Malibu City Council  
Environmental Sustainability Subcommittee  
Special Meeting Agenda  
Tuesday, September 3, 2019  
1:00 P.M.

City Hall – Multipurpose Room  
23825 Stuart Ranch Road

Mayor Jefferson Wagner  
Councilmember Skylar Peak

Call to Order

Approval of Agenda

Report on Posting of the Agenda – August 27, 2019

Public Comment  This is the time for the public to comment on any items not appearing on this agenda. Each public speaker shall be allowed up to three (3) minutes for comments. The Subcommittee may not discuss or act on any matter not specifically identified on this agenda, pursuant to the Ralph M. Brown Act.

Staff Updates

Discussion Items

1. Approval of Minutes – May 13, 2019

   Recommended Action: Approve the minutes of the Environmental Sustainability Subcommittee Special meeting of May 13, 2019.

   Staff contact: Administrative Assistant Nelson-Brown, 456-2489, ext. 274

2. Coastal Vulnerability Assessment

   Recommended Action: Provide a recommendation to the City Council concerning the Coastal Vulnerability Assessment consultant.

   Staff Contact: Environmental Sustainability Analyst Shen, 456-2489, ext. 376
Adjournment

I hereby certify under penalty of perjury, under the laws of the State of California, that the foregoing agenda was posted in accordance with the applicable legal requirements. Dated August 27, 2019, at 4:15 p.m..

[Signature]

Rebecca Nelson-Brown, Administrative Assistant
Environmental Sustainability Subcommittee Agenda Report

To: Mayor Wagner and Councilmember Peak
Prepared by: Mary Linden, Executive Assistant
Approved by: Reva Feldman, City Manager
Date prepared: August 26, 2019
Meeting date: September 3, 2019
Subject: Approval of Minutes – May 13, 2019

RECOMMENDED ACTION: Approve the minutes of the Environmental Sustainability Subcommittee Special meeting of May 13, 2019.

DISCUSSION: Staff has prepared draft minutes for the Environmental Sustainability Subcommittee Special meeting of May 13, 2019 and hereby submits the minutes to the Subcommittee for approval.

ATTACHMENTS: Draft Minutes of the May 13, 2019 Environmental Sustainability Subcommittee Special meeting
CALL TO ORDER

Mayor Wagner called the meeting to order at 2:15 p.m.

ROLL CALL

The following persons were recorded in attendance by the Recording Secretary:

PRESENT: Mayor Jefferson Wagner and Councilmember Skylar Peak

ALSO PRESENT: City Manager Reva Feldman; Community Services Director Jesse Bobbett; Environmental Sustainability Director Craig George; Environmental Programs Coordinator Shea Cunningham; Environmental Sustainability Analyst Christine Shen; Community Services Deputy Director Kristin Riesgo; Environmental Programs Coordinator Mark Johnson; and Executive Assistant Mary Linden

APPROVAL OF AGENDA

MOTION Councilmember Peak moved and Mayor Wagner seconded a motion to approve the agenda. The motion carried unanimously.

REPORT ON POSTING OF AGENDA

Executive Assistant Linden reported that the agenda for the meeting was properly posted on May 8, 2019.

DISCUSSION ITEMS

ITEM 1 Approval of Minutes – January 22, 2018
Staff recommendation: Approve the minutes of the Environmental Sustainability Subcommittee Special meeting of January 22, 2018.

MOTION Councilmember Peak moved and Mayor Wagner seconded a motion to approve the minutes of the Environmental Sustainability Subcommittee Special meeting of January 22, 2018. The motion carried unanimously.

ITEM 2 Earth Friendly Management Policy (EFMP)
Recommended Action: 1) Review the proposed Draft Earth Friendly Management Policy and the original Draft Earth Friendly Management Policy submitted by Poison Free Malibu; and 2) Provide a recommendation
to the City Council concerning adoption of an Earth Friendly Management Policy.

Community Services Director Bobbett presented the report. He discussed the Community Services Department’s activities related to management of pests at City parks and facilities. He stated the Department had supported and complied with the Council’s direction to fully ban the use of pesticides and rodenticides at City parks and facilities. He discussed concerns with trapping at parks, burrows, and ground rodents. He suggested the Subcommittee recommend the Council keep emergency language in the Draft Earth Friendly Management Policy allowing the temporary use of trapping or pesticides during an emergency or circumstances related to public welfare, public safety or the protection of public facilities, as declared by the City Manager, City Council or the Los Angeles County Department of Public Health. He clarified those temporary measures would only be applied with Council authorization and were needed to protect the City from liability during an emergency or circumstance related to the public welfare, public safety or the protection of public facilities.

Councilmember Peak stated his intention was to get this passed as soon as possible. He stated it was unfortunate it had not been accomplished sooner.

June Louks thanked the Subcommittee for acknowledging the time that has lapsed since the issue was first addressed. She stated the school district had assured the community that no more pesticides would be allowed at Malibu High School except for rare exceptions, but instead it had become a daily habit. She express support for the Poison Free Malibu (PFM) policy.

Joel Schulman deferred his time to Kian Schulman.

Kian Schulman presented information on the PFM-proposed policy. She stated synthetic pesticides proposed by staff included poisons that could lead to serious health problems. She discussed the death of P-47, a recently deceased mountain lion. She reiterated that she did not want herbicides and pesticides to be used. She discussed the history of the EFMP process. She requested the Parks and Recreation Commission be tasked with oversight of the policy.

Patt Healy indicated support for the EFMP prepared by PFM. She stated Malibu could help in small ways to reduce danger to the whole earth. She read from a Time Magazine article about serious damage to the planet’s plants and species caused by people.

Keegan Gibbs supported PFM’s work on the EFMP. He stated exemptions for unforeseen causes should not exist. He stated it was important to draw
the line. He commended the Council for being earth friendly. He expressed concern that allowing exemptions opened the door for future Councils to allow the use of pesticides. He stated the trash bin lid lock ordinance was related to the cause of rodent issues.

Sherman Baylin stated she fully supports PFM. She stated exemptions were loopholes for future killing. She suggested Malibu Strong should include no to pesticides, no to killing, and yes to implementing the PFM EFMP. She thanked Ms. Schulman.

Linda Gibbs stated she supported only the PFM plan and did not support any exemptions. She stated states across the country were passing healthy soils acts and California’s act was tied to carbon credit programs. She stated everything done to the surface of the soil affected the health of the entire ecosystem. She recommended the City follow the five healthy soils principles. She supported adopting the EFMP proposed by PFM as written or to make it stronger by adding the five healthy soils principles.

Judy Villalba expressed strong support for the PFM policy with no exemptions and including oversight. She stated the dumpster lock ordinance needed to be implemented. She requested staff provide a timetable for implementation and that the City Manager provide updates to the Council.

Lance Simmens discussed 18 principles in the previous PFM policy. He suggested those 18 principles be incorporated in the City policy. He discussed his involvement in the Office of Sustainable Government. He stated there was no greater crisis facing humanity than environmental degradation. He stated we must do anything in our power to ensure our children’s lives are at least as good as or better than we had.

In response to Councilmember Peak, Ms. Schulman stated there were 10 comments that needed to be brought back into the City policy. She stated the main concern was the City’s return to synthetics. She expressed disappointment that the oversight committee had been demolished. She thanked Environmental Sustainability Director George for providing the framework for the PFM policy. She suggested adding earth friendly and green language for a unified policy.

Councilmember Peak suggested staff incorporate PFM’s requests into the policy and have it placed on the next City Council agenda.

Mayor Wagner commended PFM for the support expressed at today’s meeting. He thanked Environmental Sustainability Director George for working with PFM.
Councilmember Peak thanked staff for its work on the policy.

Environmental Sustainability Director George thanked Ms. Schulman. He stated staff supported being poison free but acknowledged differences in how the policy would be implemented and how the program would operate.

Councilmember Peak suggested staff prepare a pamphlet that people would have to sign when applying for any conditional permits issued by the City stating that no pesticides or rodenticides would be used, all dumpsters would have locks, and acknowledging that violations would result in revoking the permit.

Environmental Sustainability Director George stated that type of permit restriction would have to be reviewed by the City Attorney regarding enforceability.

Councilmember Peak stated he would want it to only be a condition for permits, including building permits or restaurant operational permits.

Mayor Wagner suggested language in initial study include that there would be no grandfathering on leases of City properties. He stated conditional permit requirements would transfer to any new leaseholder.

ITEM 3 Enhanced Dumpster Enforcement Program

Recommended Action: 1) Receive a report on the Enhanced Dumpster Enforcement Program, which addresses the issue of sanitary conditions in and around trash enclosure areas; and 2) Provide a recommendation to the City Council on enforcement of dumpster regulations of Malibu Municipal Code (MMC) Chapter 8.32, Solid Waste and Recyclable Materials, through the Enhanced Dumpster Enforcement Program.

Environmental Sustainability Director George stated the current ordinance allowed the City Manager to require locks on dumpsters. He stated it could be included in a review of the Clean Bay Restaurant program. He stated the program had been reviewed with PFM and the City’s waste companies. He stated there were pitfalls for enforcement if all bins were required to be locked.

Environmental Sustainability Analyst Shen presented the report. She stated the goal of the program was to improve cleanliness, prevent the presence of rodents, and discourage the use of poisons. She explained the current MMC regulations. She stated poor best management practices (BMP) in the field were often the result of businesses trying to cut costs. She stated the problems would not be completely resolved with locks. She expressed the need for proper training. She stated staff recommended the enhanced
program, which stressed education and enforcement, with locks required on a case by case basis. She stated all commercial property owners and businesses had been sent letters, and staff visited over 56 businesses since last summer. She thanked the City’s haulers for working with staff to help identify problem businesses. She introduced Mike Smith of Waste Management and Gabriel Chavez of Universal Waste Systems.

Gabriel Chavez, Universal Waste Systems, applauded PFM for its work to eradicate poisons in the City. He commended Malibu for being a pacesetter for environmental issues. He stated one of biggest issues for haulers was rats around bins. He discussed the lack of education and training, and the need for stronger enforcement of existing policy. In response to Councilmember Peak, Mr. Chavez stated metal lids were problematic, as they were easily damaged or bent and were more likely to cause injuries. He stated the metal lids were also too heavy for many individuals to lift, which led to waste being left on top of or next to the closed bins.

Mike Smith, Waste Management Director of Operations, commended the hard work already done by the City and residents. He stated locked lids at facilities with multiple employees and multiple shifts were not consistently managed. He agreed with Mr. Chavez that metal lids were very heavy and also very loud. He stated he would continue to work with City staff and share information with Waste Management drivers. He agreed education was necessary. He stated Waste Management would charge for clean-up and would send the information to the City.

Linda Gibbs agreed about the importance of not providing food for rats. She stated roll bars helped locked lids fit more tightly. She suggested better quality, rat-proof plastic bins and lids because they did not warp and helped prevent rodents from chewing through the bins.

Ms. Schulman discussed her work with 10 cities on this issue. She stated the primary cause of rats was unlimited food supply due to poor bins and management. She stated she visited every business in Malibu about closing lids. She discussed problems from turnover of employees and management. She discussed unauthorized access to the bins. She stated gaps between lids and bins and overstuffing were the main problems. She agreed with Ms. Gibbs about requiring locks and roll bars.

Jeff Peterson, Geoffrey’s Restaurant, stated he used snap traps at home and work. He stated boxes must be broken down to keep lids closed. He stated he believed rats accessed the bins more from holes in the bottom than from the top. He stated nothing should be left on the ground. He stated owners and managers must stay on top of their employees.
Councilmember Peak agreed employee education was important. He asked how bins were provided to businesses and restaurants and if food waste was required to be separated. Mr. Gomez explained requirements for food waste separation. Councilmember Peak suggested requiring cardboard containers.

Mr. Smith discussed State and local requirements for recycling. He discussed the City’s food waste program. He stated most locations in Malibu did not have sufficient space for the required bins and enclosures.

Councilmember Peak expressed concern about response from local businesses to the new lid lock ordinance and related fines. He suggested bins be labeled with what goes in the bin and a phone number to call if a bin was overloaded. He questioned if there would be a fine for overloading bins.

Mayor Wagner stated an education program like the Clean Bay Restaurant program was necessary. In response to Mayor Wagner, Mr. Smith agreed with allowing customers to increase service rather than paying fines. He stated employers needed to train new employees. He stated mixed waste bins with open lids created problems with rodents. He stated most customers added locks to prevent others from using their bins. He agreed that roll bars were helpful. He stated he agreed with the proposed program.

Councilmember Peak suggested requiring locking lids that must be locked during non-operating hours for any establishment with food products. He expressed concern that it would result in people placing waste on top of the locked bins.

In response to Councilmember Peak, Mr. Peterson stated leaving bins unlocked during business hours would be preferred.

Environmental Sustainability Director George stated staff was working with the haulers to have truck drivers report to the City about non-compliance. He agreed with Mr. Smith that many businesses did not have enough space for dumpsters, and many more did not have sufficient space to place dumpsters in enclosures.

Councilmember Peak reiterated his suggestion to require locking lids on any bins where food products are sold and that they be required to be locked during non-business operating hours. He stated that would prevent people from rifling through dumpsters. He acknowledged challenges businesses faced with inadequate space and educating staff.

Mr. Chavez discussed the problems of people placing trash on or next to nearby trash bins when bins were locked or overloaded. He suggested further enforcement of State laws, especially with relation to food waste...
disposal. In response to Environmental Sustainability Director George, Mr. Chavez stated it was possible to require locks only on food or organic waste bins. He noted that people usually did not go through organic waste bins.

Environmental Sustainability Analyst Shen stated the City looked out for organic waste recycling and referred businesses to the waste haulers.

Councilmember Peak recommended the approval of the Enhanced Dumpster Enforcement Program for enforcement of the City’s dumpster regulations with the addition of requiring any food establishment to have a food waste recycling program.

Mayor Wagner asked if the Clean Bay Restaurants program met the requirements of State law.

Councilmember Peak recommended signage be placed on every steel waste bin, including those at construction sites, and that those bins must be closed.

Environmental Sustainability Director George stated building inspectors issued notices of violation (NOV) at construction sites for bins with no lids.

Mr. Chavez discussed a site visit regarding an NOV sent to a property management company. He stated the management company responded with photos. He stated the site was cleaned up the next day, but lids were left propped open. He reiterated the need for educating tenants and employees.

In response to Councilmember Peak, Mr. Smith said decals worked fine on bins.

Councilmember Peak suggested including images on the decals with instructions in both English and Spanish. He stated businesses eventually would realize a cost savings from keeping bins and enclosures clean.

Mr. Smith stated they would check every restaurant to establish how many needed locking bins.

Mayor Wagner commended Mr. Peterson and Mr. Chavez.

Ms. Schulman stated food markets and shopping malls needed to be contained.

Joel Schulman expressed concern about enforcement. He stated haulers should not be responsible. He suggested fines would be the City’s best tool. He requested the City report back in six months.
Councilmember Peak stated the program had to be approved by the City Council and may include quarterly reports. He thanked Mr. Smith and Mr. Chavez for their assistance with education.

Ms. Schulman stated overstuffing was a constant problem, and the only solution was a roll bar and lock.

Councilmember Peak restated that dumpsters with locks and roll bars should be locked during non-business hours at all food establishments, including shopping centers with food establishments. He suggested enforcement should be a warning first and then a fine. Environmental Sustainability Director George confirmed that was how the proposed program was set up.

Mr. Chavez stated many larger restaurants had multiple 32- to 64-gallon food waste bins. For example, he stated Duke’s has nine of each size.

Councilmember Peak stated trash and recycling bins should be the focus.

Mr. Smith agreed with Mr. Chavez that problem areas were shopping centers with multiple businesses, each with multiple employees. He stated not all employees were educated or using equal care.

Councilmember Peak stated education was the tenants’ responsibility. In response to Councilmember Peak, Mr. Chavez stated multiple locks on a bin would be a problem.

Environmental Sustainability Analyst Shen requested clarification of whether the Subcommittee wanted to move away from the three-step approach and require locks.

Councilmember Peak suggested presenting two options to the Council. He stated he wanted to avoid too much staff time.

Mr. Smith stated the three-step approach was the best way to ease businesses into the program.

Councilmember Peak discussed the connection between trash bins and the EFMP. He suggested making clean and sanitary trash areas a requirement for Clean Bay Restaurant certification.

Mayor Wagner agreed with making that a requirement for Clean Bay certification.
CONSENSUS

By consensus, the Subcommittee recommended adding compliance with MMC 8.32.660 – Containers, Commercial and Industrial, requiring clean and sanitary trash areas as a mandatory criterion for Clean Bay Restaurant certification.

ITEM 4

Presentation on Malibu Smart – Proposition 84 Integrated Regional Water Management Comprehensive Water Conservation Project

Recommended Action: Receive and file presentation on Malibu Smart, Proposition 84 Integrated Regional Water Management Comprehensive Water Conservation Project.

Environmental Sustainability Analyst Shen introduced the item. Maureen Erbeznik, Dick Jones Communications, consultant for West Basin Municipal Water District, presented an overview of the Malibu Smart program.

Councilmember Peak requested that numbers be broken down by acre and type of property for better comparison.

Ms. Erbeznik discussed the firescaping educational initiative.

Councilmember Peak requested the initiative be offered in both English and Spanish.

Ms. Erbeznik discussed rebates that were currently available. She stated they were looking for influencers in the community who would work with them to get the information out to the community.

Councilmember Peak requested the consultants speak to the Council at a Council meeting.

CONSENSUS

By consensus, the Subcommittee received and filed the presentation on Malibu Smart, Proposition 84 Integrated Regional Water Management Comprehensive Water Conservation Project.

ADJOURNMENT

MOTION At 3:57 p.m., Councilmember Peak moved and Mayor Wagner seconded a motion to adjourn the meeting. The motion carried unanimously.
Approved and adopted by the Environmental Sustainability Subcommittee of the City of Malibu on September 3, 2019.

______________________________
JEFFERSON WAGNER, Mayor

ATTEST:

______________________________
MARY LINDEN, Executive Assistant
To: Mayor Wagner and Councilmember Peak  
Prepared by: Christine Shen, Environmental Sustainability Analyst  
Reviewed by: Andrew Sheldon, Acting Environmental Sustainability Director  
Approved by: Reva Feldman, City Manager  
Date prepared: August 20, 2019  
Meeting date: September 3, 2019

Subject: Coastal Vulnerability Assessment

**RECOMMENDED ACTION:** Provide a recommendation to the City Council concerning the Coastal Vulnerability Assessment consultant.

**DISCUSSION:** On January 22, 2018, the City Council directed staff to issue a Request for Proposals (RFP) for a Coastal Vulnerability Analysis consultant to determine susceptibility of the coastline to the effects of climate change, including beach erosion. After drafting the Coastal Vulnerability Assessment scope of work and researching costs of other cities' assessments, staff sought Council’s direction and approval of funding before issuing the RFP.

On April 24, 2019, City Council directed staff to add funding to the Proposed Budget for Fiscal Year 2019-2020 for a Coastal Vulnerability Assessment. On July 20, 2019, an RFP for a consultant for a Coastal Vulnerability Assessment was distributed. The consultant’s work would include sea level rise hazard analysis, coastal resources assessment, economics and fiscal impacts review, and adaptation strategies and policies. The RFP outlined the scope of work for the disciplines requested by the City. The RFP required applicants to enumerate the firm’s capabilities and experience in providing these requested services. In addition, identification of primary personnel for each firm was required. The City received a proposal from two firms: Moffatt & Nichol, and Environmental Science Associates (ESA).

Staff reviewed the proposals from the two firms and invited both firms to participate in qualification interviews. These interviews were conducted at City Hall on July 30, 2019. The interview panel consisted of Environmental Sustainability Director Craig George,
Environmental Sustainability Analyst Christine Shen, Associate Planner Jessica Colvard, and Garrett Wong, Senior Sustainability Analyst for the City of Santa Monica. Each firm’s interview presentation and RFP package were evaluated, and weighted scores based on the criteria listed in the RFP were applied to each firm. The evaluation produced a decision with ESA as the top ranked firm.

Although both firms’ teams are highly qualified to provide Malibu’s Coastal Vulnerability Assessment, having completed multiple assessments for cities along the coast, ESA’s proposal included a more robust public engagement section that staff believes will be crucial to communicate sensitive sea level rise information to the community.

After the panel’s evaluation, staff requested ESA to return with a revised proposal that was within the City’s budget and timeframe of 12 months. Based on the qualifications and experience in the RFP package, the timeframe and cost of the revised RFP package, and the quality of service that would be provided, staff suggests a contract be entered into with ESA.

ATTACHMENTS:
1. Coastal Vulnerability Assessment RFP
2. ESA’s Proposal to Provide Coastal Vulnerability Assessment
3. Moffatt & Nichol Proposal to Provide Coastal Vulnerability Assessment
City of Malibu
Request for Proposal

Coastal Vulnerability Assessment

Date Issued: June 20, 2019
Date Due: July 19, 2019

All questions regarding the Request for Proposal / Qualifications (RFP/Q) must be submitted in writing. Please send all questions regarding this Request for Proposal in writing via email to Tracey Rossine, Administrative Analyst, at trossine@malibucity.org or fax to (310) 456-3356.
Section I - Introduction

A. Purpose for Request for Proposal (RFP): The City of Malibu is interested in contracting with a highly qualified consulting firm experienced in sea-level rise (SLR) analysis and technical assessments to assist with the comprehensive updating of the City’s certified Local Coastal Program (LCP). The updating of the LCP will occur in two phases. The first phase, which is the focus of this RFP, addresses the vulnerability of the City’s coastline to sea level rise. This will be accomplished by conducting a vulnerability assessment and identifying a range of possible sea level rise adaptation strategies. The outcome will be a draft regulatory and adaptive strategies outline that will have been discussed in a Planning Commission public workshop. In addition, a summary report including options evaluation and recommendations based on Planning Commission workshop results will be created. These documents will be the basis for the development of draft Local Coastal Program policies in the second phase of the LCP update.

The second phase of the LCP update will involve the preparation of an adaptation plan and the necessary revisions to the land use controls for implementing the LCP contained in the Malibu Municipal Code and General Plan. Funding for this second phase has yet to be secured. While the City is only requesting proposals for the first phase of the LCP update at this time, it is the City’s intent to have the consultant selected from the responses to this RFP conduct both phases of the LCP update, contingent upon the consultant’s performance in completing phase one. The scope of services and schedule for the second phase of the LCP update would be determined once the necessary funding is secured.

The purpose of the Coastal Vulnerability Assessment is to assess the vulnerability and the projected impacts of SLR in the near term (2030), mid-term (2050), and long term (2100) in the City of Malibu. The assessments will be used to inform public and private stakeholders and decision-makers on the potential impacts and sea level rise adaptation strategies.

The objectives of the Coastal Vulnerability Assessment are to:
1. Utilize existing information and methodologies to the extent feasible, including, but not limited to:
   a. Los Angeles County Public Beach Facilities Sea-Level Rise Vulnerability Assessment (2016)
   b. Los Angeles County Coastal Regional Sediment Management Plan (2017)
   d. Coastal Storm Modeling System (CoSMoS) 3.0
   e. Regional AdaptLA: Coastal Impacts Planning in the Los Angeles Region Southern California Coastal Impacts Project
      i. Terra Costa and ESA modeling map
2. Consider work being conducted by CCC, other State agencies, regional jurisdictions, and other entities;
3. Be specific to the conditions and coastal hazards present in the City of Malibu;
4. Be written and designed to be easily understood and informative to the public, stakeholders, and City decision makers that are not familiar with the technical specifics.

B. **Minimum Firm Requirements:** The City of Malibu is seeking a consultant who has:
   - A working knowledge of the requirements of the California Coastal Act related to the preparation of Local Coastal Programs (LCP’s);
   - Experience with hydrodynamic modeling to assess SLR and the effects of SLR, including the ability to evaluate and recommend best available science (experience with and understanding of CoSMoS 3.0);
   - Experience in coastal engineering (for plan level feasibility and as necessary for comprehension of modeling; no actual detailed engineering designs needed);
   - Experience in economic and social impacts analysis, including as it relates to the effects of SLR and impacts to recreational assets;
   - Ability to evaluate the impacts of SLR based on modeling and develop vulnerability and risk assessments;
   - A working knowledge of the City’s coastal development patterns and geography;
   - A working knowledge of local, State and federal laws that could be relevant to adaptation strategies;
   - Demonstrated experience in communicating highly technical information about sea level rise and climate change effectively to the public
   - Demonstrated experience in conducting public workshops and community engagement.
   - Demonstrated experience in preparing and/or updating LCP’s in compliance with the CCC’s sea level rise policy guidance and certified by the CCC.
C. **Scope of Work:** The Scope of Work, as may be modified through negotiation and/or by written addendum, will be made a part of the Agreement. Through this RFP, it is specifically intended to procure the following:

**Task 1- Project Kickoff**

Following the award and execution of contract for the Coastal Vulnerability Assessment, a kickoff meeting will be held and attended by appropriate members of the selected consultant and representatives of key City departments. The kickoff meeting will allow for the key participants on the part of the consultant and the City to be introduced and to review the project schedule, goals, and potential challenges. The meeting will also facilitate the transfer of existing information such as critical City assets and reports relating to the Coastal Vulnerability Assessment.

**Deliverables:**
- Kickoff meeting and project schedule
- Memorandum of work previously completed and background materials and their application to the assessment

**Task 2 – Public Engagement**

The consultant(s) chosen under this request for proposal would assist with public outreach and stakeholder involvement by
- Creating a Community Engagement Plan that includes opportunities for the community to play a role in selecting preferred strategies and offer innovative educational tools to immerse participants in SLR scenarios.
- Conducting at least two public workshops to facilitate discussion on the vulnerability assessment (Task 3) and potential adaptation strategies and policies (Task 5).
- Developing presentation materials on the Vulnerability Assessment findings and Adaptation Strategies and Policies at various public meetings including but not limited to: the City Planning Commission, City Council, and Council Committees.

**Deliverables:**
- Community Engagement Plan
- Public Workshop
  - Materials for public workshop
  - Report on outcomes of public workshop
- Presentation to City Planning Commission, City Council, and/or Council Committees
  - Draft and final presentation materials
Task 3- Technical Analysis

Sea Level Rise Hazard Analysis:
A range of SLR projections relevant to the LCP development standards including, but not limited to Land Use Plan Chapter 4 (Hazards and Shoreline/Bluff Development) and Local Implementation Plan Chapter 10 (Shoreline and Bluff Development Ordinance) will be developed, and will include analysis of the H++ scenario for the critical infrastructure, and other development, as appropriate. Scenarios will be modelled or quantitatively analyzed where feasible and applicable, and will include Medium-high Risk Aversion and Extreme Risk Aversion scenarios per the 2018 OPC Guidance recommendations to aid in planning and understanding the worst-case scenario for projected time horizons. Coastal hazards during storm conditions and non-storm conditions will be evaluated for the following sea level rise scenarios through 2100.
- 2030: 1.6 ft (0.5 m)
- 2050: 1.6 ft (0.5 m), 2.6 ft (0.75 m)
- 2100: 3.3 ft, 175 cm/5.74 ft, 6.8 ft, 10 ft
These scenarios cover most of the sea level rise projections out to 2100 and provide a basis for understanding how hazards and vulnerabilities change with each increment of sea level rise. Consideration should be given to evaluating and incorporating an adjustment for vertical land motion (i.e. regional tectonic uplift) to these scenarios, based upon current published information, in order to derive appropriate local SLR projections. Additional scenarios will require additional scope and budget. The following sea level rise related coastal hazards will be evaluated:
- Storm including the 100 year storm and non-storm scenarios will be evaluated using results from the Coastal Storm Modeling System (CoSMoS) 3.0 published by USGS, Terra Costa and ESA modeling map, and other. Non-storm related flooding will be evaluated by comparing high water levels, such as a “king tide” event with existing topography in the City.
- Nearshore wave transformation profiles to evaluate pier exposure.
- Beach width changes due to sea level rise (Bruun rule).
- Historic and future changes in bluff erosion.

Coastal Resources Assessment:
The consultant should create an inventory and map of the following assets found to be at risk from SLR with and without existing shoreline and slope protection. The consultant should evaluate potential risks and impacts by rating and describing the exposure, sensitivity and adaptive capacity of each coastal resource, including but not limited to:
- Coastal Development and Coastal Dependent Development
  - Residential
  - Public infrastructure(e.g. roads, bridges, utilities) –
Work with department directors to gather a database of City’s assets and critical assets.

- Critical infrastructure
- Construction altering natural shorelines

- Public Access and Recreation
  - Beach width and associate access and recreation functions
  - California Coastal Trail

- Coastal Habitat
  - Beaches
  - Wetlands and Estuarine Habitats
  - Environmentally Sensitive Habitats
  - Other Marine Resources

- Socio-Economic Impacts
  - Environmental Justice

- Water Quality

- Archeological and paleontological resources

**Economic and Fiscal Impacts Review**

This review would provide the market value of the above coastal resources and the economic, public works, ecosystem, and recreational asset values that could be impacted by sea level rise. This information would inform Task 5, Adaptation Strategies and Policies.

This task would include evaluation of the following:

- **Property values:**
  - Obtain public and private property valuation data for the properties at risk.
  - Assign values to at-risk properties.
  - Analyze the property inventory and valuation data and estimate the potential loss in property value and the economic and fiscal impacts to the City’s general fund, tourism, coastal dependent, and other industries (i.e., loss of property tax and transient occupancy tax revenue, tourism-related jobs, tourism-related sales tax revenue, commercial fisheries, etc.).

- **Public Works values:** Assign an economic value to these assets and estimate the potential loss and replacement costs.

- **Ecosystem values:** Evaluate potential economic and fiscal impacts related to important ecosystem changes given vulnerabilities. Existing and simple methodologies and information should be utilized to the extent feasible.

- **Recreational asset values:** Evaluate potential economic and fiscal impacts related to recreational assets given vulnerabilities. Existing and simple methodologies should be utilized to the extent feasible. For beaches, methods could include assigning a value to the change in size (based on width, acreage or other metric) and incorporating beach
attendance data, as necessary. Consider the potential loss of transient occupancy tax revenue, tourism-related jobs, tourism-related sales tax revenue, etc.

While the economic and fiscal impacts review should be quantitative where feasible, it is possible that analysis of certain resources may lend itself better to a qualitative assessment.

**Deliverables:**
- Sea level rise hazard maps for each scenario
- Coastal resources database and maps
- City’s critical asset list and manager survey
- Spatial data and base map on City assets and resources from various coastal hazards overlain.
- Risk Assessment Matrix: evaluates potential risks and impacts by describing and rating the exposure, sensitivity and adaptive capacity of each coastal resource.
- Proposed, draft, and final Economic and Fiscal Impact methodology
- Data and results of the Economic and Fiscal Impacts Review Section of the Vulnerability Assessment

**Task 4 - Vulnerability Assessment**

**Draft and Final Vulnerability Assessment:** The coastal hazard maps prepared for each sea level rise scenario (Task 3) will be compared with the Coastal Resources databases (Task 3) to evaluate potential sea level rise impacts on infrastructure, development and coastal resources in the LCP planning area including, but not limited to Land Use Plan Chapter 4 (Hazards and Shoreline/Bluff Development) and Local Implementation Plan Chapter 10 (Shoreline and Bluff Development Ordinance). The vulnerability assessment approach will be consistent with the Coastal Commission’s Sea Level Rise Policy Guidance. The vulnerability of an asset or resource will depend on factors such as exposure to sea level rise hazards, sensitivity to hazards, adaptive capacity, and economic and fiscal impact. The assessment will identify "triggers" at which significant planning areas or coastal resources could be impacted by sea level rise and implementation of various studies or adaptation measures are needed. The vulnerabilities and the consequences identified in this assessment will help prioritize planning efforts to account for the urgency (time horizon) of each impact, and the importance of each impact on the community and resources.

**Deliverables:**
- Draft and final vulnerability assessment reports
**Task 5 – Adaptation Strategies and Policies**

Based on the Vulnerability Assessment (Task 4), the Consultant will produce a matrix that identifies available and recommended adaptation strategies and policies that can alleviate the vulnerabilities and exposure of each coastal resource described in Task 3 (both on private and public property) in the near term (2030), mid-term (2050/60), and long term (2100). A range of feasible adaptation will be evaluated for effectiveness, trade-offs, and costs. Adaptation strategies should be categorized by costs and timeframe for implementation, as triggered by anticipated levels of future sea level rise. Feasible adaptation strategies could include, but are not limited to, sediment management, beach nourishment, protect in place, and targeted, managed retreat.

The Consultant will generate a list of prioritized policies and adaptation measures based on community input, California Coastal Commission Policy Guidance, Chapter 3 of the Coastal Act, and local feasibility following City and public review of the Adaptation Options Matrix (see Task 4 regarding outreach). With City staff support, Consultant will identify which City department and external agency partners are relevant to each strategy. The policies identified will be incorporated in the future draft Local Coastal Program- Land Use Plan (LCP-LUP).

**Deliverables:**
- Adaptation Strategies and Policies Matrix
- Options evaluation and recommendations summary report based on results from public meetings.
- Prioritized Adaptation Strategies and Policies

**D. Proposal Contact Information:** All questions regarding the RFP must be submitted in writing. Please send all questions in writing via email or fax to:

  Tracey Rossine  
  Administrative Analyst  
  trossine@malibucity.org  
  Fax: (310) 456-3356

**E. Proposal Submission Information:** All proposals must be in conformance with the instructions provided in Section II of this RFP and received no later than **3:30 p.m. on July 19, 2019**. Mark envelope with “Coastal Vulnerability Assessment.” Submit four (4) bound copies and one (1) electronic copy. All responses must be submitted to:

  City of Malibu  
  Tracey Rossine  
  23825 Stuart Ranch Road  
  Malibu, CA 90265

Proposals received after the deadline will be considered non-responsive. No faxed or emailed proposals will be accepted.
Section II
Proposal Format and Evaluation Process

A. To simplify the evaluation process, the proposal shall be submitted in the format outlined below:

1. **Letter of Transmittal** – The proposal letter shall be addressed to the contact listed and shall include the complete name of the firm or person(s) submitting the proposal, the main office address, primary contact person’s name, title, telephone number, email, and a signature of representative legally authorized to bind the proposal.

2. **Table of Contents** – Clearly defined sections and pages numbered.

3. **Executive Summary** – A summary of the proposal stating the understanding of the requested needs and approach to work.

4. **Vendor Profile and Qualifications** – Include vendor and executive information, including management team resumes and qualifications of all key staff that would be assigned to the City.

5. **Experience** – Provide a description of local government experience and experience completing similar projects.

6. **References** – Provide at least three (3) references of current clients of similar scope with the proposal. Include name, title, address, phone number, and email of contact person.

7. **Implementation Services / Scope of Work** – Provide a sample project management plan including reasonable target dates. This section must also outline key activities, work products and assumptions.

8. **Cost Proposal** – Provide fee schedule for the duration of the contract. The fee schedule shall specifically identify the hourly rates to be charged for all staff level classifications of your firm who will provide the required services. Any reimbursable fees or other cost should be identified and included in the fee proposal. In addition, provide a list of any additional costs that will be charged by your firm in providing the requested services within the defined scopes of work. This section should also include the total cost to perform the work in its entirety, and a breakdown of costs for individual tasks.

9. **Additional Information** – Provide any other information you feel is important for consideration in our evaluation of proposals.
B. Confidential Material: Prior to the award of the contract, all proposals will be designated confidential to the extent permitted by the Public Records Act. After award of the contract, or if not awarded, after rejection of all proposals, all responses will be regarded as public records and will be subject to the review of the public. Any language purported to render confidential all or portions of the proposals will be regarded as non-effective and will be disregarded.

C. Anticipated Schedule of Events:

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Release RFP to Vendors</td>
<td>June 20, 2019</td>
</tr>
<tr>
<td>Proposals Due</td>
<td>July 19, 2019 / 3:30pm PST</td>
</tr>
<tr>
<td>Vendor Proposal Evaluations Complete</td>
<td>August 2, 2019</td>
</tr>
<tr>
<td>Finalists Notified</td>
<td>August 5, 2019</td>
</tr>
<tr>
<td>Vendor Demonstrations</td>
<td>Week of August 12, 2019</td>
</tr>
<tr>
<td>Contract Finalized</td>
<td>August 20, 2019</td>
</tr>
<tr>
<td>Agreement to City Council</td>
<td>September 9, 2019</td>
</tr>
</tbody>
</table>

(These dates are estimates and subject to be changed by the City)

D. Proposal Evaluation and Selection Process: Following the submission deadline, a selection committee will evaluate all responses and short-list the proposing vendors. Responders will be notified and finalists will be invited to present demonstrations to our staff. After all demonstrations are completed, the selection committee shall reconvene to either make a decision or to request further information.

The selection committee will then make recommendations regarding the selection and request authorization to enter into a contract with the approved vendor. The committee reserves the right to accept/reject any or all proposals. Submission of a proposal indicates acceptance of the conditions contained in the RFP and an agreement to negotiate a contract for services. An award can be made on the basis of greatest benefit and not necessarily the lowest cost option.

F. Conflict of Interest: The Consultant shall disclose any financial, business or other relationships with the City that may have an impact on the outcome of this contract or any resulting project. The City reserves the right to cancel the reward if any interest disclosed from any source could either give the appearance of a conflict or cause speculation as to the objectivity of the program. The City determination regarding any questions of conflict of interest shall be final.

G. Limits of General and Professional Liability: The Consultant shall provide detailed information pertaining to the limits of the general and professional liability insurance. See the attached professional services agreement for details.
Section III – Additional Information

**Right to Cancel** – The City reserves the right to change any aspect of, terminate, or delay this RFP, the RFP process and/or the program which is outlined within this RFP at any time, and notice shall be given in a timely manner thereafter.

**No Award** – Recipients of this RFP are advised that nothing stated herein, or any part thereof, or any communication during the evaluation and selection process, shall be construed as constituting, offering or awarding a contract, representation or agreement of any kind.

**Not Liable for Costs** – The City is not liable and will not be responsible for any costs incurred by any vendor(s) for the preparation and delivery of the RFP responses, nor will we be liable for any costs incurred prior to the execution of an agreement, including but not limited to, presentations by RFP finalists.

**Property of the City** – Responses to this RFP will become the property of the City of Malibu, and will form the basis of negotiations of an agreement with the apparent successful vendor.

**Waiver of Irregularities** – The City reserves the right, at its sole discretion, to waive minor administrative regularities contained in any proposal.

**No Obligation to Buy** – The City reserves the right to reject any or all proposals at any time without penalty and from contracting with any vendor. The release of this RFP does not convey the initiation of a purchase.

**Withdrawal of Proposals** – Vendors may withdraw a proposal that has been submitted at any time up to the proposal closing date and time. To accomplish this, a written request signed by an authorized representative of the vendor must be submitted to the RFP Contact. The vendor may submit another proposal at any time up to the proposal closing date and time.

**Errors in Proposal** – The City will not be liable for any errors in vendor proposals. Vendors will not be allowed to alter proposal documents after the deadline for proposal submission.

Corrections or amendments due to errors identified in the vendor’s Proposal may be accepted if this type of correction or amendment is due to typing, transposition or any other obvious errors. Vendors are liable for all errors or omissions contained in their proposals.

**Non-Assignability** - The Consultant shall not assign, transfer, convey or otherwise dispose of the contract, or its right, title or interest, or its power to execute such a contract to any individual or business entity of any kind without the previous written consent of the City of Malibu.
**Non-Discrimination** - The Consultant shall not discriminate as to race, creed, gender, color, national origin or sexual orientation in the performance of its services and duties pursuant to this contract, and will comply with all applicable laws, ordinances and codes of the Federal, State, County and City governments.

**Payment Terms** - The Consultant shall submit to the City, by no later than the 10th day of each month, a bill for services itemizing the fees and costs incurred during the previous month. The City shall pay the Consultant all uncontested amounts set forth in the Consultant's bill within 30 days after it is received.

**Ownership of Reports and Data** - All studies, reports, exhibits, documents, data and/or other work/material(s) prepared and/or used to comply with any section/condition of these specifications, plus any copies of same required by the agreement to be furnished to the City, shall be deemed to be public records which shall be open to inspection by the public and, as such, shall become and remain the Property of the City.

**Amendments to Request for Proposal** - The City reserves the right to amend the Request for Proposal by addendum prior to the final proposal submittal date.

**Contract Term** - This contract will cover services provided until services are rendered and deemed completed, unless upon mutual consent of the parties. The fee proposed by Consultant must be valid for the entire period unless otherwise conditioned in the Proposal.

**Non-Exclusive Contract** - The City reserves the right to contract with other Professional Service firms during the contract term.

**Insurance** - The Consultant shall meet the provisions relating to insurance coverage as provided forth in the Sample Professional Services Agreement (Attachment 1).

**Public Domain** - All products used or developed in the execution of any contract resulting from this Request for Proposal will remain in the public domain at the completion of the contract.

**Termination** - Either the City or the Consultant may terminate the Agreement, without cause, by giving the other party ten (10) days written notice of such termination and the effective date thereof.

**Required Timeframes** - The Consultant office hours shall be 8:00 a.m. to 5:00 p.m., Monday through Friday, so that the Consultant will be available to City staff.

**Conflicts of Interest** - Consultant agrees to promptly notify City whenever a client of Consultant has an interest in any project referred to Consultant for professional services. In particular, Consultant shall disclose any financial interest or relationship with any construction company that might submit a bid on the resulting construction project. The City may withdraw such project with no compensation due, if the Consultant has a conflicting interest.
**Conflict of Interest Disclosure** - In accordance with California Government Code Section 87306, the Consultant awarded a contract may be required to file a Conflict of Interest Statement. If such requirement is made, the filing must be no later than 30 days after the execution of the contract, annually thereafter prior to June 24 of each year for the duration of the contract, and within 30 days of termination of the contract. Failure to file any required statements will result in withholding payment for services rendered.

**Inspections** – The City reserves the right to inspect the work being accomplished by the Consultant at any time.

**Assignment of Consultant Personnel** - The Consultant shall have City's approval prior making the change(s) in a project team assigned to a project.

**ATTACHMENT(S):**

1. Sample Professional Services Agreement
2. Coastal Engineering Guidelines
AGREEMENT FOR PROFESSIONAL SERVICES

This Agreement is made and entered into as of [date] by and between the City of Malibu (hereinafter referred to as the "City"), and ______________ (hereinafter referred to as "Consultant").

The City and the Consultant agree as follows:

RECORDALS

A. The City does not have the personnel able and/or available to perform the services required under this Agreement.

B. The City desires to contract out for consulting services for certain projects relating ____________________________.

C. The Consultant warrants to the City that it has the qualifications, experience and facilities to perform properly and timely the services under this Agreement.

D. The City desires to contract with the Consultant to perform the services as described in Exhibit A of this Agreement.

NOW, THEREFORE, the City and the Consultant agree as follows:

1.0 SCOPE OF THE CONSULTANT’S SERVICES. The Consultant agrees to provide the services and perform the tasks set forth in the Scope of Work, attached to and made part of this Agreement, except that, to the extent that any provision in Exhibit A conflicts with this Agreement, the provisions of this Agreement govern. The Scope of Work may be amended from time to time by way of a written directive from the City.

2.0 TERM OF AGREEMENT. This Agreement will become effective on [date], and will remain in effect for a period of ____ years from said date unless otherwise expressly extended and agreed to by both parties or terminated by either party as provided herein.

3.0 CITY AGENT. The City Manager, or her designee, for the purposes of this Agreement, is the agent for the City; whenever approval or authorization is required, Consultant understands that the City Manager, or her designee, has the authority to provide that approval or authorization.

4.0 COMPENSATION FOR SERVICES. The City shall pay the Consultant for its professional services rendered and costs incurred pursuant to this Agreement in accordance with the Scope of Work’s fee and cost schedule. The cost of services shall be $_______ per month, for a total amount not to exceed $_______. No additional compensation shall be paid for any other expenses incurred, unless first approved by the City Manager, or her designee.
4.1 The Consultant shall submit to the City, by no later than the 10th day of each month, its bill for services itemizing the fees and costs incurred during the previous month. The City shall pay the Consultant all uncontested amounts set forth in the Consultant's bill within 30 days after it is received.

5.0 CONFLICT OF INTEREST. The Consultant represents that it presently has no interest and shall not acquire any interest, direct or indirect, in any real property located in the City which may be affected by the services to be performed by the Consultant under this Agreement. The Consultant further represents that in performance of this Agreement, no person having any such interest shall be employed by it.

5.1 The Consultant represents that no City employee or official has a material financial interest in the Consultant’s business. During the term of this Agreement and/or as a result of being awarded this contract, the Consultant shall not offer, encourage or accept any financial interest in the Consultant’s business by any City employee or official.

5.2 If a portion of the Consultant’s services called for under this Agreement shall ultimately be paid for by reimbursement from and through an agreement with a developer of any land within the City or with a City franchisee, the Consultant warrants that it has not performed any work for such developer/franchisee within the last 12 months, and shall not negotiate, offer or accept any contract or request to perform services for that identified developer/franchisee during the term of this Agreement.

6.0 GENERAL TERMS AND CONDITIONS.

6.1 Termination. Either the City Manager or the Consultant may terminate this Agreement, without cause, by giving the other party ten (10) days written notice of such termination and the effective date thereof.

6.1.1 In the event of such termination, all finished or unfinished documents, reports, photographs, films, charts, data, studies, surveys, drawings, models, maps, or other documentation prepared by or in the possession of the Consultant under this Agreement shall be returned to the City. If the City terminates this Agreement without cause, the Consultant shall prepare and shall be entitled to receive compensation pursuant to a close-out bill for services rendered and fees incurred pursuant to this Agreement through the notice of termination. If the Consultant terminates this Agreement without cause, the Consultant shall be paid only for those services completed in a manner satisfactory to the City.

6.1.2 If the Consultant or the City fail to fulfill in a timely and proper manner its obligations under this Agreement, or if the Consultant or the City violate any of the covenants, agreements, or stipulations of this Agreement, the Consultant or the City shall have the right to terminate this Agreement by giving written notice to the other party of such termination and specifying the effective date of such termination. The Consultant shall be entitled to receive compensation in accordance with the terms of this Agreement for any work satisfactorily completed hereunder. Notwithstanding the foregoing, the Consultants shall not be relieved of liability for damage sustained by virtue of any breach of this Agreement and any payments due under this Agreement may be withheld to off-set anticipated damages.
6.2 **Non-Assignability.** The Consultant shall not assign or transfer any interest in this Agreement without the express prior written consent of the City.

6.3 **Non-Discrimination.** The Consultant shall not discriminate as to race, creed, gender, color, national origin or sexual orientation in the performance of its services and duties pursuant to this Agreement, and will comply with all applicable laws, ordinances and codes of the Federal, State, County and City governments.

6.4 **Insurance.** The Consultant shall submit to the City certificates indicating compliance with the following minimum insurance requirements no less than one (1) day prior to beginning of performance under this Agreement:

(a) Workers Compensation Insurance as required by law. The Consultant shall require all subcontractors similarly to provide such compensation insurance for their respective employees.

(b) Comprehensive general and automobile liability insurance protecting the Consultant in amounts not less than $1,000,000 for personal injury to any one person, $1,000,000 for injuries arising out of one occurrence, and $500,000 for property damages or a combined single limit of $1,000,000. Each such policy of insurance shall:

1) Be issued by a financially responsible insurance company or companies admitted and authorized to do business in the State of California or which is approved in writing by City.

2) Name and list as additional insured the City, its officers and employees.

3) Specify its acts as primary insurance.

4) Contain a clause substantially in the following words: "It is hereby understood and agreed that this policy shall not be canceled nor materially changed except upon thirty (30) days prior written notice to the City of such cancellation or material change."

5) Cover the operations of the Consultant pursuant to the terms of this Agreement.

