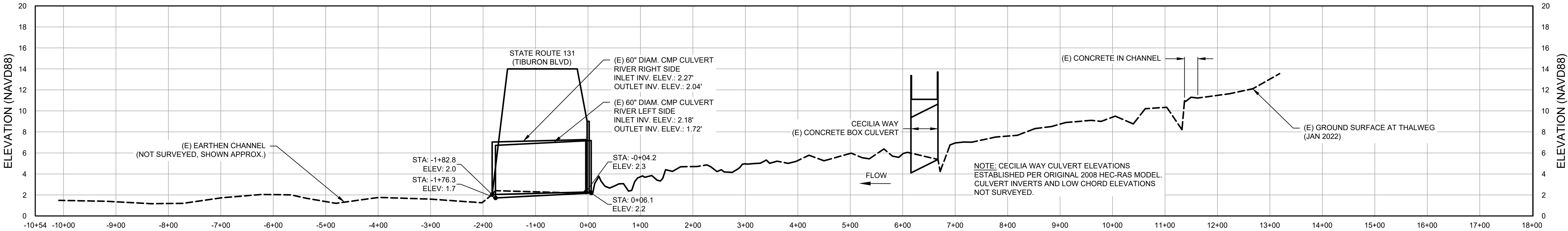
FIG.2

LEGEND

- EXISTING PROPERTY BOUNDARY LINE (FROM MARINMAP GIS, APPROX.)
- //// EXISTING BUILDING LINE (FROM MARINMAP GIS, APPROX.)
- - - EXISTING THALWEG LINE
- EXISTING LIVE IN-CHANNEL TREE



WEST CREEK MEDIUM PLAN "MEDIUM PLAN 2" (PLAN 63)
SCALE: 1" = 100'



POTENTIAL WEST CREEK FLOOD RISK REDUCTION MEASURES - PROFILE
SCALE: H:1" = 100', V:1" = 5' (20X EXAGGERATION)

Revisions:

NO.	DESCRIPTION	DATE

MARIN COUNTY WATER CONSERVATION
AND FLOOD CONTROL DISTRICT ZONE 4
TIBURON, CALIFORNIA 94920

TASK 3 FLOOD RISK REDUCTION ALTERNATIVES

EAST & WEST CREEKS

HYDRAULIC MODEL ANALYSIS FOR FLOOD RISK REDUCTION

Geomorph DESIGN
2100 Fourth Street, No. 154
San Rafael, CA 94901
(510) 218-1064
www.geomorphdesign.com

geomorphDESIGN

Date:
17 JUL 2023

Design by:
MS

Drawn by:
BRS

Checked by:
MS

Scale:
1" = 100'

FIG.5

Attachment 3

Sample Professional Services Contract

THIS CONTRACT is made and entered into this _____ day of _____, 20____, by and between the MARIN COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT, hereinafter referred to as "District" and _____, hereinafter referred to as "Consultant."

RECITALS:

WHEREAS, District desires to retain a person or firm to provide the following service: _____; and

WHEREAS, Consultant warrants that it is qualified and competent to render the aforesaid services;

NOW, THEREFORE, for and in consideration of the Contract made, and the payments to be made by District, the parties agree to the following:

1. SCOPE OF SERVICES:

Consultant agrees to provide all of the services described in **Exhibit A** attached hereto and by this reference made a part hereof.

2. FURNISHED SERVICES:

The District agrees to:

- A. Guarantee access to and make provisions for the Consultant to enter upon public and private lands as required to perform their work.
- B. Make available all pertinent data and records for review.
- C. Provide general bid and Contract forms and special provisions format when needed.

3. FEES AND PAYMENT SCHEDULE:

The fees and payment schedule for furnishing services under this Contract shall be based on the rate schedule which is attached hereto as **Exhibit B** and by this reference incorporated herein. Said fees shall remain in effect for the entire term of the Contract. Consultant shall provide District with his/her/its Federal Tax I.D. number prior to submitting the first invoice.

4. MAXIMUM COST TO DISTRICT:

In no event will the cost to District for the services to be provided herein exceed the maximum sum of \$ _____ including direct non-salary expenses. As set forth in section 14 of this Contract, should the funding source for this Contract be reduced, Consultant agrees that this maximum cost to District may be amended by written notice from District to reflect that reduction without prior written approval.