6.5 **Indemnification.** Consultant shall indemnify, defend with counsel approved by City, and hold harmless City, its officers, officials, employees and volunteers from and against all liability, loss, damage, expense, cost (including without limitation reasonable attorneys fees, expert fees and all other costs and fees of litigation) of every nature arising out of or in connection with Consultant’s performance of work hereunder or its failure to comply with any of its obligations contained in this Agreement, regardless of City’s passive negligence, but excepting such loss or damage which is caused by the sole active negligence or willful misconduct of the City. Should City in its sole discretion find Consultant’s legal counsel unacceptable, then Consultant shall reimburse the City its costs of defense, including without
limitation reasonable attorneys fees, expert fees and all other costs and fees of litigation. The Consultant shall promptly pay any final judgment rendered against the City (and its officers, officials, employees and volunteers) covered by this indemnity obligation. It is expressly understood and agreed that the foregoing provisions are intended to be as broad and inclusive as is permitted by the law of the State of California and will survive termination of this Agreement.

OR FOR AGREEMENTS WITH DESIGN PROFESSIONALS (architect, landscape architect, professional engineer, or land surveyor – See Civil Code Section 2782.8) USE THE FOLLOWING:

6.5 Indemnification. Consultant shall indemnify, defend with counsel approved by City, and hold harmless City, its officers, officials, employees and volunteers from and against all liability, loss, damage, expense, cost (including without limitation reasonable attorneys fees, expert fees and all other costs and fees of litigation) of every nature arising out of or in connection with Consultant’s negligence, recklessness or willful misconduct in the performance of work hereunder or its failure to comply with any of its obligations contained in this Agreement, except such loss or damage which is caused by the sole active negligence or willful misconduct of the City. The Consultant shall promptly pay any final judgment rendered against the City (and its officers, officials, employees and volunteers) with respect to claims determined by a trier of fact to have been the result of the Consultant’s negligent, reckless or willful misconduct. It is expressly understood and agreed that the foregoing provisions are intended to be as broad and inclusive as is permitted by the law of the State of California and will survive termination of this Agreement.

6.6 Compliance with Applicable Law. The Consultant and the City shall comply with all applicable laws, ordinances and codes of the federal, state, county and city governments, including, without limitation, Malibu Municipal Code Chapter 5.36 Minimum Wage.

6.7 Independent Contractor. This Agreement is by and between the City and the Consultant and is not intended, and shall not be construed, to create the relationship of agency, servant, employee, partnership, joint venture or association, as between the City and the Consultant.

6.7.1. The Consultant shall be an independent contractor, and shall have no power to incur any debt or obligation for or on behalf of the City. Neither the City nor any of its officers or employees shall have any control over the conduct of the Consultant, or any of the Consultant’s employees, except as herein set forth, and the Consultant expressly warrants not to, at any time or in any manner, represent that it, or any of its agents, servants or employees are in any manner employees of the City, it being distinctly understood that the Consultant is and shall at all times remain to the City a wholly independent contractor and the Consultant's obligations to the City are solely such as are prescribed by this Agreement.

6.8 Copyright. No reports, maps or other documents produced in whole or in part under this Agreement shall be the subject of an application for copyright by or on behalf of the Consultant.

6.9 Legal Construction.
(a) This Agreement is made and entered into in the State of California and shall in all respects be interpreted, enforced and governed under the laws of the State of California.

(b) This Agreement shall be construed without regard to the identity of the persons who drafted its various provisions. Each and every provision of this Agreement shall be construed as though each of the parties participated equally in the drafting of same, and any rule of construction that a document is to be construed against the drafting party shall not be applicable to this Agreement.

(c) The article and section, captions and headings herein have been inserted for convenience only, and shall not be considered or referred to in resolving questions of interpretation or construction.

(d) Whenever in this Agreement the context may so require, the masculine gender shall be deemed to refer to and include the feminine and neuter, and the singular shall refer to and include the plural.

6.10 Counterparts. This Agreement may be executed in counterparts and as so executed shall constitute an agreement which shall be binding upon all parties hereto.

6.11 Final Payment Acceptance Constitutes Release. The acceptance by the Consultant of the final payment made under this Agreement shall operate as and be a release of the City from all claims and liabilities for compensation to the Consultant for anything done, furnished or relating to the Consultant’s work or services. Acceptance of payment shall be any negotiation of the City’s check or the failure to make a written extra compensation claim within ten (10) calendar days of the receipt of that check. However, approval or payment by the City shall not constitute, nor be deemed, a release of the responsibility and liability of the Consultant, its employees, sub-consultants and agents for the accuracy and competency of the information provided and/or work performed; nor shall such approval or payment be deemed to be an assumption of such responsibility or liability by the City for any defect or error in the work prepared by the Consultant, its employees, sub-consultants and agents.

6.12 Corrections. In addition to the above indemnification obligations, the Consultant shall correct, at its expense, all errors in the work which may be disclosed during the City’s review of the Consultant’s report or plans. Should the Consultant fail to make such correction in a reasonably timely manner, such correction shall be made by the City, and the cost thereof shall be charged to the Consultant.

6.13 Files. All files of the Consultant pertaining to the City shall be and remain the property of the City. The Consultant will control the physical location of such files during the term of this Agreement and shall be entitled to retain copies of such files upon termination of this Agreement.

6.14 Waiver; Remedies Cumulative. Failure by a party to insist upon the performance of any of the provisions of this Agreement by the other party, irrespective of the
length of time for which such failure continues, shall not constitute a waiver of such party's right to demand compliance by such other party in the future. No waiver by a party of a default or breach of the other party shall be effective or binding upon such party unless made in writing by such party, and no such waiver shall be implied from any omissions by a party to take any action with respect to such default or breach. No express written waiver of a specified default or breach shall affect any other default or breach, or cover any other period of time, other than any default or breach and/or period of time specified. All of the remedies permitted or available to a party under this Agreement, or at law or in equity, shall be cumulative and alternative, and invocation of any such right or remedy shall not constitute a waiver or election of remedies with respect to any other permitted or available right of remedy.

6.15 Mitigation of Damages. In all such situations arising out of this Agreement, the parties shall attempt to avoid and minimize the damages resulting from the conduct of the other party.

6.16 Partial Invalidity. If any provision in this Agreement is held by a court of competent jurisdiction to be invalid, void or unenforceable, the remaining provisions will nevertheless continue in full force without being impaired or invalidated in any way.

6.17 Attorneys' Fees. The parties hereto acknowledge and agree that each will bear his/her or its own costs, expenses and attorneys' fees arising out of and/or connected with the negotiation, drafting and execution of the Agreement, and all matters arising out of or connected therewith except that, in the event any action is brought by any party hereto to enforce this Agreement, the prevailing party in such action shall be entitled to reasonable attorneys' fees and costs in addition to all other relief to which that party or those parties may be entitled.

6.18 Entire Agreement. This Agreement constitutes the whole agreement between the City and the Consultant, and neither party has made any representations to the other except as expressly contained herein. Neither party, in executing or performing this Agreement, is relying upon any statement or information not contained in this Agreement. Any changes or modifications to this Agreement must be made in writing appropriately executed by both the City and the Consultant.

6.19 Notices. Any notice required to be given hereunder shall be deemed to have been given by depositing said notice in the United States mail, postage prepaid, and addressed as follows:

CITY: Reva Feldman  
City Manager  
City of Malibu  
23825 Stuart Ranch Road  
Malibu, CA 90265-4861  
TEL (310) 456-2489 x 226  
FAX (310) 456-2760

CONSULTANT:  

6.20 Warranty of Authorized Signatories. Each of the signatories hereto warrants and represents that he or she is competent and authorized to enter into this Agreement
7.0 GENERAL TERMS AND CONDITIONS. (City and Consultant initials required at EITHER 7.1 or 7.2)

7.1 Disclosure Required. By their respective initials next to this paragraph, City and Consultant hereby acknowledge that Consultant is a “consultant” for the purposes of the California Political Reform Act because Consultant’s duties would require him or her to make one or more of the governmental decisions set forth in Fair Political Practices Commission Regulation 18700.3(a) or otherwise serves in a staff capacity for which disclosure would otherwise be required were Consultant employed by the City. Consultant hereby acknowledges his or her assuming-office, annual, and leaving-office financial reporting obligations under the California Political Reform Act and the City’s Conflict of Interest Code and agrees to comply with those obligations at his or her expense. Prior to consultant commencing services hereunder, the City’s Manager shall prepare and deliver to consultant a memorandum detailing the extent of Consultant’s disclosure obligations in accordance with the City’s Conflict of Interest Code.

City Initials ______
Consultant Initials ______

7.2 Disclosure not Required. By their initials next to this paragraph, City and Consultant hereby acknowledge that Consultant is not a “consultant” for the purpose of the California Political Reform Act because Consultant’s duties and responsibilities are not within the scope of the definition of consultant in Fair Political Practice Commission Regulation 18700.3(a) and is otherwise not serving in staff capacity in accordance with the City’s Conflict of Interest Code.

City Initials ______
Consultant Initials ______

This Agreement is executed on ________________, 2018, at Malibu, California, and effective as of [date].

CITY OF MALIBU:

REVA FELDMAN, City Manager

HEATHER GLASER, City Clerk
(seal)

CONSULTANT:

APPROVED AS TO FORM:

CHRISTI HOGIN, City Attorney
City of Malibu

Proposal for Coastal Vulnerability Assessment

Work That Matters
July 19, 2019
City of Malibu

Proposal for Coastal Vulnerability Assessment

Work That Matters

July 19, 2019

Prepared for:
City of Malibu
Tracey Rossine
Administrative Analyst

23825 Stuart Ranch Road
Malibu, 90265

ESA
626 Wilshire Boulevard
Suite 1100
Los Angeles, CA 90017
213.599.4300

P190785
Letter of Transmittal
July 19, 2019

Tracey Rossine  
Administrative Analyst  
City of Malibu  
23825 Stuart Ranch Road  
Malibu, CA 90265

Subject: Proposal for Coastal Vulnerability Assessment for the City of Malibu’s Local Coastal Program Update

Dear Ms. Rossine:

The City of Malibu, known for its beautiful beaches, surfing spots, and homes on the coastline is being severely affected by erosion, flooding, and devastating fires, which are aggravated by climate change and sea-level rise (SLR). Environmental Science Associates (ESA) recognizes the challenges—and costs—that these issues pose to local business owners, residents, and infrastructure. We have put forth a highly-qualified team of experts to assist City staff, residents, and other stakeholders with addressing and managing the many facets of the City’s Coastal Vulnerability Assessment and identification of a range of possible SLR adaptation strategies. ESA understands that the Coastal Vulnerability Assessment and adaptation strategies will be the basis for the development of the City’s Local Coastal Program (LCP) policies in the second phase of the LCP update. As an in-house team of coastal engineering and coastal policy experts, ESA can guide the Coastal Vulnerability Assessment and Adaptation Strategies towards successful policy development and provide continuity between the vulnerability and policy phases. ESA, an employee-owned environmental, planning and design firm founded in 1969, is well positioned to deliver the necessary services to develop economically-viable regulatory and adaptive strategies that are responsive to threats and impacts of climate change. We know ESA can deliver, because we have ample experience doing this exact type of work, we have a skilled and cohesive team that regularly performs these services together, and know the City well. We have provided SLR vulnerability and risk assessments, regional and localized SLR and climate impact studies, erosion analysis, hydrodynamic modeling, coastal hazard mapping, policy development, and adaptation planning for over a half-dozen projects to update or amend LCPs for SLR.

Integrated Team of Engineers and Planners

We offer a committed and proven team with the chemistry necessary to move fluidly and seamlessly to deliver responsive-services to the City of Malibu. Our integrated team provides important continuity and institutional knowledge of SLR and other coastal issues currently affecting California. This team can anticipate each other’s approach to any potential challenges based on experience working on similar projects. This team has worked together on City of Santa Barbara Sea Level Rise Adaptation Plan for the LCP Update, City of Oceanside LCP Update Land Use Plan, and the award-winning Del Mar LCP Amendment to Address Sea-Level Rise and Coastal Flooding, among others. Our collaborative team of engineers and planners also specializes in presenting and conveying technically complex analyses to public stakeholders, effectively facilitating public engagement efforts, and build consensus around complex planning efforts.

Our Project Management Team will be led by James Jackson, PE who will serve as the project manager. He has assisted clients with adaptation planning and the preparation of policies that address coastal development and SLR, and has experience integrating those project achievements and goals with public outreach efforts. He has been the
project manager on Pacifica LCP Update, Pajaro Dunes Vulnerability Assessment and Santa Barbara County LCP Coastal Hazards Modeling and Vulnerability Assessment (Phase 1 and 2) and has lead or conducted technical analysis on a number of other SLR vulnerability and adaptation projects, including the AdaptLA vulnerability assessment covering Malibu and Los Angeles County. James will work closely with our project director, Nick Garrity, PE who brings over 18 years of experience working with coastal and estuarine systems. Nick has developed and continually innovates his approaches to the evaluation of coastal flood risks with a focus on incorporating sea-level rise adaptation into project planning and design. He will provide senior-level project oversight and guidance gained through his vulnerability assessment, adaptation planning, and LCP experience in cities of Santa Barbara, Oceanside, and Del Mar and the Port of San Diego.

Our Project Management team is skillfully supported by key ESA technical leads in the areas of coastal policy and planning, regulatory requirements, engineering and GIS. We have included additional specialized teaming partners, such as AECOM who will provide their expertise related to Economics Analysis and have worked with us on the Economic Impact of Climate Adaptation Strategies in Southern Monterey Bay and City of Santa Barbara Sea Level Rise Adaptation Plan for the LCP Update. We have also partnered with Kearns & West to help provide support to our Outreach team and have worked with us on the Ormond Beach Restoration and Public Access project and the Pacifica LCP Update. Our senior technical advisory team, all of whom are leading experts in their fields and have relevant experience in Malibu, includes ESA’s senior coastal engineer, Bob Battalio, PE; coastal ecologists Dr. Richard Ambrose, PhD (UCLA professor) and Dr. Karen Martin, PhD (Pepperdine University professor); and coastal geologist Dr. Adam Young (UC San Diego Scripps Institution of Oceanography project scientist). The ESA team also has the support of the University of Southern California SeaGrant Program, with whom we collaborated with on the AdaptLA (see letter of support attached as Additional Information).

**Experience with Coastal Vulnerability Assessments**

The ESA team brings extensive experience performing hazard modeling and analyses, vulnerability and risk assessments to the built and natural environment and adaptation alternatives analysis to inform planning. Our analyses take into consideration coastal storm damage, as well as both storm event and long-term shoreline erosion. By coupling our practices of applied geomorphology with more traditional engineering approaches, ESA will be able to analyze existing built and natural assets and identify solutions to protect the City from future impacts from coastal storms as well as long term tidal inundation and erosion. We have experience delivering nearly identical scopes of work in Santa Barbara, Pacifica, Oceanside, and Del Mar, where we have learned how to accurately interpret and apply available information, data, and methods in community-specific contexts unique to each of these areas. We provide more details about our project experience performing vulnerability assessments and adaptation strategies in Section 3.

**Experience with Malibu**

ESA understands the SLR vulnerabilities that Malibu is faced with through direct experience conducting the Los Angeles County AdaptLA: Coastal Impacts Planning project, which mapped potential coastal flooding and erosion hazards with sea-level rise through 2100 for LA County. The City of Malibu contains a number of assets at risk to erosion and flooding with SLR including private property, sanitary sewer lines, Pacific Coast Highway, multiple Fire Stations as well as beaches, wetlands and related coastal access. In Los Angeles County, Malibu accounts for two thirds of individual buildings and structures at risk to storm erosion impacts under existing conditions (AdaptLA Vulnerability Assessment, ESA 2016). We reviewed the Malibu Lagoon Restoration design, understand the Lagoon breaching dynamics and management considerations, and are aware of ongoing erosion at the Abrahamson House. We have also monitored the coastal ecology in Malibu for a number of development and public access projects. We understand the complex interplay of private property and public access from our work on the Malibu Coastal Access Public Works Plan EIR.
Per the RFP, ESA does not have any financial, business or other relationships with the City that may have an impact on the outcome of this contract or any resulting projects. Upon award, ESA will provide detailed information pertaining to the limits of the general and professional liability insurance per the RFP.

We are ready and excited to leverage our team’s collective knowledge and experience in Malibu and coastal vulnerability and adaptation planning engineering and policy expertise to successfully complete the City’s Coastal Vulnerability Assessment and Adaptation Strategies and the subsequent phase of adaptation planning, policy development, and the LCP update. We appreciate the opportunity to submit our qualifications to the City of Malibu. As the project manager and point of contact, please feel free to reach out to James Jackson, PE at 213.599.4300 or via email, jjackson@esassoc.com if you have any questions or need clarifications. Thank you for considering ESA.

Sincerely,

Bob Battalio, PE  
Proposed Senior Technical Advisor  
Vice President  
Authorized to Legally  
Bind the Proposal

James Jackson, PE  
Proposed Project Manager  
Civil & Coastal Engineer

Nick Garrity, PE  
Proposed Project Director  
Environmental Hydrology &  
Design Director
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Executive Summary
Section 3

Executive Summary

Experienced and Integrated Team of Engineers and Planners

Since 1969, ESA has been providing superior environmentally focused work and client-focused project management to support successful completion of projects on time and within budget. We are able to continuously improve our work and our capabilities because of the dedication and expertise of the people who make up ESA. Our team for this project has demonstrated depth and experience successfully managing projects much like the City of Malibu Coastal Vulnerability Assessment and eventual Local Coastal Program Update, with a full range of services needed to carry projects from inception to completion. We offer a committed team with the chemistry necessary to move fluidly and seamlessly to deliver responsive services to the City. Our integrated coastal engineering and coastal policy team provides comprehensive sea-level rise planning knowledge and services, with seamless translation and continuity between hazard analyses, vulnerability assessments, adaptation planning, and policy development. The project will be led by James Jackson, PE (project manager), Nick Garrity, PE (project director), Bob Battalio, PE (senior technical advisor), and Reema Shakra, AICP (lead coastal policy and regulatory planner), which is ESA’s go-to team for preparing sea-level rise vulnerability assessments and adaptation plans to inform local coastal planning throughout California.

Understanding the Project Needs

The City of Malibu is seeking a consultant to support the preparation of a Coastal Vulnerability Assessment and matrix of adaptation strategies and policies. The City has been severely affected by erosion, flooding, and devastating fires, which are aggravated by climate change and sea-level rise. Developing a better understanding of what’s at risk for the Malibu community and identifying potential solutions represents a proactive approach that will help the City and the community more effectively prepare for sea-level rise.
A great deal of effort has already been put towards improving our understanding of coastal vulnerabilities to sea-level rise, including technical studies prepared by Los Angeles County that include Malibu’s waterfront (Public Beach Facilities Sea-Level Rise Vulnerability Assessment (2016), Coastal Regional Sediment Management Plan (2017), and Regional AdaptLA: Coastal Impacts Planning in the Los Angeles Region Southern California Coastal Impacts Project (2016). The Las Virgenes-Malibu Council of Governments (COG) Multi-Jurisdictional Hazard Mitigation Plan (2019) acknowledges sea-level rise as one of several potential climate change impacts that could impact communities in the COG and identifies preliminary strategies to overcome related challenges. The Coastal Storm Modeling System (CoSMoS) 3.0 tool prepared by USGS maps the entire California coast and includes a wide range of potential sea-level rise projections that can be used to inform the potential hazards Malibu could expect to face as a result of tidal inundation, erosion, wave run-up, and extreme storm events. The state has provided clear direction to local communities on which sea-level rise projections we should rely upon to plan for and anticipate sea-level rise related impacts. This includes sea-level rise science and projections in the Ocean Protection Council’s (OPC) State of California Sea-Level Rise Guidance (2018 update) and the prior 2012 National Research Council’s Sea-Level Rise for the Coast of California, Oregon and Washington: Past, present, and Future. The California Coastal Commission (CCC) has directed local governments to rely on OPC’s Sea-level Rise Guidance in their 2018 update to the California Coastal Commission Sea-Level Rise Policy Guidance. The CCC guidance document also stipulates the process communities should follow in preparing a vulnerability assessment. This suite of tools, data, technical reports, and guidance provides Malibu with a broad foundation to rely upon and inform the preparation of a local vulnerability assessment. ESA is intimately familiar with all of these documents and tools, and can efficiently and effectively utilize them to the benefit of Malibu as we have for the Cities of Del Mar, Oceanside, Santa Barbara, Pacifica, and others.

Malibu can also look to a growing body of knowledge and guidance regarding sea-level rise adaptation strategies to inform the development of the adaptation strategies and policy matrix. The CCC’s Sea-level Rise Guidance document identifies over 100 adaptation strategies and the draft Coastal Adaptation Planning Guidance: Residential Development includes adaptation strategies specific to residential development. We also understand the state’s priorities on adaptation approaches with the recent update to the Safeguarding California Plan: California’s Climate Adaptation Strategy. Guidance on appropriate adaptation strategies that are more locally relevant are available in the City of Los Angeles’ Pathways to Resilience: Adapting to Sea-Level Rise in Los Angeles (September 2018) and will soon be available as part of the Southern California Association of Governments’ Regional Climate Adaptation Planning Guide, a framework ESA is currently preparing. ESA has been working with multiple communities up and down the coast to identify adaptation solutions that are locally relevant and feasible. Our unique team of engineers, planners, economists, and outreach
specialists facilitates the identification of technically feasible adaptation solutions and implementing actions that are informed by financial, political, social, and environmental constraints.

Informing and engaging the community we seek to protect from sea-level rise related hazards is key to any resilience building effort. The Coastal Hazard Vulnerability Assessment will need to be prepared to be easily understood and informative to the general public and stakeholders. This can be achieved with preparation of a visually appealing document that clearly defines technical concepts and delivers key findings in a concise and easily understood format. Supporting materials, such as a web-based interactive map that identifies hazards and assets and populations at-risk, and outreach materials that clearly deliver key messages are also integral in building understanding in the community.

ESA has refined our approach to clearly presenting complex and controversial technical information and results to public stakeholders through our various sea-level rise planning projects, with the City of Oceanside Vulnerability Assessment (https://www.ci.oceanside.ca.us/civica/filebank/blobdload.asp?BlobID=48346) and public workshop being recent examples commended for their effective communication. For the City of Malibu, ESA can readily apply our proven approach to successfully convey rigorous technical analyses in a way that is understandable to the public.

Our Approach to the Work

Building off of our work from AdaptLA, which included the City of Malibu, we will compare AdaptLA and CoSMoS hazard data to inform the hazard analysis, update and detail the vulnerability assessment we completed for AdaptLA, and identify adaptation strategies using our experience preparing adaptation plans from Pacifica, Santa Barbara, Del Mar, and other cities. Our recommended approach includes coordination with CCC staff to ensure consistency with the Coastal Act as well as integration of community values, based on public engagement efforts conducted as part of this project.

The ESA team will first hold a project kick-off meeting with City staff to confirm project goals and schedule, review pertinent studies, and identify any data needs beyond what ESA has already collected for the AdaptLA study. We will then work with the City to develop a community engagement plan that will document the approach to soliciting input from the public, including convening public workshops and preparing an interactive online map of coastal assets and hazards in the city. We recommend community engagement and CCC coordination at key milestones to facilitate informing stakeholders, obtaining early input, soliciting review comments, and progressing the project towards successful City and other approvals.

Our technical analysis is composed of three components: (1) sea-level rise scenario definition and coastal hazard mapping analysis, (2) coastal resources, vulnerable population groups, and asset inventory (3) analysis of coastal hazards impacts on coastal resources, vulnerable groups, and assets, and (4) assessment of potential physical, economic/fiscal, and ecologic impacts and vulnerabilities. We will define sea-level rise scenarios with the City to analyze city vulnerability, including the extreme risk scenario as directed by state guidance for critical infrastructure if necessary. We will then compile and compare the various sea-level rise hazard maps available for Malibu that ESA has either developed directly (AdaptLA) or used extensively for similar studies (CoSMoS).

Our approach to the technical analyses includes input and review by key senior technical advisors throughout the project. These advisors are leading academic experts in their fields. We will work with Dr. Adam Young, PhD, to review and compare bluff erosion analyses prepared for AdaptLA and CoSMoS. Dr. Young led a bluff erosion hazard analysis for AdaptLA as a consultant to TerraCosta Consulting Group, who developed an alternative set of shoreline erosion maps for AdaptLA independent from ESA’s AdaptLA erosion hazard analysis and vulnerability assessment. The collected hazard maps will be used to evaluate Malibu’s exposure to regular tidal inundation and long-term erosion as well as from a 100-year coastal storm event for existing conditions and future sea-level rise scenarios. Coastal assets
and vulnerable population groups will then be inventoried (e.g., development, infrastructure, public access and recreation, coastal habitat, vulnerable populations such as elderly and seasonal residents) and reviewed in coordination with asset managers (e.g., public works departments, public health providers) as well as our senior technical advisors to understand the sensitivity and adaptive capacity of each coastal resource, vulnerable population groups, and built asset. Based on their wide-ranging research, including studies specific to Malibu, Dr. Richard Ambrose, PhD, and Dr. Karen Martin, PhD, will provide input and review on coastal ecology vulnerabilities specific to Malibu’s beaches, rocky intertidal habitat, and Malibu Lagoon as well as other coastal lagoons. ESA will work with AECOM to conduct an economic and fiscal impacts review to estimate the market value of the various coastal property, public works, ecosystems, and recreational assets potentially affected by sea-level rise.

The technical analyses will feed into a draft vulnerability assessment. Each asset’s vulnerability to sea-level rise will be determined from the mapped coastal hazard exposure of the asset, the asset’s sensitivity to impacts and adaptive capacity, and consequences of impacts. Once a draft vulnerability assessment is prepared, the ESA team will support the first public workshop to present the vulnerability assessment context, approach, and results. The first public workshop will also serve as an opportunity to solicit input on community values and priorities that will inform next steps for adaptation.

ESA will then identify triggers for adaptation that address the City’s key vulnerabilities. ESA will develop a list of sea-level rise adaptation measures (including policies) that could be employed in Malibu if and when identified triggers are reached. The various adaptation measures will be assessed for effectiveness at mitigating hazards, consideration of trade-offs (e.g., aesthetic and ecological implications), and engineering costs, and presented in a matrix. The measures will span the general adaptation categories of accommodation, protection, and retreat, or a hybrid of these, consistent with CCC guidance. Adaptation measures will be prioritized based on community values and input received, the Coastal Act, CCC policy guidance, feasibility, and other criteria identified by the City. ESA will then present the adaptation evaluation matrix and prioritized strategies in a second public workshop for discussion and public input.

Refinement of the adaptation strategies and development of implementation policies will occur as part the second phase of the project.

In the second or subsequent phase of the project, ESA can develop an adaptation plan that explains the purpose and context for sea-level rise adaptation planning, identifies and evaluates adaptation strategies that incorporate different measures over time, and prioritized adaptation strategies based on further public outreach and City consideration. ESA can prepare implementation policies for incorporation into the City’s Local Coastal Program, Zoning Code and General Plan, as part of the second phase.
Vendor Profile and Qualifications
Section 4

Vendor Profile and Qualifications

Vendor and Executive Information

Environmental Sciences Associates (ESA) is a multi-disciplinary environmental planning and design firm founded in California in 1969. We are an employee-owned corporation of more than 525 professionals located within 19 offices across California, Oregon, Washington, and Florida. ESA is known for leading multi-objective projects that integrate coastal hazard analyses, vulnerability assessments, economic analysis, adaptation and ecological restoration planning and design, resource management, and climate change planning and policy to benefit clients, the environment, and society as a whole. For 50 years, ESA has provided a full suite of environmental services in California—everything from small stand-alone technical memoranda, to large-scale coastal development and restoration projects requiring federal and state approvals. The breadth of our services and the depth of our staff allow us to provide comprehensive and scientifically sound reports and responsive client services while meeting project budget and schedule requirements.

The City of Malibu will benefit from the full resources and expertise of our coastal engineering and planning team, a collaboration of civil and coastal engineers, hydrologists, and planners. This includes the experience acquired on our recent work providing vulnerability assessments and formulating adaptation strategies to inform local coastal planning along California’s coast for all of Los Angeles County through AdaptLA and for the cities of Santa Barbara, Oceanside, Del Mar, Pacifica, and Monterey. For each of these projects, the team we are proposing performed similar services as those requested by the City of Malibu. By deploying our proposed coastal engineering and planning team, the City will benefit from a group that brings not only an understanding of the importance of
accurate vulnerability assessments in informing feasible adaptation measures and implementable Local Coastal Plans (LCPs), but also technical expertise, highly relevant experience, and proven effective collaboration necessary for an efficient workflow.

The Right Team for the Job

Our breadth of capabilities is the product of a team composed of civil engineers, coastal scientists and policy experts, geomorphologists, and community planners with decades of technical and policy-oriented experience. We help our clients solve complex coastal issues at both the regional and site-specific levels and regularly perform the following services along California’s coast.

- Sea-level rise impact and vulnerability assessments related to climate change
- Climate-influenced flood hydraulics in rivers and creeks, and lagoon estuaries
- Coastal and fluvial hazard mapping and flood management studies, including working closely with the U.S. Geological Survey and their CoSMoS modeling.
- Shoreline erosion assessment and management
- Multi-objective ecological enhancement of rivers, creeks, wetlands, and shores
- Modeling of hydrology, hydraulics, sediment transport, and geomorphic and habitat responses
- Hydrographic and biological field data collection
- Geographic Information System (GIS) analysis and cartography
- Development and screening of sea-level rise adaptation strategies
- Design/implementation of coastal armoring, beach nourishment, and natural infrastructure solutions
- Close collaboration with the California Coastal Commission (CCC)
- Land use planning and site analysis
- Local coastal program updates
- General and specific plans
- Zoning and development codes
- Climate action and adaptation planning
- Public presentations and communication of technical analyses and planning approaches
- Public outreach and facilitation services supplemented by Kearns & West
- Economic analysis provided by teaming partner AECOM

Project Team

We have crafted a core team of key personnel with the expertise to effectively address the needs of the Malibu LCP Update project. We believe that the successful management of this project includes providing sufficient staff depth and experience to meet the varied and immediate needs of the City, combined with strategic and attentive leadership to oversee the delivery and quality of the completed work. Our team:

- Possesses a high degree of technical expertise with sea-level rise vulnerability and coastal hazard assessments, including engaging with leading academic and agency scientists and conducting assessments along the entire West Coast. We have included Dr. Adam Young, PhD (UC San Diego Scripps Institution of Oceanography), Dr. Karen Martin, PhD (Pepperdine University), and Dr. Richard Ambrose, PhD (University of California Los Angeles) as key academic experts with whom we have collaborated on similar projects and who bring highly relevant experience and knowledge to the project as senior technical advisors.
> Has extensive knowledge of the California Coastal Act, an understanding of the CCC methodology, and experience with LCP Amendments made possible by the inclusion of former CCC staff members Ryan Todaro and Elijah Davidian, now ESA in-house staff.

> Has developed recent adaptation plans for the Cities of Del Mar and Pacifica that were complimented by the CCC as being examples that should be shared regionally. ESA has built off of these successful adaptation plans to develop similar adaptation plans for the Cities of Oceanside and Santa Barbara. ESA can take a similar approach for the City of Malibu by leveraging our prior successes with adaptation planning.

> Has successfully assisted City staff in navigating the LCP update process amidst deeply divided communities.

> Has the ability to present and convey technically complex analyses to public stakeholders, effectively facilitate public engagement efforts, and build consensus around complex planning efforts.

> Represents an integrated team that blends scientific and engineering expertise with practical planning experience, supplemented by trusted subconsultants.

This core team has the appropriate skills, experience, and capacity to successfully complete the Coastal Vulnerability Assessment and identify effective adaptation strategies. Our team organizational chart shown in Figure 2-1 illustrates our reporting structure. Biographies for our project management and technical support teams are provided in the following sections. Full team resumes can be found in Appendix A.

Management Team and Task Leads

JAMES JACKSON, PE | Project Manager and Coastal Processes and Engineering Task Lead

James has over 7 years of experience in river and coastal hazard modeling, climate change/sea-level rise vulnerability assessments and adaptation analysis, and habitat restoration. James has modeled coastal hazards in Los Angeles, Ventura, Santa Barbara, San Diego, Santa Cruz, Monterey, and Marin counties, which gives him an exceptional technical foundation and grasp of sea-level rise vulnerability assessments and adaptation planning in California. He has excellent writing and verbal communication skills and has a proven ability to coordinate activities with the client’s project manager in a professional and timely manner, as he has done as project manager for projects such as Pacifica LCP Update, Pajaro Dunes Vulnerability Assessment, Santa Barbara Coastal Structures Assessment, Santa Barbara County LCP Coastal Hazards Modeling and Vulnerability Assessment (Phase 1 and 2), and the Marin County LCP Grant.

As the project manager, James will serve as the day-to-day primary point of contact for the City. He will oversee work tasks and the management of the schedule and budget, as well as coordinate work among the technical disciplines. James will also serve as the overall task lead for the technical studies, vulnerability assessment, and adaptation strategy development.
NICK GARRITY, PE | Project Director

Nick is a hydrologist and civil engineer with 18 years of experience working with coastal, estuarine, and river systems. During this time, he has developed and continually innovated approaches to the evaluation of coastal flood risks with a focus on incorporating sea-level rise adaptation into project planning and design. His technical and project management experience includes hydrodynamic modeling, flood hazard studies, coastal adaptation and restoration planning and design, geomorphic assessments, environmental impact and vulnerability assessments, and post-project monitoring and evaluation. Nick also specializes in navigating and communicating complex technical analyses and planning processes in coordination with diverse stakeholder groups, including the public and regulatory agencies.

As project director, Nick will provide senior-level project oversight and guidance through his adaptation planning and LCP experience in Santa Barbara, Oceanside, and Del Mar. He will implement ESA’s rigorous Quality Assurance/Quality Control program.

BOB BATTALIO, PE | Senior Coastal Engineering Advisor

Bob will provide oversight of technical analyses and adaptation planning. He has more than 30 years of experience in beach management, restoration design, coastal engineering, and project management. He has addressed erosion and flooding hazards in numerous locations in California, Washington, and Oregon, including shoreline mapping, sand budgets, wave and run-up studies, design of hard and soft erosion protection, and design of shoreline retreat/realignment.

Bob was the project director for the cities of Del Mar, Pacifica, and Santa Barbara LCP Amendments to address sea-level rise, for which he oversaw technical analyses and adaptation planning based on his expertise in coastal management. Bob has served as the engineer-of-record on many multi-objective public works projects on the California coast, including constructed projects totaling over 4,000 acres of restored tidal wetlands, several miles of restored creeks, and the two managed shore retreat projects in California (Pacifica State Beach and Surfers’ Point in Ventura). Most recently, Bob has directed studies of sand management in Monterey Bay and the San Francisco area, and directed coastal analysis for Coastal Resilience Ventura and the Goleta Beach study. Bob was also the project director conducting the coastal analysis for the Ocean Beach Master Plan, which focused on adaptation of San Francisco’s Pacific coast through 2100 to protect both City infrastructure and the beach, which is part of the Golden Gate National Recreation Area (National Park Service).

As the senior technical advisor, he will also be available to Nick and James for strategic consultation regarding coastal hazards, vulnerability, and adaptation and stakeholder and regulatory agency outreach strategies.

RICHARD AMBROSE, PHD (University of California Los Angeles) | Senior Coastal Ecology Advisor

Richard F. Ambrose has been a professor in the Department of Environmental Health Sciences and the Institute of the Environment and Sustainability at UCLA since 1992. His research generally addresses human effects on natural or urban ecosystems, including the restoration of degraded coastal habitats, especially wetlands; evaluating alternatives for managing watershed-level ecological problems resulting from urbanization; evaluating the effects of climate change on coastal habitats and climate change adaptation strategies; and urban ecology, especially the ecological aspects of green infrastructure used to capture and treat stormwater and other...
urban runoff. He has served on scientific advisory panels for many organizations, including the California Coastal Commission, Santa Monica Bay Restoration Commission, California Ocean Protection Council, U.S. Army Corps of Engineers, and the Southern California Wetlands Recovery Project, and has provided advice about environmental restoration issues to a wide variety of government and private organizations.

KAREN MARTIN, PHD (Pepperdine University) | Senior Beach Ecology and Grunion Advisor
Karen Martin is Distinguished Professor of Biology and Frank R. Seaver Chair in Natural Science at Pepperdine University, where she has taught for over 25 years. She earned a doctorate in biology at UCLA followed by a post-doctoral fellowship at Friday Harbor Laboratories, University of Washington. She has published three scholarly books and over 50 peer-reviewed journal articles and book chapters on coastal ecology, amphibious fishes, and the transition from water to land. She co-founded the Beach Ecology Coalition, a nonprofit organization to bring together beach managers, maintenance workers, ecologists, surfers, lifeguards, and resource managers to balance human recreation with wildlife conservation on sandy beaches. She co-founded the Grunion Greeters, a citizen scientist group that provides data on grunion populations throughout their habitat range. She has worked with municipalities and agencies throughout California, including California Coastal Commission, California Department of Fish & Wildlife, California State Parks, U.S. Fish and Wildlife Service, National Marine Fisheries Service, the counties of San Diego, Orange, Los Angeles, Santa Barbara, and Monterey, and cities including San Diego, San Clemente, Malibu, Santa Monica, Newport Beach, and Manhattan Beach. She has received the Environmental Partnership Award from the America Shore and Beach Preservation Association and the Conservation Achievement Award from the American Fisheries Society.

ADAM YOUNG, PHD (Scripps Institution of Oceanography) | Senior Coastal Geology Advisor
Adam Young is a project scientist in the Integrative Oceanography Division and Center for Coastal Studies at Scripps Institution of Oceanography, UC San Diego. Young’s research focuses on coastal physical processes and quantitative coastal evolution on time scales relevant to modern society. He is specifically interested in coastal erosion, hazards, geomorphology, sea-level rise, sediment budgets, and anthropogenic influences on the coastal system. Young uses field-based and remote-sensing instrumentation, including lidar, seismometers, ocean wave sensors, video monitoring, DGPS, and a novel micro-erosion meter, to quantify coastal process interaction. His studies have focused intensively on California coastal cliffs, but also include sites in Australia, New Zealand, United Kingdom, Hawaii, and North Carolina. Young's research has received state and national awards, international media attention, and was recognized by the California State Senate for excellence.

GREG AINSWORTH | Coastal Ecology Task Lead
Greg grew up surfing the Malibu waves and is intimately familiar with the shoreline. He has 17 years of experience conducting biological assessments on properties within and around the Santa Monica Mountains. He has prepared numerous technical reports for the County of Los Angeles for projects located within the county’s Sensitive Ecological Area or Local Coastal Program areas. Greg has a grasp of local regulations, ordinances, and municipal codes governing biological resources and is an expert at conducting impact analyses and developing mitigation strategies for various project types.
Greg managed a focused rare plant survey and prepared a technical report for the Santa Monica Mountains Conservancy’s Malibu Bluffs and Corral Canyon properties for the **Malibu Bluffs and Corral Canyon Park Focused Rare Plant Survey for the Malibu Parks Public Access Enhancement Project**. He conducted a biological inventory and prepared a biological report in accordance with the Malibu Local Coastal Program Implementation plan for the **Moonshadows Restaurant Revetment and Wastewater Upgrade Project**.

**REEMA SHAKRA, AICP | Coastal Policy and Regulatory Planning and Outreach Task Lead**

Reema is a project planner with 14 years of professional experience in land use planning, coastal management, environmental impact assessment, sustainable development, regulatory compliance, and policy research and analysis. She has assisted public sector clients with preparing policies and regulations that address coastal development, land use, sustainability, and conservation of environmental resources. She also has extensive experience conducting public outreach, having facilitated dozens of open house and community workshop meetings and advisory committee meetings, and presented at city council and planning commission hearings.

Her relevant experience includes the **City of Oceanside Local Coastal Program Update**, for which she is preparing a comprehensive update to the Local Coastal Program, which included extensive public outreach to the community members and stakeholders including pop-up outreach, community surveys, stakeholder interviews, public workshops, and public hearings. Reema was involved in facilitating the outreach events and will prepare the draft Land Use Plan for City Council adoption. In addition to Oceanside, Reema has worked on the **City of Santa Barbara Sea-level Rise Adaptation Plan for the LCP Update** and **Del Mar LCP Amendment to Address Sea-Level Rise and Coastal Flooding**.

**AARON MCGREGOR (AECOM) | Economics Task Lead**

Aaron McGregor specializes in applied economic and environmental policy analysis. With more than a decade of experience in social science research and economic analysis, he has worked with government agencies, academic institutions, non-governmental organizations, foundations and private entities. Aaron’s work is rooted in understanding the relationships between land use strategies in the built and natural environment and changes in economic activity and well-being. A large portfolio of Aaron’s work addresses the socioeconomic impacts of natural hazards, including those exacerbated by a changing climate, as well as the costs and benefits of adaptation measures that can help communities manage these increasing risks. He has participated as an advisor and technical lead on several climate change vulnerability and adaptation studies, including probabilistic risk assessments focused on natural hazards, co-authored articles and reports on these topics, presented his work at professional conferences and meetings, provided expert testimony, and sat on committees to inform public policy. Before joining AECOM, Aaron worked as an economist for the U.S. Army Corps of Engineers, a social scientist with the California Ocean Science Trust, an economic researcher with the State of California, and as an independent consultant.

Aaron’s experience includes serving as the technical lead to evaluate the future economic and financial impacts from sea-level rise, coastal flooding and erosion for the **City of Santa Barbara Sea-level Rise Adaptation Plan and Local Coastal Plan Update** and worked on the cost benefit analysis for **Economic Impact of Climate Adaptation Strategies in Southern Monterey Bay**.
Technical Team
This core team has the appropriate skills, experience, and capacity to successfully complete the Coastal Vulnerability Assessment and identify effective adaptation strategies. Our team organizational chart shown in Figure 2-1 illustrates our reporting structure. Biographies for our technical support team are provided in the following section. Full team resumes can be found in Appendix A.

FIGURE 2-1: ORGANIZATIONAL CHART

COASTAL ECOLOGY
Task Lead: Greg Ainsworth
John Bourgeois
May Lau

COASTAL POLICY AND REGULATORY PLANNING
Task Lead: Reema Shakra, AICP
Elijah Davidian, AICP, LEED AP
Ryan Todaro

COASTAL PROCESSES AND ENGINEERING
Task Lead: James Jackson, PE
Lindsey Sheehan, PE
Louis White, PE
Nick Garrity, PE
Matthew Brennan, PhD, PE

ECONOMICS
Task Lead: Aaron McGregor (aec)
Anne deBoer (ae)
Feliz Ventura (ae)

OUTREACH
Task Lead: Reema Shakra, AICP
Joan Isaacson (kw)
Jenna Tourjé (kw)
Nick Garrity, PE
James Jackson, PE

COASTAL ECOLOGY
JOHN BOURGEIOIS | Role: Coastal Ecology
John has dedicated his career to the protection and restoration of ecosystems. He specializes in the management of complex and multi-disciplinary projects. He has worked in a variety of ecological and cultural settings, from the central Pacific, throughout the Gulf Coast, and finally spending the past 18 years working in California coastal areas. As an effective communicator with a strong technical background, he is confident in being able to tackle a diversity of technical and political situations to address complex land use planning issues. He is a regional leader
on issues such as pragmatic implementation of large-scale projects, sea-level rise adaptation, and regulatory integration.

For the South Bay Salt Pond Restoration Project, California State Coastal Conservancy, John managed all aspects of one of the largest wetland restoration projects in the United States.

MAY LAU | Role: Adaptation Permitting Considerations
May has 15 years of experience providing permitting strategies, permit applications, and technical analyses for a variety of projects. Her technical capabilities include review and preparation of environmental documents, coastal development permits, biological assessments, and natural resource studies. She has consulted extensively with California coastal agencies for permit preparation and compliance, and to provide feasible and successful mitigation to her clients.

For the California Coastal Conservancy, Ballona Wetlands Restoration Project, May was responsible for the review of existing biological reports and data, coordination with various resource agencies and subconsultants, and preparation of the biological resources chapter of the Environmental Impact Report (EIR).

COASTAL POLICY AND REGULATORY PLANNING
ELIJAH DAVIDIAN, AICP, LEED AP | Role: Coastal Policy and Regulatory Planning
Elijah has 15 years of experience working on environmental planning projects with a focus on coastal resource planning and regulatory compliance. His responsibilities primarily include project management and technical support in the areas of California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) environmental regulatory permitting for a variety of project types throughout California. Elijah has extensive experience with projects involving coastal land use policy and planning, open space and recreation management, and water resources infrastructure. Prior to joining ESA, Elijah served as staff to the California Coastal Commission.

His relevant experience includes the City of Eureka, Local Coastal Plan Update project, for which Elijah assisted the City with a comprehensive update of its coastal land use planning policies and regulations. He is also collaborating with ESA coastal geomorphologists and engineers on an analysis of sea-level rise vulnerability, available adaptation strategies, and the development of policies to address future coastal land use decisions in the face of climate change.

RYAN TODARO | Role: Coastal Policy and Regulatory Planning
Ryan has 19 years of experience in the environmental field on numerous projects in Southern California and the Central Coast. His experience includes obtaining essential permits and entitlements, and coordinating with construction personnel, local governments, and regulatory agencies regarding environmental compliance, permitting, and mitigation measures for multifaceted projects, often involving multiple stakeholders. In addition to his experience leading environmental documents to successful completion, as a former California Coastal Commission employee Ryan is skilled at analyzing proposed applications and discretionary actions within the coastal zone for conformity with California Coastal Act requirements. Through his past reviews and analyses of coastal development permit applications, coastal land use plans, and zoning ordinances, he has developed a keen understanding of what is feasible, preferred, and permitable in the eyes of the California Coastal Commission. Moreover, his understanding of an otherwise challenging review process allows him to successfully usher projects through the necessary processes with efficiency to success. To complement his experience with coastal projects, Ryan is accustomed to coordinating public meetings and open houses, and conducting...
negotiations, meetings, and other correspondence with governmental and regulatory agencies throughout the course of the environmental review process.

For the City of Oceanside Local Coastal Program Update, Ryan assisted the City in preparing a comprehensive update to the Local Coastal Program to address sea-level rise and other hazards, public access, scenic resources, visitor-serving commercial and recreational land uses, and natural resources. Ryan provided coastal planning expertise throughout the LCP update process, including Coastal Act consistency analysis, Coastal Commission precedent research, and participation in meetings with City and Coastal Commission staff.

COASTAL PROCESSES AND ENGINEERING

LINDSEY SHEEHAN, PE | Role: Ecological Vulnerability

Lindsey is a hydrologist and coastal engineer specializing in sea-level rise planning and the restoration of coastal and estuarine ecosystems. Her experience includes conducting and overseeing numerical modeling, GIS analysis, field data collection, and hydrologic, geomorphic, and water and sediment quality technical analyses in support of shoreline and tidal wetland restoration projects and coastal processes assessments.

Lindsey’s relevant experience includes the Comprehensive Update of the Land Use Plan of the City of Oceanside Local Coastal Program, for which she led the development of the vulnerability assessment using outputs from CoSMoS 3.0 and led the public outreach associated with the report. Lindsey is currently leading the development of the adaptation plan for the City of Santa Barbara City of Santa Barbara Sea-level Rise Adaptation Plan for the Local Coastal Program Update.

LOUIS WHITE, PE | Role: Coastal Engineering

Louis is a coastal engineer with more than 11 years of experience in planning and design of coastal management, restoration, and sea-level rise adaptation projects. He applies strong project management and technical skills to complex, multi-objective projects, and has been instrumental in the success of several major coastal restoration and climate change adaptation projects. Louis has assisted local agencies and special districts in evaluating potential sea-level rise impacts on their assets, including to wastewater infrastructure, highways and transportation, and public open spaces, and developed adaptation approaches for their continued and future operations. By combining a technical base in coastal hydrology and engineering with an understanding of regulatory and environmental processes, Louis helps clients navigate projects through key stages of planning, permitting, design, and implementation.

For the City of Eureka, General Plan Update, Local Coastal Program Land Use Plan Update, Climate Action Plan and EIR, Louis developed sea-level rise projections for the area, and evaluated the vulnerability of the City’s
MATTHEW BRENNAN, PHD, PE | Role: Hydrodynamics and Geomorphology
Dr. Brennan is a water resources engineer with 20 years specializing in estuarine management and restoration. His strengths include evaluating management and restoration scenarios from hydrologic and geomorphic perspectives to support ecosystem sustainability. To implement these perspectives, Dr. Brennan has developed and applied a wide range of hydrodynamic and transport process numeric models. In conjunction with these technical skills, his project management experience includes active client communication, teaming with biologists, integrating input from expert advisors, overseeing technical tasks, and managing subcontractors.

His relevant project experience includes the Los Angeles County AdaptLA: Coastal Impacts Planning, California State Coastal Conservancy, Ormond Beach, Conceptual Restoration Alternatives for Coastal Wetlands Site, and the City of Mountain View Shoreline Sea-level Rise Study.

Teaming Partners
For this project we have enhanced our in-house team with AECOM to support on economics and Kearns and West for outreach. Following are their brief bios.

AECOM | ECONOMICS
AECOM is a global full-service consultancy, which is recognized for their work assessing sea-level rise risk and vulnerabilities on completed projects in San Diego, Los Angeles, Long Beach, San Francisco, Berkeley, Oakland, and San Jose. They provide economic consulting services that are designed to help clients understand how to approach and maximize returns on issues at the forefront of climate adaptation strategy and implementation in coastal environments.

ANNE DEBOER (AECOM) | Role: Economics and Fiscal Impacts
Anne is a professional economist specializing in the economic and financial effects of sea-level rise, resilience funding and financing, and economic impact assessments, with over 5 years of experience. She has worked with both public and private sector clients to deliver real estate and policy strategy recommendations to address the impacts of climate change using tools such as triple bottom line and benefit-cost analyses. Anne has analyzed the economic and financial effects of sea-level rise and coastal flooding for numerous jurisdictions in California, including studies for Santa Barbara, Long Beach, and the Port of Oakland.

In support of the City of Santa Barbara Sea-level Rise Adaptation Plan and Local Coastal Plan Update, Anne is modeling Santa Barbara’s public and private assets, coastal recreational assets, utilities, and transportation information to evaluate the future economic and financial impacts from sea-level rise. For the City of Long Beach Economic and Financial Effects of Sea-Level Rise, Anne is modeling the vulnerability of property, infrastructure, and natural resources that underpin the economy of the City to better understand the economic consequences of a changing climate.

FELIZ VENTURA (AECOM) | Role: Economics and Fiscal Impacts
Feliz has 16 years of public sector, non-profit and private sector experience in economic analysis and strategy development. She has worked on projects across California that seek to improve economic, environmental, and
social outcomes for areas ranging from local communities to countries. Her focus has been on the business case for development that also addresses environmental and social challenges, and she has developed analyses and investment plans under the varying climactic conditions.

Feliz directed a series of economic analyses to support the Financial Cost of Sea-Level Rise, Cost of Inaction, Funding Strategies, and Economic Development Assessment for City of Long Beach Climate Action and Adaptation Plan. For the Port of Los Angeles, Financial Cost of Sea-level Rise for Sea-Level Rise Adaptation Plan, Feliz provided input on methodology and data sources for the port’s approach to the financial analysis of financial impacts, and reviewed and provided comments on the analysis.

Kearns and West | OUTREACH

Kearns & West, Inc., (K&W) is a California-based, small, woman-owned collaboration, stakeholder engagement, and facilitation firm specializing in services to government agencies that help them to be more effective in their relationships with their stakeholders and the public. We have included K&W on our team as an optional support task. Their project-based knowledge of sea-level rise adaptation, coastal and marine resources, flood protection, and land use at the local, state, and national levels may benefit the long-term outreach goals of the City. K&W brings knowledge and tools that offer the City strategic planning processes that have been tried, tested, and proven to work.

JOAN ISAACSON (KEARNS & WEST) | Role: Community Engagement and Stakeholder Facilitation

Joan Isaacson is a principal at Kearns & West and brings 25 years of experience in community engagement, stakeholder facilitation, and urban and environmental planning across Southern California. At the core of her work is a commitment to formulating the best facilitation and engagement strategy where participants can see their fingerprints on the outcomes. Joan has special expertise in creative, effective community engagement programs for citywide and regional planning projects, focusing on involving the full cross-section of community perspectives. In particular, she has been on the forefront of designing public involvement programs for coastal communities’ sea-level rise adaptation planning. Flooding, resiliency, hazard mitigation, and emergency preparedness are also common components of her current work.

Joan has a strong background in community and stakeholder engagement specifically related to resilience and sea-level rise adaptation planning. Her projects include community engagement and training support for the Federal Emergency Management Agency’s (FEMA’s) hazard mitigation and flood risk map programs, community engagement process for the City of Los Angeles Sea-Level Rise Adaptation Planning for Venice Local Coastal Program, facilitating the steering committee for the LA River Master Plan Update, and the Ormond Beach Restoration and Public Access project, which she worked on with ESA. She has also worked on multiple municipal hazard mitigation plans for Southern California cities. Through each project, Joan designs processes to synchronize outreach and discussion topics with the regulatory landscape and planning arc of risk analysis, vulnerability assessment, and mitigation exploration, integrating risk communication principles.
JENNA TOURJÉ (KEARNS & WEST) | Role: Community Engagement and Stakeholder Facilitation

Jenna Tourjé is a director at Kearns & West with over 10 years of experience in community engagement, stakeholder facilitation, and urban planning. She is passionate about partnering with communities on the path to creating healthy, whole, and equitable places, where people love where they live and have a voice and a stake in the future.

Jenna’s experience working in coastal communities includes leading a multi-pronged approach for community engagement for the Malibu Bluffs Park Master Plan. She has supported engagement for resiliency and adaptation planning for the Venice Local Coastal Program and has been engaged in coastal outreach in multiple projects in Laguna Beach, Long Beach, and San Clemente. Jenna has supported FEMA’s hazard risk and flood risk map programs in Region 8 and Region 9, and has experience with hazard mitigation plans in Southern California.
Experience
Section 5

Experience

Having done numerous local coastal programs (LCPs) and sea-level rise assessments, ESA’s proposed experts bring to the City the benefit of an integrated coastal engineering and coastal policy team that offers comprehensive sea-level rise planning knowledge and services, with seamless translation and continuity between hazard analyses, vulnerability assessments, adaptation planning, and policy development. This team is also well acquainted with the City of Malibu through the projects they have worked on, as shown later in this section. We have also provided five examples of LCPs we have recently completed or are currently working on, one of which has received peer-recognized awards. The City of Malibu will benefit from having a team that does not need a learning curve to get this project started and delivered successfully. In this section we discuss ESA’s experience with local government, including coastal hazard modeling and risk assessments, sea-level rise vulnerability assessments and adaptive management, coastal management and adaptation planning, and coastal land use planning and policy analysis. The projects presented in this section directly reflect the collective experience of our management and technical teams.

Coastal Hazard Modeling and Risk Assessments

The City of Malibu’s beachfront is beloved throughout the community, region, and beyond. Rising sea levels mean that this coastline may be fundamentally altered over time. Significant changes to beaches and coastal development will affect both the local economy and ecology. Just recently, the Woolsey Fire had a great impact on the City and we understand the danger and potential post-fire erosional issues this may have for coastal resources as well as the expected increase in fire danger that will come with climate change. In addition to beaches, public resources are also at risk. For example, the historic Adamson House and Malibu Lagoon Museum recently lost a 100-year-old palm tree in front of the property due to an advancing escarpment as water from the lagoon eroded sand that supports the lawn and trees on the property. Additionally, many private residences are at risk, whether low at the back of beach or atop the coastal bluff. Other publicly enjoyed spaces like this are at risk to impacts from sea-level rise.
The ESA team brings extensive coastal process, engineering, and planning experience to effectively assess the vulnerability and risk to the built and natural environment based on our coastal hazard analyses. Our analyses take into consideration coastal storm damage, as well as both storm event and long-term shoreline erosion. By coupling our practices of applied geomorphology with more traditional engineering approaches, ESA is the ideal consultant who can analyze existing built and natural assets and identify solutions to protect the City from future storm impacts. The methods developed by ESA staff and others for this study have been adopted and are becoming widely used along the Pacific Coast.

In the early 2000’s, ESA developed the first new coastal flood studies on the West Coast since the prior studies were completed in the 1980s. The Federal Emergency Management Agency then enlisted ESA staff as a part of a national team to review and develop Guidelines for Pacific Coast Flood Studies (2005), which identified modifications needed for the Pacific region. In one of the methods used, ESA computed 100-year coastal flood parameters, such as wave run-up, using decades of real water level and wave time series and compared them to a synthetic time series developed using statistical techniques. ESA has improved its coastal flood modeling over the years, including development of methods to model the effects of sea-level rise.

ESA was also hired by the State of California in 2008 to provide coastal modeling in support of a statewide vulnerability assessment and subsequent adaptation strategy. ESA was contracted to the Ocean Protection Council to support the Pacific Institute in developing the first statewide coastal erosion maps that included the effects of sea-level rise. Since the Pacific Institute – Ocean Protection Council study was completed in 2009, ESA has embarked on a series of sea-level rise coastal hazard mapping funded by California and intended to support LCP updates. An applicable example of our work is Los Angeles County AdaptLA: Coastal Impacts Planning, for which ESA modeled and mapped coastal erosion, wave run-up, overtopping, and flood inundation for the entire LA County coastline and assessed vulnerability of built and natural assets. The AdaptLA work was conducted in close coordination with the U.S. Geological Survey (USGS); we utilized the same input wave and water level data used in USGS’s CoSMoS 3.0 and compared results for coastal erosion and flooding. We continue to collaborate with USGS on the development and application of CoSMoS as part of LCP updates up and down the west coast based on our experience modeling and mapping for the State of California.

Sea-Level Rise Vulnerability Assessments and Adaptive Management

Planning for climate change and sea-level rise requires identifying built and natural assets that are under potential threat and developing creative and intelligent ways to integrate physical process studies and engineering with future land use planning.

Our depth of experience stems from working on similar projects with coastal clients and agencies along the West Coast. These projects include the Coastal Resilience Ventura Program for The Nature Conservancy, which characterized climate change impacts to coastal hazards of flooding and erosion from sea-level rise and

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1 Geomorphology is the study of the origin and evolution of topographic and bathymetric features created and affected by physical, chemical and biological processes at or near the Earth’s surface.
increased storm events in Ventura County. We have developed a shoreline change model that tracks shoreline and backshore erosion and beach width. The model can be utilized to test various adaptation strategies and provide outputs for ecology and recreation value, and has been applied to various projects, including Economic Impact of Climate Adaptation Strategies in Southern Monterey Bay, AdaptLA: Coastal Impacts Planning, City of Oceanside’s Local Coastal Program Land Use Plan, Pacifica LCP Update, and Santa Barbara LCP.

ESA helps coastal communities to develop, screen, and evaluate various flood and erosion adaptation strategies. Our adaptation work is informed by our long record of in-the-ground design and construction of various “gray” and “green” solutions to coastal flooding and erosion. As an example, ESA is leading the implementation of adaptation strategies on the open coast under the Ocean Beach Interagency Coastal Management Plan in San Francisco as ESA staff conducts topographic surveys and observations of the shoreline for bluff erosion and beach conditions. ESA developed multi-objective solutions to balance habitat, recreation, and infrastructure along the 3.5-mile stretch of sandy beach. Through the review of adaptation scenarios and assessment of coastal erosion and flood hazard events, ESA provided a final plan that included a series of key moves focusing on protecting critical sewer infrastructure balanced with maintaining beach habitat, access, and hazard reduction.

Coastal Management and Adaptation Planning

As the City continues to more fully understand the threat that sea-level rise poses to its coastal infrastructure, it will need to translate the vulnerability and risk assessments into approaches for adaptive policy and planning. ESA offers the City project experience in coastal adaptation planning and design that spans traditional coastal engineering and natural/green infrastructure, so that we can fully integrate a process that provides a long-term, economically viable solution to the threats of climate change.

ESA encountered this problem first-hand while acting as the lead coastal processes consultant on the Ocean Beach Interagency Coastal Management Plan mentioned above. This plan describes a preferred adaptation strategy that balances infrastructure protection, public recreation, and ecology for the west shore of San Francisco through 2100. The plan includes safety triggers to implement emergency measures, and our team recently confirmed the long-term feasibility of the plan, including the hybrid seawall armoring-sand placement-retreat-restoration adaptation strategy for south Ocean Beach, fronting wastewater treatment facilities. The strategy gained the support of the City and County of San Francisco, the National Park Service, and the Coastal Commission. ESA also identified interim solutions for the protection of the wastewater infrastructure over the course of the next 10 years, assisted in securing permits, designed sand placement that occurred throughout the last two years, and coordinated with the San Francisco Planning Department to develop long-term management solutions for the City’s pending LCP update.

Owing to ESA’s experience with nature-based coastal and other flood-plain management projects, our help has been solicited with research and guidelines for natural infrastructure. ESA assisted The Nature Conservancy and Point Blue Conservation Science to develop Natural Infrastructure Guidelines for Coastal Adaptation. The collaboration, supported by the National Oceanographic and Atmospheric Administration Sentinel Program and funded by the State of California Fourth Climate Assessment resulted in guidelines for natural infrastructure such as dunes and cobble berms for swell exposed coasts and oyster reefs, marsh sills and tidal benches (akin to the horizontal levee and living levee concepts also developed by ESA and others) for estuaries. These natural infrastructure tools are applicable.
Coastal Land Use Planning and Policy Analysis

ESA is well qualified to assist the City through the second phase of this project, having provided technical support for several LCP updates for the Counties of Los Angeles, Marin, Santa Barbara, Monterey, Sonoma, and the cities of Del Mar, Eureka, San Francisco, Pacifica, and Oceanside. ESA’s analyses supported the development of the adopted Marin County LCP and the City of Del Mar’s LCP Amendment for sea-level rise. In Del Mar, ESA completed a coastal hazard, vulnerability, and risk assessment; a draft sea-level rise adaptation plan; and led the preparation of an LCP Amendment to address sea-level rise hazards, including protection, accommodation, and retreat adaptation strategies in a revised land use plan (LUP) and implementation program.

ESA also engaged in a comprehensive LCP Update for the City of Eureka as part of the City’s General Plan Update. For Eureka, ESA prepared a revised City of Eureka General Plan and LCP Land Use Plan that addressed a range of coastal and economic development issues, including sea-level rise vulnerability and adaptation, and the conversion of coastal-dependent industrial land uses. Additionally, ESA supported the City of Pacifica’s General Plan and EIR, which addressed LCP updates and several challenging natural resource issues. ESA recently completed the vulnerability assessment, adaptation plan, and new sea-level rise policy language for the Pacifica LCP Update.

Other notable LCP Update projects include: a comprehensive update to the City of Oceanside’s Local Coastal Program Land Use Plan, which focuses on balancing Oceanside’s economic growth and redevelopment of their coastal zone, with plans to protect those assets and resources; for the County of Marin, Local Coastal Program Sea-Level Rise Adaptation Grant Program, for which ESA assisted Marin County to obtain funding, provided further guidance regarding the use of available regional coastal flooding hazard maps, developed updated coastal erosion hazards that account for sea-level rise, assessed the vulnerability of wetlands and beaches to sea-level rise, and developed shoreline adaptation strategies; and supporting the County of Sonoma LCP Update, which is the County’s first comprehensive LCP update in more than 15 years.

Local Government Experience

ESA has unsurpassed experience providing multidisciplinary support services to municipal clients. Through this experience, we have developed a high level of trust, which has resulted in long-term relationships with our clients. Our team of specialists have extensive experience coordinating with and working as an extension of staff for several Southern California cities and counties, including the Counties of Los Angeles and Ventura, and have staff that have Santa Monica Mountains Coastal Zone expertise. Other local cities we have worked with include Los Angeles, Santa Monica, El Segundo, Manhattan Beach, Redondo Beach, Rancho Palos Verdes Estates, Huntington Beach, Newport Beach, and Laguna Beach.

We are also able to coordinate with local representatives of state and federal resource agencies including the California Coastal Commission (CCC), State Lands Commission, Santa Monica Mountains Conservancy, USGS (re:
CoSMoS), the California Department of Transportation, Heal the Bay, and the Santa Monica Bay Restoration Commission (SMBRC).

**Similar Project Experience**

ESA is well qualified to assist the City, having provided technical support for several vulnerability assessments for LCP updates, including counties (Los Angeles, Marin, Santa Barbara, Monterey, Sonoma) and cities (Del Mar, Eureka, San Francisco, Pacifica, and Oceanside). Following is a sample of our experience preparing vulnerability assessments for coastal city LCPs and similar projects.

**EXPERIENCE WITH CITY OF MALIBU**

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<tr>
<th>Key Team</th>
<th>Key Project Attributes</th>
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<tbody>
<tr>
<td>Bob Battalio</td>
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<td>Local experience</td>
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The following are a few projects ESA has worked on in the City of Malibu:

**California State Coastal Conservancy and Mountains Recreation Conservation Authority, Malibu Coastal Access Public Works Plan EIR.** Our team is coordinating with California State Coastal Conservancy and Santa Monica Mountains Conservancy and decision-makers regarding the analysis of impacts of a Public Works Plan for the development, operation, and maintenance of coastal public access facilities and improvements at 12 sites in the City of Malibu. Two of the 12 sites would involve new construction. This is an access project where all of the access points are existing legal easements. The project is in the initial phase (completion of underlying technical studies) and is expected to be ready to proceed to the formal CEQA process in the coming months.

**Surfrider Foundation, Malibu Lagoon Restoration Review.** ESA was hired by the Surfrider Foundation to assist its local chapter with concerns about the Lagoon Restoration project. ESA identified actions to address the stakeholder concerns consistent with the restoration project goals, as well as additional actions that could be undertaken in the future.
Malibu Wastewater project, for which ESA assessed the water quality management problems of Malibu Lagoon, mapped the stormwater drains contributing runoff to the lagoon, and developed estimates on nonpoint source pollutant loads to the lagoon and Santa Monica Bay.

Los Angeles County, Biological Assessment for 28906 Verde Mesa Lane – Lots 5 and 6. ESA managed biological field surveys and the preparation of the Biological Assessment Report that was prepared for a proposed project located within the City of Malibu Local Coastal Program area. A detailed technical report was prepared in accordance with the Malibu Local Coastal Program Implementation Plan.

Malibu Bluffs and Corral Canyon Park Focused Rare Plant Survey for the Malibu Parks Public Access Enhancement Project. ESA’s biological team managed a focused rare plant survey and prepared a technical report for the Santa Monica Mountains Conservancy’s Malibu Bluffs and Corral Canyon properties. Field surveys included detailed vegetation mapping and focused rare plant surveys. A detailed technical report was prepared, intended to accompany a project submittal package to the California Coastal Commission.

Additional biological assessments include: La Paz Lane Biological Assessment, Larkspur Biology Report, and Calicut Road Biology Assessment.

LOS ANGELES COUNTY, ADAPTLA COASTAL IMPACTS PLANNING

Key Team
> Bob Battalio
> Nick Garrity
> Louis White

Key Project Attributes
> Vulnerability assessment to support LCP updates throughout Los Angeles County
> Familiarity with coastal issues
> Multiple public meetings, including a workshop on adaptation strategies for subareas

ESA was a key collaborator on AdaptLA: Coastal Impacts Planning for the Los Angeles Region. This project, funded by the Ocean Protection Council under the Local Coastal Program Sea-Level Rise Adaptation Grant program, ESA modeled coastal flooding and shoreline and bluff erosion for the entire Los Angeles County shoreline. The City of Santa Monica led the effort on behalf of 11 participating jurisdictions representing municipalities in Los Angeles County. The project team included multiple support organizations, including the University of Southern California Sea Grant Program, the Los Angeles Regional Collaborative on Climate Action and Sustainability; the California State Coastal Conservancy; Heal the Bay; and SMBRC.

The project coincided with the development of the Coastal Storm Modeling System (CoSMoS) for Southern California, developed by the U.S. Geological Survey and funded by the State Coastal Conservancy. Technical support for CoSMoS development was provided by ESA and Scripps Institution of Oceanography staff. ESA provided coastal flood and
erosion hazard mapping using wave and water level projections from the USGS. ESA also used this mapping to conduct a vulnerability assessment of developed infrastructure and natural habitats along the entire Los Angeles County coast.

CITY OF SANTA BARBARA SEA-LEVEL RISE ADAPTATION PLAN FOR THE LCP UPDATE

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<td>Lindsey Sheehan</td>
<td>Sea-level rise adaptation alternatives</td>
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ESA is assisting the City of Santa Barbara with updating its LCP to comply with CCC guidance and a CCC grant agreement. We will be evaluating alternative strategies to adapt to sea-level rise and preparing draft policy language for evaluation by the City, the public, and the CCC. ESA developed sea-level rise scenarios consistent with the updated (2018) CCC Guidance, and developed linkages to the previously developed USGS CoSMoS and the Coastal Resilience flood and erosion hazard mapping developed by ESA. ESA completed a vulnerability analysis, which updated previous efforts by incorporating more recent assessments of the City’s assets and infrastructure. This project built upon our prior (2015) work for the County of Santa Barbara, which included both a countywide coastal flooding and erosion mapping effort and a more detailed analysis specifically for the City of Santa Barbara. Under a separate contract, ESA was also tasked by the City of Santa Barbara to adjust our coast hazard mapping to account for the effects of existing shore protection structures.

ESA will be developing an adaptation plan, identifying different adaptation strategies, and determining their implications for improved protection in the near-term, mid-term, and long-term. ESA is working with the City to develop criteria for evaluating these strategies (including non-economic criteria) and partnered with AECOM to identify the monetary costs of sea-level rise, coastal erosion, and flooding, and the benefits conveyed via the adaptation scenarios.

ESA will be revising the applicable sections of the City’s LCP based on public and stakeholder input, the vulnerability assessment update, and the adaptation plan. This will lead to a set of draft LCP Land Use Plan policies for review by the City and CCC, aiming for future adoption by the City Council.
ESAs thorough and measured approach to vulnerability assessment supports a proactive, transparent, and inclusive dialogue on how best to protect our shared coastal assets.” – Russ Cunningham, Principal Planner at Oceanside

Having completed the vulnerability assessment, ESA is currently in the process of developing the Oceanside Adaptation Plan, which will be designed to help property owners (public and private) plan for and address hazards associated with future sea-level rise. Informed by the vulnerability assessment, the adaptation plan will provide a framework for the City to monitor the effects of coastal erosion and flooding and prepare for the identified vulnerabilities by choosing from a suite of adaptation measures. Ultimately, the Oceanside Adaptation Plan will provide flexibility for the City to choose appropriate adaptation measures over time.
CITY OF DEL MAR LCP AMENDMENT TO ADDRESS SEA-LEVEL RISE AND COASTAL FLOODING

Key Team
> Nick Garrity
> James Jackson
> Reema Shakra
> Lindsey Sheehan

Key Project Attributes
> Vulnerability assessment
> Coastal hazards
> Familiarity with coastal issues
> LCP amendment to address sea-level rise
> Public workshops

ESA assisted the City of Del Mar in preparing an LCP Amendment to address sea-level rise, storm surge, and coastal flooding. ESA analyzed the potential impacts of sea-level rise and coastal flooding, and supported the City in creating policies and regulations to manage the City’s coastline and protect public health and safety. The City of Del Mar is vulnerable to river and coastal flooding and erosion, with significant related damage occurring in the recent past.

Along the Del Mar bluffs, the cliff top has retreated to a point where it is a safety concern for the LOSSAN (Los Angeles-San Diego-San Luis Obispo) railroad along the bluff top. ESA’s analyses included assessing beach, bluff, and river flood and erosion hazards and vulnerabilities with sea-level rise, and developing adaptation strategies and coastal policies to reduce flood and erosion risks. ESA’s Del Mar Coastal Hazards, Vulnerability, and Risk Assessment is available at: [http://www.delmar.ca.us/DocumentCenter/View/2455](http://www.delmar.ca.us/DocumentCenter/View/2455). ESA collaborated with the City, the Stakeholder and Technical Advisory Committee (STAC), and the public in a series of 10 committee meetings and public workshops. Based on input from the STAC and ESA’s expertise in coastal adaptation planning, our team drafted a sea-level rise adaptation plan to serve as the City’s long-range plan to reduce sea-level rise risks, which is available at: [http://www.delmar.ca.us/DocumentCenter/View/2561](http://www.delmar.ca.us/DocumentCenter/View/2561). To support the adaptation plan, ESA prepared two technical reports: a sediment management plan, which analyzed the feasibility of and provided recommendations on beach nourishment and lagoon dredging; and a wetland habitat migration assessment, which assessed the sustainability of marsh habitats in the San Dieguito Lagoon. The two studies provide recommendations on the next steps for Del Mar in implementing the adaptation plan.

In a letter from the CCC to the City of Del Mar in regard to its Local Coastal Program Amendment, CCC staff commented: “We commend the scientific approach utilized in the City’s Vulnerability Assessment and Sediment Management Plan specifically, both of which identify and analyze current and future threats to the City from flooding and accelerated erosion due to changing future ocean conditions.” – Gabe Buhr, CCC Coastal Program Manager
ESA also developed land use policies and regulations for the LCP Amendment to address sea-level rise and associated risks. In the fall of 2018, the City Council adopted the LCP Amendment, which will now be submitted to the CCC, which has expressed its support for Del Mar’s strategy to address sea-level rise.

CITY OF PACIFICA LCP AMENDMENT TO ADDRESS SEA-LEVEL RISE AND COASTAL FLOODING

<table>
<thead>
<tr>
<th>Key Team</th>
<th>Key Project Attributes</th>
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<tbody>
<tr>
<td>Bob Battalio</td>
<td>&gt; sea-level rise vulnerability assessment and adaptation analysis</td>
</tr>
<tr>
<td>James Jackson</td>
<td>&gt; Coastal hazards</td>
</tr>
<tr>
<td>Reema Shakra</td>
<td>&gt; Familiarity with coastal issues</td>
</tr>
<tr>
<td></td>
<td>&gt; Extensive public engagement process and coordination with CCC</td>
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</table>

ESA assisted the City of Pacifica in updating its LCP to comply with CCC guidance and a CCC grant agreement. **ESA assessed the vulnerabilities of public and private property, development, and infrastructure to coastal erosion, storm flooding, and tidal inundation.** ESA also developed and evaluated alternative strategies to adapt to sea-level rise and prepared draft policy language for evaluation by the City. The project included an extensive public engagement process, led by Kearns & West, and coordination with the CCC. ESA and Kearns & West worked together to expand the community engagement during the project responding to the City’s and public’s desire for additional meetings. ESA developed sea-level rise scenarios consistent with the updated (2018) CCC Guidance, and developed linkages to the previously developed USGS CoSMoS flooding results and erosion hazard mapping from the San Francisco Coastal Regional Sediment Management Plan (by ESA and the Coastal Sediment Management Workgroup). ESA developed adaptation alternatives specific to the geomorphic setting, wave exposure, and asset density within each of the City’s coastal subareas. The adaptation alternatives analysis included an economic cost-benefit analysis that accounted for the engineering costs to adapt, resulting impacts (avoided or reduced) to property, infrastructure, business revenues, and beach recreation. Working with the City, the ESA team developed a list of priority sea-level rise adaptation policies for the LCP Update that places a near-term emphasis on protection strategies, while establishing guidance for flood and erosion monitoring programs and reassessment of the City’s adaptation plan in the future. The policy language developed by the ESA team was ultimately accepted by the Pacifica City Council, and City staff are moving ahead with their LCP Update to include the policy concepts that the ESA team developed.
SCAG, SOUTHERN CALIFORNIA REGIONAL CLIMATE ADAPTATION FRAMEWORK

Key Team  >  Reema Shakra

Key Project Attributes  >  Comprehensive framework to support regional climate adaptation planning
>  Climate change vulnerabilities
>  Model General Plan policies for Safety, Land Use, Circulation, and Environmental Justice Elements
>  Model Local Coastal Program policies

ESA is supporting the Southern California Association of Governments (SCAG) in preparing a comprehensive framework to support regional climate adaptation planning, identify climate change vulnerabilities, assist in capacity building, and provide outreach and other implementation tools for local jurisdictions. The SCAG region includes 191 cities and six counties. The project includes coordinating regional collaboration for climate adaptation and resiliency planning; developing model adaptation language for General Plans to support compliance with Senate Bill 379 as well as model language for Local Coastal Programs; and developing regional metrics, data, and tracking. ESA is leading the effort on the following major elements: preparing General Plan and Local Coastal Program guidance and developing a regional climate adaptation framework and regional coordination strategy.

**General Plan and Local Coastal Program Guidance.** ESA is providing support for all of the cities and counties in the SCAG region by analyzing the gaps in their adaptation planning efforts and providing guidance on how to resolve those gaps. ESA will also establish model policy language for the General Plan, including the General Plan’s Circulation, Land Use, Safety, and Environmental Justice Elements. Model language will also be provided for Local Coastal Programs.

**Adaptation Planning Framework and Regional Coordination.** Using stakeholder input from the region, ESA is developing a multi-step process that will illuminate how to assess risk and how to develop strategies that reduce risk. The resulting products include a Regional Climate Adaptation Coordination Strategy, Southern California Adaptation Planning Guide, Lessons Learned and Next Steps Summary Report, and case studies.
References
Section 6

References

ESA has earned a reputation for responsive service, technical excellence, and high-quality work products. We invite you to contact our clients, listed below, for an appraisal of the quality of our work, technical expertise, as well as our ability to meet schedules and budgets.

<table>
<thead>
<tr>
<th>Client Name/Contact Person</th>
<th>Description of Services Provided</th>
<th>Staff Assigned to On-Call</th>
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<tbody>
<tr>
<td><strong>City of Del Mar</strong></td>
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<tr>
<td>Kathleen Garcia</td>
<td>Del Mar LCP Amendment to Address Sea-Level Rise and Coastal Flooding</td>
<td>Nick Garrity, PE</td>
</tr>
<tr>
<td>Planning Director</td>
<td><em>The full project description can be found Section 3, Experience.</em></td>
<td>Lindsey Sheehan, PE</td>
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<tr>
<td>Russ Cunningham</td>
<td>Oceanside LCP Update Land Use Plan</td>
<td>Nick Garrity, PE</td>
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<tr>
<td>Principal Planner</td>
<td><em>The full project description can be found Section 3, Experience.</em></td>
<td>James Jackson, PE</td>
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<td><strong>City of Pacifica</strong></td>
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<tr>
<td>Bonny, O’Connor</td>
<td>Pacifica LCP Land Use Plan Update</td>
<td>Bob Battalio, PE</td>
</tr>
<tr>
<td>Associate Planner</td>
<td><em>The full project description can be found Section 3, Experience.</em></td>
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<td><strong>City of Santa Barbara</strong></td>
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<tr>
<td>Melissa Hetrick</td>
<td>Santa Barbara Sea-Level Rise Adaptation Plan for the LCP Update</td>
<td>Nick Garrity, PE</td>
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<tr>
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<td><em>The full project description can be found Section 3, Experience.</em></td>
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Section 7
Implementation Services/Scope of Work
Section 7

Implementation Services/ Scope of Work

ESA will build off of our experience preparing sea-level rise vulnerability assessments and adaptation plans throughout California, including ESA’s AdaptLA vulnerability assessment encompassing Malibu. ESA can leverage this experience to efficiently develop the City’s Vulnerability Assessment and Adaptation Strategies to provide an effective basis for developing sea-level rise policies in the LCP Update and the City’s long-range planning efforts to manage the effects of sea-level rise. ESA will complete a Vulnerability Assessment and develop Adaptation Strategies to inform the subsequent Adaptation Plan and LCP Update (second phase) using our approach that has been tested with numerous cities, stakeholders, and the Coastal Commission on multiple projects.

ESA’s Scope of Work will meet the City’s objectives of the Coastal Vulnerability Assessment as summarized from the RFP:

1. Utilize existing information and methodologies to the extent feasible. ESA can apply the same methodologies used for AdaptLA and has used CoSMoS hazard data for many jurisdictions.
2. Consider work being conducted by CCC, other State agencies, regional jurisdictions, and other entities. In addition to our work on AdaptLA, ESA is involved in regular coordination with CCC through our other LCP update projects and is currently working with the Southern California Association of Governments’ Regional Climate Adaptation Planning Guide, a framework ESA is currently preparing. We can readily transfer our knowledge from these and other efforts to the City’s project.
3. Be specific to the conditions and coastal hazards present in the City of Malibu. ESA is familiar with the coastal erosion and flooding hazards present at Malibu through our work in Malibu, assessment of Malibu hazards and vulnerabilities in AdaptLA, and assessments for similar coastlines in California.
4. Be written and designed to be easily understood and informative to the public, stakeholders, and City decision makers that are not familiar with the technical specifics. ESA and our teammates have
experience clearly communicating the complex technical issues associated with SLR vulnerability and adaptation projects to a wide range of audiences, including in our award-winning vulnerability assessments.

ESA is committed to working with the City to refine our proposed scope of work, schedule, and cost proposal to meet the City’s needs. We have included a provisional schedule at the end of this section, following the Scope of Work.

**Scope of Work**

**Task 1- Project Kickoff and Management**

ESA will mobilize and initiate the project upon receiving notice to proceed and will lead a project kickoff meeting with the City (Task 1.1). We have also included ESA’s scope to manage the project, the ESA team, budget, and schedule and to have regularly-scheduled meetings with the City (Task 1.2). As an optional task (not currently included in the scope of work or cost proposal), we recommend the City consider coordinating with California Coastal Commission (CCC) staff near the beginning of the project and at key milestones in the preparation of the Coastal Vulnerability Assessment and Adaptation Strategies.

1.1 Project Kickoff

ESA will participate in a kickoff meeting with representatives from relevant City departments. The ESA team and the City will meet to discuss and review the project schedule (see Table 7-1), goals, and potential challenges. The kickoff meeting will enable ESA to identify and obtain existing information such as critical City assets that were not included in the AdaptLA Vulnerability Assessment (ESA 2016). The pertinent background studies listed in the RFP will also be reviewed in the kickoff meeting for information relevant to the project.

1.2 Project Management and Meetings

The key to a successful partnership between the City and the consultant team on the project will be strong collaboration and coordination. ESA will coordinate with the City’s project manager to establish regularly scheduled project management meetings. It is anticipated that these meetings will occur on a monthly basis throughout the planning process. The primary intent of these meetings will be for staff and ESA to regularly and efficiently check in on project progress and schedule. The meetings also provide an opportunity to discuss issues that have arisen and share ideas.

Project meetings could include City staff from different departments, such as engineering and public works, to ensure that all groups are informed of the planning efforts and can participate in the process. This provides for more efficient use of staff time as initial work products submitted by ESA will already reflect staff input, facilitating review and minimizing the need for subsequent revisions. Monthly meetings can be scheduled to coincide with other meetings and events to maximize efficiency, or re-scheduled as needed. ESA will consult with City staff as to the format and desired outcomes of these meetings, as well to identify the appropriate attendees. We assume in the budget that one ESA staff will remotely attend the monthly meetings (up to 1 hour) for a project duration of 12 months.

This task includes ESA’s management of efforts related to the Scope of Work, schedule, budget, and invoicing, as well as general internal and external team management. ESA will assist City staff with meeting administrative grant requirements such as the quarterly reporting required by the CCC. This task includes a total of 60 hours of project management time, which assumes an average of 5 hours per month over the 12-month life of the project.
**Task 1 Assumptions:**

- City staff will coordinate representative attendance from key City departments.
- The kickoff meeting will be held at a City building and will be up to 2 hours in length.
- ESA Team attendance will be in-person and will include the project director, project manager, and a representative from Kearns and West. Other team members may attend remotely.

**Task 1 Deliverables:**

- Kickoff meeting and project schedule
- Up to 12 conference calls with the City

**Task 2 | Public Engagement**

ESA and Kearns & West (K&W) will draw from our experience with prior SLR projects to assist the City with public outreach and stakeholder involvement for the project by developing an engagement plan, an interactive web-map, and presentation materials as well as conducting meetings with the public and key stakeholders.

**2.1 Community Engagement Plan**

Following the project kick off meeting, Kearns and West will prepare a Community Engagement Plan, which will serve as a guide to provide communities the opportunity to engage in the vulnerability assessment and for developing educational tools to immerse the community in the process. The Community Engagement Plan will also anticipate the process for communities to provide input on selecting preferred strategies in the second phase of the project. The Plan will include elements necessary for the consultant team and City staff to create pathways for active public engagement in the Project through developing an outreach and participation program for residents and stakeholders.

The opportunities for community input to shape and form planning policy can vary depending on the technical and regulatory context. While some planning processes have few limits, such as a visioning project, others like long-range sea level rise planning have specific mandates and conditions that must be addressed. For this project, conducting a vulnerability assessment and identifying a range of possible sea-level rise adaptation strategies, opportunities for input include:

- The types and locations of community and environmental assets to address in the Vulnerability Assessment including environmental justice concerns.
- Hazard mitigation and adaptation planning approaches, in the context of 1) applicable established regulations and requirements; 2) relative impacts on coastal, environmental, recreation, and fiscal resources; 3) opportunities for achieving multiple benefits, including other community goals and needs; and 4) assumptions of the vulnerability assessment.

The Community Engagement Plan will incorporate stakeholder analysis, an outreach program, a communications plan, programs & activities, roles and responsibilities, and a calendar. In addition to outlining methods for how residents will be engaged in the process through in person meetings, workshops, and digital engagement, the plan will identify additional outreach that the City should consider, including online surveys, partnerships with community organizations, etc. Particular consideration will be given to effective strategies for providing information to the public in understandable, relevant formats. For example, we propose developing a web-map for the project that is described below.

We also recommend that the City consider forming stakeholder groups for the project including a Community Working Group and/or Technical Working Group, which could provide input to the project team and City on the
Coastal Vulnerability Assessment and Adaptation Strategies prior to the Public Workshops. ESA has not included scope and budget for Working Group meetings or revisions to work products in response to working group comments; however, pending review and approval by the City, ESA could allocate meetings within Task 1 to Working Group meetings and/or provide Working Group meeting support and attendance as an additional service.

### 2.2 Public Workshops

As part of the outreach process, we propose two workshops to facilitate discussion on the Vulnerability Assessment and Adaptation Strategies. We propose the first workshop to take place once the hazard and asset data are collected to share information about sea level rise projections and implications for Malibu and gather input on potential vulnerabilities and key community priorities. The workshop will be structured to allow for community members to learn about sea level rise and will include a presentation, a large group format, and structured small group breakout sessions with collaborative, hands-on activities to allow for cross-pollination of ideas between participants.

The second workshop will take place after initial draft adaptation measures are identified. This workshop will provide opportunities for participants to review and provide input on the measures. The workshop could be structured as a World Café format or as an Open House. With a World Café format, participants could review and provide input on preferred measures in small group breakouts. For the Open House structure, a continually running presentation would provide information on the project, input received from the community, and the process-to-date. Each Open House station would provide opportunities for input.

As an option, the first workshop could focus on education and results of the Vulnerability Assessment, and the second workshop could focus on the draft Adaptation Measures.

The ESA team can also help the City connect with other regional planning efforts that have outreach programs such as the University of Southern California Sea Grant Program (USC Sea Grant) and the Coastal Resilience network. Note we collaborated with USC Sea Grant on the AdaptLA project, coordinated with USC Sea Grant while preparing our proposal, and have USC Sea Grant's letter of support for ESA in Section 9, Additional Information.

**Vulnerability Assessment Presentation**

ESA will develop materials on the findings of the Vulnerability Assessment to be presented in the Public Workshop 1 as well as public meetings with the City Planning Commission, City Council, and Council Committees. The presentation includes a slideshow and poster graphics.

**Adaptation Strategies and Policies Presentation**

ESA will develop materials to be presented at Public Workshop 2 and public meetings with the City Planning Commission, City Council, and Council Committees. The presentation includes a slideshow and poster graphics.

### 2.3 City Presentations

ESA will prepare for and attend up to two presentations on the Coastal Vulnerability Assessment and Adaptation Strategies to the City Planning Commission, City Council, and/or Council Committees. ESA will prepare draft presentation materials for the City’s review and revised final presentation materials in response to comments. We assume that presentation materials will consist of PowerPoint presentations and handouts previously prepared for the workshops.
2.4 Interactive SLR Web-map

ESA has developed web-maps for previous sea-level rise projects that were successful at reaching community members who could not attend public meetings and served as a valuable tool during the meetings themselves. A web-map allows the public to view and manipulate GIS maps on the internet without special software, and helps make this technical information accessible to the public. A City-based web page can be helpful in making project information accessible. A web-map for Malibu’s Vulnerability Assessment would include the coastal hazard maps developed in Task 3.2 and the Assets identified in Task 3.3 for the public to interact with and explore potential sea-level rise impacts on the Malibu coastline for themselves. The layers uploaded to the web-map will be

Task 2 Assumptions:

> Preparation and attendance at two Public Workshops, for example one Draft Vulnerability Assessment Workshop and one Adaptation Strategies Workshop.

> Up to 4 members of the ESA Team will attend each workshop (two facilitators and an associate from Kearns and West and the ESA Project Manager).

> Large-scale map print-outs of the hazard and asset maps produced in Task 3. No new content will be prepared for the workshop.

> Up to two presentations to City Planning Commission, City Council, and/or Council Committees using PowerPoint.

> Up to one ESA team member will attend each City Planning Commission, City Council, and/or Council Committees meeting.

> The City will host a webpage for the project upon which deliverables and other relevant materials may be posted (e.g. links to relevant background studies as well as web-map developed for the project).

> The layers uploaded to the web-map will be similar to the maps prepared under Tasks 3.2 and 3.3 and will not require substantive changes to symbology or content.

Task 2 Deliverables:

> Draft and Final Community Engagement Plan

> Public Workshops (Task 2.2)

  o Preparation of logistics memo before workshop
  o Large-scale map printouts
  o Draft and final slide deck
  o Workshop attendance and facilitation
  o Memorandum summarizing workshop attendance, format and presentation, input, and major discussion themes

> Presentations to City Planning Commission, City Council, and/or Council Committees (up to two presentations)

> Draft and final presentation materials

> Interactive web-map (Task 2.4)

Task 3 | Technical Analysis

In this Task, ESA will establish existing coastal hazard conditions at Malibu, select sea-level rise scenarios for analysis, compile sea-level rise hazard data, inventory the City’s development, infrastructure, and natural coastal
resources potentially at risk to sea-level rise, and tabulate the economic value of these built and natural assets to support the Vulnerability Assessment in Task 4.

3.1 Existing Conditions
ESA will begin Task 3 by documenting existing conditions in Malibu to be incorporated into the Draft Vulnerability Assessment. Existing Conditions will establish the planning context and identify existing processes, such as current coastal flooding, creek and lagoon flooding, coastal sediment processes, and existing adaptation measures such as coastal armoring. ESA will compile and describe the information and data derived from existing studies, reports, and data sources listed below:

- USGS's CoSMoS 3.0 coastal flooding and erosion projections
- FEMA Flood Insurance Rate Maps and Flood Insurance Study for Malibu Creek and the City’s coastline.
- State of California Sea Level Rise Guidance – 2018 Update
- Rising Seas in California, An Update on Sea-Level Rise Science
- 2012 National Research Council’s Sea-Level Rise for the Coast of California, Oregon and Washington: Past, present, and Future
- California Coastal Commission 2015 Sea Level Rise Policy Guidance
- California Coastal Commission Local Coastal Program Update Guide
- California Coastal Commission 2018 Residential Adaptation Policy Guidance (Draft)
- Safeguarding California Plan: 2018 Update, California’s Climate Adaptation Strategy
- California Adaptation Planning Guide
- Los Angeles County Public Beach Facilities Sea-Level Rise Vulnerability Assessment
- Los Angeles County Coastal Regional Sediment Management Plan
- Regional AdaptLA: Coastal Impacts Planning in the Los Angeles Region (ESA and Terra Costa hazard maps)
- Las Virgenes-Malibu Council of Governments Multi-Jurisdictional Hazard Mitigation Plan General Plan
- Local Coastal Program

In our review of available data and studies, we will identify any critical data gaps for the assessment. To address critical data gaps, we will develop a set of reasonable assumptions for use in the assessment and/or identify additional data collection or studies that could be performed in the future as part of implementing the Adaptation Plan in subsequent phases of this project. As part of developing the Existing Conditions, we will define coastal sub-areas for Malibu. It is important to define sub-areas in Malibu to properly characterize the range of shoreline typology (e.g. low beach, tall bluff, lagoon), wave exposure, geomorphic processes, and level/type of development so that appropriate adaptation measures can be applied in the Adaptation Strategies task and second phase of the project. ESA anticipates defining between three and five sub-areas.

3.2 Sea-level Rise Hazard Analysis
Define Sea-Level Rise Scenarios
We will define a set of sea-level rise planning scenarios in coordination with the City that provide a defensible basis for an efficient vulnerability assessment that can be clearly articulated to the public and stakeholders and accepted by the CCC. The sea-level rise scenarios will be selected to represent the following scenarios per the
City’s Request for Proposals and the 2018 OPC Guidance recommendations to aid in planning and understanding the worst-case scenario for projected time horizons:

**Extreme Risk Aversion (H++) Scenario:** for the critical infrastructure, and other development as appropriate.

**Medium-High Risk Aversion Scenario:** for all other built and natural assets.

ESA is familiar with the latest sea-level rise science due to participation in California’s Fourth Climate Assessment studies and for the AdaptLA project, where we considered the new worst-case (extreme) sea-level rise curve at the clients’ request. We will recommend sea-level rise scenarios that will be associated with the planning horizons for mid-century (e.g. 2050/2060) and late century (e.g. 2100). For efficiency, ESA assumes that two sea-level amounts will be selected to represent the Medium-High Risk Aversion Scenario for the project, and that the same two SLR amounts will be used to evaluate the Extreme Risk Aversion Scenario when they occur planning horizons. ESA will review vertical land motion (i.e. regional tectonic uplift and local subsidence) and identify implications to relative sea-level rise for the City.

**Flooding and Erosion Mapping Analysis**

The ESA team will review CoSMoS hazard outputs and compare with hazard information previously prepared by ESA and TerraCosta for the study area during the Adapt LA project. ESA proposes to quantitatively analyze the selected sea-level rise scenarios using existing hazard modeling outputs produced by USGS (CoSMoS 3.0) for flooding and erosion in addition to wave run-up hazards by ESA (AdaptLA, shown on coastalresilience.org).

ESA understands that the City is planning a more detailed analysis of hydrodynamics and coastal processes for Malibu Lagoon. ESA is capable of performing more detailed analyses of current and future conditions with sea-level rise at Malibu Lagoon and incorporating this information into the sea-level rise planning process; however, we have not included detailed modeling of Malibu Lagoon in this scope of work based on our understanding of the City’s approach. ESA assumes that existing hazard mapping will be used to characterize current and future flooding in Malibu Lagoon. If ESA is selected to support the City for the upcoming Malibu Lagoon study, the results may be applied for the Vulnerability Assessment as project timing permits.

We will analyze coastal erosion and flooding hazards representing storm conditions and chronic (non-storm) conditions for existing conditions and the selected sea-level rise amounts. The following sea-level rise related coastal hazards will be evaluated:

- **Tidal inundation (non-storm)**
  - Extent of high water such as a “king tide” event with existing topography in the City.
  - Groundwater level response to sea-level rise in low-lying areas using projected tide levels as surrogates for groundwater levels.

- **Storm flooding from a 100-year event**
  - Coastal flooding, lagoon flooding, wave run-up and overtopping
  - Nearshore wave heights to evaluate pier exposure.
  - Lagoon flooding accounting for geomorphic response to SLR using the approach ESA developed and applied for AdaptLA and a high-level qualitative assessment of the effects of fluvial discharge.

- **Coastal erosion**
  - Historic and future changes in bluff erosion.
  - Beach width changes due to sea-level rise. We will apply CoSMoS and/or AdaptLA hazard mapping outputs to determine beach widths for the Vulnerability Assessment. Alternatively,
ESA may utilize our two-line beach width model that applies the Bruun rule and historic shoreline and bluff erosion rates. We propose to use our 2-line shore response model in Phase 2 to analyze adaptation scenarios. If our review of the CoSMoS and AdaptLA erosion results indicates that it may be more efficient to perform 2-line modeling for the VA “do-nothing scenario,” we will use the 2-line model in place of using the CoSMoS and AdaptLA results.