5. TIME OF CONTRACT:

This Contract shall commence on _____, and shall terminate on _____. Certificate(s) of Insurance must be current on day Contract commences and if scheduled to lapse prior to termination date, must be automatically updated before final payment may be made to Consultant. The final invoice must be submitted within 30 days of completion of the stated scope of services.

6. INSURANCE:

Commercial General Liability:

The Consultant shall maintain a commercial general liability insurance policy in the amount of \$1,000,000 (\$2,000,000 aggregate). The District and the County of Marin shall be named as an additional insured on the commercial general liability policy.

Commercial Automobile Liability:

Where the services to be provided under this Contract involve or require the use of any type of vehicle by Consultant, Consultant shall provide comprehensive business or commercial automobile liability coverage, including non-owned and hired automobile liability, in the amount of \$1,000,000.00.

Workers' Compensation:

The Consultant acknowledges the State of California requires every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of the Labor Code. If Consultant has

employees, a copy of the certificate evidencing such insurance, a letter of self-insurance, or a copy of the Certificate of Consent to Self-Insure shall be provided to District prior to commencement of work.

Errors and Omissions, Professional Liability or Malpractice Insurance.

Consultant may be required to carry errors and omissions, professional liability or malpractice insurance.

All policies shall remain in force through the life of this Contract and shall be payable on a "per occurrence" basis unless District specifically consents to a "claims made" basis. The insurer shall supply District adequate proof of insurance and/or a certificate of insurance evidencing coverages and limits prior to commencement of work. Should any of the required insurance policies in this Contract be cancelled or non-renewed, it is the Consultant's duty to notify the District immediately upon receipt of the notice of cancellation or non-renewal.

If Consultant does not carry a required insurance coverage and/or does not meet the required limits, the coverage limits and deductibles shall be set forth on a waiver, **Exhibit C**, attached hereto.

Failure to provide and maintain the insurance required by this Contract will constitute a material breach of this Contract. In addition to any other available remedies, District may suspend payment to the Consultant for any services provided during any time that insurance was not in effect and until such time as the Consultant provides adequate evidence that Consultant has obtained the required coverage.

7. ANTI DISCRIMINATION AND ANTI HARASSMENT:

Consultant and/or any subConsultant shall not unlawfully discriminate against or harass any individual including, but not limited to, any employee or volunteer of the District and the County of Marin based on race, color, religion, nationality, sex, sexual orientation, age or condition of disability. Consultant and/or any subConsultant understands and agrees that Consultant and/or any subConsultant is bound by and will comply with the anti discrimination and anti harassment mandates of all Federal, State and local statutes, regulations and ordinances including, but not limited to, County of Marin Personnel Management Regulation (PMR) 21.

8. SUBCONTRACTING:

The Consultant shall not subcontract nor assign any portion of the work required by this Contract without prior written approval of the District except for any subcontract work identified herein. If Consultant hires a subConsultant under this Contract, Consultant shall require subConsultant to provide and maintain insurance coverage(s) identical to what is required of Consultant under this Contract and shall require subConsultant to name Consultant, District, and County of Marin as an additional insured under this Contract for general liability. It shall be Consultant's responsibility to collect and maintain current evidence of insurance provided by its subConsultants and shall forward to the District evidence of same.

9. ASSIGNMENT:

The rights, responsibilities and duties under this Contract are personal to the Consultant and may not be transferred or assigned without the express prior written consent of the District.

10. LICENSING AND PERMITS:

The Consultant shall maintain the appropriate licenses throughout the life of this Contract. Consultant shall also obtain any and all permits which might be required by the work to be performed herein.

11. BOOKS OF RECORD AND AUDIT PROVISION:

Consultant shall maintain on a current basis complete books and records relating to this Contract. Such records shall include, but not be limited to, documents supporting all bids, all income and all expenditures. The books and records shall be original entry books with a general ledger itemizing all debits and credits for the work on this Contract. In addition, Consultant shall maintain detailed payroll records including all subsistence, travel and field expenses, and canceled checks, receipts and invoices for all items. These documents and records shall be retained for at least five years from the completion of this Contract. Consultant will permit District to audit all books, accounts or records relating to this Contract or all books, accounts or records of any business entities controlled by Consultant who participated in this Contract in any way. Any audit may be conducted on Consultant's premises or, at District's option, Consultant shall provide all books and records within a maximum of fifteen (15) days upon receipt of written notice from District. Consultant shall refund any monies erroneously charged.