The above hazards will be analyzed using mapping outputs from one or more of the above mentioned existing sources. ESA will summarize the various data for discussion with the City and selection of appropriate hazard maps. Selected hazard maps will be compiled for analysis in the Vulnerability Assessment and presented on the web-map, PDF maps and engagement materials (posters and presentations).

### 3.3 Coastal Resources Assessment

ESA will work with the City department staff to identify the City’s assets and critical assets that are most critical and vulnerable to sea-level rise impacts. We assume that the primary source for Asset data will be the AdaptLA study and that City staff will collect and provide any other relevant asset data that should be included in the Vulnerability Assessment in GIS format. The coastal resources assessment will include tabulating the following assets:

- **Coastal Development and Coastal Dependent Development**
  - Residential
  - Commercial and Visitor-serving development
  - Public infrastructure (e.g. roads, bridges, utilities)
  - Critical infrastructure
  - Construction altering natural shorelines

- **Public Access and Recreation**
  - Beach width and associated access and recreation functions
  - California Coastal Trail

- **Coastal Habitat**
  - Beaches
  - Wetlands and Estuarine Habitats
  - Environmentally Sensitive Habitats
  - Other Marine Resources

- **Socio-Economic Impacts**
  - Vulnerable population groups, such as the elderly, renters, and seasonal residents as well as low-income and non-white communities

- **Water Quality**
  - Potential flooding and inundation of contaminated sites or treatment systems

- **Archaeological and paleontological resources**
  - Archaeological resources, historic-period built resources, Native American cultural resources, and paleontological resources.

The inventoried AdaptLA asset data and any additional pertinent data from the City will be organized into a geodatabase for the Vulnerability Assessment and presented on the web-map, PDF maps and engagement materials as needed. The actual list of assets that will be incorporated into the Vulnerability Assessment will be developed and agreed upon with the City at the beginning of this task. The Vulnerability Assessment (Task 4) will
group the assets into asset categories, describe each asset category exposure to sea-level rise hazards, sensitivity of the asset to hazard impacts, the adaptive capacity of the asset, and consequences from impacts.

### 3.4 Economic and Fiscal Impacts Review

The purpose of this task is twofold: (1) establish an agreed-upon methodological framework for assessing the economic and fiscal impacts of the sea level rise scenarios and related coastal hazards identified in the RFP; and (2) implement the agreed-upon methodologies to develop economic and fiscal impact results for the identified sea level rise and related coastal hazard scenarios to be incorporated in the Vulnerability Assessment. The analysis will include evaluation of public and private parcels, as well as public infrastructure, ecosystem services, and recreational assets. Associated fiscal and employment impacts will also be considered.

To estimate impacts, AECOM will employ, where appropriate, broadly accepted methodologies and standard economic values published in the academic and management literature. Where asset-specific risks require more localized inputs and assumptions, City staff and other local subject matter experts will be consulted.

Effort will be taken to monetize impacts where credible and transferable methodologies exist. For the evaluation of some economic and fiscal impacts, the preferred approach may be to estimate impacts using different methodologies to provide low and high ranges of impact. In cases where there is less consensus on how to monetize an economic and/or fiscal impact, or there is inadequate data to support a monetary analysis of impact, alternative quantitative and/or qualitative approaches will be used. The results, based upon the assumptions agreed upon with the City, can represent either a baseline or no action analysis that can inform the type, scale and timing of adaptation strategies that could be implemented to mitigate future impacts and increase the resilience of Malibu’s people, economy and environment to future coastal hazards.

For the purposes of the scope of work and budget, we have assumed the following approach to Task 3 Economic and Fiscal Impact Review.

**Methodology**

AECOM will prepare a memo outlining the draft methodology for the economic and fiscal impacts review for City staff to review. City staff will review the draft methodology memo and provide one set of consolidated comments. AECOM will prepare a final methodology memo in response to the City’s comments on the draft memo.

**Property Values**

AECOM will apply a suite of market valuation methodologies, with specific consideration given to the type of property, attributes recorded by the County Assessor, in addition to any other information that can be provided by the City or other relevant stakeholders. When data gaps exist with publicly available resources, AECOM will review and make use of alternative sources of information, such as commercial and/or proprietary data platforms.

**Private Parcels.** For residential parcels where assessed valuations for land and improvements are recorded, in addition to the most recent sales transaction date, relevant economic price indices at the zip code level could be used to generate first order market estimates. These estimates would be compared to recent market transactions, and if significant variability exists, additional real estate market analysis techniques will be performed to adjust these estimation parameters accordingly. Alternatively, acquisition cost per square foot factors could be developed if there are enough recent market transactions to estimate this value with reasonable confidence. The recommended methodology will hinge on an initial analysis by AECOM of available data and recent market transactions.

For non-residential properties where there can be more variability in transaction prices and less granular geographic price indices, AECOM will conduct standard real estate proforma techniques for different occupancy
classes (e.g., commercial, industrial, flex space) by evaluating recent sales data in addition to key market indicators such as vacancy rates, lease rates and operating expenses. AECOM will use these data to develop cost per square foot valuations that can be applied across the study area.

**Public Parcels.** For publicly owned property, AECOM will use any attribute data for public parcels recorded by the County Assessor or the City to estimate the improvement value. The technique chosen to value the land portion of the parcel will be informed in part by City assumptions on the opportunity cost of forgoing future use of vulnerable parcels.

**Fiscal and Employment.** AECOM will evaluate a combination of data resources to develop an understanding of fiscal and employment impacts tied to vulnerable property. For changes in property tax revenues, recorded assessed values and local property tax rates will be analyzed. Sales and transient occupancy tax exposure and related direct employment impacts will be estimated with local tax rates, employment and wage data from the Bureau of Labor Statistics, the City or a proprietary data platform like ESRI's Business Analyst, and any retail sales and hotel tax receipts that the City can provide. AECOM will compute estimates across these impact categories with average market factors that account for occupancy class and additional property characteristics.

**Public Works Values.** AECOM will consult literature that contains published economic service values to address the loss or impaired function of key public works assets such as wastewater and electricity. These industry standard metrics have been developed by federal agencies such as FEMA and have been used in the context of assessing impacts from coastal hazards. However, there is strict criteria for their application, in addition to considerations around the potential for double counting impacts.

ESA will provide engineering assistance to AECOM by estimating the costs of public works facilities damages. ESA will consult with the City Public Works Department and assume a replacement cost estimate will be used to define potential damage.

**Ecosystem Values**

There is a growing body of literature that addresses the ecosystems services provided by coastal habitats. Yet, the scientific understanding on how to value these resources in economic terms is still in a state of infancy. For primary ecosystems goods, services and functions provided by coastal habitats evaluated in the Coastal Resource Assessment as part of Task 3 (not including beach recreation which is addressed under Recreational Asset Values in Task 3), AECOM will review the academic and gray literature to identify where there are credible and transferable values for estimating potential impacts. This review will draw from meta-analyses that evaluate different studies that are attempting to value similar types of ecosystem services in different geographic locations. In the event there are primary coastal habitats where there is not consensus on how to assign a monetary value, alternative approaches will be evaluated, including using restoration costs as a metric to evaluate the ecosystem services. Fiscal impacts will be evaluated for primary coastal habitats that provide a direct use value (e.g., near shore environments used for scuba diving or snorkeling). Estimates of changes in user spending and associated fiscal impacts will draw from published studies that account for coastal recreational expenditures.

**Recreational Asset Values**

AECOM will estimate the recreational value of the City's beaches by applying the valuation framework outlined by the California Coastal Commission, which draws from various methodologies outlined in the academic and management literature. The analysis will incorporate estimates of beach attendance (where available), beach area, and the value of a day at the beach to monetize the recreational value provided by the City's beaches, and how this value could change overtime as sea levels rise. Additional consideration will be given to how existing visitation levels could change overtime from an increase in the local and regional population.
To estimate the fiscal impacts associated with changes in beach attendance, AECOM will review published reports that document the distribution of trip types (e.g., day use, overnight) and trip spending (e.g., food, parking, sundries) by visitors. These spending profiles and assumptions on the location of expenditures (e.g., within the City boundary or outside the City boundary) will be related to relevant tax revenue streams, including sales and transient occupancy taxes to estimate direct fiscal effects. AECOM will use expenditures by type and location to compute the order of magnitude number of jobs and amount of wages supported directly by beach goers.

For additional recreational assets such as coastal trails, bluff parks, bike paths, among others, that may be vulnerable to sea level rise and related coastal hazards, AECOM will review the academic and management literature to determine the most appropriate economic values to incorporate, which could include standardized values that relate the area of the asset to its annual economic value (e.g. value per acre of active park land) or the replacement cost of the asset based on available City and/or regional estimates.

**Results**

The methodology, data, and results of the economic and fiscal impacts review will be documented in the Draft and Final Vulnerability Assessment reports. Results for each economic and fiscal impact type will presented for each time horizon and sea level rise scenario and reported in current dollars. Results will also be reported in a manner to distinguish what impacts are from a gradual rise in sea level (i.e., recurring high tides), which could be considered permanent impacts if no action is taken, and the additional risks from storm induced flooding (i.e., 100-year storm).

**Task 3 Assumptions:**

- City staff will coordinate with relevant departments to collect spatial data with relevant attributes for the missing assets identified in the asset review. City staff will deliver the asset data via CD or file sharing system. All of the data will be delivered at one point in time in a geodatabase.

- ESA will use georeferenced asset data (e.g., GIS shapefiles) from AdaptLA and the City, and has not budgeted field checks of locations nor digitization of paper records or data provided in non-GIS formats (written reports, CAD, excel, etc.).

- AECOM will model in monetary terms impacts that are greatest in magnitude and/or of greatest interest to the City as it would be beyond the scope of this analysis put a dollar value on every asset identified in the Vulnerability Assessment. Additional categories of impact that are not evaluated monetarily will be addressed qualitatively.

  - Up to 5 subareas will be defined along the Malibu coastline

  - Up to 2 future SLR amounts will be mapped in addition to existing conditions. Hazard maps corresponding to the two SLR amounts will be applied at different times according to the Med-High and Extreme Risk Aversion Scenarios in order to determine vulnerabilities under each scenario as needed.

**Task 3 Deliverables:**

- Coastal hazard database and maps for existing conditions and future SLR scenarios (Task 3.1 and 3.2), to be provided as part of the Draft Vulnerability Assessment in Task 4

- Coastal asset database and maps (Task 3.3), to be provided as part of the Draft Vulnerability Assessment in Task 4

- City’s critical asset list (Task 3.3), to be provided as part of the Draft Vulnerability Assessment in Task 4
Publicly accessible web-map of asset locations and sea-level rise hazard zones, providing an interactive spatial overlay map of hazards on assets/resources (Task 2.4 deliverable)

Draft Risk Assessment Matrix: evaluates potential risks and impacts by describing and rating the exposure, sensitivity and adaptive capacity of each coastal resource (Task 3.2, 3.3), to be provided as part of the Draft Vulnerability Assessment in Task 4

Draft and Final Economic and Fiscal Impact methodology memorandum (Task 3.4)

Data results of the Economic and Fiscal Impacts Review Section of the Vulnerability Assessment, to be provided as part of the Draft Vulnerability Assessment in Task 4

Task 4 | Vulnerability Assessment

ESA will prepare a Draft Vulnerability Assessment. The hazard maps selected in Task 3.1 will be overlaid on the asset inventory developed in Task 3.2 to produce vulnerability maps. The potentially impacted assets will be quantified and tabulated, and asset categories will be assessed for vulnerability considering the exposure, sensitivity, and adaptive capacity of asset categories. The results will be presented in a Draft Vulnerability Assessment to be reviewed by City staff; ESA will make one round of edits prior to sharing the draft for public input. Feedback from the community/stakeholders and the public will be incorporated into the report to develop the Final Vulnerability Assessment.

For each asset category, asset vulnerability will be assessed and mapped based on the exposure mapping, asset inventory, and consideration of each asset’s sensitivity and adaptive capacity. For each asset category, a sensitivity rating will be assigned that characterizes the degree of impact that would result from a given amount of exposure (inundation or erosion). Higher sensitivity indicates that the asset will have high vulnerability for a given amount of exposure, whereas a lower sensitivity indicates that the asset will incur limited damage or operational interruptions, and hence a lower vulnerability for the same amount of exposure. Similarly, the adaptive capacity is used to indicate the system’s ability to cope with the impacts. The combination of the degree of exposure, the sensitivity, and adaptive capacity yields the asset’s vulnerability.

ESA anticipates providing an initial assessment of asset sensitivity and adaptive capacity based on professional judgement; we assume City staff will coordinate with relevant departments to review and verify these factors during the City review of the Draft Vulnerability Assessment. The vulnerability mapping will assess vulnerability to natural resources (beaches, bluffs, and lagoons), the built environment (property and infrastructure including utilities and storm drain systems), vulnerable populations, and public access. Vulnerability will be assessed for the asset categories listed in the RFP, and consistent with CCC guidelines:

- Coastal Development and Coastal Dependent Development
  - Vulnerability of development will be evaluated as described above.

- Public Access and Recreation
  - Vulnerability of public access and recreation will be evaluated based on the beach width analysis results as well as projected erosion and flooding impacts to coastal access points.

- Coastal Habitat / Ecology
  - In order to assess coastal habitat vulnerability, the ESA team will summarize the ecological assets within the hazard zones and how they will be impacted by sea-level rise. This will focus on characterizing the existing estuarine, coastal bluff, and beach habitats for existing conditions,
and then using information from the physical modeling tasks to evaluate the future conditions. ESA proposes to use ESA’s Habitat Evolution Model (HEM), the California Sea-level Affecting Marshes Model (CA-SLAMM), or another custom GIS model to assess Malibu Lagoon habitat change with sea-level rise. We worked with Warren-Pinnacle to refine the original (east-coast-specific) SLAMM model to be more appropriate for California systems, based on our deep understanding of lagoon processes. ESA will work with the City to select the appropriate model(s) for the project. ESA will then use habitat evolution modeling to assess the future vulnerability of the different habitat types in Malibu Lagoon. We will evaluate beach ecology along the Pacific shoreline by interpreting beach width results from ESA’s two-line model referenced above. ESA team members, Dr. Richard Ambrose, PhD and Dr. Karen Martin, PhD, will provide input on the methodology and review and interpretation of results to inform the habitat vulnerability assessment based on their research and expertise on Malibu beach ecology, rocky intertidal habitat, Malibu Lagoon, and key species such as grunion.

> **Socio-Economic Impacts**
  
  o Vulnerable population groups will be identified based on impacts sea-level rise related hazards could have on community members most at-risk, including the elderly, renters, seasonal residents, low-income households, and non-white communities.

> **Water Quality**
  
  o ESA will evaluate potential contaminated site flooding and inundation will be analyzed where applicable and potential impacts to treatment systems.

> **Archeological and paleontological resources**
  
  o ESA will identify potential flood and erosion impacts to any known archeological and paleontological resource based on maps provided by the City, if available.

From the Vulnerability Assessment, ESA will identify trigger points at which specific sub-areas, critical assets or coastal resources could be impacted by SLR. These triggers will help to define the timing of needed adaptation measures. Example triggers include amount of observed sea-level rise, minimum beach width or development offset from bluff edge (see Section 9 for an example table of adaptation triggers developed for the Pacifica LCP Update). The vulnerabilities and the consequences identified in this assessment will help prioritize planning efforts to account for the urgency (time horizon) of each impact, and the importance of each impact on the community and resources.

**Task 4 Assumptions:**

> City will provide one consolidated set of staff comments on the Draft Vulnerability Assessment that will include City department staff input on asset sensitivity and adaptive capacity. Comments will be inherently consistent.

> Trigger points will be developed at a high level for the asset categories listed above. Specific triggers for individual adaptation actions/areas will be developed in the second phase for the Adaptation Plan analysis.

**Task 4 Deliverables:**

> Draft and Final Vulnerability Assessment reports

> Presentation materials for Public Workshop 1 on the Draft Vulnerability Assessment
Task 5 | Adaptation Strategies and Policies

ESA will develop a list of applicable adaptation measures for evaluation and review with the City and community. Preferred adaptation measures will then be combined to create high-level potential Priority Adaptation Strategies specific to the various coastal sub-areas in Malibu. For the purposes of this scope, we define adaptation measures as the individual tools or options that are available for sea-level rise adaptation (e.g. beach nourishment, armoring, retreat policies, etc.) and adaptation strategies as an initial or high-level strategy for combining one or more measures over time in a potential adaptation scenario or pathway (e.g. nourish beach in near-term, armor backshore in mid-term, raise structures in long-term).

5.1 Identify Adaptation Measures

ESA will develop a matrix of adaptation measures (individual tools) that could be employed in Malibu to alleviate the vulnerabilities of public and private coastal resources in the City through 2100 identified in Task 4. We will evaluate each measure for effectiveness, trade-offs, and relative costs in addition to community values identified in the first public workshop. Consistent with CCC Guidance, a variety of adaptation measures will be considered, including traditional coastal engineering and nature-based or green infrastructure solutions, and multi-objective measures that incorporate environmental considerations and a holistic approach, rather than focusing on independent or single-purpose solutions for protection. Adaptation measures will be compiled from various categories: policy measures, non-structural measures (beach nourishment, sediment management), structural measures (shoreline armoring, floodwalls, building/road elevation) and hybrid measures (low wall, cobbles and sand cover). An example matrix is provided in Section 9 from our work on the Pacifica LCP which lists the pros and cons of various adaptation measures along with high level suitability for the various sub-areas of coastline. ESA will also consider innovative measures such as living sea walls with input from Dr. Ambrose, as well as artificial offshore reefs.

The result of this task will be a draft SLR adaptation memorandum with the adaptation measures matrix that will be discussed in Public Workshop 2. In addition, a summary memorandum including feedback received during the workshop and ESA recommendations will be created as part of the community engagement plan. These documents will be the basis for the development of the Adaptation Plan and draft Local Coastal Program policies in the second phase of the LCP update.

Materials from the adaptation measures memorandum will be reviewed in Public Workshop 2 to communicate the available adaptation options and gather feedback from the public and stakeholders. Community input will inform the City and ESA of the priorities to consider when developing the adaptation strategies.

5.2 Prioritize Adaptation Strategies

ESA will develop high-level potential Priority Adaptation Strategies that are tailored for each of the various sub-areas of Malibu’s coastline. The Strategies will be comprised of the preferred adaptation measures resulting from the analysis in Task 5.1 and community input received in Task 3.1. Per CCC guidance, the Prioritized Adaptation Strategies will include the following themes:

> Accommodation
> Protection
> Retreat
> Hybrids of the above

Given the uncertainty in sea-level rise projections and erosion/flooding model limitations, planning for sea-level rise requires a phased approach, where certain adaptation measures would be used in the near-term, while others
would be needed in the long-term. The phased approach provides a way to manage the inherent uncertainty in the timing and extent of potential sea-level rise impacts. As such, adaptation measures will be categorized by costs and relative timeframe for implementation. The prioritized adaptation strategies will be organized in a list for each sub-area. The specific timing of each adaptation strategy will be determined in the second phase of the project as part of the Adaptation Plan analysis.

To prepare for the second phase of the project, ESA can work with the City to identify relevant agencies and departments needed to scope and analyze each adaptation strategy for the adaptation plan.

**Task 5 Assumptions:**

- One Priority Adaptation Strategy consisting of one or more measures will be developed for each coastal sub-area, based on evaluation of the adaptation measures matrix and community input.
- Priority Adaptation Strategies will be developed at a high level with relative timing. The ESA team can perform detailed analysis of engineering quantities and costs, trigger timing, and economic cost-benefit analysis in the second phase of the project.

**Task 5 Deliverables:**

- Adaptation Measures Matrix (Task 5.1)
- Adaptation measures evaluation and recommendations summary memorandum based on results from Public Workshop 2. (Task 5.1 and 5.2)
- Prioritized Adaptation Strategies and Policies (Task 5.2)

**Contingency Items**

ESA’s budget estimate includes a contingency for optional tasks that may benefit the project. The various items that may warrant use of contingency budget are described below.

**Optional Task 1 Items**

**CCC Staff Coordination**

We recommend the City consider coordinating with California Coastal Commission (CCC) staff near the beginning of the project and at key milestones in the preparation of the Coastal Vulnerability Assessment and Adaptation Strategies. We have included the following scope of work for an optional CCC staff coordination task for the City’s consideration and can provide a cost proposal for this task at the City’s request.

CCC staff is charged with evaluating LCP updates for Coastal Act consistency and forwarding to the Commission a recommendation regarding LCP certification. As its formal review comes at the very end of the process, the CCC staff’s decision in this regard can have substantial implications for project schedule, budget, and process; CCC-suggested modifications could involve substantive LCP revisions that could trigger subsequent reviews by the City Council and CCC. For these reasons, we recommend that City staff consider focused meetings with CCC staff at key project milestones. Three such meetings are recommended for this first phase, although additional focused meetings may be necessary:

1. The first meeting would occur at the start of the project phase (Task 1) to discuss the City’s work program for the first and subsequent phases of the Coastal Vulnerability Assessment and LCP update, project timelines, review cycles, and protocols for communications with CCC staff. The meeting could also include a discussion of major staff-directed changes the City would like to make to the LCP at the outset of the LCP update effort (alternatively, this discussion could be deferred to the second phase of the project). We propose that this meeting be attended by City staff only.
2. The second meeting would occur early in the Vulnerability Assessment phase (Task 1), with the purpose of briefing CCC staff on the sea-level rise scenarios, methodology, and findings from the Vulnerability Assessment.

3. The third meeting would occur early during the development of Adaptation Strategies (Task 5.1), with the purpose of briefing CCC staff on possible adaptation measures. We would also share public input received from Public Workshop #1, which will inform the City and ESA of community values and priorities.

We expect that City staff would take the lead in coordinating and facilitating CCC coordination. However, we assume that ESA would participate in up to two meetings, potentially by phone or internet, and to be on hand to support City staff, as needed, within the available budget for these tasks.

Optional Task 2 Items

Additional Workshops
An additional workshop could be added in the middle of the process that is focused on informing residents to increase education opportunities and to increase the opportunities for community input to help guide the study. Given that this is a citywide project, holding each workshop twice (different locations, two different date/times) could help to widen the number of participants and range of perspectives.

If the City added a third workshop, we suggest the following sequencing: The first workshop could be structured to introduce project, focus on providing info about sea level rise trends and implications, and engage participants in discussions so that they have a chance to ask questions and get information about what they are most concerned about. The first workshop could also include a discussion about potential vulnerabilities, to help guide the team’s research and analysis. The second and third workshops could be structured to share conclusions of the team’s vulnerability analysis (second workshop) and adaptation measures (third workshop), and solicit feedback, answer questions, and hear additional ideas for consideration.

Additional City Council Meetings
ESA may present at more than two City Council Meetings.

Online Survey
Residents of Malibu are highly engaged online, and previous projects in Malibu have shown that digital engagement through online survey tools reach a wide audience. For the Malibu Bluffs Parkland, almost 10% of residents in Malibu responded to the survey. This indicates that an online tool, whether through SurveyMonkey or a more integrated platform, can more readily immerse the community in sea level rise education and input opportunities for the vulnerability assessment.

Pop-Up Outreach
Pop-up workshops, sometimes known as tactical urbanism, are an engaging way to bring the community together around projects and plans using short-term and scalable activities out in the places where people gather. These are especially geared for community members that might not attend traditional workshops and to engage a broader sector of the community. Pop-up events could be implemented throughout the process to share information about sea-level rise and adaptation strategies, and provide opportunities for input outside of the traditional project workshops.

Presentations to Community and Stakeholder Organizations
Existing community and stakeholder groups in Malibu have relationships with residents that could be beneficial in sharing information about sea-level rise and adaptation strategies. Presentations at existing groups using a “go to
them” strategy can help increase the level of community engagement in the project and engage different groups in the process. Presentations usually include a slide deck, a set of display boards and handouts that can be available for staff to use at additional meetings if desired.

**Webpage**

ESA and K&W could develop the City’s webpage for the project if desired by the City. A project webpage is an effective tool for community members to access information on the project process, educational materials and to provide opportunity for input. The webpage would be hosted on the City of Malibu’s website, and would be a central hub for the fact sheets, FAQs, online survey tools, community engagement summaries, and products related to adaptation measures for Malibu.

**Video**

Opportunities to develop educational materials on sea-level rise and potential vulnerabilities in Malibu could be shown graphically using video. Unlike other planning processes, sea-level rise planning has strong visual components. A project video hosted on the City’s website and the project webpage could provide a concise and engaging tool for residents to learn more about sea-level rise and adaptation measures in Malibu.

**Informational Materials, FAQ**

Informational material can be used to inform and engage residents on sea-level rise and adaptation measures and provide a consistent message for the project. Our team recommends providing a visually engaging project information handout (or project factsheet) as an educational tool, with information about the project, why it is taking place, the schedule, and opportunities for engagement. The factsheet can be both electronic and in print. Along with the fact sheet, we recommend a list of FAQs to be hosted on the City’s website that can be updated throughout the project if new items are brought to the City’s attention.

Included in this task could be opportunities to develop a concept like Game of Floods, which teaches players about sea-level rise adaptation choices. Like the award-winning version developed by Marin County, the game allows players to design solutions that protect entire communities as well as individual properties to address the permanent flooding impacts of sea-level rise.

**Task 3 Optional Items**

**Asset Data Collection and Characterization**

ESA may assist with additional asset data gathering beyond the existing AdaptLA asset data and additional assets provided by City staff. Additionally, ESA can conduct asset manager surveys to properly characterize the sensitivity and adaptive capacity of various assets to SLR hazards.

**Hazard Mapping Analysis**

ESA may perform updates to specific flooding and erosion hazards if the regional hazard mapping (AdaptLA and/or CoSMoS) are determined to mischaracterize hazard exposure for a given area. ESA can provide the option to refine and/or update ESA’s regional AdaptLA hazard mapping for the City based on the selected SLR scenarios, if needed or desired.

In addition to coastal flooding, ESA can assess flooding from fluvial sources using available information (e.g., FEMA Flood Insurance Studies) and our experience with increased precipitation associated with climate change. ESA can revise the lagoon flooding assessment we developed for AdaptLA to refine the results for Malibu Lagoon. ESA can also review available existing Malibu Creek flood hydraulics with lagoon and ocean levels to provide a high-level assessment of future flood levels for use in the vulnerability assessment.
Task 4 Optional Items

**Vulnerability Assessment**

ESA may revise the Vulnerability Assessment more than the one proposed iteration in response to public or stakeholder comments or Coastal Commission comment, and may assist the City to respond to technical comments received on the Final Vulnerability Assessment.

Task 5 Optional Items

**Adaptation Pathways Schematics**

The prioritized adaptation strategies can be developed into adaptation pathway schematics as a communication tool. An example schematic provided in Section (g) details various adaptation measures phased over time based on SLR amount.

Schedule and Project Management Plan

We know that timely completion of the Coastal Vulnerability Assessment and Adaptation Strategies is important to the City. ESA’s estimate of the total overall proposed schedule for the project is approximately 18 months. As Table 7-1 on the following page shows, the proposed work schedule assumes the project will be initiated in September 2019, ending with presentation of Priority Adaptation Strategies in February 2021.

The schedule in Table 7-1 is provisional and will be updated as part of the project kickoff, after obtaining a more detailed understanding of the City’s needs and expectations. ESA is ready, available, and motivated to support the City to meet the project schedule, provide quality deliverables, and coordinate effectively with stakeholders.

ESA’s project management plan strives to maximize the efficiency of the project where possible. As such, some of the tasks in Table 7-1 overlap in time because information gathered in a certain task may be critical to another task. Also, some tasks can be conducted simultaneously to improve the project efficiency. For example, coastal hazard and asset data can be gathered at the same time, or ESA can coordinate with asset managers for information on asset sensitivity and adaptive capacity while the exposure analysis is being conducted. Similarly, the economic impacts and financial analysis methodology may be developed while the exposure analysis is conducted. A key engagement tool, the web-map (Task 2.4) depends on the hazard and asset data collected in Task 3. The project management plan and schedule can be revised as necessary to meet the City’s needs during the Project Kickoff.

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### TABLE 7-1: PROVISIONAL PROJECT SCHEDULE

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<td>TBD</td>
</tr>
<tr>
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<td></td>
<td></td>
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</tr>
<tr>
<td>&gt; Up to two meetings</td>
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<td>1 month</td>
<td>January 2020</td>
<td>February 2020</td>
</tr>
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<td></td>
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<tr>
<td>&gt; Web-map</td>
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<td>5 MONTHS</td>
<td>NOVEMBER 2019</td>
<td>MARCH 2020</td>
</tr>
<tr>
<td>Task 3.1 Existing Conditions</td>
<td>1 month</td>
<td>November 2019</td>
<td>December 2019</td>
</tr>
<tr>
<td>Task 3.2 Sea-level Rise Hazard Analysis</td>
<td>2 months</td>
<td>November 2019</td>
<td>December 2019</td>
</tr>
<tr>
<td>Deliverables:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; Coastal Hazard Database &amp; Maps</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 3.3 Coastal Resources Assessment</td>
<td>3 months</td>
<td>November 2019</td>
<td>January 2020</td>
</tr>
<tr>
<td>Deliverables:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; Coastal Resources Database &amp; Maps</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; City’s critical asset list</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>&gt; Draft Risk Assessment Matrix</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Task 3.4 Economic, Fiscal Impacts Review</td>
<td>6 months</td>
<td>November 2019</td>
<td>April 2020</td>
</tr>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; Draft Economic Methodology Memo</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>&gt; Final Economic Methodology Memo</td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>&gt; Economic and Fiscal Impacts Results</td>
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<td></td>
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</tr>
<tr>
<td>TASK 4 – VULNERABILITY ASSESSMENT</td>
<td>5 MONTHS</td>
<td>MARCH 2020</td>
<td>OCTOBER 2020</td>
</tr>
<tr>
<td>Deliverables:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; Draft Vulnerability Assessment</td>
<td>3 months</td>
<td>March 2020</td>
<td>May 2020</td>
</tr>
<tr>
<td>&gt; City and CCC review</td>
<td>1 months</td>
<td>May 2020</td>
<td>June 2020</td>
</tr>
<tr>
<td>&gt; Final Vulnerability Assessment</td>
<td>1 months</td>
<td>June 2020</td>
<td>July 2020</td>
</tr>
<tr>
<td>TASK 5 – ADAPTATION STRATEGIES &amp; POLICIES</td>
<td>6 MONTHS</td>
<td>JULY 2020</td>
<td>OCTOBER 2020</td>
</tr>
<tr>
<td>&gt; Task 5.1 Develop Adaptation Measures</td>
<td>3 months</td>
<td>July 2020</td>
<td>September 2020</td>
</tr>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; Measures Matrix</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>&gt; Matrix Evaluation Memo</td>
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<td>Task 5.2 Prioritize Adaptation Strategies</td>
<td>1 month</td>
<td>September 2020</td>
<td>October 2020</td>
</tr>
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<td>Deliverable:</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>&gt; Priority Adaptation Strategies</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>
Section 8

Cost Proposal

The ESA team’s cost proposal for the scope of work (excluding optional tasks) is included below. We have provided our best estimate for a rigorous technical analysis, clear presentation of vulnerability assessment results, and a high-level of public engagement. ESA is committed to working with the City to refine the scope and budget to meet the City’s needs for the project. ESA can also support the City in preparing and pursuing grant funding opportunities if appropriate, which we have successfully secured for other LCP updates and a range of other projects. ESA understands that the City has budgeted $200,000 for the Coastal Vulnerability Assessment and that our cost proposal exceeds this amount. In order to more closely meet the City’s anticipated budget, we have reduced our standard billing rates and excluded any mark-up fees, including on our team’s subconsultant services, and have refined the scope in coordination with City staff. Separate from our proposed scope and budget, a contingency is included to accommodate additional services if needed and approved by the City. Examples of additional services are described in Section 7.
<table>
<thead>
<tr>
<th>Task #</th>
<th>Task Name/Description</th>
<th>Labor Category</th>
<th>Total Hours</th>
<th>Labor Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>Project Kickoff and Management</td>
<td>Senior Director II</td>
<td>0 28 0 24 70 0</td>
<td>122 $20,110</td>
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<tr>
<td></td>
<td></td>
<td>Director III</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Managing Associate III</td>
<td>20</td>
<td>20 60</td>
</tr>
<tr>
<td>2.0</td>
<td>Public Engagement</td>
<td>Senior Director II</td>
<td>0 16 0 28 52 24</td>
<td>120 $18,780</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Director III</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Managing Associate III</td>
<td>2</td>
<td>16 20 16 8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Managing Associate II</td>
<td>8</td>
<td>4 16 8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Senior Associate I</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>3.0</td>
<td>Technical Analysis</td>
<td>Senior Director II</td>
<td>5 18 2 16 98 112</td>
<td>251 $36,850</td>
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<tr>
<td></td>
<td></td>
<td>Director III</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Managing Associate III</td>
<td>2</td>
<td>6 0 4 24 40</td>
</tr>
<tr>
<td></td>
<td>Define Scenarios</td>
<td>Senior Director II</td>
<td>1 4 2 8</td>
<td>59 $8,740</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Director III</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Floodung and Erosion Mapping</td>
<td>Managing Associate III</td>
<td>1</td>
<td>2 24 24</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Senior Associate II</td>
<td>1</td>
<td>4 24 24</td>
</tr>
<tr>
<td></td>
<td>Coastal Resources</td>
<td>Senior Director II</td>
<td>1 4 2 40</td>
<td>59 $8,740</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Director III</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Economic and Fiscal Impacts</td>
<td>Managing Associate III</td>
<td>2</td>
<td>6 0 4 24 40</td>
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<tr>
<td></td>
<td></td>
<td>Senior Associate II</td>
<td>1</td>
<td>4 24 24</td>
</tr>
<tr>
<td>4.0</td>
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<td>Senior Director II</td>
<td>3 32 8 24 104 92</td>
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<td></td>
<td>Draft VA</td>
<td>Director III</td>
<td>3</td>
<td>24</td>
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<tr>
<td></td>
<td>Final VA</td>
<td>Managing Associate III</td>
<td>8</td>
<td>24 12</td>
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<td>8</td>
<td>24 12</td>
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<tr>
<td>5.0</td>
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<td>Director III</td>
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<td>8</td>
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<td></td>
<td>Adaptation Measures</td>
<td>Managing Associate III</td>
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<td>8 4 32</td>
</tr>
<tr>
<td></td>
<td>Strategies Development</td>
<td>Senior Associate II</td>
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<td>24</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Senior Associate I</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>10 106 14 100 380 228</td>
<td>838</td>
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**Total Labor Costs**

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<th>$2,400</th>
<th>$22,260</th>
<th>$2,660</th>
<th>$17,000</th>
<th>$55,100</th>
<th>$29,640</th>
<th>$129,060</th>
</tr>
</thead>
</table>

| Percent of Effort - Labor Hours Only | 1.2% | 12.6% | 1.7% | 11.9% | 45.3% | 27.2% | 100.0% |
| Percent of Effort - Total Project Cost | 1.1% | 10.4% | 1.2% | 7.9% | 25.6% | 13.8% | 60.0% |

**ESA Labor Cost**

|                  | $129,060 |

**ESA Non-Labor Expenses**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Reimbursable Expenses</td>
<td>$2,300</td>
</tr>
<tr>
<td>ESA Equipment Usage</td>
<td>-</td>
</tr>
</tbody>
</table>

**Subtotal ESA Non-Labor Expenses**

|                  | $2,300 |

**Subconsultant Costs**

|                  | $83,635 |

**PROJECT TOTAL**

|                  | $214,995 |

**Contingency**

|                  | $15,000 |
### Reimbursable Expenses

<table>
<thead>
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<th>Expense</th>
<th>Amount</th>
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<tbody>
<tr>
<td>Project Supplies</td>
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<tr>
<td>Printing/Reproduction</td>
<td>$ 500</td>
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<tr>
<td>Document and Map Reproductions (CD + Digital Photo)</td>
<td>$ -</td>
</tr>
<tr>
<td>Postage and Deliveries</td>
<td>$ -</td>
</tr>
<tr>
<td>Mileage</td>
<td>$ -</td>
</tr>
<tr>
<td>Vehicle Rental</td>
<td>$ -</td>
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<tr>
<td>Lodging</td>
<td>$ -</td>
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<tr>
<td>Airfare</td>
<td>$ 1,800</td>
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<tr>
<td>Other Travel Related</td>
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<td>-</td>
<td>$ -</td>
</tr>
<tr>
<td>-</td>
<td>$ -</td>
</tr>
<tr>
<td>Subtotal Reimbursable Expenses</td>
<td>$ 2,300</td>
</tr>
<tr>
<td>0% Fee on Reimbursable Expenses</td>
<td>$ -</td>
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<tr>
<td>Total Reimbursable Expenses</td>
<td>$ 2,300</td>
</tr>
<tr>
<td>Total Equipment Usage Costs</td>
<td>$ -</td>
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</table>

**TOTAL NON-LABOR EXPENSES**  $ 2,300
## Attachment B
### Cost Proposal: Subconsultant Detail

<table>
<thead>
<tr>
<th>Task Number / Description</th>
<th>Subconsultant 1</th>
<th>Subconsultant 2</th>
<th>Subconsultant 3</th>
<th>Subconsultant 4</th>
<th>Subconsultant 5</th>
<th>Subtotal Subconsultant Cost</th>
<th>Total Subconsultant Project Cost</th>
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</thead>
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<td>Insert Budget By Task</td>
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<tr>
<td>1 Kickoff</td>
<td>$ 960</td>
<td>$ 2,820</td>
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<td></td>
<td></td>
<td>$ 3,780</td>
<td>$ 3,780.00</td>
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<td>2 Engagement</td>
<td>$ 1,685</td>
<td></td>
<td>$ 28,260</td>
<td></td>
<td></td>
<td>$ 29,945</td>
<td>$ 29,945.00</td>
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<tr>
<td>3 Technical Analysis</td>
<td>$ 29,310</td>
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<td></td>
<td>$ 6,400</td>
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<td>$ 35,710</td>
<td>$ 35,710.00</td>
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<tr>
<td>4 Vulnerability Assessment</td>
<td>$ 4,100</td>
<td>$ 3,600</td>
<td></td>
<td></td>
<td></td>
<td>$ 12,100</td>
<td>$ 12,100.00</td>
</tr>
<tr>
<td>5 Adaptation Strategies</td>
<td></td>
<td></td>
<td>$ 1,600</td>
<td></td>
<td></td>
<td>$ 1,600</td>
<td>$ 1,600.00</td>
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<td>6 Expenses</td>
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<td></td>
<td></td>
<td></td>
<td>$ 500</td>
<td>$ 500.00</td>
</tr>
<tr>
<td><strong>Subconsultant Total</strong></td>
<td>$ 36,555</td>
<td>$ 3,600</td>
<td>$ 6,000</td>
<td>$ 31,080</td>
<td>$ 6,400</td>
<td>$ 83,635</td>
<td>$ 83,635</td>
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</tbody>
</table>
9

Additional Information
Section 9

Additional Information

In this section we are including the following:

- Example graphics and other work products that are referenced in the proposal that can be reproduced and/or modified for Malibu’s Coastal Vulnerability Assessment.
- Letter of Support from the University of Southern California Sea Grant Program

Example Graphics and Other Work Products

Below is a snapshot taken of the online map that ESA develop for the Pacifica Local Coastal Program (LCP) Update to communicate sea-level rise hazard exposure in the City as well as display all the asset data collected. This map was useful for reaching residents and other members of the public who could not attend public workshops. The online map was also used as a breakout workstation during the public workshop on vulnerability, enabling attendees to become familiar with the hazards and assets potentially at risk in the City.

**FIGURE 9-1: PACIFICA SEA LEVEL RISE LCP UPDATE – HAZARD EXPOSURE MAP (CITY OF PACIFICA PROJECT WEBSITE)**
Table 9-1: Adaptation Triggers/ Thresholds for Hazard-Specific Measures in Pacifica, shows sea-level rise triggers developed for the Pacifica LCP Update which were based on the results from the vulnerability assessment. Note that each hazard-driven adaptation action has different triggers for each sub-area because of different geomorphic conditions and proximity of development to coastal hazards.

<table>
<thead>
<tr>
<th>Sub-area</th>
<th>Beach Nourishment (stable beach width, feet)</th>
<th>Coastal Erosion Actions (bluff/dune erosion offset, feet)*</th>
<th>Coastal Storm Flooding Adaptation (fee SLR)</th>
<th>Tidal Inundation Adaptation (feet SLR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fairmont West</td>
<td>75</td>
<td>260</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>West Edgemar and Pacific Manor</td>
<td>75</td>
<td>220</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Northwest Sharp Park</td>
<td>50</td>
<td>70</td>
<td>1</td>
<td>n/a</td>
</tr>
<tr>
<td>Sharp Park, West Fairway Park, and Mori Point</td>
<td>50–170¹</td>
<td>35</td>
<td>0–3⁴</td>
<td>Not reached⁶</td>
</tr>
<tr>
<td>Rockaway Beach (not Headlands)</td>
<td>75</td>
<td>30</td>
<td>0</td>
<td>n/a</td>
</tr>
<tr>
<td>Pacifica State Beach</td>
<td>150</td>
<td>100</td>
<td>0–2²</td>
<td>n/a</td>
</tr>
<tr>
<td>West Linda Mar</td>
<td>n/a</td>
<td>n/a</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Pedro Point</td>
<td>n/a²</td>
<td>100–110³</td>
<td>0</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Notes:
* Bluff erosion offsets have not been certified by a licensed geotechnical engineer or engineering geologist. Site-specific offsets shall be developed as needed for individual projects.
1. Stable beach width along Beach Boulevard is 50 feet; stable beach width along Sharp Park Golf Course is 150 feet
2. Beach nourishment calculations are included in Pacifica State Beach
3. Shoreline erosion buffer at beachfront homes is 100 feet to shoreline, bluff erosion buffer is 110 feet for bluff-top property
4. Beach Blvd. seawall is overtopped and Clarendon floods with 0 feet sea-level rise, West Fairway Park storm flooding occurs with 3 feet sea-level rise
5. Anza Pump Station and commercial floodproofing needed with OR Linda Mar Pump Station floodproofing
6. No tidal inundation impacts for Sharp Park, West Fairway Park and Mori Point sub-area within the SLR amount analyzed

The example table, Table 9-2: Adaptation Measure Suitable Matrix, shows a list of adaptation measures that are applicable for Pacifica’s coastline. Some adaptation measures are appropriate for more areas than others, depending on the geomorphology, wave exposure, and level of development.
<table>
<thead>
<tr>
<th>MEASURES</th>
<th>PROS</th>
<th>CONS</th>
<th>FAIRMONT WEST</th>
<th>WEST EDGEMAR &amp; PACIFIC MANOR</th>
<th>NORTHWEST SHARP PARK</th>
<th>ROCKAWAY BEACH, QUARRY &amp; HEADLANDS</th>
<th>PACIFICA STATE BEACH</th>
<th>WEST LINDA MAR</th>
<th>PIEDRO POINT AND SHELTER COVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deed Restrictions and Conservation Easements</td>
<td>Conserves views, natural shoreline, and beach</td>
<td>Needs open space to initiate</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>=</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Rolling Easements</td>
<td>Conserves views, natural shoreline, and beach</td>
<td>Complicated once easement reaches development, need open space</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Fee Simple Acquisition</td>
<td>Avoids hazards, enables natural shoreline, sustains beach</td>
<td>Expensive, requires landowner agreement</td>
<td>=</td>
<td>-</td>
<td>=</td>
<td>=</td>
<td>=</td>
<td>=</td>
<td>=</td>
</tr>
<tr>
<td>Managed Realignment or Relocation</td>
<td>Avoids hazards, enables natural shoreline, sustains beach</td>
<td>Expensive in developed areas, needs place to relocate</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>=</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Transfer of Development Rights</td>
<td>Avoids hazards, enables natural shoreline, sustains beach</td>
<td>Land must be undeveloped</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Beach Nourishment</td>
<td>Habitat and recreational value, buffers against backshore erosion</td>
<td>Limited sand available, high rates needed with sea-level rise</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>n/a</td>
</tr>
<tr>
<td>Dune Restoration / Nourishment</td>
<td>Habitat value, buffers against backshore erosion and flooding</td>
<td>Requires space, monitoring</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>=</td>
<td>-</td>
<td>+</td>
<td>n/a</td>
</tr>
<tr>
<td>Horizontal Levee (Ecotone Levee)</td>
<td>Habitat value, buffers against erosion and flooding forces</td>
<td>Requires space, monitoring</td>
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<td>-</td>
<td>-</td>
<td>=</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Structural Adaptation/Elevation</td>
<td>Raises structure above flood hazard zone, limits damages</td>
<td>Costly, alters exposure landward of structure, may need to raise again</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Elevate/ Reconstruct Road</td>
<td>Reduces flood exposure, uses available space.</td>
<td>May need wider easement to raise on fill, does not address erosion alone.</td>
<td>-</td>
<td>-</td>
<td>=</td>
<td>=</td>
<td>=</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>
### Table 9-2. Adaptation Measure Suitability Matrix

<table>
<thead>
<tr>
<th>Measures</th>
<th>Pros</th>
<th>Cons</th>
<th>Fairmont West</th>
<th>West Edgemar &amp; Pacific Manor</th>
<th>Northwest Sharp Park</th>
<th>Sharp Park, West Fairway Park &amp; Mori Point</th>
<th>Rockaway Beach, Quarry &amp; Headlands</th>
<th>Pacifica State Beach</th>
<th>West Linda Mar</th>
<th>Pedro Point and Shelter Cove</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seawalls and Revetments</td>
<td>Familiar/in use, prevents erosion, maintains property in place</td>
<td>Costly construction and maintenance, esp. with sea level rise, loss of beach on eroding shores</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>=</td>
<td>+</td>
<td>=</td>
<td>+</td>
</tr>
<tr>
<td>Sand Retention Structures</td>
<td>Helps retain sand, potential recreation and habitat function</td>
<td>Costly, not effective without beach, requires maintenance with sea-level rise, ocean impacts</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>=</td>
<td>=</td>
<td>n/a</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Traditional Levee</td>
<td>Prevents flooding</td>
<td>Requires space, not suitable for wave action.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>=</td>
<td>-</td>
</tr>
</tbody>
</table>

Notes: Bold text indicates measures that were used in adaptation strategies for one or more sub-areas
+ measure is suitable for the sub-area
= measure may be suitable for sub-area
- measure is not suitable for the sub-area
n/a measure is not applicable for the sub-area due to existing land uses or ownership, level of development, or geographic conditions

The example Adaptation Pathways schematics shown in **Figure 9-2 and 9-3**, were developed to communicate potential adaptation strategies that combines the project, accommodate, and retreat themes specified in Coastal Commission guidance. Similar graphics could be developed to communicate the prioritized adaptation strategies for Malibu.
**FIGURE 9-2: ADAPTATION PATHWAYS SCHEMATICS (SCENARIO 1A)**

**Beach Adaptation Plan – Scenario 1b. Sea Wall Protection**

<table>
<thead>
<tr>
<th>Triggers</th>
<th>SLR (ft):</th>
<th>Summer</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0'</td>
<td>120'</td>
<td>65'</td>
</tr>
<tr>
<td></td>
<td>1'</td>
<td>80'</td>
<td>25'</td>
</tr>
<tr>
<td></td>
<td>2'</td>
<td>35'</td>
<td>15%</td>
</tr>
<tr>
<td></td>
<td>3'</td>
<td>0'</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>5.5'</td>
<td>0'</td>
<td>0%</td>
</tr>
</tbody>
</table>

*Risk: 1% 5% 15% 50% 100%

<table>
<thead>
<tr>
<th>Beach Width</th>
<th>Lead time:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protect - Natural</td>
<td>5-10 yrs</td>
</tr>
<tr>
<td>Project - Engineered</td>
<td>10-15 yrs</td>
</tr>
<tr>
<td>Accommodate</td>
<td>5-10 yrs</td>
</tr>
<tr>
<td>Retreat</td>
<td>15-20 yrs</td>
</tr>
</tbody>
</table>

* Annual chance of extreme flooding and damage (1983 event) without adaptation
**FIGURE 9-3: ADAPTATION PATHWAYS SCHEMATICS (SCENARIO 1B)**

**Beach Adaptation Plan – Scenario 1a. Protection with Sand Retention Measures and Offshore Breakwater/Reefs with Sand Retention Measures**

<table>
<thead>
<tr>
<th>Triggers</th>
<th>SLR (ft):</th>
<th>0'</th>
<th>1'</th>
<th>2'</th>
<th>3'</th>
<th>5.5'</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer:</td>
<td></td>
<td>120'</td>
<td>80'</td>
<td>35'</td>
<td>0'</td>
<td>0'</td>
</tr>
<tr>
<td>Winter:</td>
<td></td>
<td>65'</td>
<td>25'</td>
<td>0'</td>
<td>0'</td>
<td>0'</td>
</tr>
</tbody>
</table>

*Risk: 1% 5% 15% 50% 100%

**Lead time:**

- **Protect - Natural**
  - 5-10 yrs
  - Beach and dune nourishment

- **Project - Engineered**
  - 15-20 yrs
  - Sand retention structures (e.g., offshore breakwater, reef(s), groins)

- **Accommodate**
  - 5-10 yrs
  - Raise structures

- **Retreat**
  - 15-20 yrs
  - Remove structures

*Annual chance of extreme flooding and damage (1983 event) without adaptation.*
Letter of Support

To: Tracey Rossine
From: Phyllis Griffman and Nick Sadrpour
Subject: Support for City of Malibu Coastal Vulnerability Assessment

18 July 2019

Re: Support for ESA- Malibu Coastal Vulnerability Assessment

On behalf of the Sea Grant Program at the University of Southern California, we are writing to strongly support the proposal by Environmental Science Associates (ESA) for the City of Malibu’s Coastal Vulnerability Assessment. The City of Malibu faces many hurdles in understanding risks, vulnerabilities, and potential adaptation strategies to bolster coastal resilience for its iconic resources. Analysis of these issues requires rigorous technical analysis as well as a focus on communicating the significant impacts that will result from coastal hazards caused by sea level rise and climate change.

USC Sea Grant has, through its Regional AdaptLA program, spent years developing relationships within the Los Angeles and Southern California region while providing capacity to local jurisdictions to advance resilient policies for a changing coast. During the major analysis component integrating coastal hazard modeling with local geographies and advanced climate and sea level rise models, ESA was an essential partner with our program. Their work conceptualized complex scientific analysis into public facing mapping and reporting documents. The Regional AdaptLA program was highly collaborative enterprise; ESA was an exceptional team member and worked alongside the US Geological Survey and other modeling teams in a productive way to produce comprehensive results. ESA participated in and led webinars, workshops, and meetings to help communicate dense and sometimes high technical information to foster benefit of better planning and understanding of assets at risk to coastal hazards.

USC Sea Grant enthusiastically supports ESA for continuing their work in the Los Angeles region, especially in Malibu, given their track record with our AdaptLA program and with sea level rise and coastal change in other difficult California regions. Please feel free to reach out with any questions you may have.

Sincerely,

Phyllis Griffman, Associate Director               Nick Sadrpour, Science, Research & Policy Specialist
Nicholas J. Garrity, PE

Project Director

Nick is a coastal engineer and hydrologist with more than 17 years of experience working with coastal, estuarine, and river systems. His technical and project management experience includes managing flood and erosion hazard studies, sea-level rise analyses and adaptation planning, shoreline stabilization and restoration planning and design, hydrodynamic and sediment transport modeling, environmental impact assessments, engineering design, and post-project monitoring and evaluation. Nick is currently managing the City of Del Mar’s LCP Amendment to address sea-level rise, which includes coastal hazards analyses, vulnerability assessment, adaptation planning, and development of LCP policies and regulations. He recently completed the Chula Vista Bayfront Project Sea-level Rise Analysis for the Port of San Diego’s Coastal Development Permit. He has also managed the planning, design, and monitoring of multiple large-scale coastal restoration and flood management projects such as the Ballona Wetlands Restoration and analyses for the development of FEMA’s Guidelines for Pacific Coast Flood Hazard Mapping.

Relevant Experience

City of Del Mar, Local Coastal Program Amendment to Address Sea-Level Rise, Storm-Surge, and Coastal Flooding, Del Mar, CA. Project Manager. ESA is assisting the City of Del Mar to prepare a Local Coastal Program Amendment to Address Sea-Level Rise, Storm-Surge, and Coastal Flooding (accepted by City Council Oct 2018). ESA is analyzing the potential impacts of sea-level rise and coastal flooding and supporting the City to create polices and regulations to manage the City’s coastline and to protect public health and safety. ESA’s analyses include assessing beach, bluff, and river flood and erosion hazards and vulnerabilities with sea-level rise and developing adaptation strategies to reduce flood and erosion risks. Guidance is being provided by the City’s appointed Sea-Level Rise Stakeholder-Technical Advisory Committee (STAC). ESA is collaborating with the City, STAC, and public in a series of committee meetings and public workshops.

City of Oceanside, Comprehensive Update of the Land use Plan of the City of Oceanside Local Coastal Program, Oceanside, CA. Vulnerability Assessment and Adaptation Plan Senior Review. ESA is assisting the City of Oceanside in preparing an update to the Local Coastal Program to address sea-level rise, storm-surge and coastal flooding. ESA is analyzing the potential impacts of sea-level rise and coastal flooding and supporting the City to create polices and regulations to manage the City’s coastline and to protect public health and safety.

San Diego Unified Port District, Chula Vista Bayfront Project Sea Level Rise Analysis, San Diego, CA. Project Manager. ESA performed an analysis of flood and erosion hazards and vulnerabilities for the Chula Vista Bayfront Project (CVBP) under a range of projected sea level rise scenarios. ESA also assisted the Port District and City of Chula Vista to develop adaptation strategies to reduce future flood risks. ESA collaborated with the CVBP civil engineering consultant to assess potential vulnerabilities of storm drain systems, in addition to Bay flooding, and
evaluate construction quantities and cost implications for different adaptation approaches. ESA’s sea level rise analysis provides the technical basis for and informs the Coastal Development Permits for the CVBP.

**Northwest Hydraulics Consultants and the Federal Emergency Management Agency (FEMA), Guidelines and Specifications for Coastal Flood Mapping, Task Manager.** ESA is participating in the evaluation and update of FEMA’s Guidelines and Specifications for mapping of coastal flood hazards on the Pacific Coasts. ESA is leading several key technical areas including wave transformations, wave runup and overtopping of shores and shore structures, wind wave generation in embayments such as San Francisco Bay. Mr. Garrity managed a task on storm meteorology and the definition of the 100-year flood event in terms of joint occurrence of high wind wave and high water levels.

**San Diego Unified Port District and the California State Coastal Conservancy, San Diego Bay Nearshore Linkages: Living Shorelines Oyster Reef Project, San Diego, CA. Project Manager.** ESA is assisting the Merkel & Associates team with implementing intertidal shoreline stabilization with restoration of biologically rich shallow subtidal habitats, specifically native oyster reefs. ESA is developing the physical basis for the living shoreline reef designs and developing the coastal engineering design for reefs.

**San Diego Unified Port District, Kellogg Coastal Access Feasibility Study, San Diego, CA. Project Director.** ESA developed five alternatives to address sand erosion near Kellogg Street in the Point Loma/Shelter Island area. ESA has prepared a draft Feasibility Study which assesses the performance, cost, maintenance, and permitting for each alternative. As part of the study, ESA performed a coastal processes assessment and considered the impact of swell, wind waves, and boat wakes on the shoreline.

**San Diego Unified Port District, Bayside Park Emergency Shoreline Stabilization, San Diego, CA. Project Manager.** ESA developed the design for the emergency shoreline stabilization at Bayside Park to restore the public beach and protect the park from coastal erosion. ESA’s design utilized a nature-based approach by setting back the beach and placing a rounded river cobble berm and sand to dissipate wave energy and erosion. The shoreline stabilization project was successfully implemented within a month timeframe and won an APWA honor award.

**California Coastal Conservancy, Ballona Wetlands Restoration: Development and Evaluation of Restoration Alternatives and Conceptual Restoration Design, Los Angeles, CA. Project Manager.** Since 2005, ESA has worked with the State Coastal Conservancy and California Department of Fish and Wildlife to plan wetland restoration and enhancement, preserve open space and create managed public access compatible with the natural resources for the 600-acre Ballona Wetlands Ecological Reserve in Los Angeles, near Marina del Rey. In collaboration with the multi-agency Project Management Team, a Science Advisory Committee, and a diverse group of regulatory and public stakeholders, ESA has identified restoration goals and objectives, defined alternatives, prepared a Restoration Plan and Feasibility Report, developed the preliminary engineering design, and performed a range of technical analyses to support the EIR/EIS and permitting (hydrology, biology, sediment and water quality, cultural resources, and others). ESA is currently preparing the EIR/EIS for public review. Nick has managing the restoration design and is leading engineering analyses in support of the EIR/EIS.
James Jackson, PE
Civil / Coastal Engineer

A registered professional engineer with a Masters in Environmental Engineering from UC Berkeley, James has experience with wetland and creek restoration design, floodplain and stormwater management, coastal and fluvial hydrology and geomorphology, and climate change/sea-level rise vulnerability assessments and adaptation planning.

Relevant Experience

City of Oceanside, City of Oceanside Local Coastal Program, Oceanside CA. First phase of a Local Coastal Program Update to prepare an updated Land Use Plan. Coastal Engineer. ESA is assisting the City of Oceanside with the first phase of a Local Coastal Program Update to prepare an updated Land Use Plan. The project includes preparation of a Coastal Hazard Vulnerability Assessment and Adaptation Plan as well as a community outreach program. James provided input for and review of the coastal vulnerability assessment, developed engineering unit costs of replacing infrastructure and other assets, and developed adaptation alternatives to manage sea level rise and associated flooding and erosion hazards in the City.

City of Pacifica, Pacifica Draft LCP Update, Pacifica CA. Project Manager, Engineer. ESA assisted the City of Pacifica to address sea level rise in their Local Coastal Program (LCP) Draft update. ESA measured the degree of vulnerability posed to Pacifica’s social, economic, and physical coastal resources by examining the risks and sensitivities associated with sea level rise, erosion, and coastal flooding. The vulnerability and risk assessments were used to prioritize key areas with sea level rise strategies as part of an adaptation plan that identifies effective shoreline accommodation, protection, and retreat strategies through rigorous analysis of existing hazard mapping products and community/stakeholder input. The adaptation plan was designed to work as a standalone strategic plan that includes short-term prioritized actions as well as a monitoring framework with triggers for erosion and flooding adaptation strategies that are dependent on future observed SLR and erosion amounts specific to key areas. The specific measures from the adaptation plan were then translated into a set of policies that range in scope from City-wide to individual areas that will be included in the City’s LCP and LCP Land Use Plan (LUP) by City staff. James managed the project and performed the technical analyses of vulnerability assessment and adaptation planning and alternatives assessment.

AdaptLA, Los Angeles County Coastal Hazard Modeling and Vulnerability Assessment, CA. Hydrologist, Deputy Project Manager. ESA assisted the County of Los Angeles / AdaptLA to obtain funding through the Ocean Protection Council’s (OPC) Local Coastal Program (LCP) Sea-Level Rise Adaptation Grant Program. ESA modeled projected climate change impacts to the coast of Los Angeles County at a scale suitable for planning purposes. Using a variety of SLR and wave climate scenarios, ESA produced maps of projected future coastal hazards which include an integrated...
approach of stepping through time eroding the coast and flooding newly eroded areas through hydraulic connectivity. In addition, this study provided estimates of future erosion rates, flood elevations and depths of flooding at various planning horizons into the future. Finally, the issue of uncertainty in the projections was addressed by developing a variety of projected impacts then overlapping them and developing an uncertainty index that shows relative risk of impact. James managed the project as well as performing geomorphic analysis of the Los Angeles County shoreline, combining inputs of historic erosion, wave climate and storm flooding to generate a set of future erosion and flood hazard zones for various sea level rise scenarios. James led the modeling of coastal flooding and erosion hazards for the County utilizing current SLR guidance and prepared the technical report.

Santa Barbara Planning Department, Santa Barbara County Local Coastal Program (Phase 1 and 2), Santa Barbara County, CA. Project Manager, Hydrologist. ESA modeled projected climate change impacts to the coast of Santa Barbara County at a scale suitable for planning purposes. Using a variety of SLR and wave climate scenarios, ESA produced maps of projected future coastal hazards which include an integrated approach of stepping through time eroding the coast and flooding newly eroded areas through hydraulic connectivity. In addition, this study provided estimates of future erosion rates, flood elevations and depths of flooding at various planning horizons into the future. Finally, the issue of uncertainty in the projections was addressed by developing variety of projected impacts then overlapping them and developing an uncertainty index that shows relative risk of impact. James managed the project as well as performed geomorphic analysis of the Santa Barbara County shoreline, combining inputs of historic erosion, wave climate and storm flooding to generate a set of future erosion and flood hazard zones for various sea level rise scenarios.

San Mateo County Harbor District, Surfer’s Beach Pilot Project, El Granada CA. Coastal Engineer. ESA is providing construction and engineering design services for the Surfer’s Beach Beneficial Dredged Sand Placement project at the Pillar Point Harbor, in El Granada, CA. The project involves the dredging, fluidization, and transport of the dredge slurry to Surfer’s Beach, which has been negatively by erosion, and as a result, has receded to the point where no beach width remains. James is preparing construction documents, engineer’s quantity and cost estimates, technical specifications, and other support services during construction.

Marin County Coastal Hazard Modeling and Adaptation Assessment, CA. Project Manager, Hydrologist. ESA assisted Marin County to obtain funding through the Ocean Protection Council’s (OPC) Local Coastal Program (LCP) Sea-Level Rise Adaptation Grant Program. This funding is available to encourage local governments and other entities responsible for planning under the California Coastal Act to develop and adopt updated plans that conserve and protect coastal resources from future impacts from sea-level rise and related climate change impacts such as extreme weather events. James provided guidance to the County regarding the use of available regional coastal flooding hazard maps, produced updated future coastal erosion hazards that account for sea level rise, assessed the vulnerability of a number of wetlands and beaches by examining geomorphic response to sea level rise and storm events, and developed shoreline adaptation strategies that include relative costs and triggers for implementation for various at-risk communities on the Pacific coast of Marin County.
Robert Battalio, PE
Chief Engineer

A registered professional engineer with a Masters in Engineering from UC Berkeley, Bob Battalio has 30 years of experience with flood management, restoration design, coastal engineering, preparation of construction documents, and project management. His training and work experience is focused in the coastal and estuarine areas, wetland and creek restoration design, and waterfront civil engineering projects. His experience in San Francisco Bay includes the BCDC sea level rise study published in 1990, and multiple wetland restoration, dredging, shore armoring and shore modification projects. Bob was also one of the study leaders in the development of FEMA’s Pacific Coast Flood Hazard Mapping Guidelines, as well as Project Director for a study of coastal erosion response to climate change for Pacific Institute and the California Ocean Protection Council. Bob has been responsible for more than 4,000 acres of wetland restoration constructed on the west coast of the USA. He was the lead coastal engineer for managed retreat shore enhancement projects constructed at Surfers Point, Ventura, CA and Pacifica State Beach, Pacifica, CA.

Relevant Experience

Monterey Bay Sanctuary Foundation, Monterey Bay Sea Level Rise Vulnerability Assessment, California. **Project Director.** With funding from the California Coastal Conservancy, the Natural Capital Project, and the City of Capitola, ESA modeled future coastal erosion and flooding influenced by sea level rise and precipitation changes. The results are posted on TNC’s Coastal Resilience website, and being used to inform local coastal program updates.

Ventura County Climate Change Vulnerability Study, California. **Project Director.** The Ventura County Climate change project with the Nature Conservancy is part of the Coastal resiliency project www.coastalresilience.org. ESA conducted modeling of coastal hazards influenced by climate change, including flooding and erosion. Climate-influenced flood hydraulics were also modeled for three streams (Ventura, Santa Clara and Callegaus). The coastal and fluvial changes were used to drive an ecological vulnerability assessment using SLAMM (Sea Level affecting Marsh Model), assess carbon sequestration, and to assess the economic benefit – cost of adaptation scenarios.

Strategy to Advance Flood protection, Ecosystems and Recreation along the Bay (SAFER Bay). San Francisquito Creek Joint Powers Authority. **Project Director.** Assisted the SFCJPA with its successful grant application for the DWR Local Levee Assistance Program. Presently, the project is evaluating and designing more than 5 miles of the coastal levee along the Menlo Park and East Palo Alto shoreline, and will soon extend the project area to include Palo Alto, which lies immediately north of the Mountain View Shoreline study site. ESA is leading the coastal flooding and sea level rise vulnerability assessments, interior drainage, restoration design, and CEQA environmental review.
Ocean Protection Council and Pacific Institute, Coastal Infrastructure and Vulnerability Impacts Assessment CA. 2009. Project Director. ESA mapped coastal erosion hazards resulting from sea level rise scenarios, evaluated geomorphic response of various backshore types by applying a total water level methodology, collaborated with climate change researchers at Scripps, organized and engaged peer review team on methods and results, collaborated with Pacific Institute to identify economic impacts associated with coastal erosion hazards.

Monterey Regional Water Pollution Control Agency, Southern Monterey Bay Coastal Erosion Studies, Monterey County, CA. Project Director. Assessed the Risks to regional sanitary sewer facilities from coastal erosion over the next 50 years; prioritized facilities based on their vulnerability to future erosion and the severity of anticipated damages; and recommended a plan to minimize damages. The assessment included shore morphology and the response to sea level rise, shore recession due to a sand deficit, seasonal and storm-induced responses, and wave runup.

Santa Barbara County Sea Level Rise Hazard Mapping, California. Project Director. Bob led the analysis of coastal flooding and erosion for the Santa Barbara County shore, resulting in hazard maps for a range of dates and sea level rise projections. The project also included evaluation of future river flood hydraulics based on projected increases in precipitation, and quantified consideration of the effects of shore armoring on erosion and flooding. The mapping results are hosted on TNC Coastal Resilience website. The project was funded by the State of California in order to support informed coastal zone management planning.

Ocean Beach Master Plan, San Francisco, CA. Bob was the senior, lead coastal engineer supporting development of a plan to adapt to rising sea levels on the Pacific Coast of San Francisco. Provided coastal processes and engineering to the San Francisco Urban Planning + Research (SPUR) in support of a Master Plan for San Francisco’s Ocean Beach. SPUR is lead a team to develop a long-term shore management vision for the City / County of San Francisco and the National Park Service, Golden Gate National Recreation Area. Key considerations were coastal processes and erosion / flood hazards, sea level rise, infrastructure and property vulnerability and maintenance of the natural shore. ESA subsequently led a team of engineers which further developed the shore modifications, and assessed the vulnerability and identified a protective scheme for a $100M wastewater tunnel in the erosion hazard zone. ESA also contributed to a strategy to manage risks in the interim until the project can be implemented, including a monitoring program and sand placement.

East Bay Regional Park District, Hayward Shoreline Sea-Level Rise Study, San Francisco Bay, CA. Project Director. ESA conducted a preliminary study on the effect of sea-level rise over a 50-year planning horizon on the resources of the Hayward shoreline and the actions that could be taken to protect both the wetlands and shoreline development in this area. ESA examined potential impacts to the Hayward area to the north of Highway 92 and providing recommendations for possible mitigation measures to protect existing and planned uses along the shoreline. This study initiated the development of a waste-water-supported horizontal living- levee that utilizes the biomass generation of emergent vegetation to “keep up” with sea level rise for ecology as well as ecosystem services such as flood protection.
Reema Shakra, AICP
LCP and Planning Support

Reema is a project planner with 13 years of professional experience in land use planning, coastal management, environmental impact assessment, sustainable development, regulatory compliance, and policy research and analysis. She has assisted public sector clients with preparing policies and regulations that address coastal development, land use, sustainability, and conservation of environmental resources. Reema also has extensive experience conducting public outreach, having facilitated dozens of open house and community workshop meetings and advisory committee meetings, and presented at city council and planning commission hearings. Reema has also worked the permit counter for two different cities, reviewing private projects for compliance with land use, design, and environmental requirements.

Relevant Experience

City of Del Mar Local Coastal Program Amendment, Del Mar, CA. Project Planner. Reema is assisting the City of Del Mar to prepare a Local Coastal Program Amendment to Address Sea-Level Rise, Storm-Surge, and Coastal Flooding (accepted by City Council Oct 2018). ESA is analyzing the potential impacts of sea-level rise and coastal flooding and supporting the City to create polices and regulations to manage the City's coastline and to protect public health and safety. ESA's analyses include assessing beach, bluff, and river flood and erosion hazards and vulnerabilities with sea-level rise and developing adaptation strategies to reduce flood and erosion risks. Guidance is being provided by the City's appointed Sea-Level Rise Stakeholder-Technical Advisory Committee (STAC). ESA is collaborating with the City, STAC, and public in a series of committee meetings and public workshops. Reema will be helping the City amend their Local Coastal Program Land Use Plan and Implementing Ordinances to incorporate climate change adaptation strategies consistent with the California Coastal Commission guidelines on sea level rise. Reema will be presenting revised policy and standards to the STAC, Planning Commission and City Council.

City of Oceanside Local Coastal Program Update, Oceanside, CA. Deputy Project Manager. Reema is assisting the City of Oceanside to prepare a comprehensive update to the Local Coastal Program to address sea-level rise and other hazards, public access, scenic resources, visitor-serving commercial and recreation land uses, and natural resources. ESA is preparing a background study that identifies existing conditions in the City's coastal zone, a vulnerability assessment and adaptation plan to plan for sea-level rise related hazards, and a Land Use Plan that will provide policy direction for future development and investment in the Coastal Zone over the next twenty to thirty years. The update to the Local Coastal Program will involve extensive public outreach to community members and stakeholders, including pop-up outreach, community surveys, stakeholder interviews, public workshops, and public hearings. Reema will be
helping the City develop the Background Study, amend their Local Coastal Program Land Use Plan and conduct public outreach.

**General Plan Update, Local Coastal Program Land Use Plan Update, Climate Action Plan and EIR, City of Eureka, Eureka, CA.** *Local Coastal Planner.* Reema is assisting the City of Eureka with a comprehensive update of its coastal land use planning policies and regulations. Specifically, Reema is working with City staff to revise the Land Use Plan (LUP) component of Eureka’s Local Coastal Program. The LUP will inform planning and development decisions within Eureka’s coastal zone for the next 10 to 15 years. As part of this work, Reema is collaborating with ESA coastal geomorphologists and engineers on an analysis of sea-level rise vulnerability, available adaptation strategies, and the development of policies to address future coastal land use decisions in the face of climate change. Reema is also preparing policies as part of the General Plan Update and has contributed to the open space, natural resources, agriculture, and timberlands elements.

**Southern California Association of Governments Southern California Regional Climate Adaptation Framework.** *Senior Planner.* Reema, as part of a larger consultant team, is assisting SCAG in preparing a comprehensive framework to support regional climate adaptation planning, identify climate change vulnerabilities, assist in capacity building, and provide outreach and other implementation tools for local jurisdictions. Reema will be assisting with the following major elements: developing a regional climate adaptation framework and regional coordination strategy and preparing model policies for the General Plan and LCP.

**Coastal Code Development and Public Outreach, multiple cities and counties, WA.** *Project Manager.* Reema helped more than a dozen cities and counties in Washington State to amend their shoreline master programs (SMP) in response to a state-mandate to update all programs consistent with revised guidelines, best available science, existing conditions, and community input. Similar to California LCPs, SMPs are required to include goals, policies, permitting procedures, and implementing regulations. Reema managed the development of both technical, and policy and regulatory products, effectively translating scientific literature on best practices for protecting natural resources into implementable policies and regulations that took into account existing conditions and community values. Reema also managed public outreach efforts, including facilitation of technical advisory committee meetings, citizen committee meetings, and community workshops, and presentations to Planning Commissions and City Councils during public hearings. She also prepared informational handouts and FAQs that explained complex regulatory requirements and permit procedures, and encouraged environmentally friendly practices along the shoreline.

**Coast Highway Corridor Study and Environmental Impact Report, Oceanside, CA.** *Project Planner.* Reema is supporting the City of Oceanside in the development of the Oceanside Coast Highway Corridor Study and Environmental Impact Report (EIR).
Richard F. Ambrose  
Professor, Department of Environmental Health Sciences, University of California, Los Angeles

(a) Professional Preparation
University of California, Irvine  Biological Sciences  B.S., 1975  
University of California, Los Angeles  Ecology  Ph.D., 1982  
Simon Fraser University  Ecology  Postdoc., 1983-84

(b) Appointments
1992-present  Research Professor (2019-present), Professor (2000-2019) and Associate Professor (1992-2000), Department of Environmental Health Sciences and the Institute of the Environment and Sustainability, UCLA  
1998-2011  Director, Environmental Science and Engineering Program, UCLA  
1985-1992  Assistant/Associate Research Biologist, Marine Science Institute, University of California, Santa Barbara

(c) Publications (Selected from 210 total, with 100 peer-reviewed journal articles)


(d) Synergistic Activities

CURRICULUM VITAE

Karen Lynn Matthews Martin
Distinguished Professor of Biology, Frank R. Seaver Chair in Natural Science
Pepperdine University
24255 Pacific Coast Highway, Malibu, California  90263-4321
Telephone: 310/506-4808, FAX 310/506-4785
Karen.Martin@Pepperdine.edu
https://seaver.pepperdine.edu/academics/faculty/?faculty=karen_martin

Education

Postdoctoral Fellowship, Friday Harbor Laboratories, University of Washington, 1990-91

Doctor of Philosophy in Biology, University of California, Los Angeles (UCLA), 1990
Dissertation Title: "Facultative Aerial Respiration in Marine Intertidal Fishes"

Master of Science in Zoology, University of Oklahoma

Bachelor of Science in Zoology, University of Oklahoma

Professional Experience

Distinguished Professor in Biology, Pepperdine University, Malibu, California, 1991- present.

Associate Editor, Physiology and Physiological Ecology, for COPEIA, the peer-reviewed scientific journal of the American Society of Ichthyologists and Herpetologists, 2009-present.

Board of Directors and Co-Founder, Beach Ecology Coalition, an educational public benefit nonprofit corporation, since 2004.


Executive Director, Grunion Greeters, 2002-present. Direct citizen scientists monitoring for California Grunion spawning runs statewide, manage funding and carry out research projects and public outreach.

Adjunct Research Professor, California State University, Fullerton, California, 1998-1999.
Sabbatical position.


Lecturer, University of California, Los Angeles, 1990.


Teaching Fellow and Graduate Student, Department of Biology, UCLA, 1984-1990.

Assistant Professor, Department of Biology, Oklahoma State University, Oklahoma City branch, 1981-1984. Tenure track position, left to pursue doctorate.
Lecturer, Department of Zoology, University of Oklahoma, 1980-1983.

Education Assistant, Lecturer, Oklahoma Museum of Natural History (now the Sam Noble Museum), Norman, Oklahoma, 1981-1982.

Graduate Teaching Assistant, Department of Zoology, University of Oklahoma, 1975-1978.

Honors and Awards

KNX Newsradio Hero of the Week, March 2018 (KCBS radio 1070, Los Angeles)

For Documentary “Surf, Sand, and Silversides: the California Grunion” Best EcoFriendly Film, Toronto Beaches Film Festival, 2012; Sound Editing Award, International Wildlife Film Festival, 2012, Award of Excellence for Scriptwriting, Best Shorts Competition, 2012; Best Short Documentary, Los Angeles City Cinema Festival, 2011. Official Selection: San Francisco Ocean Film Festival, BLUE Ocean Film Fest and Conservation Event, Newport Beach Film Festival, SoCal Film Festival, Temecula Valley International Film Festival, American Fisheries Society Fish Film Festival, 2015

Conservation Achievement Award, American Fisheries Society (Western Division), 2011.


Environmental Partnership Award, American Shore and Beach Preservation Association, 2006.

Fellow, American Institute of Fishery Research Biologists, since 2004.

Frank R. Seaver Endowed Chair, Pepperdine University, since 2000.

Friday Harbor Postdoctoral Research Fellowship, Friday Harbor Lab, Univ. Washington, 1990-91.

Outstanding Graduate Student, Alumni Association Award for Excellence, UCLA, 1989

Graduate Woman of the Year, Association of Academic Women, UCLA, 1989

University Graduate Fellowship, UCLA, 1988, 1989

Special Faculty Award, Biology, UCLA, 1988

Hortense Fishbaugh Memorial Scholarship, Affiliates of UCLA, 1988

A. M. Schechtman Teaching Award, Biology, UCLA, 1987

Jeannette Baumert Turner Award for Excellence in Reporting, The Oklahoma Daily, Norman, Oklahoma, 1983.

Peer Reviewed Publications: Books and Symposium Volumes


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La Jolla, CA 92093-0209

University of California San Diego

EDUCATION

2006    PhD, Jacobs School of Engineering, UC San Diego, CA
2004    MS, Jacobs School of Engineering, UC San Diego, CA
1999    BS, Civil Engineering, California Polytechnic Institute, San Luis Obispo, CA

EMPLOYMENT

2011-Present  Associate Project Scientist, Scripps Institution of Oceanography, UC San Diego
2007-2011    Post Doctoral Researcher, Scripps Institution of Oceanography, UC San Diego

CONSULTING

2018    City of Del Mar, Geotechnical Review for Coastal Development, ESA
2018    Land’s End Legal Case, Terra Costa / Dentons US LLP
2017    City of Oceanside Coastal Hazards, Vulnerability, and Risk Assessment, ESA
2016    City of Del Mar Coastal Hazards, Vulnerability, and Risk Assessment, ESA
2016–2017 Coastal Processes Analysis at San Onofre Nuclear Generating Station, Coastal Environments Inc.
2009-2013 A Methodology for Assessing the Impact of Sea Level Rise on Military Installations in the Southwestern United States, SPAWAR / USGS / TerraCosta

SELECTED JOURNAL PUBLICATIONS

Young AP, Guza RT, O’Reilly WC, Burvingt O, Flick RE (2016) Observations of coastal cliff base waves, sand levels, and cliff top shaking. Earth Surface Process and Landforms 41 (11), 1564-1573, Scripps website featured publication.


SELECTED TECHNICAL REPORTS


Elwany H, Flick RE, Young AP (2016) Coastal Analysis for End-State Planning of San Onofre Nuclear Generating Station, Phase 1, Coastal Environments Inc.


Gregory C. Ainsworth
Director, Biological Resources

Greg is a Southern California native and has 17 years of experience conducting biological assessments on properties within and around the Santa Monica Mountains. He prepared numerous technical reports for the County of Los Angeles for projects located within the county’s Sensitive Ecological Area or Local Coastal Program areas. Greg is knowledgeable of the local regulations, ordinances and municipal codes, is an expert at conducting impact analyses and developing mitigation strategies for various project types. He is well-versed in CEQA, the Endangered Species Acts, and the Clean Water Act. Greg is a certified arborist and seasoned wetland delineator, and has been trained in conducted wetland and riverine functional assessments.

Relevant Experience

Malibu Bluffs and Corral Canyon Park Focused Rare Plant Survey for the Malibu Parks Public Access Enhancement Project, Malibu, CA. Project Manager. Greg managed a focused rare plant survey and prepared a technical report for the Santa Monica Mountains Conservancy’s Malibu Bluffs and Corral Canyon properties. Field surveys included detailed vegetation mapping and focused rare plant surveys. A detailed technical report was prepared, intended to accompany a project submittal package to the California Coastal Commission.

Biological Assessment for 28906 Verde Mesa Lane – Lots 5 and 6, Los Angeles County, CA. Project Manager. The proposed project consists of the development of a single-family residence on the northern portion of the property. Greg managed biological field surveys and the preparation of the Biological Assessment Report that was prepared for a proposed project located within the City of Malibu Local Coastal Program area. Field surveys included detailed vegetation mapping, focused rare plant surveys; evaluation of city protected trees, wetlands and waters under the jurisdiction of state and federal agencies, onsite or adjacent Environmentally Sensitive Habitat Areas (ESHA), and any potential wildlife movement corridors. A detailed technical report was prepared in accordance with the Malibu Local Coastal Program Implementation Plan.

Moonshadows Restaurant Revetment and Wastewater Upgrade Project, Biological Inventory, Malibu, CA. Lead Biologist. Greg conducted a biological inventory and prepared biological report for the proposed project located at 20356 Pacific Coast Highway, Malibu, CA. The proposed project was located within the City of Malibu Local Coastal Program area. Field surveys included detailed habitat assessment and mapping, and an evaluation of any potentially occurring sensitive plant and animal species. A detailed Biological Inventory Report was prepared in accordance with the Malibu Local Coastal Program Implementation Plan.

Biological Inventory for 6306 Bonsall Road, Malibu, CA. Project Manager. The proposed project consists of the development of a single-family residence on the
northern portion of the property. Greg managed biological field surveys and the preparation of the Biological Inventory Report for a proposed project located within the City of Malibu Local Coastal Program area. Field surveys included detailed vegetation mapping, focused rare plant surveys; evaluation of city-protected trees, wetlands and waters under the jurisdiction of state and federal agencies, onsite or adjacent Environmentally Sensitive Habitat Areas (ESHA), and any potential wildlife movement corridors. A detailed technical report was prepared in accordance with the Malibu Local Coastal Program Implementation Plan.

Nesting Bird Survey for Proposed Renovations and New Construction of a Single-family Home at 5838 Deerhead Road, Malibu, CA. Lead Biologist. Greg managed a focused bird survey that was conducted within, and immediately adjacent 5838 Deerhead Road to determine whether birds were nesting prior to the initiation of proposed disturbance activities. The survey was completed pursuant to the Malibu Local Coastal Program, as part of a Coastal Development Permit.

Las Flores Canyon Road (APN 4448-026-079) Biological Constraints Assessment and Plant Survey, Los Angeles County, CA. Project Manager. Greg managed a biological field survey and the preparation of a Preliminary Biological Assessment Report that was prepared for a potential project located within the Santa Monica Mountain Local Coastal Program area. Field surveys included detailed vegetation mapping, focused rare plant survey, assessment of wetlands and waters under the jurisdiction of state and federal agencies, and an evaluation of any potential wildlife movement corridors. A preliminary technical report was prepared in accordance with the Los Angeles County Local Coastal Program Implementation Plan.

Little Las Flores, APN 4448-023-007, Biological Assessment, Los Angeles County, CA. Project Manager. Greg managed biological field surveys and the preparation of the Biological Assessment Report that was prepared for a potential project located within the Santa Monica Mountain Local Coastal Program area. Field surveys included detailed vegetation mapping, focused rare plant survey, oak tree survey, assessment of wetlands and waters under the jurisdiction of state and federal agencies, and an evaluation of any potential wildlife movement corridors. A detailed technical report was prepared in accordance with the Los Angeles County Local Coastal Program Implementation Plan, intended to accompany a project submittal package to the county.

Preliminary Biological Assessment, 621 Thrift Road, Los Angeles County, CA. Project Manager. Greg managed biological field surveys and the preparation of a Preliminary Biological Assessment Report that was prepared for a potential project located within the Santa Monica Mountain Local Coastal Program area. Field surveys included detailed vegetation mapping, focused rare plant survey, oak tree survey, assessment of wetlands and waters under the jurisdiction of state and federal agencies, and an evaluation of any potential wildlife movement corridors. A preliminary technical report was prepared in accordance with the Los Angeles County Local Coastal Program Implementation Plan.
Lindsey Sheehan, PE  
Hydrologist

Lindsey is a hydrologist and coastal engineer specializing in sea-level rise planning and the restoration of coastal and estuarine ecosystems. Her work at ESA includes managing projects while conducting and overseeing numerical modeling, GIS analysis, field data collection, and hydrologic, geomorphic, and water and sediment quality technical analyses in support of shoreline and tidal wetland restoration projects and coastal processes assessments. Lindsey has experience in environmental analysis for CEQA- and NEPA-level environmental documentation. Lindsey has applied these skills to multiple restoration planning efforts in Southern California, San Francisco Bay, along the Pacific coast, and along the Gulf Coast.

Relevant Experience

City of Oceanside, Comprehensive Update of the Land use Plan of the City of Oceanside Local Coastal Program, Oceanside, CA.  
**Lead.** ESA is assisting the City of Oceanside in preparing an update to the Local Coastal Program to address sea-level rise, storm-surge, and coastal flooding. ESA is analyzing the potential impacts of sea-level rise and coastal flooding and supporting the City to create policies and regulations to manage the City’s coastline and to protect public health and safety. Lindsey led the development of the Vulnerability Assessment using outputs from CoSMoS 3.0 and led the public outreach associated with the report. Lindsey is currently leading the development of the Adaptation Plan.

City of Santa Barbara, City of Santa Barbara Sea Level Rise Adaptation Plan for the Local Coastal Program Update, Santa Barbara, CA.  
**Coastal Engineer.** ESA is assisting the City of Santa Barbara to address sea-level rise in their Local Coastal Program update. This includes updating the existing sea-level rise Vulnerability Assessment and developing a sea-level rise Adaptation Plan. Lindsey is leading development of the adaptation plan.

City of Del Mar, Local Coastal Program Amendment to Address Sea-Level Rise, Storm-Surge, and Coastal Flooding, Del Mar, CA.  
**Deputy Project Manager.** ESA is assisting the City of Del Mar to prepare a Local Coastal Program Amendment to address sea-level rise, storm-surge, and coastal flooding. ESA is analyzing the potential impacts of sea-level rise and coastal flooding and supporting the City to create policies and regulations to manage the City’s coastline and to protect public health and safety. Guidance is being provided by the City’s appointed Sea-Level Rise Stakeholder-Technical Advisory Committee (STAC). ESA is collaborating with the City, STAC, and public in a series of committee meetings and public workshops. Lindsey led the development of a sediment management plan and habitat evolution modeling within the lagoon. These technical analyses were then fed into the Adaptation Plan.

EDUCATION

MS, Environmental Fluid Mechanics and Hydrology, Stanford University  
BS, Environmental Engineering, Literature Minor, Massachusetts Institute of Technology

8 YEARS OF EXPERIENCE

CERTIFICATIONS/REGISTRATION

Registered Professional Engineer, California, #C80116

8 YEARS OF EXPERIENCE
Los Cerritos Wetlands Authority, Los Cerritos Wetlands Restoration Program EIR, Long Beach and Seal Beach, CA. Restoration Lead. Lead by the Los Cerritos Wetlands Authority (LCWA), a joint power agreement between the San Gabriel and Lower Los Angeles Rivers and Mountains Conservancy (RMC), State Coastal Conservancy (SCC), City of Long Beach, and City of Seal Beach, ESA was retained to develop an Optimized Restoration Alternative and Restoration Plan for 500 acres of salt marsh, seasonal wetlands, and other freshwater marsh in the Los Cerritos Wetland Complex. The Restoration Plan will proceed through the CEQA review process in the form of a Program Environmental Impact Report (PEIR). In addition to the Restoration Plan, as part of the PEIR, ESA is developing multiple technical reports, including hydrodynamics, sediment transport and geomorphology, and water and sediment quality. Lindsey is leading the restoration design and associated technical reports.

California State Coastal Conservancy, Ballona Wetlands Restoration, Los Angeles, CA. Deputy Project Manager. ESA is working with the Department of Fish and Game and the State Lands Commission to define alternatives, conduct a feasibility analysis, develop a conceptual restoration plan, perform technical analyses and produce an EIS/EIR for the enhancement of 600-acres of the Ballona Wetlands in Los Angeles County. Lindsey conducted 2-D modeling of fluvial hydraulics, estuary hydrodynamics, coastal sand transport, and habitat projections and developed a water and sediment quality report for Ballona Creek and Wetlands. Lindsey has also conducted preliminary engineering design analyses to support the project EIR/S and permitting and prepared the hydrology and water quality analysis for the EIR/S.

California State Coastal Conservancy, The Nature Conservancy, and the City of Oxnard, Ormond Beach Wetlands Restoration Plan, Oxnard, CA. Hydrologist. ESA is preparing a Restoration and Public Access Plan to design a sustainable and resilient ecosystem restoration that functions in response to the restored hydrology and integrates ecologically-sensitive public access. The Ormond Beach Wetlands include lagoon, salt pan, and salt marsh habitat. Lindsey led the field data collection and the development of the Existing Conditions Report.

Laguna Ocean Foundation, Aliso Creek Estuary Restoration Plan, Laguna Beach. Deputy Project Manager. ESA developed a Conceptual Restoration Plan for the Aliso Creek Estuary in Laguna Beach, California. The goal of the project, which was funded by the California Coastal Conservancy and others, was to identify a feasible plan to restore the lagoon at the mouth of Aliso Creek to a healthy estuary. Restoration objectives were defined by a multi-disciplinary group of professional experts with knowledge of similar systems in Southern California and the dynamics and functions of such systems under historical conditions. ESA’s analyses included hydrologic modeling of coastal, estuary, and fluvial processes, ecological assessments, and restoration site planning and design. Lindsey led field data collection, hydraulic modeling, and a water quality assessment.

California Coastal Commission, San Dieguito Lagoon Mitigation Monitoring, Del Mar, CA. Project Manager. Lindsey conducted topographic surveys to assist the California Coastal Commission with an audit of the restored habitat acreages, survey elevations, and vegetation limits and to review mitigation performance.
EDUCATION
MA, Planning: Emphasis in Environmental Analysis and Policy, and Land Use Economics, University of California Los Angeles, 2010
BA, Political Science: Emphasis in Political Economy, Westmont College, 2007

12 YEARS EXPERIENCE
OFFICE LOCATION
San Francisco, CA

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Aaron.McGregor@aecom.com

PROFESSIONAL AFFILIATIONS
Board member of the California Shore & Beach Preservation Association

Aaron McGregor specializes in applied economic and environmental policy analysis. In his 10 plus years of experience in social science research and economic analysis, he has worked with government agencies, academic institutions, non-governmental organizations, foundations and private entities. Aaron’s work is rooted in understanding the relationships between land use strategies in the built and natural environment and changes in economic activity and well-being. A large portfolio of Aaron’s work addresses the socio-economic impacts from natural hazards, including those exacerbated by a changing climate, as well as the costs and benefits of adaptation measures that can help communities manage these increasing risks. He has participated as an advisor and technical lead on several climate change vulnerability and adaptation studies, including probabilistic risk assessments focused on natural hazards, co-authored articles and reports on these topics, presented his work at professional conferences and meetings, provided expert testimony, and sat on committees to inform public policy. Before joining AECOM, Aaron worked as an economist for the U.S. Army Corps of Engineers, a social scientist with the California Ocean Science Trust, an economic researcher with the State of California, and as an independent consultant.

Relevant Experience

Santa Barbara Sea Level Rise Adaptation Plan and Local Coastal Plan Update, CA.
In support of the City of Santa Barbara’s Local Coastal Plan update, Aaron is serving as the technical lead to evaluate the future economic and financial impacts from sea level rise, coastal flooding and erosion. This includes an evaluation of vulnerability to coastal recreational assets, public and private property, utilities, and transportation assets in the study area. Economic and financial costs and benefits are being modeled to both the no-action scenario as well as a suite of adaptation scenarios that will be developed by the project team. The project will also attempt to address funding and financing vehicles that could be harnessed to support implementation of future projects. 2018-present.

Economic and Financial Effects of Sea Level Rise, Long Beach, CA.
The City of Long Beach is vulnerable to the effects of coastal flooding and sea level rise. To better understand the economic consequences of a changing climate, Aaron is leading an analysis to capture the vulnerability of property, infrastructure and natural resources that underpin the economy of the City. This information is intended to fulfill California State Lands Commission AB 691 requirement to assess the impact of seal level rise on granted trust lands as well as help the City inform its climate action planning. Aaron is conducting additional analysis on funding and financing mechanisms in support of coastal adaptation. 2018-present.
that underpin the economy of the City. This information is intended to fulfill California State Lands Commission AB 691 requirement to assess the impact of seal level rise on granted trust lands as well as help the City inform its climate action planning. Aaron is conducting additional analysis on funding and financing mechanisms in support of coastal adaptation. 2018-present.

Financial Impacts of Sea Level Rise, Port of Oakland, CA. In response to the California State Lands Commission AB 691 requirement to assess the impact of seal level rise on granted trust lands, Aaron led an analysis of the Port’s economic vulnerability to future permanent tidal inundation as well as temporary storm events. Financial impacts being evaluated account for damage to infrastructure and core facilities, operational disruptions to the seaport and airport and the Port’s commercial real estate portfolio and to recreational open spaces and natural habitats. 2018-2019.

Dania Beach Economic Impact from Sea Level Rise, FL. Broward County is working to develop an understanding of how businesses in Dania Beach will operate as sea levels rise, and how a variety of potential mitigation and/or adaptation approaches can serve to protect the community from impacts from existing and future coastal hazards. Aaron served as technical lead to model the economic impacts of modeled hazard events and proposed interventions. This work includes direct damage modeling to the business community, as well as associated economic impacts that can cascade to the regional and state economy using the dynamic forecasting REMI PI+ model. 2018.

Financial and Financing Climate Adaptation and Resilience Infrastructure, CA. There is a growing list of adaptation and resilience needs that communities are identifying throughout the State. Yet, there are gaps in knowledge on the options for public and private funding and financing of projects and programs that may be responsive to such needs. Aaron co-authored a report accessible to policymakers and other key stakeholders in California that synthesizes information from the body of literature and expert interviews. 2017-2018.

Lower Manhattan Coastal Resiliency Project, New York, NY. The Lower Manhattan Coastal Resiliency Project is an integrated coastal protection initiative aimed at reducing flood risk due to coastal storms and sea level rise in Lower Manhattan, an economic and cultural core of New York City. Aaron was the lead economist, overseeing economic effects modeling to property, critical utilities such as the combined sewer system and transportation infrastructure, for a range of alternatives. Aaron also led a more detailed benefit-cost analysis for the Two Bridges area in Lower Manhattan in support of feasibility and schematic design reporting. 2017–2018.

Citywide Storm Sewer System Master Plan, San Jose, CA. To inform capital improvement investments to the City of San Jose’s stormwater sewer system, Aaron led a triple bottom line analysis to evaluate identified environmental, social and financial costs and benefits. This investigation involved an assessment of a suite of alternatives with varying combinations of grey and green infrastructure solutions. 2016-2017.

North of the Delta Off Stream Storage Investigation, CA. The objective of this work was to assess the financial feasibility of a multi-billion-dollar off-site water storage reservoir that will support environmental as well as social and economic benefits. Aaron evaluated the economic costs and benefits from various construction alternatives for recreation, hydropower, urban and agricultural water supply, refuges, fish populations, and flooding. 2016-2017.

San Mateo County Sea Level Rise Vulnerability Assessment, CA*. The objective of this assessment was to identify vulnerable assets on the bay and coast side of the San Mateo County peninsula, determine types of impacts, issue initial recommendations on adaptation measures, and improve flooding and sea level rise mapping. Aaron evaluated the economic vulnerability of critical county assets (e.g., transportation, health care, wastewater) to sea level rise and erosion, accounting for direct physical damages as well as effects to worker productivity, regional employment and commercial and industrial entities. 2015-2016.

Dry Creek, Warm Springs Dam Ecosystem Restoration, California*. The study assessed various ecosystem restoration alternatives, in particular non-structural improvements, that can support sensitive anadromous fish populations in the Russian River watershed. Aaron, the economic study lead, conducted cost effective and incremental cost analyses on the proposed restoration alternatives by incorporating changes in habitat and landscape outputs relative to market proxy restoration costs. 2015-2016.
John Bourgeois

Restoration Ecology Program Manager

John has dedicated his career to the protection and restoration of ecosystems. He specializes in the management of complex and multi-disciplinary projects. He has worked in a variety of ecological and cultural settings, from the central Pacific, throughout the Gulf Coast, and finally spending the past 18+ years working in San Francisco Bay and other California coastal areas. As an effective communicator with a strong technical background, he is confident in being able to tackle a diversity of technical and political situations to address complex land use planning issues. He is a regional leader on issues such as pragmatic implementation of large-scale projects, sea level rise adaptation and regulatory integration.