12. WORK PRODUCT/PRE-EXISTING WORK PRODUCT OF CONSULTANT:

Any and all work product resulting from this Contract is commissioned by the District as a work for hire. The District shall be considered, for all purposes, the author of the work product and shall have all rights of authorship to the work, including, but not limited to, the exclusive right to use, publish, reproduce, copy and make derivative use of, the work product or otherwise grant others limited rights to use the work product.

To the extent Consultant incorporates into the work product any pre-existing work product owned by Consultant, Consultant hereby acknowledges and agrees that ownership of such work product shall be transferred to the District.

13. TERMINATION:

- A. If the Consultant fails to provide in any manner the services required under this Contract or otherwise fails to comply with the terms of this Contract or violates any ordinance, regulation or other law which applies to its performance herein, the District may terminate this Contract by giving five (5) calendar days written notice to the party involved.
- B. The Consultant shall be excused for failure to perform services herein if such services are prevented by acts of God, strikes, labor disputes or other forces over which the Consultant has no control.
- C. Either party hereto may terminate this Contract for any reason by giving thirty (30) calendar days written notice to the other parties. Notice of termination shall be by written notice to the other parties and be sent by registered mail.
- D. In the event of termination not the fault of the Consultant, the Consultant shall be paid for services performed to the date of termination in accordance with the terms of this Contract so long as proof of required insurance is provided for the periods covered in the Contract or Amendment(s).

14. APPROPRIATIONS:

The District's performance and obligation to pay under this Contract is contingent upon an annual appropriation by the Marin County Board of Supervisors, the State of California or other third party. Should the funds not be appropriated District may terminate this Contract with respect to those payments for which such funds are not appropriated. District will give Consultant thirty (30) days' written notice of such termination. All obligations of District to make payments after the termination date will cease.

Where the funding source for this Contract is contingent upon an annual appropriation or grant from the Marin County Board of Supervisors, the State of California or other third party, District's performance and obligation to pay under this Contract is limited by the availability of those funds. Should the funding source for this Contract be eliminated or reduced, upon written notice to Consultant, District may reduce the Maximum Cost to District identified in section 4 and correspondingly reduce the scope of work and deliverables to reflect that elimination or reduction.

15. RELATIONSHIP BETWEEN THE PARTIES:

It is expressly understood that in the performance of the services herein, the Consultant, and the agents and employees thereof, shall act in an independent capacity and as an independent Consultant and not as officers, employees or agents of the District. Consultant shall be solely responsible to pay all required taxes, including but not limited to, all withholding social security, and workers' compensation.

16. AMENDMENT:

This Contract may be amended or modified only by written Contract of all parties.

17. ASSIGNMENT OF PERSONNEL:

The Consultant shall not substitute any personnel for those specifically named in its proposal unless personnel with substantially equal or better qualifications and experience are provided, acceptable to District, as is evidenced in writing.

18. JURISDICTION AND VENUE:

This Contract shall be construed in accordance with the laws of the State of California and the parties hereto agree that venue shall be in the County of Marin, California.

19. INDEMNIFICATION:

Consultant agrees to indemnify, defend, and hold District, its employees, officers, and agents, harmless from any and all liabilities including, but not limited to, litigation costs and attorney's fees arising from any and all claims and losses to anyone who may be injured or damaged by reason of Consultant's negligence, recklessness or willful misconduct in the performance of this Contract.

20. COMPLIANCE WITH APPLICABLE LAWS:

The Consultant shall comply with any and all Federal, State and local laws and resolutions: including, but not limited to the County of Marin Nuclear Free Zone, Living Wage Ordinance, and Board of Supervisors Resolution #2005-97 prohibiting the off-shoring of professional services involving employee/retiree medical and financial data affecting services covered by this Contract. Copies of any of the above-referenced local laws and resolutions may be secured from the Contract Manager referenced in section 21. In addition, the following NOTICES may apply:

- 1. Pursuant to California Franchise Tax Board regulations, District will automatically withhold 7% from all payments made to vendors who are non-residents of California.**
- 2. Consultant agrees to meet all applicable program access, digital access and physical accessibility requirements under State and Federal laws as may apply to services, programs or activities for the benefit of the public.**
- 3. For Contracts involving any State or Federal grant funds, Exhibit D must be attached. Exhibit D shall consist of the printout results obtained by search of the System for Award Management at www.sam.gov.**

Exhibit D - Debarment Certification

By signing and submitting this Contract, the Consultant is agreeing to abide by the debarment requirements as set out below.

- The certification in this clause is a material representation of fact relied upon by District.
- The Consultant shall provide immediate written notice to District if at any time the Consultant learns that its certification was erroneous or has become erroneous by reason of changed circumstances.
- Consultant certifies that none of its principals, affiliates, agents, representatives or Consultants are excluded, disqualified or ineligible for the award of contracts by any Federal agency and Consultant further certifies to the best of its knowledge and belief, that it and its principals:
 - Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded by any Federal Department or Agency;
 - Have not been convicted within the preceding three-years of any of the offenses listed in 2 CFR 180.800(a) or had a civil judgment rendered against it for one of those offenses within that time period;
 - Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State, or Local) with commission of any of the offenses listed in 2 CFR 180.800(a);
 - Have not had one or more public transactions (Federal, State, or Local) terminated within the preceding three-years for cause or default.
- The Consultant agrees by signing this Contract that it will not knowingly enter into any subcontract or covered transaction with a person who is proposed for debarment, debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction.
- Any subConsultant will provide a debarment certification that includes the debarment clause as noted in preceding bullets above, without modification.

21. NOTICES:

This Contract shall be managed and administered on District's behalf by the Department Contract Manager named below. All invoices shall be submitted and approved by this Department and all notices shall be given to District at the following location:

Contract
Manager:

Dept./Location: Department of Public Works
P. O. Box 4186
San Rafael, CA 94913-4186

Telephone No.:

Notices shall be given to Consultant at the following address:

Consultant:

Address:

Telephone
No.:

22. ACKNOWLEDGEMENT OF EXHIBITS

Check applicable Exhibits

**CONSULTANT'S
INITIALS**

EXHIBIT A.

<input type="checkbox"/>	Scope of Services	
<input type="checkbox"/>	Fees and Payment	
<input type="checkbox"/>	Insurance Reduction/Waiver	
<input type="checkbox"/>	Consultant's Debarment Certification	
<input type="checkbox"/>	SubConsultant's Debarment Certification	
<input type="checkbox"/>	Federal Provisions Exhibit / Attachment 1	
<input type="checkbox"/>		
<input type="checkbox"/>		

EXHIBIT B.

EXHIBIT C.

EXHIBIT D.

EXHIBIT E.

EXHIBIT F.

EXHIBIT .

EXHIBIT .

IN WITNESS WHEREOF, the parties have executed this Contract on the date first above written.

CONSULTANT:

**APPROVED BY
MARIN COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT:**

By: _____
Name: _____
Title: _____

By: _____

DISTRICT COUNSEL REVIEW AND APPROVAL (required if template content has been modified)

District Counsel: _____ **Date:** _____

EXHIBIT "A"
SCOPE OF SERVICES (required)

EXHIBIT "B"
FEES AND PAYMENT SCHEDULE (required)

Attachment 4

Geospatial Data Contract Deliverables Guidelines

**GEOSPATIAL DATA CONTRACT DELIVERABLES GUIDELINES
MARIN COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
(updated 01/19/2022)**

1. PURPOSE and SCOPE

The Marin County Flood Control and Water Conservation District (District) strives to improve service delivery, increase efficiencies, and standardize and centralize data. Setting forth the District's expectations for geospatial data delivery will help us achieve these goals.

This document provides guidance to consultants, contractors, partners, and any others who provide geospatial data to District projects, programs, or staff. It provides guidance on recommended formats and associated documentation for delivering geospatial data and related information. This document is intended as general guidance; individual projects may require modifications or enhancements to these guidelines. District project managers and consultants are encouraged to work together to set and manage expectations for geospatial data deliverables.