Relevant Experience

South Bay Salt Pond Restoration Project, California State Coastal Conservancy, San Jose, CA. Executive Project Manager. John managed all aspects of one of the largest wetland restoration projects in the United States. This includes running a multi-agency management team, technical oversight of consultants, contractors and scientists, extensive public and political outreach, and fundraising. He coordinated, oversaw, and assisted in the implementation of South Bay Salt Pond Restoration Project, project design and regional planning, related scientific studies, adaptive management, and regulatory compliance including permitting and monitoring.

Louisiana Department of Natural Resources, Coastal Restoration Division, Thibodeaux, LA. Natural Resources Geoscience Specialist. John conducted ecological monitoring on a variety of large-scale wetland restoration projects, including the development of monitoring plans and assistance in project design. He performed data management, technical report writing, presentations, and equipment maintenance; supervised student workers and less senior biologists.

Baylands Ecosystem Habitat Goals Update for Climate Change. Advisor and Chapter Co-Lead. The Baylands and Climate Change: What We Can Do is an update to the 1999 Baylands Ecosystem Habitat Goals, which for the first time set comprehensive restoration goals for the San Francisco Bay estuary. Produced by a collaborative of 21 management agencies working with a multi-disciplinary team of over 100 scientists, it synthesizes the latest science—particularly advances in the understanding of climate change and sediment supply—and incorporates projected changes through 2100 to generate new recommendations for achieving healthy baylands ecosystems. John served as an active participant throughout the process and was co-lead on 2 chapters of the science foundation update.

USGS National Wetlands Research Center, Lafayette, LA. Biologist. John conducted in-depth evaluations of wetland impacts and recovery related to the oil and gas industry throughout the Gulf Coast. This included collection and
analysis of data, technical report preparation and presentations, and staff supervision. He also performed field work for a variety of other coastal projects.

**Hayward Shoreline Resilience Study, Hayward, CA. Advisor.** BCDC staff, as part of the Adapting to Rising Tides (ART) Program, convened a working group to build from the Alameda County ART Project outcomes to assess local and asset-specific vulnerabilities. John was a key member of that working group, helping the team understand how the various assets fit together and interact on the landscape of the study area and beyond.

**Resilient By Design, Alameda Creek Watershed, CA. Advisor and Partner.** John was a site tour leader for the South Bay for the Resilient By Design competition – a year-long collaborative design challenge bringing together local residents, public officials and local, nationals and international experts to develop community-based solutions to strengthen resilience to sea level rise and flooding. John also participated actively with two design teams (Public Sediment led by SCAPE Landscape Architecture and the South Bay Sponge led by Field Operations), grounding their visions into the realities of the existing landscapes.

**Alameda Flood Control Channel Dredging Project, Alameda Creek, CA. Project Manager.** Prior to joining ESA, John managed an interdisciplinary team on a multi-year effort to evaluate the impacts to, and rate of recovery of, the natural habitat, vegetation and wildlife in the Alameda Flood Control Channel as a result of channel dredging. One of the goals of the project was to help quantify the temporal impacts resulting from repeated in-channel disturbance so that appropriate mitigations can be established.

**Bair Island Restoration Planning, Redwood City, CA. Project Manager and Technical Advisor.** Up until the South Bay Salt Pond Project, Bair Island was one of the largest wetland restoration projects in California. Prior to joining ESA, John led the initial efforts to develop the restoration and monitoring plans, and managed the CEQA/NEPA process. John continued to serve as a senior technical advisor for many years through the implementation process.

**VTA Consolidated Biological Mitigation, Santa Clara County, CA. Project Manager.** Prior to joining ESA, John served as the project manager and lead restoration ecologist on a large mitigation program for the Santa Clara Valley Transportation Authority. The program goal was to provide mitigation for wetland, riparian, and shaded riverine aquatic habitat impacts from multiple transportation projects. Rather than mitigate each relatively small impact at multiple individual project sites, the mitigation was successfully consolidated into two larger sites to maximize habitat benefits. Tasks included: mitigation site scouting and selection, negotiations with the regulatory agencies, site design, implementation oversight, contingency actions, and long-term monitoring.

**Wetland Regional Monitoring Program, San Francisco Bay. Steering Committee and Technical Advisory Committee.** The Wetlands Regional Monitoring Program (WRMP) is convening stakeholders from a broad range of backgrounds and expertise to develop and regional monitoring program plan for wetlands in the Bay Area. The goal for this program is to help the Bay restoration and regulatory community evaluate the effectiveness of on-going efforts and to improve consistency, efficiency and usefulness of monitoring in the region. John’s recognized experience and expertise in restoration implementation and adaptive management led to his appointment to the Steering Committee for this effort. After joining ESA, John’s role was shifted to the Technical Advisory Committee.
Matthew Brennan, PhD, PE
Senior Engineering Hydrologist

Dr. Brennan is a water resources engineer with 20 years specializing in estuarine management and restoration. His strengths include evaluating management and restoration scenarios from hydrologic and geomorphic perspectives to support ecosystem sustainability. To implement these perspectives, Dr. Brennan has developed and applied a wide range of hydrodynamic and transport process numeric models. In conjunction with these technical skills, his project management experience includes active client communication, teaming with biologists, integrating input from expert advisors, overseeing technical tasks and managing subcontractors.

Relevant Experience

California State Coastal Conservancy, Ormond Beach, Oxnard, CA. Project Manager. Developed and evaluated conceptual restoration alternatives for a coastal wetlands site. Alternatives include creating a new tidal lagoon, restoring a mosaic of intermittent ponds, and enhancing existing habitat. These design alternatives were configured and evaluated with the objective that both topographic and hydrologic modifications support wetland habitat functions. The alternatives were also evaluated with respect to future increases in mean sea level. Currently, Matt is leading field monitoring, lagoon inlet modeling, and sea level rise habitat assessment to inform preliminary restoration design.

California State Coastal Conservancy, South Bay Salt Pond Restoration Project, San Francisco Bay, CA. Hydrodynamic Modeler. The project consists of restoring 15,000 acres of former salt ponds to tidal action, enhancing wetland habitat and providing flood protection. DELFT3D hydrodynamic modeling for NEPA/CEQA assessed the long-term impacts on water levels, salinity, tidal prism and habitat. Further particle transport modeling optimized specific project features to meet the multiple criteria of sediment management, water quality and ecological habitat.

Alameda County Coastal Flood Study, CA. Alameda County. Project Manager. Matt reviewed coastal flood studies by the US Army Corps and FEMA contractors, and recommended a methodology to complete the coastal flood studies in southern Alameda County. A range of technical aspects include hydrodynamic bay models, wave generation and propagation modeling, statistical analyses of joint probability and extreme value distributions, wave runup, overtopping and dissipation over mudflats and marshes.

California State Coastal Conservancy, Ormond Beach, Oxnard, CA. Project Manager. Developed and evaluated restoration alternatives for a coastal wetlands site. Alternatives include creating a new tidal lagoon, restoring a mosaic of intermittent ponds, and enhancing existing habitat. These design alternatives were configured and evaluated with the objective that both topographic and...
hydrologic modifications support wetland habitat functions. The alternatives were also evaluated with respect to future increases in mean sea level.

**Los Angeles County Coastal Hazards Modeling and Vulnerability Assessment, Los Angeles, CA. Project Manager.** This project mapped coastal erosion and flood hazards under projected future climate scenarios for the entire coast of Los Angeles County. After selecting sea-level rise scenarios based on best-available science, the project team characterized shoreline geology, geomorphology, and coastal processes. The scenarios and physical processes were combined to project erosion and flooding hazards to 2100 and map along 65 miles of shoreline. The resulting hazard maps were intersected with infrastructure and ecological assets to assess these elements’ short-term and long-term vulnerability.

**Marsh Wave Attenuation Services and Response to Sea-Level Rise, Jackson County, MS. Project Manager & Coastal Hydraulics Task Lead.** This study is using hydrodynamic and wave models to assess the relative change in flood hazard over the next 50 years at Chevron’s Pascagoula Refinery based on projected response of the marsh to a range of sea-level rise projections. Marsh geomorphic change will be projected as elevation and scarp erosion changes using recent science developed by Gulf studies verified with historic data and local conditions.

**Improving SLAMM for California Estuaries, multiple coastal lagoons, CA. Project Manager.** Coastal marshes, whose elevations are strongly determined by tidal water levels, face a growing threat from sea-level rise. Warren Pinnacle Consulting has developed a widely-used tool for assessing marsh evolution, Sea Level rise Affecting Marshes Model (SLAMM). With funding and support from The Nature Conservancy, ESA partnered with Warren Pinnacle Consulting to improve SLAMM, particularly for its use in California estuaries. ESA recommended and assisted with the addition of California wetlands land use classes, several user interface improvements, predictions for marsh carbon sequestration, and a methodology for handling the perched water levels and habitats associated with lagoon estuaries. To inform the lagoon methodology, we reviewed data for a range of California lagoons, developed a lagoon classification framework and conceptual model, and translated this conceptual model into an algorithm for use by SLAMM.

**Mountain View Shoreline Sea Level Rise Study. City of Mountain View. Project Manager, Coastal Engineer.** Matt managed ESA’s work for the City to develop a comprehensive sea level rise vulnerability and adaptation assessment. The study addressed the potential for increased flooding directly from coastal sources as well as upstream sea level rise impacts to creek flooding and stormwater drainage. The study identified opportunities for integrating City objectives with other multi-objective projects such as tidal marsh restoration and regional-scale flood protection. ESA quantified the City’s future flood risk and developed a draft Capital Improvement Program and cost estimates to meet the long-term flood protection needs of the Shoreline Community. Matt continues to advise the City on its implementation of the study.
Elijah A. Davidian, AICP, LEED AP
Senior Managing Associate

Elijah has 15 years of experience working on environmental planning projects with a focus on coastal resource planning and regulatory compliance. His responsibilities primarily include project management and technical support in the areas of CEQA, NEPA, environmental regulatory permitting for a variety of project types throughout California. Elijah has extensive experience with projects involving water resources infrastructure, open space and recreation management, and coastal land use policy and planning. Prior to joining ESA, Elijah served as staff to the California Coastal Commission, the agency charged with regulating land use planning and development along the State’s 1,100-mile Pacific coastline.

Relevant Experience

City of Del Mar, Local Coastal Program Amendment to Address Sea-Level Rise, Storm-Surge, and Coastal Flooding, Del Mar, CA. Senior Coastal Policy Advisor. Elijah assisted a team of ESA technical and planning staff with the preparation of an amendment to the City of Del Mar’s Local Coastal Program to address sea-level rise, storm-surge, and coastal flooding. ESA’s analyses included assessing beach, bluff, and river flood and erosion hazards and vulnerabilities with sea-level rise and developing adaptation strategies to reduce flood and erosion risks. Drawing upon his experience as Coastal Commission staff, Elijah helped guide the technical analysis in a manner that focused on policy outcomes responsive to the community’s needs, while also addressing applicable Coastal Commission’s guidance and policies.

City of Eureka, Local Coastal Plan Update. Local Coastal Plan Task Leader. Elijah is assisting the City of Eureka with a comprehensive update of its coastal land use planning policies and regulations. Specifically, Elijah is working with City staff to revise the Land Use Plan (LUP) component of Eureka’s Local Coastal Program. The LUP will inform planning and development decisions within Eureka’s coastal zone for the next 10 to 15 years. As part of this work, Elijah is collaborating with ESA coastal geomorphologists and engineers on an analysis of sea-level rise vulnerability, available adaptation strategies, and the development of policies to address future coastal land use decisions in the face of climate change.

Sonoma County, Local Coastal Plan Update, Sonoma County, CA. Project Manager. Elijah is supporting the County with its first comprehensive Local Coastal Plan update in more than 15 years. His work involves preparing background documentation and drafting land use policies and programs for each of the Local Coastal Plan’s nine elements. Elijah is also advising County staff on matters of Coastal Act compliance, representing the County in policy negotiations.
with the California Coastal Commission, and assisting with public engagement. The LCP governs all major land use and planning decisions within Sonoma County’s coastal communities. The plan area spans the length of Sonoma’s 55-mile coastline and includes the communities of Jenner, Bodega Bay, and Sea Ranch among others.

**Daly City, Vista Grande Drainage Basin Improvement Project EIR/EIS.** *Regulatory Task Leader.* Elijah supported Daly City’s efforts to complete CEQA and NEPA compliance documentation, and is current assisting with securing authorization from the State Lands Commission, California Coastal Commission, and coastal local governments, for improvements to its stormwater system. The project involves improvements to Daly City’s stormwater conveyance canal adjacent to Lake Merced, enlargement of the drainage tunnel beneath Fort Funston, and replacement of the beach outfall structure. Elijah continues to work with ESA technical staff and the affected agencies to ensure the project conforms to applicable coastal laws, regulations, and policies.

**California Public Utilities Commission, Monterey Peninsula Water Supply Project EIR/EIS, Monterey Peninsula, California.** *Deputy Project Manager.* Elijah assisted with the preparation of CEQA and NEPA compliance for the MPWSP, which evaluateds the proposed 9.6 million-gallon/day desalination plant and more than 30 miles of pipelines, injection and extraction wells, pump stations, and storage facilities. The project traverses six coastal local government jurisdictions on the Monterey Peninsula. In addition to assisting with project team coordination, Elijah is drafted the land use, recreation, and aesthetic resources sections and provided senior review of other sections. Elijah is also advised on compliance with applicable coastal laws and regulations (e.g., CZMA, Coastal Act, and LCPs).

**California Coastal Conservancy, Bel Marin Keys Unit V Wetland Restoration Project, Marin County, CA.** *California Coastal Conservancy, Bel Marin Keys Unit V Wetland Restoration Project, Marin County, CA.* Elijah is managing a team of ESA staff in support of the Coastal Conservancy’s restoration of more than 1,500 acres of diked and farmed former tidal salt marsh habitat. The ESA team is providing technical services in the area of wetland restoration design, cultural and biological resources assessments, wetlands delineation, CEQA and NEPA compliance, and regulatory permitting (e.g., USACE, RWQCB, CDFW, BCDC). ESA is also working with numerous local stakeholders, including staff from Novato Sanitary District and Marin County Public Works Department, among others.

**San Francisco Public Utilities Commission, South Ocean Beach Long-term Improvements Project.** *Project Manager.* Elijah is working with the SFPUC to provide project planning, CEQA and NEPA documentation, and environmental permitting for a managed shoreline retreat project along San Francisco’s South Ocean Beach. The purpose of the project is to address chronic coastal erosion and sea-level rise hazards that threaten City infrastructure, while improving conditions for public beach access, recreation, and ecosystem function. The project involves a large scale revisioning of an approximately 1-mile stretch of the City’s Pacific Ocean coastline, including installing a low-profile wall to protect an existing combined stormwater/sewer transport tunnel from coastal erosion hazards; removing approximately 1,000 feet of revetment rock from the beach; closing and removing an approximately 3,000-foot segment of the four-lane Great
May Lau
Senior Managing Associate

May is a senior project manager and regulatory specialist with 15 years of experience in the environmental consulting industry. Her primary responsibilities include providing project management, permitting strategies, permit applications, and technical analyses for a variety of water/wastewater, energy, transportation, private development, and restoration projects. Her management and technical capabilities include review and preparation of environmental documents in compliance with National Environmental Policy Act (NEPA), California Environmental Quality Act (CEQA), Federal Endangered Species Act (FESA), and California Endangered Species Act (CESA); wetland and jurisdictional delineations; Clean Water Act permitting; streambed alteration agreements; coastal development permits; mitigation planning; biological assessments; and natural resource studies. She has consulted extensively with the United States Army Corps of Engineers (USACE), United States Fish and Wildlife Service (USFWS), California Department of Fish and Wildlife (CDFW, formerly CDFG), California coastal agencies, and regional water quality control boards (RWQCBs) for permit preparation and compliance, and to provide feasible and successful mitigation to her clients.

Relevant Experience

Mountains Recreation & Conservation Authority Culvert Replacement Project, Moran Consulting Corporation, Malibu, Los Angeles County. Project Manager/Regulatory Specialist. ESA conducted a biological resources assessment, mapping of environmentally sensitive habitat areas (ESHA), a jurisdictional delineation, and a cultural resources study in support of environmental permitting. ESA is also preparing the Section 404 Clean Water Act permit, Section 401 Water Quality Certification, 1602 Streambed Alteration Agreement, and coastal development permit for the project.

Los Angeles County Department of Public Works (LACDPW), On-Call Environmental Services, Los Angeles County, CA. Project Manager. ESA is supporting the LACDPW, including the Water Resources Division, Watershed Management Division, and Flood Maintenance Division (Los Angeles County Flood Control District [LACFCD]) by providing a full array of environmental services under a 5-year on-call services contract. With a team of 15 specialized subcontractors to supplement ESA’s in-house team of over 450 professional planners, biologists, and technical specialists, ESA can easily respond to a wide range of planning, permitting, and compliance needs for routine and emergency operations and maintenance activities with qualified technical experts in all environmental disciplines. Ninety (90) task orders have been authorized under this contract, including preparation of regulatory permits (404, 401, and 1602), biological and cultural resources surveys and reports, focused surveys for
federally- and/or state-listed species, wetland delineations, compliance/mitigation monitoring and reporting, air and water quality sampling, and preparation of CEQA documents.

Ballona Wetlands Restoration Project, California Coastal Conservancy, Playa Del Rey, CA. Senior Biologist. ESA is preparing an EIS/EIR to assess the potential environmental impacts of wetland restoration of the Ballona Wetlands. May is responsible for review of existing biological reports and data, coordination with various resource agencies and subconsultants, and preparation of the biological resources chapter of the EIR.

City of Long Beach, Los Cerritos Wetlands Oil Consolidation and Restoration Project EIR, Long Beach, CA. Senior Biologist. ESA prepared an EIR for the Los Cerritos Wetlands and Oil Production project in the city of Long Beach. The project includes a comprehensive wetlands restoration that will restore a privately owned oil field in the city of Long Beach through the creation of a wetlands mitigation bank. The project will occur on four properties and will relocate and modernize existing oil production facilities. In addition, the project will include the construction of facilities to support oil production and will include a visitor’s center and pedestrian paths on the newly restored wetlands. Major environmental topics evaluated in the EIR include biological resources, cultural resources and historic resources, greenhouse gas, geologic conditions, hazards and hazardous materials, and hydrology and water quality and sea level rise. May was responsible for peer review of the jurisdictional delineation report and biological reports; evaluation of project compliance with federal, state, and local regulatory requirements; and preparation of the biological resources chapter of the EIR.

San Gabriel River Confluence with Cattle Canyon Improvements Project, Watershed Conservation Authority, Angeles National Forest, Los Angeles County, CA. Project Manager. This project involves recreational improvements and ecological restoration opportunities in order to address resource management challenges resulting from high public use of a 1.5-mile reach of the East Fork San Gabriel River, near its confluence with Cattle Canyon Creek, within designated critical habitat for Santa Ana sucker. As a subconsultant to BlueGreen Consulting, ESA is providing environmental services for the project, including preparation of a joint NEPA/CEQA document (EIS/EIR), biological and cultural surveys and reports, hydrology and soils report, jurisdictional delineation, conceptual geomorphology and hydrology investigation, and support of the conceptual restoration approach during the feasibility/design stages. May is responsible for managing the staffing, schedule, and budgets, internal and client meetings/coordination, as well as review of all technical reports and the EIS/EIR.

Santa Susana Field Laboratory Soil and Groundwater Remediation EIR, Department of Toxic Substances Control, Simi Valley, Los Angeles County, CA. Senior Biologist. ESA is preparing a Program EIR to assess the potential environmental impacts of soil and groundwater remediation activities within the Santa Susana Field Laboratory. May is responsible for review of existing biological reports and data, agency consultation, coordination with various subconsultants, and preparation of the biological resources chapter of the EIR.
Ryan Todaro
Program Manager

Ryan has 19 years of experience in the environmental field and has served as an environmental manager and lead planner for numerous projects. He has served as project manager and lead planner for numerous projects in Southern California and the Central Coast. His experience includes preparing and managing CEQA and NEPA documents, obtaining essential permits and entitlements, and coordinating with construction personnel, local governments, and regulatory agencies regarding environmental compliance, permitting, and mitigation measures for multifaceted projects often involving multiple stakeholders.

In addition to his experience leading environmental documents to successful completion, as a former California Coastal Commission employee, Ryan is skilled at analyzing proposed applications and discretionary actions within the coastal zone for conformity with the California Coastal Act requirements. Through his past reviews and analyses of coastal development permit applications, coastal land use plans, and zoning ordinances, he has developed a keen understanding of what is feasible, preferred, and permitable in the eyes of the California Coastal Commission. Moreover, his understanding of an otherwise challenging review process allows him to successfully usher projects through the necessary processes with efficiency to success.

To complement his experience with coastal projects, Ryan is accustomed to coordinating public meetings and open houses, and conducting negotiations, meetings, and other correspondence with governmental and regulatory agencies throughout the course of the environmental review process.

**Relevant Experience**

**City of Oceanside Local Coastal Program Update, Oceanside, CA.** California Coastal Commission Liaison. Ryan is assisting the City of Oceanside to prepare a comprehensive update to the Local Coastal Program to address sea-level rise and other hazards, public access, scenic resources, visitor-serving commercial and recreation land uses, and natural resources. ESA is preparing a background study that identifies existing conditions in the City’s coastal zone, a vulnerability assessment and adaptation plan to plan for sea-level rise related hazards, and a Land Use Plan that will provide policy direction for future development and investment in the Coastal Zone over the next twenty to thirty years. The update to the Local Coastal Program will involve extensive public outreach to community members and stakeholders, including pop-up outreach, community surveys, stakeholder interviews, public workshops, and public hearings. Ryan provides coastal planning expertise throughout the LCP update process, including Coastal...
Act consistency analysis, Coastal Commission precedent research, and participates in meetings with City and Coastal Commission staff.

**County of Mendocino Planning & Building Department, Mendocino Town Plan Update Project, Mendocino, CA. Project Manager.** The project involves updating the Mendocino Town Segment of the certified Local Coastal Program, which proposes numerous changes to the certified Mendocino Town Plan (Land Use Plan) and Zoning Code (Implementation Plan), primarily relating to visitor-serving facilities, changes to certain land use designations, revised permitted and conditionally-permitted use types, new water quality provisions, and new policy formatting in the LUP. Ryan provides coastal planning services including reviewing pertinent elements of the draft Mendocino Town Plan, Coastal Act consistency analysis, and correspondence between County and Coastal Commission staff, and conducting Coastal Commission precedent research, and participates in meetings with County and Coastal Commission staff.

**Malibu Lumber LLC, Malibu Lumber Yard, Malibu, CA. Lead Land Use Planner.** The project involved obtaining wastewater discharge permits for the Malibu Lumber yard commercial development project. Ryan managed tasks associated with obtaining waste discharge and water recycling requirements from the California Regional Water Quality Control Board.

**Los Cerritos Wetlands Authority, Los Cerritos Wetlands Restoration Program EIR, Seal Beach and Long Beach, CA. Project Manager.** ESA is assisting the Los Cerritos Wetlands Authority with preparation of a Program Environmental Impact Report for the Los Cerritos Wetlands Conceptual Restoration Plan (CRP) in the cities of Seal Beach and Long Beach, California. The study will focus on determining a proposed ecological restoration alternative design and analyzing the potential environmental impacts resulting from the implementation of that restoration alternative across the entire Los Cerritos Wetlands complex. As project manager, Ryan is the main point of contact responsible for managing the consultant team.

**City of Long Beach, Los Cerritos Wetlands Restoration and Oil Consolidation Project, Long Beach, CA. Technical Team Coordinator.** The project includes a comprehensive wetlands restoration that will restore a privately owned oil field in the City of Long Beach through the creation of a wetlands mitigation bank. The project will occur on four properties and will relocate and modernize existing oil production facilities. In addition, the project will include the construction of facilities to support oil production and will include a visitor’s center and pedestrian paths on the newly restored wetlands. Major environmental topics evaluated in the EIR include biological resources, cultural resources, hazards and hazardous materials, and hydrology and water quality. Ryan coordinates with the technical team on the preparation of the EIR.
Louis White, PE
Coastal Engineer

Louis is a coastal engineer with more than 12 years of experience in planning and design of coastal management, restoration, and sea-level rise adaptation projects. Louis applies strong project management and technical skills to complex, multi-objective projects, and has been instrumental in the success of several major coastal restoration and climate change adaptation projects. Louis frequently assists local agencies and special districts evaluate potential impacts of sea-level rise on their assets, including to wastewater systems, highway and transportation infrastructure, and public open spaces, and develop adaptation approaches for their continued and future operations. By combining a technical base in coastal hydrology and engineering with an understanding of the regulatory and environmental processes, Louis helps clients navigate projects through key stages of planning, permitting, design, and implementation.

Relevant Experience

City of Santa Barbara, Santa Barbara Sea-Level Rise Adaptation Plan for the Local Coastal Program Update, Santa Barbara, CA. Project Engineer. ESA is helping the City of Santa Barbara update their Local Coastal Program policies by evaluating the City’s vulnerability to sea-level rise and preparing an adaptation plan. Funded by a California Coastal Commission grant, the project is using available hazard maps and the new 2018 sea-level rise guidance to determine the most vulnerable assets in the City. Louis is the project engineer, coordinating the planning, technical and economic team to develop feasible and practical solutions that are acceptable to the community.

City of Eureka, General Plan Update/Local Coastal Program Land Use Plan Update, Climate Action Plan and EIR, Eureka, CA. Coastal Engineer. ESA assisted the City update its General Plan and Local Coastal Program Land Use Plan, and prepared a Climate Action Plan and EIR. Louis prepared local sea-level rise projections for Humboldt Bay used to evaluate the vulnerability of the City’s assets. Louis prepared an adaptation guidance document that the City used to develop technical information for sea-level rise adaptation planning and policy development. As part of this work, Louis worked directly with multiple City staff and local stakeholders involved in sea-level rise planning.

County of Humboldt and GHD Inc., Humboldt Bay Sea-Level Rise Adaptation Plan for Humboldt Bay Transportation Infrastructure, Eureka, CA. Project Manager. The County of Humboldt is leading a study to refine existing understanding of climate change vulnerability to a portion of Highway 101 extending north from Eureka, as well as to vulnerable populations, landowners, and stakeholders, including utilities infrastructure and agriculture. As part of GHD’s team, ESA is assisting on the application of the State of California’s Sea-Level Rise Guidance, coastal engineering analyses, and adaptation planning. Louis is leading the technical work on coastal flooding and erosion processes, and supporting the adaptation planning process.
City of Ventura, Surfer’s Point Managed Shoreline Retreat, Seaside Park, Ventura, CA. Project Manager. ESA assisted the City of Ventura design and implement a managed shoreline retreat and coastal trail project at Surfer’s Point, which included widening the beach up to 80 feet, and restoring natural cobble berm and vegetated back-beach dune habitat. ESA led preliminary through final design, and provided construction support during construction of Phase 1 of the project, completed in 2011, followed by implementation of dune grading and seeding in 2012. Louis developed the construction documents, and has led the last 5+ years of post-construction monitoring and surveys.

City of Ventura, Alternatives Analysis for the Surfer’s Point Promenade Emergency Repairs, Ventura, CA. Project Manager. In response to erosion damages to the promenade at Surfer’s Point, caused by winter storms in December 2015, the City of Ventura placed cobble and angular quarry stone under an emergency permit along 465 feet of shore. ESA was retained to assist the City conduct and prepare an alternatives analysis to support the permitting process with the California Coastal Commission and the US Army Corps of Engineers. With input from local stakeholders, including Surfrider Foundation, ESA prepared a 404(b)(1) alternatives analysis that considers several alternative methods for modifying the emergency project to result in the Least Environmentally Damaging Practicable Alternative (LEDPA). A key objective of the project is to identify feasible modifications to the emergency project and select an approach that the community and regulatory agencies support.

Department of Water Resources and Ocean Science Trust, Technical Methods Manual for Adjusting FEMA Coastal Flood Maps to Account for Future Sea Level Rise, 2016. Coastal Engineer. ESA led the development of a manual to assist planners and engineers with planning for sea level rise by extension of FEMA coastal flood hazard maps typically used by municipalities. The manual was developed with assistance of scientists from the Scripps Institution of Oceanography who provided future water level and wave conditions based on global climate models. The Manual was developed as part of a multi-agency effort funded by the NOAA Coastal and Ocean Climate Adaptation (COCA) Program, The California Department of Water Resources (DWR) with coordination support from the California Ocean Science Trust (OST), to develop guidance products to help local communities adapt and plan for sea level rise. Louis analyzed observed and modeled coastal data and performed coastal engineering calculations, including wave runup and overtopping analyses, to develop the technical approaches described in the manual.

South San Luis Obispo County Sanitation District, Sea Level Rise Analysis for Wastewater Treatment Facility Redundancy Project, Oceano, CA. Project Manager. ESA is assisting Kennedy/Jenks Consultants conduct a sea level rise (SLR) analysis that will be included in a Coastal Development Permit (CDP) application to the California Coastal Commission (CCC) for a Wastewater Treatment Facility (WWTF) Redundancy Project. In accordance with the CCC’s 2015 SLR Policy Guidance, ESA is evaluating the flooding impacts to the WWTF, located in a low-lying area adjacent to a coastal lagoon, for existing and future conditions with SLR. ESA is conducting hydraulic modeling of the lagoon and creek systems to diagnose the flooding mechanisms and events that damage the WWTF for existing conditions, and will estimate the relative change in frequency of occurrence of the damaging events for the future.
Anne deBoer is a professional economist specializing in the economic and financial effects of sea level rise, resilience funding and financing, and economic impact assessments. Since joining AECOM in 2017, Anne has worked with both public and private sector clients to deliver real estate and policy strategy recommendations to address the impacts of climate change using tools such as triple bottom line and benefit-cost analyses. Anne has analyzed the economic and financial effects of sea level rise and coastal flooding for numerous jurisdictions in California, including studies for Santa Barbara, Long Beach, and the Port of Oakland.

She has 3 years of previous professional experience advising higher education clients on asset management and greenhouse gas reduction strategies. Her graduate school experience focused on sustainability in transportation and land use planning, infrastructure risk management, and climate vulnerability assessments. She obtained a B.A with high honors from Wesleyan University where she studied sustainable architecture.

### Relevant Experience

**Economic and Financial Effects of Sea Level Rise, Long Beach, CA, 2017-Present.** The City of Long Beach is vulnerable to the effects of coastal flooding and sea level rise. To better understand the economic consequences of a changing climate, Anne is modeling the vulnerability of property, infrastructure and natural resources that underpin the economy of the City. This information is intended to fulfill California State Lands Commission AB 691 requirement to assess the impact of seal level rise on granted trust lands as well as help the City inform its climate action planning.

**Economic and Financial Effects of Sea Level Rise, Port of Oakland, CA, 2018-Present.** In response to the California State Lands Commission AB 691 requirement to assess the impact of sea level rise on granted trust lands, Anne modeled the economic impacts of multiple sea level rise scenarios to the Port’s Maritime operations, the Oakland Airport, and the Commercial Real Estate division.

**Santa Barbara Sea Level Rise Adaptation Plan and Local Coastal Plan Update, CA, 2018-Present:** In support of the City of Santa Barbara’s Local Coastal Plan update, Anne is modeling Santa Barbara’s public and private assets, coastal recreational assets, utilities, and transportation information to evaluate the future economic and financial impacts from sea level rise, coastal
flooding, and erosion. Economic and financial costs and benefits are being modeled to both a no-action scenario as well as a suite of adaptation scenarios that will be developed by the project team. The project will also attempt to address funding and financing vehicles that could be harnessed to support implementation of future projects.

**Lower Manhattan Economic Cost of Inaction Analysis, New York City Economic Development Corporation, NY, 2018:** The Lower Manhattan Coastal Resiliency Project is an integrated coastal protection initiative aimed at reducing flooding risks due to storms and sea level rise in Lower Manhattan. AECOM was retained to develop a comprehensive strategy for addressing the combined effects of sea level rise and storm surge through a series of adaptive infrastructure investments. Anne quantified the costs of inaction using New York City land use data, sea level rise projections, traffic and transit information, and FEMA guidelines.

**Cost of Inaction and Benefit Cost Analysis for Dania Beach, FL, 2017-2019**
Anne conducted an analysis to develop an understanding of how businesses in Dania Beach will operate as sea levels rise. This analysis included a qualitative and quantitative understanding of how potential mitigation and/or adaptation approaches might serve to protect the community from coastal flooding and sea level rise, while also supporting and promoting economic resilience in the region.

**Berkeley Energy Assurance Team, City of Berkeley, CA, 2017:** AECOM is engaged in developing a coordinated regulatory, technical and financial feasibility analysis and implementation plan for a multi-facility clean energy microgrid in Downtown Berkeley. Anne supported the policy research and the development of a financial model for the proposed microgrid including identifying and evaluating potential financing opportunities, sustainable return of investment analysis, and a triple bottom line analysis.

**Confidential Client, San Francisco Bay Area, 2017-2018:** AECOM was engaged in a Triple Bottom Line (TBL) and benefit-cost analysis that define the value of investing in climate adaptation and resilience in a coastal context. Anne supported the effort to determine the cost of inaction from new sources of climate-related risk as well as benefits from local and regional resilience strategies to assets of interest. Findings were incorporated in a memo and tool to assist in the design and implementation of an asset management strategy that accounts for climate risk by providing an understanding of the tradeoffs between a range of potential climate adaptation responses.

**San Francisco Public Utilities Commission (SFPUC), Flood Risk Mitigation, San Francisco, CA, 2018-Present:** AECOM has been undertaking the economic evaluation of flood risk management measures for SFPUC by determining the comprehensive economic impact associated with storm-related flooding and the economic benefits from improving storm water management infrastructure within the City of San Francisco. This work includes the evaluation of flood risk mitigation technologies that could be considered in the context building code principles and guidelines such as dry proofing, wet proofing and elevating structures at risk to future flooding. Anne is supporting this effort by examining the costs and benefits of applying flood risk mitigation technologies to potential new construction and substantially improved structures in defined flood zones.

**F1 Mexico City Economic Impact, CIE, Mexico City, Mexico, 2017-Present:** AECOM has been supporting CIE (event organizer) to determine the annual economic impact of the Formula 1 Mexico Grand Prix event hosted in Mexico City. Anne supported the effort by providing background analysis, and participating in the economic impact analysis and the media analysis that determines the additional economic benefit of event coverage from various social and traditional media outlets.

**Economist, Economic Impact of Mexico City Music Festivals, OCESA, Mexico City, Mexico, 2016-Present:** AECOM has been supporting OCESA, a leading entertainment company in Mexico, to determine the annual economic impact of their music festival events in Mexico City. Anne supports the effort by helping to update the economic impact analysis of existing and/or new music festival events and its impact on the local economy, as well as related presentation materials.
Feliz M. Ventura has sixteen years of public sector, non-profit and private sector experience in economic analysis and strategy development in the U.S., Latin America, and Asia. Feliz has worked on projects across California, the U.S., and Latin America that seek to improve economic, environmental, and social outcomes for areas ranging from local communities to countries. At AECOM, she has focused on the business case for development that also addresses environmental and social challenges and has developed analyses and investment plans under the varying climactic conditions. She speaks English, Spanish and Portuguese, and has done business across the Americas, Asia and Europe.

Prior to AECOM, Feliz held roles with the State of Washington and the World Resources Institute. At the World Resources Institute in Washington, D.C., Feliz assisted client companies in Latin America and Asia to measure and improve their triple bottom lines, worked to attract investment from major U.S. and European Union funds into client companies, harmonized triple bottom line standards for global use, and coordinated Brazilian operations.

Relevant Experience

Flood Risk Mitigation Policy, San Francisco Public Utilities Commission, CA.

To develop flood risk management policies, AECOM has been undertaking the economic evaluation of flood risk management measures for SFPUC. Feliz directs economic work that includes benefit-cost evaluation of flood risk mitigation technologies that could be considered in the context of a flood resilient building code and broader policy considerations around economic and implementation impacts resulting from a flood resilient building code. 2018-present.

Cost of Inaction and Benefit Cost Analysis for Dania Beach, FL. Feliz is leading an analysis to develop an understanding of how businesses in Dania Beach will operate as sea levels rise, and how a variety of potential mitigation and/or adaptation approaches can serve to protect the community from impacts ranging from rainfall + tidal flooding to saltwater intrusion to extreme events, but also support redevelopment that would promote economic resilience by protecting social and environmental assets in the context of rising seas. Finally, as this area experiences population growth over the next 20 years, considerations around community health and equity will continue to be critical as impacts and potential mitigation and/or adaptation approaches will also be considered. 2017-present.
Climate Adaptation and Resilience Funding and Financing, Resource Legacy Foundation, San Francisco and Sacramento, CA. Feliz directs a project on existing and upcoming funding and financing strategies for climate adaptation and resilience. To examine this topic, academic and practical expertise was leveraged, and outcomes include case studies on how to apply existing and innovative funding/financing structures in the areas of coastal, water/wastewater, heat and fire, and programmatic investments. To inform recommendations, thought leaders and practitioners in finance, municipal government, insurance, and academia were interviewed. Interim and final products will be presented to the California Office of Planning and Research’s Integrated Climate Adaptation and Resiliency Program. 2017-present.

Lower Manhattan Climate Resilience Benefit Cost Analysis, NY. Feliz directs the benefit cost analysis for a variety of protection and adaptation approaches for Lower Manhattan, the cultural, financial and civic core of the City of New York. Feliz leads a team that is defining and analyzing the benefits of building to regional scale approaches to sea level rise and storm surge management and collaborates closely with engineers and modelers developing protection approaches. This study will be used to inform the City’s strategy for managing the impacts of climate change and may be used to pursue funding for projects with favorable benefit-cost ratios. 2017-2018.

Two Bridges Climate Resilience Benefit Cost Analysis, NY. Feliz directs the benefit cost analysis for a variety of protection and adaptation approaches for the Twin Bridges subarea in Lower Manhattan, the cultural, financial and civic core of the City of New York. Feliz leads a team that is defining and analyzing the benefits of building to regional scale approaches to sea level rise and storm surge management and collaborates closely with engineers and modelers developing protection approaches. This study will be used to inform the City’s strategy for managing the impacts of climate change and may be used to pursue funding for projects with favorable benefit-cost ratios. 2017-2018.

Economic Impact and Benefit Cost Analysis for Santa Barbara Local Coastal Plan Update, CA. Feliz served as the economics director for the analysis of economic and fiscal impacts, which include land and improvements, public infrastructure, ecosystem and recreational asset values. This information will be used to develop information that informs a benefit-cost analysis of adaptation strategies for use by public and private sector entities including, but not limited to, sediment management, beach nourishment, protect in place and targeted, managed retreat under temporary and permanent inundation conditions. 2017-present.

Confidential Client, San Francisco Bay Area. Feliz is the technical lead for a triple bottom line assessment and benefit-cost analysis that defines the value of investing in climate adaptation and resilience in a coastal context. The analyses consider impacts over various time frames for assets that will experience climate impacts from new sources over their lifespans, as well as illuminate cobenefits from resilience investments using a triple bottom line approach. Findings will be incorporated into a tool designed to assist in the design and implementation of a cohesive management strategy that accounts for climate risk by providing an understanding of the tradeoffs between a range of potential climate adaptation responses. 2017-present.

Berkeley Energy Assurance Transformation, City of Berkeley, Berkeley, CA. The Berkeley Energy Assurance Transformation (BEAT) project will explore the opportunities for dense urban cities to create innovative approaches for increasing energy reliability and reducing greenhouse gas emissions for critical facilities. Feliz is the AECOM project manager and economic director for this effort which will address the regulatory, financial and technical aspects of developing a microgrid in Berkeley to develop a plan for a shovel-ready project, as well as create a roadmap for microgrid development in other dense, urban areas. Feliz will lead the overall effort as well as a financial analysis of the project’s feasibility, including an assessment of innovative climate and green financing mechanisms. Finally, Feliz will also lead a triple-bottom line assessment of the microgrid’s impact on the community. Subconsultants to this contract include Lawrence Berkeley National Laboratory, Association of Bay Area Governments, and the Center for Sustainable Energy. 2016-present.
**Joan Isaacson**
Principal, Senior Facilitator

**SUMMARY OF QUALIFICATIONS**

Joan Isaacson is a Principal at Kearns & West, and brings 25 years of experience in community engagement, stakeholder facilitation, and urban and environmental planning across Southern California. At the core of her work is a commitment to formulating the best facilitation and engagement strategy where participants can see their fingerprints on the outcomes.

Joan has special expertise in creative, effective community engagement programs for citywide and regional planning projects, focusing on involving the full cross-section of community perspectives. In particular, she has been on the forefront of designing public involvement programs for coastal communities' sea level rise adaptation planning. Flooding, resiliency, hazard mitigation, and emergency preparedness are also common components of her current work. Having grown up in coastal Ventura County, and conducted public involvement in coastal cities like Del Mar, Carlsbad, Oceanside, Oxnard, Long Beach, Imperial Beach, San Clemente, Venice, Pacific Palisades, and Coronado, she has given Joan insight into the love and care coastal residents have for their community environments.

Joan’s participatory programs include focus groups, advisory committees, stakeholder interviews, customized website dialogue platforms, online and telephone surveys, pop-up outreach, public workshops and open houses, webinars, success story campaigns, storytelling, educational videos and newsletters, and media monitoring. She also has special expertise in conducting multi-language and multi-cultural community engagement in addition to facilitating stakeholder and interagency committee processes. Joan also lectures and conducts training on public involvement.

**RELEVANT EXPERIENCE**

City of Los Angeles Sea Level Rise Adaptation Planning for Venice Local Coastal Program, Public Involvement Director. Joan recently completed a community engagement process for the City of Los Angeles, focusing on providing essential information about sea level rise and flood risks, community vulnerabilities, and mitigation opportunities. Input helped to guide the vulnerability assessment and mitigation planning.

City of Del Mar and City/County of San Francisco Sea Level Rise Adaptation Planning for Local Coastal Programs, Public Involvement Consultant. Both cities had limited budget for community engagement, but recognized the need for strategic assistance. Joan prepared comprehensive public involvement plans that addressed the community information and education, and designed multi-pronged engagement programs that aligned with the research, vulnerability assessment and mitigation identification process. Staff used the public involvement plans for the duration of their planning processes.

City of Burbank Citywide Complete Streets Plan, Community Engagement Director. Joan is providing strategic guidance on citywide planning.

**EXPERTISE**

- Public Involvement
- Stakeholder Facilitation
- Participatory Process Design
- Training
- Urban and Environmental Planning

**EDUCATION & CERTIFICATIONS**

BS, Psychology
Cal State University | Fullerton, CA

MA, Geography
San Diego State University | San Diego, CA

International Association of Public Participation Certification

American Institute of Certified Planners, 1995-2017

**MEMBERSHIPS**

American Planning Association – San Diego Board, Professional Development Chair
Lambda Alpha Honorary Land Use Economics Society
community engagement, combining traditional community workshops with experiential activities, including the city’s first ever walking/bicycling tour to gain citizen perspectives.

**County of Los Angeles Los Angeles River Master Plan Update**, Lead Facilitator. Joan is facilitating the Steering Committee and Subcommittee process for the Master Plan Update, which addresses flood management, resiliency, water supply, ecological systems, parks and trails, and community health, housing, and dislocation issues. Her team also provides logistics support for all meetings, and handles note taking and meeting summary tasks.

**Federal Emergency Management Agency Local Communications Support and Training, RiskMAP Program**, Contract Director, Trainer, and Facilitator. Joan manages Kearns & West’s local outreach support for FEMA Region IX’s flood mapping and hazard mitigation program. Prior work included a national stakeholder involvement program for a new disaster recovery strategy. Joan is also part of a select group of national trainers for sessions and webinars on project management, internal communications, and partnerships with local agencies and cities. Her work for FEMA has also included specialized communication strategies communicating flood risks and motivating household emergency preparedness.

**City of Long Beach Southeast Area Specific Plan**, Public Involvement Manager. Although mostly built out, several development opportunities occur near wetlands and along Pacific Coast Highway, the primary commercial corridor. Prior attempts to update planning policy languished due to controversy, but in 2013 the City relaunched a participatory process to achieve an implementable plan, including a community advisory committee, public workshops and open houses, informational materials, pop-up outreach, an online discussion forum, and media relations.

**California Strategic Growth Council Best Practice Highlights for Sustainable Community Grant-Funded Activities**, Project Director. Joan led the Kearns & West team’s screening of 125 planning activities funded by the Strategic Growth Council, including focused general plan updates, corridor plans, specific and community plans, and regional sustainable community strategies. The end-product, intended for elected officials, community leaders, and stakeholder interests, showcases examples of planning activities that exemplify multiple sustainability benefits, community engagement and stakeholder collaborations, and integration of unique local strengths.

**City of Los Angeles Department of Water and Power 100% Renewable Energy Study and On-Call Support**, Lead Facilitator
As Stakeholder Advisory Group facilitator, Joan is part of the core project team for the study, working with the Mayor’s Office, Department of Water and Power, and the National Renewable Energy Lab. She has been instrumental in designing the process for engaging stakeholder input per direction of a City Council motion, which involves environmental, neighborhood health, rate payer, energy supply, and business interests. She has also supported numerous LADWP citywide and neighborhood public involvement programs for policy and capital projects over last 12 years.

**City/County of Honolulu Stormwater Utility Formation Advisory Group and Community Outreach**, Lead Facilitator and Outreach Advisor. Joan is working with a technical team to facilitate a stakeholder group providing input on the fee structure for a new stormwater utility, a cornerstone for O’ahu’s integrated water management plan. Stakeholders are grappling with the intersections of climate change, flood risk, fresh water security, land use and development trends, and equity in discussions about the fee structure.

**City of San Diego De Anza Revitalization Plan/Mission Bay Park**, Public Involvement Manager and Advisory Committee Facilitator. Joan directed the initial phase of public involvement for planning the next chapter of this significant property within Mission Bay Park, balancing new public recreational activities, resiliency, wetland restoration, mobility improvements, camping, and a sustainable revenue stream. It included an ad hoc committee, community workshops, an online discussion forum, stakeholder interviews, and pop-up outreach. Joan facilitated all committee meetings and community workshops.

**City of Oxnard Ormond Beach Coastal Restoration and Public Access Plan, and Parks Master Plan**, Public Involvement Director, Lead Facilitator. The citywide public involvement programs for these two projects are being led by Joan and the Kearns & West team. The City has prioritized hearing from communities underrepresented in civic dialogue as well as established stakeholders, in order to have representative input. Both projects started with preparation of comprehensive public involvement plans, and implementation has included stakeholder focus groups, online surveys, social media, community workshops and open houses, advisory committee, informational materials, partnerships with community organizations, and Spanish/Mixe gestures.
JENNA TOURJÉ  
DIRECTOR & FACILITATOR  

SUMMARY OF QUALIFICATIONS

Jenna Tourjé is a Director at Kearns & West with over 10 years of experience in community engagement, stakeholder facilitation, and urban planning. She is passionate about partnering with communities on the path to creating healthy, whole and equitable places, where people love where they live and have a voice and a stake in the future.

Through her experience as an outreach professional, urban planner, and educator, Jenna’s unique expertise informs each one of her projects. Her projects involve multi-pronged outreach techniques and scale outreach to engage even the hardest to reach community members. She has led and facilitated stakeholder and community engagement at the regional and local level related to resiliency, sustainability, water policy, transit-supportive development, active transportation, healthy communities, transportation planning, and parks and open space.

Jenna has worked in coastal communities throughout her careers, from resiliency and SLR to parks master plans. Jenna’s experience spans community groups, municipalities, agencies, and regions throughout California. Some of her favorite work involves engaging with communities to incorporate sustainability and resiliency policies. Jenna is certified by the International Association of Public Participation (IAP2) and co-instructs the Graduate Planning Practicum for the Masters of Urban Planning and Public Policy department at UC Irvine.

RELEVANT EXPERIENCE

City of Malibu, Malibu Bluffs Parkland Master Plan and EIR  
Public Outreach Lead | 2015 to 2016

Jenna coordinated the public outreach and engagement for the Malibu Bluffs Park Master Plan. Outreach for the project included interactive online engagement, a youth design charrette, visual preference surveys, and community meetings, engaging over 1000 residents in the park design. The project helped the City explore the potential of the Parkland to provide new recreational opportunities for the Malibu community to meet the city’s current and future recreation needs.

County of Los Angeles, LA River Master Plan Update Steering Committee  
Facilitator | 2018 to Present

Jenna is part of the facilitation team for the LA River Master Plan Update Steering Committee and Subcommittee process. The effort to update the LA River Master Plan was launched to modernize an existing 1996 plan, synthesize more recent ideas for portions of the LA River, and bring a coherent and comprehensive vision to the transformation and re-imagining of the LA River.

Campo Wind Energy Project EIS Public Hearing Facilitation, Dudek  
Facilitator | 2019

Jenna provided expert facilitation for the final Campo Wind Energy Project EIS process. The process included engaging a KW Facilitator and Assistant Facilitator to design a meeting process, prep the team, and facilitate the meeting. Meetings for the project on the Campo Indian Reservation near Eastern San Diego County...
were highly charged, and Kearns & West was brought in to allow for a public process where everyone’s voices could be heard. The client meeting and wanted help with facilitation.

### Edwards Air Force Base (AFB) Empathy & Risk Communications, ESA
**Facilitator | 2019**
Jenna facilitated an empathy training and dry run for the Edwards AFB public hearings relating to solar energy projects. The project included training on risk communication and displaying empathy in public meetings. Risk communication training involved interactive exercises on how to respond to potential issues the community might identify (i.e., Valley Fever), interfacing with the public, and responding to questions. The Risk Communication and Empathy Training was enhanced with a presentation and activity relating to employing empathy in public meetings, with practice on diffusing public angst and outrage, effective communication, and responsiveness.

### FEMA, Community Engagement and Risk Communications
**Facilitator | 2018 to Present**
Jenna provided outreach and facilitation support for Region 8, including developing materials for kick-off and discovery meetings and working on-the-ground with stakeholder groups to provide education on hazard mitigation planning, identifying priorities floodplain community resilience priorities, and facilitating regional engagement for the RiskMAP program.

### City of Los Angeles, Sea Level Rise Adaptation Planning/Venice Local Coastal Program Update
**Outreach Specialist | 2018**
For the series of community workshops, Jenna has assisted with facilitating discussions with community members to convey information about climate-related flooding risks, community vulnerabilities, and mitigation concepts. Facilitation has required special attention to effective communication techniques for the ethnically and economically diverse communities in Venice.

### LA Metro, ATP Cycle 4 and SB 1 Grants
**Lead Grant Writer | 2018**
As Lead Grant Writer, Jenna provided support to Metro for ATP Cycle 4 grant applications for cities in LA County, including the cities of Huntington Park, Paramount, and South Gate. Grants focused on reducing emissions, meeting State goals for sustainability, and building resiliency into the transportation system, both with Metro and with each City.

### City of Laguna Beach, Village Entrance Project
**Planner | 2015 to 2018**
Jenna led community outreach and engagement for the redesign of the Village Entrance, a highly controversial project that broke ground in late 2018. Outreach included walking tours, traditional & pop-up workshops, focus groups, online engagement, and external communications. Improvements will include additional landscaping, a pedestrian/bicycle pathway and an exterior renovation of historic structures.

### Southern California Association of Governments, Placentia General Plan Update Sustainability Element
**Public Outreach Lead | 2015 to 2016**
As part of a Sustainability Planning Grant, Jenna prepared a sustainability element and conducted community outreach in support of the Placentia General Plan Update. Through this element, the city integrated principles of sustainability—a balance between social equity, a strong economy, and a healthy environment. This provides additional opportunities to identify ways to improve the quality of life in Placentia and become a more resilient community. Jenna administered a community survey and conducted community outreach workshops. Implementation programs, including actions, identification of key partners and potential funding sources, and a monitoring program, were also prepared.

### City of Laguna Beach, Enhanced Mobility and Complete Streets Transition Plan
**Planner | 2014 to 2015**
Jenna developed final plan and deliverables for the Enhancement Mobility and Complete Streets Transition Plan. The plan is designed to provide the policy framework for the city to implement physical and operational changes to the roadway network to improve conditions for all users including bicycles, pedestrians, transit, and motor vehicles. Extensive community outreach, including an online survey, walk audit, and bike audit, resulted in community identification of issues and opportunities. The project included an extensive analysis of the existing facilities in Laguna Beach that support or hinder mobility, including sidewalk locations, street grades, and speed limits. The final plan included recommendations to improve mobility citywide.
July 19, 2019

Ms. Tracey Rossine  
City of Malibu  
23825 Stuart Ranch Road  
Malibu, CA 90265

Subject: Request for Proposal to Provide Coastal Vulnerability Assessment

Dear Ms. Rossine:

The City of Malibu (City) and its residents enjoy a beautiful coastline that is infamous for its beaches, iconic highway, historic pier, beautiful homes, unique open spaces and ecosystems, as well as a world class university. The value in these resources extend beyond City lines, the Malibu coast is a unique asset to California and the nation. However, this coastline is forever at risk from both natural and anthropogenic impacts. This Request for Proposal (RFP) to provide a Coastal Vulnerability Assessment is a critical need to plan for infrastructure improvements to protect the coast and the community’s infrastructure. Sea level rise (SLR) not only increases the potential for flooding, it accentuates the impacts of storm damage. Moffatt & Nichol (M&N) is pleased to submit this proposal to assist the City in conducting a vulnerability assessment and identifying a range of possible SLR adaptation strategies to be included in the Local Coastal Program (LCP) update.

M&N brings a team of local engineers and scientists with thorough knowledge of the coastal processes and existing shore protection structures and an understanding of performance and design limitations of each shore protection method that may be applied. We have more experience applying this knowledge to the Southern California than any other coastal engineering firm. M&N has teamed with Rincon Consultants Inc. (Rincon). Rincon currently provides contract planning services to City and has worked closely with the City for nearly four years. In this capacity, Rincon is intimately familiar with the City’s expectations for high quality analysis and technical writing, professionalism, and detailed record keeping. The M&N team brings a combination of highly qualified staff, local understanding and physical presence, in-depth permitting experience, and ability to manage complex projects to seamlessly integrate the work conducted through this contract into the Malibu Planning Department processes.

The project success will be facilitated by our team’s excellent working relationship with California Coastal Commission (CCC) staff. Our successful track record with gaining approvals for SLR vulnerability assessments and adaptation strategies in support of LCP updates derives in strong part from our excellent relationships with CCC staff, at all levels from their dedicated SLR vulnerability assessment experts and local permit staff to management level staff and the executive director.

The M&N team will be led by Mr. Aaron Holloway as proposed project manager. He will lead a team of accomplished scientists, engineers, and planners, many who have been actively working for the City for years. I will serve as the contract principal-in-charge and ensure resources are available, contracting obligations are satisfied, and the City’s expectations are met. Our detailed scope of work will guide the consultant team and the City in an efficient and effective partnership to complete the studies needed to support the LCP update.

We have complied with all requirements as set forth in the RFP. This submittal consists of four copies, and one digital copy of our proposal. Thank you for the opportunity to submit our proposal. The M&N team is very excited to support the City with this project and confident we can provide the City with an unparalleled level of service.

Please feel free to contact me at any time by telephone at (714) 296-9017 or by e-mail at sanghera@moffattnichol.com if you have any questions. We look forward to working the City on this phase of this important project.

Sincerely,

MOFFATT & NICHOL

Shelly Anghera, PhD  
Vice President, Coastal Water & Environmental Director
Executive Summary

Uniquely Qualified and Familiar Team

Moffatt & Nichol (M&N) brings a unique combination of local knowledge and industry expertise in preparing sea level rise (SLR) vulnerability assessments and adaptation planning. M&N is a leader in coastal hazard mitigation and resilience improvements with a talented team ready to assist the City of Malibu (City). M&N has teamed with Rincon Consultants, Inc. (Rincon) to create a uniquely qualified team to support the City with the Coastal Vulnerability Assessment. Our team possess several key characteristics including the following.

- Technical experts to implement modeling and complete expected analyses as required
- Understand of the City planning process and how the Local Coastal Plan (LCP) will be used to support long-term planning
- Respected as technical experts by the local resource agencies and experienced in navigating the environmental review process
- Experience with similar assignments to efficiently implement both simple and complex tasks within the scope.

The M&N team meets all of these qualifications, and our proven successes at the City makes us a reliable choice. This strategic partnership offers the City scientists, engineers, economists, and planners with local experience to cover both phases of the project. Our multidisciplinary team will help identify key challenges unique to Malibu that should be addressed by the Coastal Vulnerability Assessment to adequately inform new or revised policies of the updated LCP. This knowledge and experience is essential when applying results from regional modeling efforts, such as Coastal Storm Modeling System (CoSMoS) and AdaptLA (completed by ESA and TerraCosta) that may not have the resolution required to accurately identify hazard thresholds along the coast of Malibu.

Our team has been at the forefront of coastal vulnerability assessments that address the challenges and uncertainties of climate change and increased coastal hazards due to SLR. In the last five years, our team has worked on 29 studies throughout Southern California to inform long-term planning efforts, such as LCP updates and General Plan updates. M&N has developed city-wide SLR vulnerability assessment studies for 12 cities in Southern California, including Newport Beach, Huntington Beach, Morro Bay, Venice (City of Los Angeles), San Clemente, Dana Point, Avalon, and Carlsbad. All of these cities have similar pressures defined by their unique legacies, engaged communities that live on the coast with an active commerce dependent on tourism.

Rincon currently provides contract planning services to the City and has worked closely with the City for nearly four years. In this capacity, Rincon is intimately familiar with the City’s expectations for high quality analysis and technical writing, professionalism, and detailed record keeping. The combination of highly qualified staff, local understanding and physical presence, in-depth permitting experience, and ability to manage complex projects will allow the M&N team to continue to seamlessly integrate into the Malibu Planning Department.
Project Understanding

The purpose of the Coastal Vulnerability Assessment is to assess the vulnerability and the projected impacts of SLR in the near term (2030), mid-term (2050), and long term (2100) in the City. The assessments will be used to inform public and private stakeholders and decision makers on the potential impacts and SLR adaptation strategies.

The M&N team understands that updating the LCP will occur in two phases. The first phase will focus on addressing the vulnerability of the City’s coastline to SLR. Once the assessment is complete, a draft regulatory and adaptive strategy outline will be produced for review during the Planning Commission public workshop. The options evaluation and recommendations that are determined from said workshop will be summarized in a report.

The second phase will consist of the preparation of an adaptation plan and the revisions required to the land use controls for implementing the LCP in the Malibu Municipal Code and General Plan. The second phase is not yet funded.

Approach Overview

It is critical that the required analyses to meet the LCP requirements is conducted in a way that is sensitive to the long-term resource needs of the City. The City requires a consultant team with an understanding of the latest modifications to the models, their limitations and applicability to the Malibu coast, as well as a clear vision of how the LCP will be applied for the City’s future project planning. Under the leadership of Mr. Aaron Holloway, proposed project manager, the City will benefit from his ability to harness and apply our team’s combined expertise to smoothly navigate the local and state dimensions of the LCP update process.

M&N will lead the overall project management, economic and fiscal impact review, vulnerability assessment, and various technical disciplines. Rincon will be primarily responsible for public engagement and adaptation strategies and policies. The approach for each task identified in the scope of work is summarized in the Implementation Services/Scope of Work section (page 16) of this proposal. Our schedule for the key deliverables illustrates how information from one scope element flows to another. For each of the five tasks identified in the RFP, the key activities, deliverables and cost assumptions are summarized that detail the technical activities and data gathering steps.

Overall our approach is to work collaboratively with City staff to complete the project on time and on budget. We will use well-crafted tools and experience to efficiently execute each stage of the process. We will maintain our professional and collaborative relationships with the resource agencies and other stakeholders to facilitate meetings and document reviews. Our experienced project manager will be supported by the entire team.

The overall schedule to complete the scoped deliverables for this phase of the project is estimated to require 9 months and cost approximately $206,000.
Vendor Profile and Qualifications

M&N (prime consultant) has teamed with Rincon to create a uniquely qualified team to support the City. This strategic partnership offers scientists, engineers, economists, and planners with local experience to cover both phases of the project. Our multidisciplinary team will help identify key challenges unique to Malibu that should be addressed by the Coastal Vulnerability Assessment to adequately inform new or revised policies of the updated LCP. The two firms individually and jointly support the City on several projects related to coastal engineering and planning, including, Technical Review of FEMA California Coastal Analysis and Mapping, Biological and Cultural Services for Malibu Bluffs Parkland, Broad Beach Living Shoreline, and On-Call Environmental Consulting Services.

Moffatt & Nichol

M&N was founded in Long Beach, California, in 1945 to provide design engineering services to the evolving U.S. maritime industry. This basis led M&N to be one of the first engineering firms in the world to embrace the concept of modern coastal engineering. Today, M&N’s 38 offices and more than 800 employees worldwide includes the largest collection of coastal engineers of any consulting firm in the United States. Our elite, influential staff of scientists, planners, and engineers are recognized for solving global issues related to coastal, estuarine, and riverine systems.

Building upon M&N’s reputation for excellence in coastal engineering, our coastal resiliency specialists weave unique experience developed through more than 4,000 waterfront projects with innovative approaches for an uncertain future. M&N experts have assessed hazards, developed adaptation plans, and designed solutions in key coastal areas of the United States already suffering intense, high profile climate-related impacts like Miami, New York City, Norfolk, North Carolina, and Louisiana.

More than half a century of designing coastal flood protection projects has prepared our staff with exceptional expertise on how current and predicted SLR hazards vary significantly across regions and stretches of coastline. Our Southern California SLR team applies unparalleled familiarity with complex, situational coastal processes and development patterns to efficiently deliver world-class solutions for local and regional SLR resilience.

M&N has been a trusted partner for coastal services in the Malibu community for more than 20 years. Our record of successfully completed projects in the area grants us peerless insight into the coastal challenges faced by the City. The key personnel selected for our team have been leaders on our recent work in the City, including the Broad Beach Living Shoreline and Technical Review of FEMA California Coastal Analysis and Mapping in Malibu. These projects highlight our capacity to manage the practical, political, and technical challenges posed by the Coastal Vulnerability Assessment and subsequent adaptation planning.

Rincon Consultants

Rincon was founded in 1994 and is a multidisciplinary environmental science, planning, and engineering consulting firm with offices throughout California. Rincon’s 260 professionals have extensive experience managing coastal planning projects within biologically diverse and sensitive areas in the coastal zone. Their technical expertise and familiarity with the City processes coupled with their experience conducting coastal engineering services in Malibu and other coastal areas make them uniquely qualified to assist with this work.

Rincon is highly familiar with the needs of the Malibu community, having completed numerous contract planning assignments, and other related planning assignments, that cover a variety of services such as biological, stormwater, and water quality related services, as well as the development of Stormwater Pollution Prevention Plans for the City of Malibu over the past several years. This knowledge of the resources in the area will be applied to the findings of the complex local coastal plan policy framework that exists in Malibu. Rincon staff experience supporting all stages of local coastal planning projects, from outreach to cost-benefit analysis to policy development and zoning implementation. Rincon’s combination of technical knowledge and policy understanding provides unique qualifications to support the City in LCP updates.
Team Organization

It is critical that the required analyses to meet the LCP requirements is conducted in a way that is sensitive to the long-term resource needs of the City. The City requires a consultant team with an understanding of the latest modifications to the models, their limitations and applicability to the Malibu coast, as well as a clear vision of how the LCP will be applied for the City’s future project planning. Under the leadership of project manager Mr. Holloway, the City will benefit from his experience and ability to apply our team’s combined expertise to smoothly navigate the local and state dimensions of the LCP update process.

Mr. Holloway will work directly with the City’s project manager to ensure that all project goals are met on time and within the project budget. Mr. Holloway has excellent and cooperative relationships with state and local resource agencies, where his professional and strategic approaches has successfully completed thoughtful planning documents throughout California. He will be supported by Dr. Shelly Anghera, principal-in-charge, whom will confirm resources are available and contractual obligations are met to ensure project progress and success.

This project will be managed through M&N’s Long Beach office and Rincon’s Ventura office. Our team members can attend City meetings as needed to increase project efficiencies and respond rapidly when project needs dictate a quick response.

Our project organization chart on the following page illustrates team organization, including reporting relationships to the City project manager and lead staff for specific aspects of the scope of work. Following the organizational chart, we have provided brief narratives for the key personnel assigned to work with the City on this contract. Full resumes for all team members are included in the Additional Information Section (page 33).
Aaron Holloway, PE | Project Manager

Mr. Holloway brings over 12 years of experience in coastal and water resources engineering with a focus on coastal and marine infrastructure projects. As project manager, Mr. Holloway will oversee all aspects of the Coastal Vulnerability Assessment during the first phase of the City’s LCP update. His experience, including design and modeling of beach nourishment projects, shore protection infrastructure, environmental restorations, and sand retention structures, makes him an ideal technical expert for evaluating SLR modeling and potential adaptation strategies. Having led projects from initial planning through permitting, detailed design and construction, Mr. Holloway is a proven manager of the challenging regulatory process for projects in the coastal zone.

Project Experience

Venice Beach Sea Level Rise Vulnerability Assessment, Los Angeles, CA (Ongoing)
Project manager for an SLR vulnerability assessment for the Venice neighborhood as part of a LCP. Assessed the vulnerability of each resource in the coastal zone in detail, identifying critical SLR thresholds, gaps in information, as well as social and environmental justice factors.

FEMA California Coastal Analysis and Mapping Project (CCAMP), Malibu, CA (Ongoing)
Technical advisor for the technical review of preliminary Flood Insurance Rate Maps and Flood Insurance Studies, including CCAMP Intermediate Data Submittals. The technical review focused on basic assumptions, data, and methods used to characterize the 100-year coastal base flood elevation along the City.

Broad Beach Living Shoreline, Malibu, CA (2009)
Project engineer who conducted numerical modeling of shoreline morphology using GENESIS and SBEACH software and performed a coastal engineering analysis to determine design water depth, breaking wave heights, and wave uprush. Researched historic and projected impacts of SLR.
Shelly Anghera, PhD | Principal-In-Charge

Dr. Shelly Anghera is a vice president at M&N and a principal scientist with more than 20 years of experience conducting field and laboratory studies related to eco-toxicology and sediment quality characterization. Her expertise centers on field study design, sediment characterization, water and sediment testing and analysis, implementation strategies for dredged material management and beneficial use in coastal zone, Total Maximum Daily Load compliance, and California’s Sediment Quality Objectives application. For this project, Dr. Anghera will support Mr. Holloway and ensure resources are available, contracting obligations are satisfied, and the City’s expectations are met.

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<tr>
<td><strong>Multiple Sediment and Water Quality Services Contracts, Long Beach, CA (Ongoing)</strong> Lead principal scientist for multiple on-call contracts focused on sediment and water quality compliance and dredged material management programs, valued at more than $20 million over the last 10 years.</td>
</tr>
<tr>
<td><strong>Technical Feasibility Evaluation for Outer Harbor Sediment Placement and Ecosystem Restoration Site, Long Beach, CA (Ongoing)</strong> Lead scientist for technical evaluations to support engineering design and permitting for the Port. Studies included evaluation of the physical isolation of contaminants and chemical containment in ocean disposal site.</td>
</tr>
<tr>
<td><strong>Marina del Rey Contaminated Sediment Management Plan, Los Angeles County, CA (Ongoing)</strong> Lead principal scientist designing long-term management plan for harbor to meet sediment and water quality compliance requirements. Leading design and permitting of dredging and sediment beneficial use program.</td>
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Weixia Jin, PhD, PE | Technical Analysis Lead

Dr. Jin has since participated in a wide range of watershed, riverine, wetlands, marina, coastal, and transportation engineering projects. Her engineering experience includes numerical modeling of watershed hydrologic routing, storm drainage system, river/wetland hydrodynamics, water quality, and sedimentation; preparation of drainage study, location hydraulic study, floodplain evaluations, bridge hydraulic and sedimentation reports; engineering designs of storm drain system, flood/erosion control structures, revetments, tidal inlets, jetties, weirs, energy dissipaters, bridge abutments and shore protection structures; and engineering studies of bridge scour analyses, reservoir sedimentation, and sediment bypassing.

<table>
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<tbody>
<tr>
<td><strong>FEMA CCAMP, Malibu, CA (Ongoing)</strong> Project manager for the technical review of preliminary Flood Insurance Rate Maps and Flood Insurance Studies, including CCAMP Intermediate Data Submittals. The technical review focused on basic assumptions, data, and methods used to characterize the 100-year coastal base flood elevation along the City.</td>
</tr>
<tr>
<td><strong>Malibu Lagoon Restoration Feasibility Study, Malibu, CA (2005)</strong> Project engineer for a restoration plan that meets the salt marsh enhancement in West Arm area to increase tidal flushing, improve water circulation, increase holding capacity, and reduce predator encroachment.</td>
</tr>
<tr>
<td><strong>Huntington Beach General Plan Update, Huntington Beach, CA (2015)</strong> Project engineer on numerical modeling of the riverine flooding, tidal hydrodynamic and SLR. The modeling results were used to map flood hazard zones and develop a georeferenced inventory of affected infrastructure.</td>
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Lexi Journey | Planner and Public Engagement Lead

Ms. Journey is a senior environmental planner. Her experience includes project management, planning policy analyses, technical analyses, and outreach for assignments, such as General Plans, Coastal Land Use Plans, and Climate Action Plans (CAPs), as well as California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) environmental assessments. She specializes in managing projects where crossover of and multi-agency cross-over is needed for community resilience.

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<tr>
<td><strong>LCP Update, Oxnard, CA (Ongoing)</strong> Project manager for the LCP update to conform with Coastal Commission policy directives and address climate change adaptation strategies for SLR. The update involves the assessment of coastal resources, the vulnerability of these resources, and development of implementation tools for protection and mitigation.</td>
</tr>
<tr>
<td><strong>Vulnerability Assessment and CAP, Merced County, CA (Ongoing)</strong> Project manager for the County’s first CAP that includes a greenhouse inventory of urban and agricultural emissions. This CAP will allow Merced County to become a leader in agricultural sustainability and provide more opportunity to receive grant funding.</td>
</tr>
<tr>
<td><strong>Morro Bay General Plan/LCP Update and EIR, Morro Bay, CA (Ongoing)</strong> Planner for the preparation of the community baseline assessment reports to identify the current environmental conditions in the City to inform the analysis of the general plan, local coastal program, and zoning ordinance updates in the environmental impact report.</td>
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</table>
Ali Rezvani, PhD | Economics and Fiscal Impact Review Lead

Dr. Rezvani provides economic and financial analysis and support as input to business development decisions under consideration by local, regional, and international clients. He has provided cost-benefit, economic impact, and competitive analysis models that analyze existing markets, commodities, freight movement conditions, and governmental policies as a means of forecasting proposed project impacts on future market, as well as project financial performance. Dr. Rezvani provides a broad knowledge of economic modeling, analysis, and forecasting developed during completion of projects for public and private sector clients.

Erik Feldman | Adaptation Strategies and Policies Lead

Mr. Feldman is a principal with experience overseeing climate action planning, resiliency planning, statewide greenhouse gas reporting, and carbon verification programs. He is involved in a wide range of urban planning and land use studies, sustainable development review, CEQA and NEPA environmental documentation, and permitting activities. He has assisted numerous local agencies and development projects with the development of greenhouse gas thresholds, analytical methods, and reduction strategies in California. He applies this experience in the successful management of environmental and sustainability projects for a variety of clients.

Troy Barnhart | Vulnerability Assessment Lead

Mr. Barnhart is an SLR analyst with preparation in coastal science, engineering, and resource management. His professional experience focuses on qualitative and quantitative evaluation of potential SLR impacts to coastal areas and development of technically appropriate, community-based resiliency strategies.

Grant Application Support, Various Locations (Ongoing)
Financial analyst for the grant application writing and benefit cost analysis support to various port authorities, transportation planning organizations, and other state and local entities for TIGER, BUILD, FAST, INFRA, and TCEP programs.

Long Beach Container Terminal Vendor Due Diligence, Long Beach, CA (2018)
Financial analyst for the evaluation of global container shipping trends, including trade volumes, shipping alliance, and container fleet up-sizing. The output of the commercial effort was Long Beach Container Terminal’s volume and revenue projections sensitized to external factors.

Commonwealth Transportation Board Rail Programs Review and Benefit-Cost Analysis Overhaul, Richmond, VA (2016)
Financial analyst for defining corridor and specific metrics to quantify the public benefits of diverting traffic from highways to rail. Corridor and specific metrics will help the agency improve its decision-making process in allocating funds.

PHRESH Development, Port Hueneme, CA (Ongoing)
Project executive for conducting a baseline analysis, conducting a port-wide GHG emission inventory, assessing vulnerability, updating existing policies, and developing various tools to calculate emissions, measure, track, monitor, and analyze incremental improvements.

CAP Vulnerability Assessment, Pasadena, CA (Ongoing)
Project executive to prepare a greenhouse gas emissions inventory, assist with a grant application to request funding for the City’s General Plan update and development of a Climate Action Plan (CAP) following the successful award of funding.

Climate Action Plan and Vulnerability Assessment, Merced County, CA (Ongoing)
Project executive for a CAP that includes a vulnerability assessment. The results of this assessment will inform the CAP and various adaptation measures with co-benefits will be developed based on the findings of the vulnerability analysis.

SLR Vulnerability Assessment, Pismo Beach, CA (Ongoing)
Assistant project manager and SLR analyst for assessment of historic and future coastal hazards facing a complex coastline of both armored and unarmored bluffs and a sandy, dune-backed beach. Evaluated potential erosion and inundation impacts to sensitive, tourism-centered community.

SLR Vulnerability Assessment, San Clemente, CA (Ongoing)
SLR analyst for vulnerability assessment focusing on coastal squeeze and blufftop development under threat of erosion as part of update to City’s LCP. Identified areas of potential future study and planning concern due to weaknesses in CoSMoS model regarding LOSSAN rail corridor and revetment.

McGrath State Beach SLR Analysis, Oxnard, CA (Ongoing)
SLR analyst for evaluation of coastal hazards for relocation of State campground facilities. Analysis included coordination with hydrodynamic modelers to account for potential to compound inundation risk from the Santa Clara River due to SLR-induced beach buildup.
Experience

Knowledge of the Region or Experience in the Region

Our team has been at the forefront of coastal vulnerability assessments that address the challenges and uncertainties of climate change and increased coastal hazards due to SLR. In the last five years, our team has worked on 29 studies throughout Southern California to inform long-term planning efforts, such as LCP updates and General Plan updates. M&N has developed city-wide SLR vulnerability studies for 12 cities in Southern California, including Newport Beach, Huntington Beach, Morro Bay, Venice (City of Los Angeles), San Clemente, Dana Point, Avalon, and Carlsbad. All of these cities have similar pressures defined by their unique legacies, engaged communities that live on the coast with an active commerce dependent on tourism. M&N’s extensive portfolio of sea level rise experience in just Southern California is highlighted on the map below.
We are the City’s Local Coastal Engineering and Planning Experts

M&N has already worked with the City specifically on their shoreline vulnerability and completed a custom coastal analysis, which afforded the team tremendous insight on the risks the City’s shoreline faces. This knowledge and experience will be essential when applying results from regional modeling efforts, such as CoSMoS and AdaptLA (completed by ESA and TerraCosta) that may not have the resolution required to accurately identify hazard thresholds along the coast of Malibu. These modeling efforts may not capture the significant variability in wave exposure and backshore characteristics that drive wave runup and overtopping. Understanding the assumptions and limitations of these regional models and where the results are valid or invalid, is a key first step in the coastal vulnerability assessment. Without this understanding there is a risk of overestimating, or underestimating the coastal hazards along a given stretch of shoreline.

Recent M&N Local Experience:

- Technical review of the FEMA CCAMP study and maps, transect by transect evaluation along the entire coast of Malibu
- Long-term shoreline changes and sediment budget studies focused on the coast of Malibu that identified rates and causes of shoreline erosion
- Wave modeling and shoreline change modeling of the Broad Beach/Zuma Beach region
- Annual beach profile monitoring data of the Broad Beach/Zuma Beach region using 10 years of measured seasonal beach profiles.

Rincon has also worked with the City on a variety of environmental issues, including marine biology, water quality, and cultural/tribal resources. Rincon worked with the Broad Beach Geologic Hazard Abatement District to map and monitor the potential biological impacts of the shoreline replenishment on Broad Beach. Custom data sets were developed using Rincon’s unmanned aerial vehicle or drone. Rincon marine scientists conducted nearly 40 days of rocky intertidal, eelgrass, surfgrass, rocky subtidal (kelp forest), and sand beach monitoring at the project site and five reference sites. Consequently, Rincon is very familiar with the ecology and marine resources located along Malibu’s coast and how climate change may impact these natural communities.

Rincon has also completed a groundwater and surface water quality monitoring program for the Malibu civic center program and is under contract to complete additional stormwater management, water quality, and spill response compliance. Rincon’s experience with Malibu’s water quality constraints and the associated regulatory framework will provide the foundation needed to assess the potential impacts that SLR may have on water quality and stormwater management.

Rincon was involved in the recovery of a Chumash cemetery identified during a utility upgrade within the City of Malibu. Rincon developed recovery methods for the identified inhumations and coordinated with tribal representatives for the dignified and respectful treatment of the human remains. Rincon has a strong relationship with the Tribes and is highly-experienced identifying cultural resources, in addition to developing and implementing tribal cultural mitigation.

As you can see, the M&N/Rincon team has worked with the City on a variety of environmental issues and has a holistic understanding of how the challenges will need to be addressed in the face of SLR.

Similar Experience and References

M&N’s reputation for excellence in the coastal engineering field has been built on years of experience working on complex and challenging projects along the world’s coastlines. This section features our team’s representative project experience on similar local government projects.
Venice Beach Sea Level Rise Vulnerability Assessment, Los Angeles, California (2017 to Present)

M&N performed an SLR vulnerability assessment for the Venice neighborhood of the City of Los Angeles as part of a LCP update performed by another consultant. The assessment was funded in part by CCC grant LCP-14-09. Venice is a historic and iconic neighborhood for the region. The neighborhood was first built on low-lying marshland and is known for its picturesque canals district.

Sea level rise puts the area at risk to unique hazards for Southern California because of its low-lying inland communities and tide gate system, which was not fully captured in United States Geological Survey’s (USGS’s) CoSMoS projections. Therefore, M&N used a combination of CoSMoS projections and scenario-based inland flood models modified from a past study to capture the full exposure to hazards, such as shoreline change, storm related flooding, and inundation.

M&N assessed the vulnerability of each resource in the coastal zone in detail, identifying critical SLR thresholds, gaps in information, as well as social and environmental justice factors. This effort involved several public meetings, coordination between government agencies, and stakeholder engagement that is currently leading to efforts to increase the resiliency of this low-lying community.

PROJECT RELEVANCE:

- Hazard Assessment
- Modeling Evaluation
- Public Engagement
- LCP Update Familiarity

This project provides an example of the need to modify the CoSMoS model in specific coastal areas.

The graphics were developed in coordination with City staff to assist the City in communicating the impacts and potential engineered solutions for the community.
Technical Review of FEMA California Coastal Analysis and Mapping Project, Malibu, California (2017 to Present)

With increased populations living along the nation’s coastlines, lakes, and major estuaries, Federal Emergency Management Agency (FEMA) initiated regional coastal engineering studies to update its Flood Insurance Studies and Flood Insurance Rate Maps. The City, a coastal city within Los Angeles County, was part of the Open Pacific Coast (OPC) study of the California Coastal Analysis and Mapping Project. The City lies along 21 miles of open coast. In 2016, FEMA distributed preliminary maps and the study reports for Los Angeles County and its incorporated areas, with significant changes in zoning designations in Malibu.

The City contracted M&N to perform a technical review of the Preliminary Flood Insurance Rate Map and supporting documents and data. The technical review focused on basic assumptions, data, and methods used to characterize the city’s 100-year coastal base flood elevation to determine if procedures and assumptions used in the flood insurance study followed FEMA’s Pacific Guidelines.

All 43 transects along the Malibu coastline were reviewed, and 22 transects were recommended for detailed review. M&N performed a detailed review that examined wave runup methodology, profile features, backshore features, wave parameters, and mapped results at each transect to determine if the correct methodology was applied and coastal conditions are correctly represented. Data sources included in the technical review were analyzed in more detail and supplemented with additional data from FEMA that had been used in its study and map preparation.

The City submitted M&N’s technical review to FEMA in November 2017, and in 2019, M&N subsequently supported the city in preparing replies to FEMA’s comments in response to the technical review.

PROJECT RELEVANCE:
- Modeling Evaluation
- Regulatory Approval

This project provides an example where site-specific modifications to standard procedures need to be applied. Impacts from poor assumptions can negatively impact the City and its residents.
Local Coastal Plan Update, Oxnard, California (2015 to Present)

Rincon prepared an LCP comprehensive update for the City of Oxnard. The LCP has two components, a Land Use Plan, which set forth the policies for development of the coastal zone, coastal access and recreation, and protection of sensitive coastal resources; and an Implementation Plan, which establishes standards and procedures to implement the land use plan policies. The LCP reflects the unique characteristics of the City of Oxnard's local coastal community and addresses regional and statewide interests and concerns. The update will bring the LCP into conformance with Coastal Commission policy directives and approaches to address climate change adaptation strategies, such as those for SLR.

The City of Oxnard adopted its 2030 General Plan in October 2011, which included goals and policies related to climate change, SLR, and the LCP itself. These updated General Plan policies are being integrated into the LCP update. Also, a vulnerability and adaptation assessment was prepared specifically for the City of Oxnard to inform new policies and implementation measures. Additional studies and existing programs incorporated into the update, include:

1) restoration and habitat management plans for land owned and managed by The Coastal Conservancy and The Nature Conservancy in and around the Santa Clara River and Ormond Beach wetlands; 2) the certified public works plan for half of the Channel Islands Harbor (south of Channel Islands Boulevard), which is owned and managed by the Ventura County Harbor Department; and 3) McGrath State Beach master plan, which calls for relocating McGrath State Beach camping and visitor facilities within the park boundaries.

Outreach for the LCP update has included various meeting with various stakeholders, including governmental agencies, technical advisories, non-governmental organizations, and the local public. Coordination with the Coastal Commission has occurred throughout the LCP update process to ensure consistency with Coastal Act requirements, as well as SLR and adaptation strategies.

PROJECT RELEVANCE:
- Hazard Assessment
- Adaptation Planning
- Public Engagement
- LCP Update Familiarity

The great success of this project is partially due to its community engagement process. Components of this process can serve as examples for the Engagement and Communication Plan.
General Plan/Local Coastal Plan Update and Environmental Impact Report, Morro Bay, California (2016 to Present)

Rincon is part of the multidisciplinary consultant team hired to lead the City of Morro Bay’s General Plan, LCP, and zoning ordinance updates and associated Environmental Impact Report (EIR) as an extension of City staff. In cooperation with another consulting firm, Rincon assisted the City of Morro Bay in conducting data review and analysis of the current extent and locations of Environmentally Sensitive Habitat Area (ESHA) resources within the City’s coastal zone to assist in updating its LCP and obtaining mapping approval by the CCC.

Rincon assisted with the preparation of the community baseline assessment reports to identify the current environmental conditions and is assisting with the preparation of various General Plan element updates, including the updated noise element. Rincon is also preparing the EIR for the proposed updates and provided updated maps of potential ESHA under current conditions.

Rincon biologists analyzed the potential future effects to ESHAs resulting from climate change and associated SLR. The analysis included a projection of future effects of SLR and associated coastal flooding and erosion events on ESHAs within the Morro Bay coastal zone, based on previously completed hazard analysis and SLR analysis, existing sea level rise models for the region, and the current location and extent of ESHAs in the City.
Broad Beach Living Shoreline, Malibu, California (2009)

M&N provided planning and engineering for the long-term restoration of Broad Beach, which had experienced profound shoreline erosion over the last 30 years. The sandy beachfront had been replaced by mountains of sandbags and temporary, unpermitted structures, and homeowners sought to move toward an environmentally responsible and long-term solution to save their homes and restore public access. The Broad Beach Living Shoreline project will result in a strategy for phased shoreline and dune restoration.

Detailed analyses of historic shoreline positions via aerial photo analysis, beach profiles, and other data sources clearly demonstrated the severity of the erosion problem. Detailed assessment of the regional wave climate has also shed light on the important relationship between wave climate and sediment transport trends, that serve as an example specific to Malibu.

An initial phase of the project involved implementation of an emergency rock revetment to protect primary residential structures and septic systems from direct ocean wave attack and damage. The long-term plan is to maintain this structure buried beneath the restored dune system and behind the beach restoration to serve as a last line of defense in the event of severe coastal storms and/or excessive beach and dune loss prior to the next scheduled beach nourishment.

M&N provided alternatives analysis, environmental sensitivity and feasibility, government agency coordination, entitlement and permit acquisition, construction cost and budget control, schedule preparation, preconstruction contractor selection and management, construction drawings, and construction management.

The project was multifaceted and involved fine scale habitat mapping and monitoring of the supratidal, intertidal, and subtidal marine habitats and communities as well. Rincon conducted habitat mapping using remote sensing with Unmanned Aerial Vehicle. In conjunction with the habitat mapping, Rincon marine scientists conducted nearly 40 days of rocky intertidal, eelgrass, surfgrass, rocky subtidal (kelp forest) and sand beach monitoring at the project site and five reference sites. Mapping and monitoring was conducted from Point Dume to the Los Angeles/Ventura County line.

PROJECT RELEVANCE:
- Hazard Assessment
- Modeling
- Engineering Design
- Regulatory Approval

The project approach, costs, and required regulatory process that was implemented serves as an example of engineering tools available that will be included in the management alternatives.
References

1. **Venice Beach Sea Level Rise Vulnerability Assessment (M&N)**
   Ms. Laura MacPherson, AICP
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   (213) 978-1187
   laura.macpherson@lacity.org

2. **Technical Review of FEMA California Coastal Analysis and Mapping Project (M&N)**
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3. **City of Oxnard Local Coastal Plan Update (Rincon)**
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4. **City of Morro Bay General Plan/LCP Update and EIR (Rincon)**
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   San Luis Obispo, CA 93401
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5. **Broad Beach Living Shoreline (M&N)**
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   Malibu, CA 90265
   (818) 263-9986
   budovrom8@gmail.com
**Implementation Services/Scope of Work**

**Project Management Plan with Preliminary Schedule of Key Deliverables**

For each of the five tasks identified in the RFP, the key activities, deliverables and cost assumptions are summarized in this section. The figure below illustrates the relative timing of each of the following tasks and the estimated schedule that will be implemented.

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<th>TASK</th>
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**Task 1 Project Kickoff**

The project kickoff meeting will provide an opportunity to review and fine tune the project management plan in addition to a discussion of potential community issues, concerns, and opportunities. Key M&N and Rincon staff will attend a formal in-person kickoff meeting to introduce the project team to representatives of the City.

In advance of the kickoff meeting, our team will conduct a due diligence review of existing information, including regional SLR vulnerability studies, coastal science and resource documentation, and hazard mitigation and adaptation plans. This review will be summarized in a memorandum that explains the relevance of each study to the scope of work and how we propose to apply the data on the Coastal Vulnerability Assessment. Our recent work for the City of Los Angeles at Venice Beach included a detailed review of several of the references listed in Section 1.A of the RFP and concluded that the CoSMoS data provides the largest range of storm hazards and sea level rise scenarios to choose from.

During the meeting, the project team will present/deliver the following.

- A draft project work plan that includes a detailed breakdown of intermediate tasks and schedule for project delivery.
• A memorandum regarding results of the existing review, including detail of background materials collected and their application.
• A data and information needs request for City staff.

To facilitate smooth and consistent communication between the project team and City staff, attendees will establish communication protocols and work product review procedures. We recommend a regularly scheduled meetings at the frequency the whole team believes is necessary to ensure a mutual understanding of the project scope, schedule, budget, and project deliverables. Budget assumes biweekly coordination calls for the project duration.

Task 1 Deliverables
  a. Kickoff Meeting with Agenda and Meeting Notes
  b. Project Work Plan
  c. Memorandum on Results of Background Review
  d. Initial Data and Information Needs Request

Task 1 Assumptions
Our budget proposed for this task assumes three project team members will attend an approximately 2-hour meeting at the City office. The kickoff meeting will be scheduled 2 to 3 weeks after receipt of executed contract and notice to proceed to allow sufficient time for preparation of materials to review at the kickoff meeting.

Task 2 Public Engagement

Task 2.1: Develop Community Engagement Plan
Rincon will lead development of the Community Engagement Plan and Schedule (Engagement Plan) that will be implemented throughout the program. In consultation with City staff, the team will identify key stakeholder groups and assemble contact information for each group. The Engagement Plan will specify information that will be conveyed at various stages of the project both with the public and decision-making bodies. The Engagement Plan will define a process to document communication to meet the public record requirements set by the Coastal Commission, including documentation of the public outreach components of the Coastal Commission’s environmental review process.

Task 2.2: Conduct Public Workshops
Especially for conscious and civically engaged communities, public education and communication of both existing coastal hazards and the projected effects of SLR is essential to driving support for adaptation efforts. In recognition of this, our team will conduct two public workshops.

During preparation for both workshops, the team can help the City notify residents in the project area and recommend materials for introductory fact sheets to include project background, process, goals, scope, schedule, approximate dates of community meetings, and plans to keep stakeholders informed (e.g., project website, email blast, etc.). For email notices, we have found adding a brief Doodle poll with a few questions to gauge interest, concerns, and preferred method of communication is effective in developing the Engagement Plan.

We will support outreach efforts by creating innovative workshop media, online media, or traditional media necessary for a project webpage, social media or noticing. We will also prepare digital versions of other materials that may be required for the workshop, including but not limited to pamphlets, posters, and a PowerPoint presentation.

The first workshop will be geared towards educating the community and stakeholders of current and historic local coastal hazards, SLR projections, and the community assets that could potentially be at risk due to new and intensifying coastal hazards. In addition to exhibits and activities, Aaron Holloway from M&N will make a presentation of results from the Coastal Resources Assessment, with City staff advising on content. Mr. Holloway has presented at several public workshops addressing coastal hazards related to SLR developed for communities with and engaged public that may not be well versed in coastal science (e.g. Venice Beach, Avalon, San Clemente). Presentation content and format will be designed for the lay person with time allotted for Q&A and interaction with the project team so interested members of the public...
come away with a greater understanding and awareness of coastal hazards. Feedback will be collected to inform the Draft Vulnerability Assessment.

The second workshop will look to empower the community and stakeholders regarding the adaptation strategies the City should take to protect critical community assets and resources. To provide the community with a depth of understanding regarding the trade-offs of adaptation, we propose to include interactive activities in the workshop, including games such as Game of Floods, The LA Times’ The Ocean Game: The sea is rising. Can you save your town?, and a Rincon original game Cards against Catastrophe. A presentation, pamphlets, and exhibits are potential methods that could be used to present and contextualize content of the Adaptation Strategies and Policies Matrix. Discussion groups may be used in addition to or as a potentially more effective substitute for a general forum. Gathered informal and formal comment will be incorporated into the Draft Options Evaluation and Recommendations Report.

Outcome reports following each workshop will be compiled by our team and submitted to City staff.

Task 2.3: Develop Presentation Materials
The team will prepare and present (or assist City staff in presenting) findings from Tasks 3, 4, and 5 at Commission meetings (e.g. Planning Commission, Parks and Recreation Commission, Transportation and Public Works Commission), City Council meetings, and/or City Council Committees to receive input at key points during the project. Presentations will be tailored for each audience, with questions developed in advance with City staff to focus their input. We will develop an annotated public agenda for each meeting to articulate objectives, ensure clear roles, and plan timing of each agenda item. For this proposal, the budget assumes the MN team will support two meetings for City Commissions and Council Committees and one public meeting for the City Council. M&N will lead the presentation of technical, economic, and scientific information, such as hazard maps, modeled scenarios, cost/benefit assessments, and/or adaptation strategies or conceptual designs. Rincon will lead meeting facilitation and materials preparation, including PowerPoint presentations, sign-in sheets, agendas, comment cards, and summary handouts.

Task 2 Deliverables
a. Community Engagement Plan and Schedule
b. Two Public Workshops
   i. Draft and Final Materials
   ii. Outcome Report
c. Three Presentations to City Planning Commission, City Council, and/or Council Committees
   i. Draft and Final Materials

Task 2 Assumptions
Our budget proposed for this task assumes that the Rincon team member will facilitate and attend two approximately 2-hour workshops at locations approved by the City. We assume that the City will be responsible for venue coordination and any rental fees. We also assume the City will be responsible for any noticing fees such as newspaper postings. Our budget assumes that a Rincon principal and project manager will attend and give presentations at up to two meetings for City Commissions and one City Council Meeting. Lastly, our budget assumes that the team will provide digital versions of all outreach materials and the City will be responsible for printing and associated printing costs.

Task 3 Technical Analysis
Malibu includes multiple shoreline types that will be subject to different coastal processes and hazards. Shoreline and bluff erosion are key concerns throughout Malibu with impacts from wave runup and coastal flooding a concern for developed areas of the coastline. Riverine flooding is a hazard of concern in low-lying areas adjacent to Malibu Creek. SLR has the potential to influence all of these hazards though not necessarily in the same way.

Task 3.1: SLR Hazard Analysis
Climate science is a constantly changing field, often with a high degree of uncertainty. In the case of California’s SLR projections, the OPC has high confidence in estimates for SLR up to the 2050 time horizon, after which uncertainty
surrounding emissions scenarios causes predictions to diverge. Due to the uncertainty associated with predicting when and at what rate SLR will occur, it is important to evaluate a range of SLR scenarios for each time horizon.

The RFP specifies SLR scenarios at 2030, 2050 and 2100 time horizons. These projections are relevant to the LCP development standards and reflect most of the SLR projections out to 2100, including the worst case H++ scenario, and provide a basis for understanding how hazards and vulnerabilities change with each increment of SLR. We propose to evaluate the range of scenarios from the RFP but propose slightly different increments to capture potential thresholds at each increment of SLR. The scenarios listed below will provide sufficient detail to identify key thresholds at which significant impacts could occur over near-term (2030), mid-term (2050) and long-term (2100) planning horizons.

- 2030: 0.8 feet (0.25 meters)
- 2050: 1.6 feet (0.5 meters), 2.6 feet (0.75 meters)
- 2100: 3.3 feet (1 meters), 4.9 feet (1.5 meters), 6.6 feet (200 centimeters), 10 feet

Most of these scenarios are consistent with the hazard information available from CoSMoS and will be quantitatively analyzed where feasible and applicable. The worst-case H++ scenario is not available from CoSMoS but will be evaluated by comparing projected storm and non-storm water levels with existing topography along the coastline.

The OPC (2018) Guidance projects SLR for multiple emissions scenarios and uses a probabilistic approach based on Kopp et al., 2014, to generate a range of projections at a given time horizon. The proposed SLR scenarios are shown graphically with the 2018 OPC projections for the Santa Monica tide gauge in the figure below. The Santa Monica tide gauge is relatively close to the study area and will provide local projections that account for factors such as tectonic activity and subsidence.