2. OVERVIEW

There are several ways to represent geospatial data, including vector data (points, lines, polygons), rasters/images, and tabular data with spatial coordinates. Appropriate representations will vary depending on the type of data and the scope and goals of the contract or project. Data formats should be clearly stipulated and agreed upon among contractors or partners and the District. Questions about data representation and format should be addressed and resolved in consultation with the project manager and GIS data specialist prior to data collection, assembly, and processing.

The District uses Esri ArcGIS software and Autodesk AutoCAD (computer aided design) software. Data deliverables in formats compatible with these are preferred. Recommended data formats are specified in Item 3 below.

All geospatial files submitted to the District must include spatial reference information that identifies the coordinate system/projection, datum, and units of measure. Recommended and required spatial reference parameters are specified in Item 4 below.

All data submitted to the District must be accompanied by associated metadata that provides all necessary information for understanding the submittal, as described in Item 5 below.

3. RECOMMENDED GEOSPATIAL DATA FILE FORMATS

The following data file formats are recommended:

Vector Data

- Esri File Geodatabase (.gdb)
- Shapefile (.shp)
- AutoDesk AutoCAD drawing files (.dwg)

Raster Data/Aerial Imagery

- Esri File Geodatabase Raster (.gdb)
- TIFF image as a GeoTIFF or with world reference file (.tif, .tiff)
- JPEG image with world reference file (.jpg, .jpw)

LiDAR Point Cloud Data

- LAS file (.las)
- LAS dataset (.lasd)

Tabular Data

- Microsoft Excel (.xlsx)
- Tab or comma-delimited text files (.txt, .csv)

Map Deliverable

- Esri ArcMap Document (.mxd)
- Esri ArcMap Package (.mpk)
- Esri ArcGIS Pro Project (.aprx)
- Esri ArcGIS Pro Project Package (.ppkx)

Other data formats may be acceptable under some circumstances but should be Esri supported file formats ([ArcGIS supported data formats](#); [ArcGIS supported raster and image formats](#)). Consultants should check with the project manager and GIS data specialist whether other formats can be accepted.

Simple attribute data should be included as part of the ArcGIS attribute table. Complex attributes should be delivered in a well-structured relational Esri file geodatabase. Spatial features and database records must share a common field with identifier that relates the spatial feature to the table record. Associated tabular data files may be provided to connect geospatial feature locations with additional attribute information; primary and foreign keys to create the data connection must be clearly identified and documented. (Note: It is not acceptable to link geospatial features to tables using ObjectID.)

CAD drawing files should include meaningful and interpretable layer names; otherwise, a key to layer names should accompany the data. It may be necessary to deliver certain CAD data files in two versions: one complete to be read by AutoCAD, and one to be read by Esri

GIS software, in which non-geographic elements such as drawing borders, title blocks, north arrows, and detail drawings are not included.

LiDAR LAS files should include point classification as defined by the American Society for Photogrammetry and Remote Sensing (ASPRS) standards ([ASPRS LAS file format](#)).

For maps created in GIS, the GIS project files should be delivered as Esri ArcMap Package (.mpk) or Esri ArcGIS Pro Project Package (.aprx) files, which include map(s) with the symbology and layout(s) used in the final map(s) along with copies of all the spatial data in the map included. Raster data/aerial imagery with large file size can cause issues with map packaging and should not be embedded in ArcMap Packages / ArcGIS Pro Project Packages. Instead, include raster data/aerial imagery files in a separate directory and provide information to link these files to the map document / project after extraction. Esri ArcMap documents (.mxd) or ArcGIS Pro projects (.aprx) with spatial data in a stand-alone directory structure may also be delivered. Map documents / projects must use relative paths and must not use printer-specific page settings.

Maps for display (i.e. PDF, JPEG, PowerPoint, or hard copy) should accompany map deliverables as reference documents, but they are not considered geospatial data deliverables.

4. SPATIAL REFERENCE REQUIREMENTS

All electronic geospatial data must have a spatial reference defined and embedded in, or associated with, the data file. If not readable by Esri software, it must be listed in a document with complete spatial reference information (coordinate system/projection, parameters, and datum). If elevation data is included, vertical datum and unit of measure must be specified. In the case of CAD data, the spatial reference must be a commonly used regional or national coordinate system. CAD data that is in page space or a custom site-specific coordinate system is not acceptable.

The preferred horizontal coordinate system for vector data is:

Projection: California State Plane, Zone III
Datum: North American Datum 1983 HARN
Units: Foot_US (i.e. "survey foot")
(WKID: 2872 Authority: EPSG)

Raster data including aerial photography may be submitted in their native projection/coordinate system.

Elevation data (surveyed elevations or topographic surface data) must be referenced to the North American Vertical Datum (NAVD) 1988.

If spatial coordinate information is provided in tabular format, at a minimum it should include the attribute fields below, along with complete spatial reference information.

- ID – a unique identifier given to each feature
- Y coordinate (if Latitude, in decimal degrees with 6 significant digits)
- X coordinate (if Longitude, in decimal degrees with 6 significant digits)

5. METADATA REQUIREMENTS

All data submitted must be accompanied by associated metadata that provides all necessary information for understanding the submittal. The District strongly encourages preparation of metadata using Esri ArcCatalog or ArcGIS Pro, or in a format that can be easily imported into ESRI software. The metadata should be located in the same directory as the data file, share the same naming prefix and, when appropriate, be embedded with or attached to the data. For any data files that do not support ESRI metadata, provide relevant information in an associated and clearly identified document file such as Microsoft Word, text file, or similar document.

A metadata document describing the entire dataset should accompany the submittal and at a minimum include:

- List of each file contained in the submittal
- Narrative description of the contents of the dataset, including all spatial data, related tables, and map deliverables
- Version and date of the submittal
- Information on sensitive data issues (if any)
- A short description of data themes (limited to one to two sentences for each theme)
- Linking fields (to documents, digital photographs, web content, etc.)
- Description of QA/QC procedures used to assess the data including measures of spatial accuracy and precision

Metadata for each individual data file should at a minimum include:

- Narrative description (Abstract), with source of input data, collection methods, equipment used, and appropriate scale for use
- Process information including how and when the data were collected, assembled, and/or updated and by whom, equipment and methods used, and any other relevant information
- Complete descriptions of all codes and all other information in the attribute fields
- Contact information for person who collected and/or prepared the geospatial data
- Statement about any issues with the data, including any assumptions, appropriate uses, data sensitivity, or any other relevant statement about how the data should or should not be used.

6. FILE NAMING CONVENTIONS

Clear, short, and descriptive file and attribute field names should be used that convey the nature of the data and subject represented. Names should not contain spaces or special characters but may contain underscores. (Note: Long file and path names of more than 128 characters may not allow backup onto computer or external hard drives.) File names must be unique, complete, and interpretable outside of the file structure.

7. DATA DELIVERY

Data submittals should be delivered via electronic data transfer (e.g. email attachment, file sharing site, etc.), or physical storage device (e.g. USB Flash Drive or external hard drive). The choice of delivery method should be based on the total file size of the submittal. Physical storage device delivery should be used if digital transfer is not feasible due to file size and/or upload-download time.

8. REFERENCES

EPA Geospatial Advisory Committee. (2020-09-15). *National Geospatial Deliverable Standard*. U.S. Environmental Protection Agency. Retrieved 2022-01-11 from <https://www.epa.gov/sites/default/files/2020-10/documents/nationalgeospatialdeliverablestandard.pdf>

County of Marin Department of Public Works, Water Resources Division. (2019-05-09). *DPW_ GUIDELINES FOR SUPPLYING GIS DELIVERABLES.pdf*.

Attachment 5

A-E Contractor Statement of Technical Review

A-E CONTRACTOR STATEMENT OF TECHNICAL REVIEW

The District's A-E Contractor _____ (*insert company name*) has completed the _____ (*insert deliverable/type of product*) of _____ (*project name and location*). Notice is hereby given that a technical review, that is appropriate to the level of risk and complexity inherent in the project, has been conducted. During the technical review, compliance with the A-E Contractor's scope of services, established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions; methods, procedures, and material used in analyses; alternatives evaluated; the appropriateness of data used and level obtained; and reasonableness of the result, including whether the product meets the District's needs consistent with law and existing County of Marin and District policy.

The technical review was accomplished by _____ (*insert name of technical reviewer*). All comments resulting from review have been resolved.

(Signature)
Technical Reviewer

(Date)

(Signature)
Project Manager

(Date)