The Medium-High Risk Aversion projections (shown by the red curve in the figure below) have a 1-in-200 chance (0.5 percent probability) of occurring at a given time horizon and would be appropriate for use on projects where damage from coastal hazards would carry a higher consequence and/or a lower ability to adapt such as residential and commercial structures. The OPC guidance also includes a specific singular scenario (called H++) that does not have a probability assigned but is representative of an extreme “worst-case” SLR scenarios. These projections are recommended for use in Extreme Risk Aversion situations in which there is a high risk to public health and safety, natural resources and critical infrastructure (OPC, 2018). The H++ extreme risk aversion curve is shown in purple in the figure below.
The SLR related coastal hazards will be evaluated and mapped using ArcGIS software. Hazards from an extreme storm event (100 year return period) and non-storm hazards will be evaluated using results from CoSMoS 3.0 published by USGS. Non-storm related flooding will be evaluated by comparing high water levels, such as a “king tide” event with existing topography in the City. Long-term shoreline and bluff retreat is another non-storm hazard that will be evaluated for each scenario using results from CoSMoS and supplemented with Bruun Rule calculations as appropriate. These results will be supplemented with data from other modeling efforts (e.g., Terra Costa and ESA for AdaptLA) and others as appropriate. Additional wave transformation analysis will be necessary to adequately assess the vulnerability of the Malibu Pier and Paradise Cove Pier to sea level rise. M&N will develop wave crest profiles to illustrate how different combinations of waves, water levels and sea level rise could impact these structures.

The M&N team offers world class coastal engineering expertise with tremendous local experience and understanding of available SLR data. This knowledge and experience is essential when applying results from regional modeling efforts such as COSMoS and AdaptLA (completed by ESA and TerraCosta) that may not have the resolution required to accurately identify hazard thresholds along the coast of Malibu. We have applied CoSMoS results to coastal vulnerability assessments for 6 municipalities in Southern California. Based on this experience there are a few areas in Malibu that may warrant some additional verification of the CoSMoS modeling results. These include areas protected by a structure, such as the Malibu Colony, in which the crest elevation and geometry of the structure may not be captured by the XBeach modeling performed for the CoSMoS hazard data. Another focus area is the Malibu Creek estuary that may be vulnerable to frequent flooding as stormwater is impounded behind a beach berm pushed higher and higher with each increment of SLR. Understanding the assumptions and limitations of these regional models and where the results are valid or invalid, is a key step of the SLR hazard analysis. Without this understanding there is a risk of overestimating or underestimating the coastal hazards along a given stretch of shoreline.

**Task 3.2: Coastal Resources Assessment**

The M&N team will assemble an inventory of assets and resources available from City and County GIS databases to document the assets and resources that will be a focus of the vulnerability assessment. The inventory will be compiled in an ArcGIS platform for direct comparison with the coastal hazards mapped for each SLR scenario. The M&N team will evaluate potential risks and impacts by rating and describing the exposure, sensitivity and adaptive capacity of each coastal resource category listed in the RFP. Our approach to each resource category is described below.

**Coastal Development and Coastal Dependent Development**

For coastal development typical along the Malibu coastline, there are hazards associated with both erosion and flooding. The hazard analysis will identify thresholds at which impacts to coastal development and coastal dependent development could occur during non-storm (daily) conditions, storm related erosion, and flooding as a result of wave runup and overtopping. Graphics are recommended to illustrate and quantify risks to this category since we will be able to obtain parcel data from City or County databases. The quantification of the risk can be assessed using GIS-based tools, these hazards can be compared against a resource database to quantify the number of resources or parcels impacts at each SLR scenario (See example on the top of the next page).
This graphical illustration of potential thresholds can assist stakeholders in understanding how and under what conditions impacts to coastal resources may increase significantly.

This data chart may be one of several methods employed to illustrate thresholds where the definition of “significance” may be defined.
**Public Access and Recreation**

With a hard line along the Pacific Coast Highway corridor throughout most of the City, any resources seaward of the highway will be impacted by “coastal squeeze” due to sea level rise and a long-term deficit in littoral sediment supply. Coastal squeeze is the process by which sea level-dependent physical features such as the beach profile and bluff face migrate landward with SLR, but are prevented from natural landward migration due to a protected or non-erodible structure. A diagram illustrating this concept is shown below.

![Diagram of coastal squeeze](image)

The coastal squeeze phenomenon has already occurred to some degree along the Malibu coastline and has resulted in impacts to beach width, access and recreational opportunities. Non-storm hazards such as long-term shoreline retreat and frequent flooding during high tides can result in significant impacts to these already limited resources in Malibu. The coastal hazard data for shoreline retreat will be used as an indicator hazard for impacts to public access, recreation and the California Coastal Trail (CCT). The impacts to this resource can be quantified in terms of acres of beach loss at each SLR increment and miles of CCT vulnerable to erosion.

**Coastal Habitat**

Rincon will lead the M&N team in identification of key areas where SLR may affect sensitive natural resources, such as ESHA areas, endangered species, subtidal, and intertidal habitat. Available data will be used to describe coastal habitats. Drawing on this information, we will evaluate and report vulnerability of and threats to ESHA areas; endangered species; critical subtidal and intertidal features, including subtidal sandy areas, tide pools, and beaches. Vulnerability threats will be considered for known adaptive actions the City is considering (to be defined at the project kickoff meeting). We will also consider vulnerability and threats as they relate to adaptive actions that the City might take in response to threats to infrastructure.

**Socio-Economic Impacts**

Socio-economic components of future SLR hazards will be evaluated using the 2016 Social Vulnerability Index (SOVI), published by the U.S. Center for Disease Control. The SOVI program uses 15 socioeconomic and demographic factors at the census tract level to identify socially-vulnerable areas where populations may be more adversely impacted during disaster events. These variables are organized around four themes: socioeconomic status, household composition and disability, minority status and language, and housing and transportation.

Environmental justice will be evaluated using the results of CalEnviroScreen 3.0, an environmental health screening tool developed by the California Environmental Protection Agency and the Office of Environmental Health Hazard Assessment. Pollution burden within each census tract is characterized using a suite of statewide indicators on pollution exposure and environmental effects.

SLR hazards could also impact vulnerable regional populations that do not live in the immediate vicinity but rely on resources, such as beaches, parking lots, and major coastal transportation routes to access these resources. Though limited data exists on specific communities that make use of the coastal resources within the City, it is likely that City beaches and access points serve as major recreational and cultural resources for a broad spectrum of communities within the City and surrounding areas.
Water Quality

Rincon will assess SLR impacts to water quality by reviewing available water quality technical reports and SLR GIS maps to identify key areas where SLR may impact water quality. Specific attention will be paid to low-laying coastal watersheds and groundwater, such as the Malibu Creek Lagoon and the groundwater in the Civic Center area of the Malibu Valley Groundwater Basin because of sensitivities related to water quality in the area. Existing information regarding the tidal flows influences to water quality in these areas will be examined, as appropriate, and incorporated into the analysis. Rincon is uniquely positioned to assess water quality impacts based on our long-standing support of surface and groundwater water quality programs in the City, especially in the Malibu Lagoon and the Malibu Valley Groundwater Basin Civic Center and Winter Canyon areas.

Archeological and Paleontological Resources

Rincon will conduct a California Historical Resources Information System records search of the City at the South Central Coastal Information Center located at California State University, Fullerton. The primary purpose of the records search is to identify any previously recorded cultural resources known to exist within the project study area. Upon completion of the records search and any supplemental research, Rincon will analyze the vulnerability of identified resources in respect to the SLR mapping.

Task 3.3: Economic and Fiscal Impact Review

M&N’s economics team will quantify in economic and monetary terms the impact of identified SLR scenarios in Sub-task 3.1 on coastal resources identified in Sub-task 3.2. The market value for coastal resources affected by SLR will be evaluated using standard approaches and best practices.

The methodology for quantifying storm damage to parcels will rely upon a GIS-based analysis that compares the coastal hazard data for each SLR scenario (3.1) with the vulnerable coastal resources (3.2) to estimate the magnitude of flooding, or wave impacts, at each parcel. An example of the output from this GIS based analysis is shown below.

Based on the depth of flooding, or wave crest elevation, the percent potential for damage at each parcel can be estimated using depth-damage relationships established through the U.S. Army Corps of Engineers North Atlantic Coast Comprehensive Study, which were developed to better capture damage to structures during coastal storms as opposed to riverine flooding. An example of a depth-damage function for a pile supported building is shown on the next page.

Property Values

Hazard events can impact property values, lodging demand and tourism and consequently, the City’s tax revenue from those activities in the short, mid-, and long-term horizon. For example, in the short and medium term, such events can impact lodging and tourism due to the closure of facilities for clean-up and repair activities. However, in long term, if SLR leads to loss of tourist attractions or the city comes to be recognized as a high-risk destination by tourists, the overall attraction of the city could be impacted, leading to tourism related revenue “shrinking” even in years with no hazard events.
Similarly, hazard events could impact city revenue from properties in both short and long terms. In the short term, revenue from property taxes can be impacted by property tax reliefs provided in response to hazard events. In the long-term, the damage resulting from hazard events could lead to a reduction of property values and consequently reductions in property taxes in total.

M&N will use the output of Sub-tasks 3.1 and 3.2 as well as Los Angeles County Office of Assessor’s Property Assessment Information System to establish a baseline for property values and revenue generating activities.

For the short-term impact, M&N will estimate the impact based on the frequency and severity of hazard events. For the medium and long-term impacts, M&N will use the available literature and best practices to quantify the long-term impact of SLR and hazard events on the City of Malibu’s general fund.

**Public Works Value**

Hazard events can impact public infrastructure and disturb social and economic functions of society. To evaluate this impact based on the outcome of Task 3.2, M&N will identify the location of major public infrastructure (roads, fire station, police department and etc.) and quantify the impact of their service disruption. For example, if a hazard event leads to the closure of a major road (Pacific Coast Highway), its loss of service will be evaluated and quantified as follows.

- The primary impact from the closure of a major road due to a hazard event would be increased vehicle miles travelled. In the case of a closure, vehicles would use alternate routes that are not impacted by the hazard for reaching their destination which could be longer than the pre-event route. These longer routes translate to additional travel miles and travel time for the closure period. As part of the impact analysis, M&N will quantify these impacts by calculating increased vehicle operating costs, value of added passenger time, cost of additional air pollution and emissions, and cost of increased crash probability.

- The secondary impact of road closure would be interruption of Emergency Medical Services (EMS) vehicles, such as police, fire department and ambulances. During the closure, impacted EMS vehicles will need to take longer routes which would increase their response times. M&N will evaluate the impacted area as well as the severity of the impact based on the information gathered in Task 2.2 and will quantify the increase in response time based on FEMA’s Benefit-Cost Analysis Re-engineering guidance.

**Ecosystem Value**

M&N will evaluate the ecosystem value of SLR based on peer reviewed work, such as *The economic value of coastal ecosystems in California*. This research provides a standard per acre value for defined ecosystem services which will then be used to quantify the ecosystem cost of SLR in the City.

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Recreational Value

M&N will evaluate the recreational value of SLR based on peer reviewed work such as *Valuing Recreation and Amenities at San Diego County Beaches* and *Economic Analysis of Beach Spending and the Recreational Benefits of Beaches in the City of San Clemente*. This research provides a standard consumer surplus per activity day value for defined recreational services (i.e. beach value) which will then be used to quantify the recreational cost of SLR in the City. In addition to the recreational asset value, M&N will also consider the impact of losing recreational land on the City’s revenue using an approach similar to the property value estimates above.

Task 3 Deliverables

a. Sea level Rise Hazard Analysis
   i. Coastal Resources GIS Database
   ii. SLR Hazard Maps
      • For Each Selected SLR Scenario
      • Including Asset and Resource Risk

b. Coastal Resources Assessment
   i. Critical Asset and Manager List
   ii. Risk Assessment Matrix

c. Economic and Fiscal Impact Review
   i. Proposed, Draft, and Final Economic and Fiscal Impact Methodology
   ii. Economic and Fiscal Impacts Review Report
      • Including Associated Data

Task 3 Assumptions

It is assumed that the coastal hazards available from the list of references provided in Section 1.A of the RFP will be used in the vulnerability assessment. No additional numerical wave modeling, coastal flood modeling, or fluvial flood modeling will be performed for this study.

It is assumed that the inventory of resources can be compiled from available City and County GIS data. We plan on performing the inventory and mapping work using an ArcGIS platform. No additional field work, data collection, or digitization of resources is included in this scope of work.

The schedule assumes the City will perform a single review of each draft deliverable and a provide a consolidated set of comments, from no more than five reviewers, within 2 to 3 weeks from submittal of draft deliverable.

Task 4 Vulnerability Assessment

Task 4.1: Prepare Draft Vulnerability Assessment

M&N will assess the vulnerability of coastal resources and critical assets to SLR hazards using an approach consistent with the Coastal Commission’s Sea Level Rise Policy Guidance. The Coastal Vulnerability Assessment will be a summary document that describes the coastal hazards, resource assessment, and economic and fiscal impacts performed as part of Task 3. Key questions that will guide the Coastal Vulnerability Assessment are illustrated in the figure on the next page. The Vulnerability Assessment will be designed to inform policy and SLR adaptation strategy development that can be incorporated into a LCP update. The vulnerabilities and the consequences identified in this assessment will help prioritize planning efforts to account for the urgency (time horizon) of each impact, and the importance of each impact on the community and resources.


3 King, Philip G. Economic analysis of beach spending and the recreational benefits of beaches in the city of San Clemente. San Francisco State University, 2002.
Vulnerability will be evaluated as a function of three factors: 1) hazard exposure, 2) hazard sensitivity, and 3) adaptive capacity, as illustrated below. Exposure to coastal processes, such as shoreline erosion, storm related flooding, and bluff erosion will be rated based on the type of hazard, duration, and frequency of storm related or non-storm impacts. Sensitivity and adaptive capacity will be evaluated in conjunction with asset managers and the project team to identify critical thresholds where hazard exposure could result in damage or functional impairment of a given resource or asset. Results of the vulnerability assessment will inform preparation of the adaptation strategies by identifying “triggers” at which significant planning areas, assets, or coastal resources could be impacted by SLR. The consequence of the identified impacts could also inform the policies and programs of an updated LCP to minimize risk to important infrastructure, basic services, and valuable resources. The Draft Coastal Vulnerability Assessment will be submitted to the City for review by staff and the findings will be presented at a public workshop.

Task 4.2: Prepare Final Vulnerability Assessment

A Final Coastal Vulnerability Assessment will be prepared that incorporates comments and input from City staff, City Council members, and the planning commission. Input gathered from the public workshops will also be incorporated into the Final Coastal Vulnerability Assessment.

Task 4 Deliverables
a. Draft Coastal Vulnerability Assessment
b. Final Coastal Vulnerability Assessment

Task 4 Assumptions
It is assumed the City will perform a single review of the Draft Coastal Vulnerability Assessment and provide a consolidated set of comments, from no more than five reviewers, within 2 to 3 weeks from submittal of draft deliverable.

Task 5 Adaptation Strategies and Policies

SLR is unique among other hazards because it’s a slow moving disaster that will develop over the span of decades. The vulnerabilities identified for SLR projections at the end of the century are overwhelming but the slow moving nature of climate change and SLR allows for time to plan, fund, and implement adaptation strategies to mitigate these impacts. Our approach to developing adaptation strategies will focus on addressing near-term vulnerabilities (approximately 2030) and mid-term vulnerabilities (approximately 2050) with specific capital improvements, land use and entitlements, emergency operations, and development standards while developing a vision for addressing long-term vulnerabilities and associated uncertainties with larger scale adaptation projects based on regional partnerships with other stakeholders.
**Task 5.1: Identify Potential Adaptation Strategies and Policies**

Based on the outcomes of the vulnerability assessment, the team will prepare an Adaptation Strategies and Policies Matrix. This task would closely adhere to the guidance provided in Chapter 7 of the California Coastal Commission Draft Sea Level Rise Policy Guidance that was adopted in November 2018, the Draft Residential Adaptation Policy Guidance issued in July 2017, and any updates that occur over the course of the project.

Whether the beach is backed by Pacific Coast Highway, bluffs, or development, coastal squeeze presents difficult challenges in Malibu when discussing adaptation strategies. There are significant trade-offs associated with every strategy and consideration of the costs and benefits of each strategy early in the planning process is essential. The figure below depicts two strategies at the opposite ends of the adaptation planning spectrum. The top row depicts a scenario where the coastline is armored to protect the back shore development and the bottom row depicts a scenario in which the coastline is allowed to migrate landward un-obstructed. These two scenarios over-simplify the opportunities for adaptation, and in reality there are a wide variety of proven adaptation strategies that can be employed to mitigate impacts from coastal erosion and SLR that will be the focus of this task.

![Diagram of Adaptation Strategies](image)

Adaptation strategies, or adaptation pathways, will be identified for the variety of resources, shoreline types, and development patterns along the Malibu coastline. Each adaptation strategy will identify a range of applicability tied to SLR thresholds and correlated to an approximate time horizon based on the latest OPC projections.

The overall approach will create a matrix of near-, mid-, and long-term adaptation policies and programs paired with LCP and Coastal Act topics mandated by the Coastal Commission LCP Update guidance documents, the California Coastal Commission SLR Guidance, and local circumstances.

**Task 5.2: Prepare Draft Options Evaluation and Recommendations Report**

Based on a review of the adaptation strategy matrix developed as part of Task 5.1 by the project team and City staff, we will perform a feasibility-level screening of adaptation strategies to develop a prioritized list of opportunities to mitigate SLR impacts over near- and mid-term planning horizons. Our team of planners, engineers, and scientists offer the City a deep bench of expertise in evaluating the feasibility of adaptation strategies along the California coast. Our experience in delivery of adaptation projects is exemplified by the recent Cardiff State Beach living shoreline project, funded by a State Coastal Conservancy grant, to implement a hybrid adaptation approach designed to protect Pacific Coast Highway while preserving coastal resources, such as beach access and dune habitat. A cross section and artistic rendering of this hybrid approach is shown in the figure on the next page.
Beach nourishment programs can provide an alternative shoreline protection method when other techniques such as managed retreat or shoreline armoring are not feasible. Sand placement from inland or offshore sources allows local beaches to maintain or increase their width as sea levels rise, providing a buffer to wave energy while preserving recreational and environmental value. Beach nourishment also complements other forms of adaptation to provide multiple layers of protection that can be customized for each individual stretch of coastline. Several nourishment projects, led by M&N, have been successfully implemented in Southern California and have proven to be an effective adaptation to shoreline erosion, expected to accelerate with SLR. A recent nourishment at Solana Beach where approximately 150,000 cubic yards of sediment was placed as part of the San Elijo Lagoon Restoration project is pictured below.

The options and evaluation report will also identify potential grant opportunities and other partnership opportunities to assist with funding future adaptation projects. Given the large areas of development within the FEMA 100-year floodplain, the adaptation strategies identified in this report will complement the Local Hazard Mitigation Plan because policies and projects that reduce the flood risk today will also improve the adaptive capacity to handle SLR. Consistency between these plans will also ensure future adaptation projects provide multiple benefits to the community and thus would be eligible for a range of local, state, and federal grant funding streams.
Task 5.3: Prepare Draft Options Evaluation and Recommendations Report

A final Adaptation Options Evaluation and Recommendations report will be prepared that incorporates comments and input from City staff, City Council members and the planning commission. Input gathered from the public workshops will also be incorporated into the final report.

Task 5 Deliverables

a. Adaptation Strategies and Policy Inventory and Matrix
b. Draft and Final Adaptation Options Evaluation and Recommendations Report
   i. Including Prioritized List of Adaptation Strategies and Policies

Task 5 Assumptions

It is assumed the options and evaluations report will include up to three adaptation strategies for each shoreline configuration (i.e. sandy beach, bluff backed shoreline, estuarine/wetland shoreline).

LCP Update Phase II

After satisfactory completion of Phase I, the M&N/Rincon team will be prepared to seamlessly transition into the second phase of developing an adaptation plan and any resulting LCP, municipal code, and General Plan amendments. At this time, our teaming agreement assumes these tasks will be led by Rincon with support from M&N and any other requisite team members. Development of the adaptation plan will be based on the Adaptation Options Evaluation and Recommendations Report from Task 5 of Phase 1.

This preparation will provide an opportunity for the City to both consolidate changes that have occurred to the LCP since its original adoption into a consolidated plan and to incorporate updated technical supporting documentation and Coastal Commission policy direction.

The CCC has recognized the need for periodic updates to LCPs statewide and published the LCP Update Guide (2007, revised 2013). This LCP update guidance document includes many example policies that have been developed in other jurisdictions (including many of which Rincon and M&N are actively working with) and approved by the Coastal Commission. This guidance will be utilized as a primary resource during the City of adaptation plan.

The Coastal Commission has also published a Final Sea Level Rise Policy Guidance Report and Draft Residential Adaptation Policy Guidance that outlines how cities can effectively address the effects of SLR in a manner consistent with the California Coastal Act. Rincon and M&N have used these documents to develop policies for other LCPs and coastal zoning ordinances, and we continue to work with Coastal Commission on refining their use as a framework for developing adaptive management strategies.

The adaptation plan will include information about the regulatory and governance issues surrounding Malibu including applicable local, state, and federal policies and regulations. Our familiarity with these requirements and the City’s unique challenges provides insight into priorities for this phase of the LCP update. Given the City’s current work on integrating strategies and policies on beach and public access into the LCP update, the management plan will focus on ensuring alignment with these new policies. Understanding the regulatory framework is critical to making sure adaptation strategies can proceed. Building on considerations from the Adaptation Options Evaluation and Recommendation Report from the prior phase, our team will specify how selected strategies and conceptual designs comply with applicable policies and regulations. In doing so, we will identify challenges or barriers that need to be addressed before implementation can commence. Further, a key motivation of the adaptation and management plan is to prevent the cycle of emergency planning and permitting that has occurred previously. To accomplish this, the plan will identify points along the implementation pathway when approvals are needed to anticipate time for the approval process.
## Cost Proposal

**City of Malibu Coastal Vulnerability Assessment**

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### TASKS

#### TASK 1 - PROJECT KICKOFF
- **Hours Subtotals**: $7,888
- **Labor Subtotals**: $7,888

#### TASK 2 - PUBLIC ENGAGEMENT
- **Hours Subtotals**: $7,888
- **Labor Subtotals**: $7,888

#### TASK 3 - TECHNICAL ANALYSIS
- **Task 3.1: Sea Level Rise Hazard Analysis**
  - **Hours Subtotals**: $18,182
  - **Labor Subtotals**: $18,182
- **Task 3.2-3.3: Coastal Resources Inventory & Assessment**
  - **Hours Subtotals**: $18,182
  - **Labor Subtotals**: $18,182
- **Task 3.3: Economic and Fiscal Impacts Review**
  - **Hours Subtotals**: $18,182
  - **Labor Subtotals**: $18,182

#### TASK 4 - VULNERABILITY ASSESSMENT
- **Hours Subtotals**: $18,182
- **Labor Subtotals**: $18,182

#### TASK 5 - ADAPTATION STRATEGIES & POLICIES
- **Hours Subtotals**: $18,182
- **Labor Subtotals**: $18,182

### TOTALS

- **Total Estimated Fee**: $206,894

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**Assumptions:**

1. Proposed budget assumes the kickoff meeting will be attended in person. All other coordination and progress update meetings will be conducted online or via conference call.
2. Public engagement assumes two public workshops and a total of 3 meetings with City officials (Planning Commission, Council or Council Committee).
3. No additional surveying, mapping or field investigations will be performed for the study. We assume all the required data on coastal resources is available through City, state or regional databases.
4. No additional numerical modeling is proposed for this project. All hazards and thresholds will be determined from available reports and data.
RATE SCHEDULE FOR PROFESSIONAL SERVICES
Effective October 1, 2018 Until Revised

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REIMBURSABLE EXPENSES (Unless Otherwise Provided in Written Agreement)

Subcontracts or Outside Services
Cost +10%

Reproductions
- In House
  - Mylar Plots (B/W) $2.00/SF
  - Color Plots $4.00/SF
  - Vellum Plots (B/W) $1.00/SF
  - Bond Plots (B/W) $0.50/SF
  - Drawing Reproduction Cost +10%
  - Document Reproduction $0.10/sheet

- Outside Reproduction Cost +10%

Travel
- Company Auto Prevailing IRS
- Rental Vehicle Cost
- Airfare Cost
- Meals and Lodging Cost
Standard Fee Schedule for Environmental Sciences and Planning Services

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*Professional classifications include: environmental scientists, urban planners, biologists, geologists, marine scientists, GHG verifiers, sustainability experts, cultural resources experts and other professionals. Expert witness services consisting of depositions or in-court testimony are charged at the hourly rate of $350.

Direct Costs

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<tr>
<td>Photocopies – Color</td>
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** $0.65/mile for mileage over 50 and for all miles incurred in employee-owned vehicles.

Other direct costs associated with the execution of a project, that are not included in the hourly rates above, are billed at cost plus 15%. These may include, but are not limited to, laboratory and drilling services, subcontractor services, authorized travel expenses, permit charges and filing fees, mailings and postage, performance bonds, sample handling and shipment, rental equipment and vehicles other than covered by the above charges.

Annual Escalation – Standard rates subject to annual escalation

Payment Terms – All fees will be billed to Client monthly and shall be due and payable upon receipt. Invoices are delinquent if not paid within ten (10) days from receipt.
Aaron Holloway, PE | Project Manager

Professional Summary

Mr. Holloway brings 15 years of experience in coastal and water resources engineering with a focus on coastal, riverine, and civil infrastructure projects. This experience has included vulnerability assessments and resiliency planning ranging from project level to regional scale studies to help clients understand and plan for impacts from rising sea levels. This experience has included design and modeling of beach nourishment projects, shore protection infrastructure, environmental restorations, and sand retention structures. Having led projects from initial planning through permitting, detailed design and construction he knows how to navigate the challenging regulatory process for projects in the coastal zone. His role on this project is as senior coastal engineer to lead the sea level rise (SLR) vulnerability assessment and adaptation plan.

His relevant project experience includes the following.

**Sea Level Rise Vulnerability Assessment, Morro Bay, California**

Senior engineer responsible for a vulnerability assessment of the unique coastal resources and infrastructure along the Morro Bay coastline including the harbor entrance, working waterfront, and sensitive ecosystems of the Morro Bay Estuary and coastal dune habitat. A coastal and estuarine model was developed specifically for this study to understand how SLR would influence hazards such as inundation, storm flooding, wave impacts, coastal erosion (beach, dune and cliff) and saltwater intrusion into freshwater resources.

**Sea Level Rise Vulnerability Assessment, Venice Beach, California**

Project manager responsible for performing a vulnerability assessment focused on coastal resources of Venice Beach, including infrastructure, civic, property, cultural and ecological resources. This study was funded in part by California Coastal Commission (CCC) Grant Local Coastal Program Local Coastal Program (LCP)-14-09 and leveraged regional studies by Adapt LA and USGS (CoSMoS) to prepare a focused assessment for the Venice community to inform the LCP update. As part of this effort, led two public workshops explaining how SLR will change coastal hazards and how it affects important coastal resources.

**Sea Level Rise Vulnerability Assessment, San Clemente, California**

Project manager responsible for crafting approach and delivering a vulnerability assessment for the City to inform the planning policies of an updated LCP. This study was funded in part by CCC Grant LCP-16-11 and leveraged regional studies by USACE and USGS (CoSMoS) to prepare an assessment of the SLR thresholds and impacts to coastal resources. San Clemente consists of narrow beaches backed by high bluffs that are vulnerable to “coastal squeeze” threatening valuable resources that contribute to the City’s vibrant beach town culture.
Aaron Holloway, PE | Project Manager (cont.)

**Sea Level Rise Vulnerability Assessment and Adaptation Plan, Dana Point, California**

Project manager responsible for performing a vulnerability assessment and developing adaptation strategies as part of an effort to amend the LCP. This study was funded in part by CCC Grant LCP-16-10 and leveraged previous regional studies and USGS (CoSMoS) to prepare an assessment of the SLR thresholds and impacts to coastal resources. The coastline of Dana Point includes a variety of coastal settings from the bluff-backed beaches of North Dana Point, Dana Point Harbor, and the low-lying sandy beaches of South Dana Point. Each segment has unique exposure to coastal hazards with differing thresholds for SLR vulnerabilities.

**Huntington Beach Desalination Project Sea Level Rise Analysis, Huntington Beach, California**

Project manager responsible for preparation of a sea level rise analysis to support Poseidon Water in obtaining a coastal development permit for the Huntington Beach Seawater Desalination project. The analysis was performed for a range of SLR scenarios and coastal hazards using the best available science and data available on shoreline erosion, storm related coastal flooding, riverine flooding and tsunami. Based on the potential SLR impacts identified and thresholds for regional and local flooding, an adaptation plan was developed to mitigate for near-term or known hazards and establish triggers for implementation of future adaptation strategies. Several additional tasks have been performed including regional nearshore wave and hydrodynamic modelling to evaluate potential for entrainment of marine organisms at various potential outfall locations.

**Sea Level Rise Study and Targeted Local Coastal Program Amendment, City of Avalon, California**

Project manager leading the effort to prepare a SLR vulnerability assessment for the City of Avalon located on Santa Catalina Island, approximately 22 miles off the coast of Southern California. This study was funded in part by CCC Grant LCP-17-07. Numerical wave modeling and mapping of coastal flooding hazards for three sea level rise scenarios was performed by M&N to capture the unique wave exposure of Avalon. This project also includes an economic assessment of SLR impacts to meet AB 691 criteria and a targeted amendment of the LCP.

**Huntington Beach General Plan Update, Huntington Beach, California**

Senior engineer responsible for assessing impacts of SLR on coastal resources, infrastructure, and assets along the City’s coastline and estuaries, including Huntington Harbour, Bolsa Chica Wetlands, and Huntington Beach Wetlands. Also performed 2-D hydrodynamic modeling of the estuarine systems using RMA-2 to evaluate the interaction of elevated ocean water levels and riverine flooding for a range of SLR projections. The SLR hazards identified led into a vulnerability and risk assessment of infrastructure and resources to inform the City’s General Plan update. Results of the assessment will be used to prioritize and plan for adaptation measures to improve the City’s resiliency to climate change.

**On-call Coastal Engineering Services, Dana Point, California**

Project engineer responsible for technical review of the Preliminary Flood Insurance Rate Maps (PFIRMs) and supporting Intermediate Data Submittals (IDS) documentation released by Federal Emergency Management Agency (FEMA). The review identified a key parameter of the runup formula (beach slope) used by FEMA that did not properly characterize the natural variability in beach slope along these transects. Also provided independent technical review of wave uprush studies submitted for new development along the Capistrano Bay Community and is familiar with the technical and regulatory challenges associated with such development.

**County of Maui Coastal Hazard Analysis, Wailuku, Hawaii/Wailuku-Kahului Wastewater Reclamation Facility Shoreline Erosion Protection, Kahului, Maui**

Project engineer for the engineering design and preparation of construction plans for extension of rock revetment landward of the mean high water mark. Landward revetment position avoided impacts within federal/state jurisdiction, created source of beach sand for nourishment, and dune restoration project components. Coastal engineering analyses included design water depth, breaking wave heights, wave uprush, and impacts of future SLR. Prepared alternatives analysis including feasibility of beach nourishment options.
Shelly Anghera, PhD | Principal-in-Charge

Professional Summary
Dr. Shelly Anghera is a principal scientist with more than 20 years of experience conducting field and laboratory studies related to eco-toxicology and sediment quality characterization. Her expertise centers on field study design, sediment characterization, water and sediment testing and analysis, implementation strategies for dredged material management, Total Maximum Daily Load (TMDL) compliance, and California’s Sediment Quality Objectives application. Dr. Anghera has taught courses on the analysis and TMDLs, interpretation of toxicity testing, Sediment Quality Objectives, and assessing ecological risk in contaminated sediments. Dr. Anghera’s projects often focus on the integration of multiple lines of evidence to determine water and sediment quality.

Her relevant project experience includes the following.

Technical Feasibility Evaluation for Outer Harbor Sediment Placement and Ecosystem Restoration, Long Beach, California
Principal scientist to assist the Port of Long Beach with permitting a confined aquatic disposal facility in the Outer Harbor. The confined aquatic disposal site will be developed to receive both clean and contaminated sediments for long-term sediment management. Led a series of technical evaluations to support engineering design and permitting. Studies included evaluation of the physical isolation of contaminants (i.e., prop wash, anchor scour, and bioturbation) and chemical containment (i.e., contaminant flux via advection or diffusion). Also led the development of an Operations Management and Monitoring Plan to document the planned approach for managing the site, which included monitoring procedures for key aspects of site use.

Marina del Rey Harbor Sediment Stressor Identification Study, Los Angeles, California
Principal scientist working with Southern California Coastal Water Research on this project to assist in the design study to assess the areal extent of sediment contamination in the Harbor for constituents listed in the TMDL for toxic pollutants to determine the most feasible sediment management strategies available to Los Angeles County.

Multiple Sediment and Water Quality Services Contracts with the Port of Long Beach, Long Beach, California
Lead principal scientist for multiple on-call sediment and water quality contracts, valued at over $4 million. The services focus on dredged material and water quality management programs. In addition, developed guidance manuals for permitting, sediment management, and construction design specifications for environmental programs.
Weixia Jin, PhD, PE | Technical Analysis Lead

Professional Summary
Dr. Jin joined Moffatt & Nichol (M&N) in 1997 and has since participated in a wide range of watershed, riverine, wetlands, marina, coastal, and transportation engineering projects. Her engineering experience includes numerical modeling of watershed hydrologic routing, storm drainage system, river/wetland hydrodynamics, water quality, and sedimentation; preparation of drainage study, location hydraulic study, floodplain evaluations, bridge hydraulic and sedimentation reports; engineering designs of storm drain system, flood/erosion control structures, revetments, tidal inlets, jetties, weirs, energy dissipaters, bridge abutments and shore protection structures; and engineering studies of bridge scour analyses, reservoir sedimentation and sediment bypassing.

Her relevant project experience includes the following.

Technical Review of FEMA California Coastal Analysis and Mapping Project, Malibu, California
Project manager for the technical review of PFIRMs and FIS documents, including California Coastal Analysis & Mapping Project IDS. The technical review focused on basic assumptions, data, and methods used to characterize the 100-year coastal base flood elevation along the City of Malibu to determine if procedures and assumptions used in the study followed FEMA’s Pacific Guidelines, and if results are reasonable and mapped properly based on our understanding of the coastal processes and storm hazards along the City’s coastline.

Malibu Lagoon Restoration Feasibility Study, Malibu, California
Project engineer for the study to yield a restoration plan that meets the salt marsh enhancement in West Arm area to increase tidal flushing, improve water circulation, increase holding capacity, and reduce predator encroachment. Reviewed and assembled previous studies and data from various federal, state, local agencies, and non-profit organizations; identified data gaps; recommended a monitoring plan and budget to resolve these data gaps; prepared a report describing the project area and existing wetland resources including Lagoon setting, hydrology, soils, water quality and biological resources; assisted in developing three restoration alternatives; and performed hydraulics, water quality, and sedimentation analysis for developing a preferred alternative.

Huntington Beach General Plan Update, Huntington Beach, California
Project engineer provided technical direction and guidance on numerical modeling of the riverine flooding, tidal hydrodynamic and SLR. The modeling results were used to map flood hazard zones and develop a geo-referenced inventory of affected infrastructure.

Regional Sea Level Rise Study for San Diego County, California
Project engineer for the collection and review of SLR guidance from federal and state agencies. This study presents the processes to determine sea levels for the San Diego coastal region to be utilized for the design of transportation infrastructure associated with the proposed I-5 North Coast Corridor program, including rail, roadway, and bridge improvements. The study area encompasses coastal areas from north San Diego County to just south of the Interstate 5 (I-5)/I-805 merge.
Lexi Journey | Public Engagement Lead

Professional Summary
Ms. Journey is a senior environmental planner and project manager in Rincon’s environmental and land use planning group. Ms. Journey’s experience includes project management, planning policy analyses, technical analyses, and outreach for assignments, such as general plans, coastal land use plans, and climate action plans, as well as California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) environmental assessments. She specializes in managing projects where crossover of and multi-agency cross-over is needed for community resilience. For example, the integration of greenhouse gas (GHG) reduction measures, adaptation strategies, and disaster preparedness into a jurisdiction’s safety element, climate action plan, and local hazard mitigation. She has managed various projects, including the Oxnard LCP Update, County of Merced Climate Action Plan (CAP) and Vulnerability Assessment, City of Del Mar Energy Efficiency Outreach Program, and City of Rancho Mirage General Plan Update. She has also prepared technical studies for topics regarding fire hazards, air quality, GHGs, noise, climate vulnerability and adaptation.

Her relevant project experience includes the following.

Local Coastal Program Update, Oxnard, California
Environmental planner and public engagement lead for the update of Oxnard’s LCP in order to conform with Coastal Commission policy directives and approaches to address climate change adaptation strategies, such as those for SLR. The update involves the assessment of Oxnard’s coastal resources, the vulnerability of these resources and development of the implementation tools for protection and mitigation. Responsible for managing the project and coordinating with the Coastal Commission as well as agency and community stakeholders.

Vulnerability Analysis and Climate Action Plan, Merced County, California
Environmental planner and public engagement lead for the County’s first CAP that includes a County-wide greenhouse inventory of urban and agricultural emissions. Because approximately 65 percent of Merced County’s GHG emissions are because of agricultural practices, which have historically not been included in climate action planning, the project involves coordination with a diverse group of stakeholders, including the Farm Bureau, California Air Resources Board, and San Joaquin Air Quality District. Extensive coordination and outreach will ensure that the County’s CAP will have mitigation measures that are implementation ready and championed by the community.

General Plan/Local Coastal Plan Update and Environmental Impact Report, Morro Bay, California
Environmental planner assisted with the preparation of the community baseline assessment reports to identify the current environmental conditions in the City to inform the analysis of the general plan, LCP, and zoning ordinance updates in the environmental impact report.
Troy Barnhart | Vulnerability Assessment Lead

Professional Summary
Mr. Barnhart joined M&N in 2019 as a staff coastal professional after completing Bachelor and Master of Science degrees with emphases on coastal science, engineering, and management. Beyond experience with coastal processes and hazards, his academic preparation developed skills in climate adaptation and resiliency planning, modeling surface and groundwater transport and mixing, hydrologic analysis, water resource management, technical writing, and Geographic Information System (GIS) use. His professional experience focuses on qualitative and quantitative evaluation of potential sea level rise impacts to coastal areas and development of technically appropriate, community-based resilience strategies.

His relevant project experience includes the following.

Sea Level Rise Vulnerability Assessment, Pismo Beach, California
Assistant project manager and sea level rise analyst for assessment of historic and future coastal hazards facing a complex coastline of both armored and unarmored bluffs and a sandy, dune-backed beach. Evaluated potential erosion and inundation impacts to sensitive, tourism-centered community.

McGrath State Beach Sea Level Rise Analysis, Oxnard, California
SLR analyst for evaluation of coastal hazards for relocation of State campground facilities. Analysis included coordination with hydrodynamic modelers to account for potential to compound inundation risk from the Santa Clara River due to SLR-induced beach buildup.

Sea Level Rise Vulnerability Assessment, San Clemente, California
SLR analyst for vulnerability assessment focusing on coastal squeeze and blufftop development under threat of erosion as part of update to City’s LCP. Identified areas of potential future study and planning concern due to weaknesses in CoSMoS model regarding LOSSAN rail corridor and revetment.

Bill Lane Center for the American West, Stanford University, California
Research assistant responsible for data collection and analysis for a study on U.S. Army Corps of Engineers Clean Water Act Section 404 permitting. Designed characterization system to analyze five years of permits issued in California in order to identify potential focus areas for streamlining permitting process.
Erik Feldman, LEED AP | Adaptation Strategies & Policies Lead

Professional Summary
Mr. Feldman is a principal with Rincon’s environmental planning and sustainability department. He oversees climate action planning, resiliency planning, statewide GHG reporting, and carbon verification programs and is responsible for the leadership and development of sustainability and resiliency services. Additionally, he is involved in a wide range of urban planning and land use studies, sustainable development review, CEQA and NEPA environmental documentation, and permitting activities. He has assisted numerous local agencies and development projects with the development of GHG thresholds, analytical methods, and reduction strategies in California.

His relevant project experience includes the following.

PHRESH Development, Port Hueneme, California
Environmental principal responsible for overseeing efforts to assist the Port of Hueneme become the first California Port to participate in the Green Marine Program. Rincon provided a suite of services and on-call support, including ensuring all criteria was thoroughly addressed and appropriately justified. Key deliverables included conducting a baseline analysis, conducting a port-wide GHG emission inventory, assessing vulnerability, updating existing policies, and developing various tools to calculate emissions, measure, track, monitor, and analyze incremental improvements within the program.

Climate Action Plan and Vulnerability Assessment, Pasadena, California
Environmental principal to assist the City of Pasadena to prepare a GHG emissions inventory, assist with a grant application to request funding for the City’s general plan update and development of a CAP following the successful award of funding to prepare the City’s CAP. Oversaw the development of GHG emission forecasts out to 2035 and worked extensively with city staff to identify and evaluate reduction measures that would achieve the greatest reduction in the most cost-effective manner. Created and implemented a comprehensive public outreach program; developed a detailed implementation, monitoring, and maintenance plan; and a compliance checklist for future development projects.

Climate Action Plan and Vulnerability Assessment, Merced County, California
Environmental principal for the preparation of a CAP for unincorporated Merced County. The CAP includes a vulnerability assessment of the County using State of California tools and best practices, such as the California Adaptation Planning Guide and Cal-Adapt. Reviewed the results of this assessment that will inform the CAP and various adaptation measures. Co-benefits will be developed based on the findings of the vulnerability analysis. The project also includes a community engagement strategy that is specific to the needs of the rural areas of the San Joaquin Valley.

Certifications
Accredited Lead Greenhouse Gas Verifier, California Air Resource Board (EO No. H-10-043) and Washington Department of Ecology
LEED Accredited Professional, 2008
Licensed General Engineering Contractor, No. 921378

Firm Name
Rincon

Education
MS, Environmental Science and Management, University of Sydney; Sydney, Australia
BS, Business and Administration, University of Colorado
Ali Rezvani, PhD | Economic and Fiscal Impact Analyst

Professional Summary
Dr. Rezvani is an integral part of M&N’s commercial services group which provides economic and financial analysis and support as input to business development decisions under consideration by local, regional, and international clients. Dr. Rezvani has provided cost-benefit, economic impact, and competitive analysis models that analyze existing markets, commodities, freight movement conditions, and governmental policies as a means of forecasting proposed project impacts on future market and cargo conditions as well as project financial performance. His work has involved transportation infrastructure research and is driven by determining operational and inventory costs of freight across different transportation modes. He has applied this research and modeling focus across a range of transportation projects involving analysis, performance, and forecasting for regional, national, and international cargo movement. Typical transportation projects have involved inland and international transportation systems including multimodal, railroad, and vessel transportation. Dr. Rezvani provides a broad knowledge of economic modeling, analysis, and forecasting developed during completion of projects for public and private sector clients.

His relevant project experience includes the following.

Long Beach Container Terminal Vendor Due Diligence, Long Beach, CA
Economic analyst for leading the commercial effort for vendor due diligence of the Long Beach Container Terminal (LBCT). The effort included the evaluation of global container shipping trends, including trade volumes, shipping alliance and container fleet upsizing. Additionally, the commercial effort looked and inter and intra-port competitions to provide a clear picture of Ports of Los Angeles and Long Beach and LBCT’s position in U.S. international trade. The output of the commercial effort was LBCT’s volume and revenue projections sensitized to external factors.

Grant Application Support, Various Locations
Financial analyst for the grant application writing and benefit cost analysis support to various port authorities, transportation planning organizations, and other state and local entities for TIGER, BUILD, FAST, INFRA and TCEP programs. These efforts involved preparing grant applications, performing benefit cost analysis as well as forecasting freight volume movements.

Virginia’s Commonwealth Transportation Board Rail Programs Review and Benefit-Cost Analysis Overhaul, Richmond, VA
Financial analyst responsible for the effort to review and overhaul the Virginia Department of Rail and Public Transportation’s Rail Enhancement Fund. This overhaul included defining corridor and Virginia specific metrics to quantify the public benefits of diverting traffic from highways to rail. Corridor and Virginia specific metrics will enable the Virginia Department of Rail and Public Transportation to improve its decision-making process in allocating funds.
Amber Bruno | Coastal Habitat Expert

Professional Summary
Ms. Bruno is a biological program manager at Rincon with experience providing biological resource compliance and project management oversight. She supports permitting and regulatory compliance for complex projects, where she has developed compliance management documents that have been implemented company wide. As a senior biologist, she has experience in wetland permitting, special status species evaluation and avoidance, and environmental compliance planning to meet aggressive construction schedules. She has extensive experience with vegetation mapping and through her career she has gained experience reviewing and mapping environmentally sensitive habitat areas (ESHA), as well as conducting botanical and special status species surveys. She is also permitted to handle desert tortoise, and has developed nesting bird management plans, and invasive species management plans for clients.

Her relevant project experience includes the following.

Environmentally Sensitive Habitat Area Mapping Services, Oxnard, California
Senior biologist responsible for working with the city of Oxnard to compile and review all available mapped habitat data previously documented within the City and verifying validity of the data and document information gaps. With the graphics department team she worked to compile the information into a database for the City to use when evaluating projects.

Malibu Bluffs Parkland Biological and Cultural Services, Malibu, California
Senior biologist for the biological resource surveys and evaluation, opportunities and constraints analysis, and ESHA mapping for the proposed Malibu Bluffs Parkland project. Conducted surveys with emphasis on constraints associated with the City’s LCP, special status species, and County fire department mandated buffers and offsets.

Crosby at Rancho Santa Fe Open Space Preserve Habitat Management Program, Carlsbad, California
Senior biologist responsible for overseeing implementation of the habitat management program, including, implementation of restoration projects, monthly surveys and patrols, public outreach and education, developing survey schedules, and technical oversight of special status species surveys. The open space preserve is 170 acres and includes part of the San Dieguito Coast to Crest trail. Management also includes regular updates with County staff and wildlife agencies regarding recreational use and threatened and endangered species management. Has overseen the habitat management of the Crosby open space preserve since 2013 and regularly works in collaboration with the County and non-profit organizations to implement special status species and habitat initiatives.
Kiernan Brtalik, QSP/D, CPSWQ, CISEC | Water Quality Scientist

Professional Summary

Mr. Brtalik is a water resources project manager within Rincon’s environmental site assessment group. He is experienced in targeted monitoring and assessment programs, regulatory-driven water quality programs, data evaluation and management, and technical environmental reporting. His water quality monitoring experience includes Areas of Special Biological Significance, TMDL, MS4 Phase I/II and Caltrans National Pollutant Discharge Elimination System requirements, best management practice effectiveness studies, and various environmental monitoring programs. Mr. Brtalik has experience planning and implementing complex multi-media monitoring and assessment programs, including groundwater, riverine and estuary, flow-and time-weighted water quality sample collection, bioassessment aerial deposition, geomorphological assessment, and volumetric creek bed and bedload trap sampling. In addition, he is an experienced GIS analyst, allowing him to convey complex environmental and water quality information within a geographical contextual framework.

His relevant project experience includes the following.

**Santa Clara River Bacteria Total Maximum Daily Load, Ventura, California**

Water resources project manager responsible for coordinating weekly and monthly bacteria sampling, ongoing data management, and semi-annual reporting.

**Civic Center Wastewater Treatment Plant Groundwater and Surface Water Monitoring and Reporting, Malibu, California**

Water resources specialist for the management and coordination of groundwater and surface water monitoring, technical data evaluation, and reporting activities. Ensures that the project meets regulatory compliance.

**On-Call Environmental Services, Malibu, California**

Water resources project manager to provide as-needed consulting services for the City of Malibu related to stormwater management, water quality, and spill response. This contract includes programmatic support for stormwater permit implementation to meet regulatory requirements; regulatory review and support related to stormwater and water quality compliance; GIS mapping and database development; and coordination of emergency hazardous waste response, profiling, and disposal. Implemented stormwater permit compliance and conducted inspections for outfall screening, construction site stormwater compliance, illicit discharge investigation, etc. Regulatory review and support services are provided for regional stormwater permit revisions; limited modification to existing program plans and documents (e.g., enhanced watershed management program and coordinated implementation monitoring program); environmental regulatory consultation; and as-needed regulatory review and support of TMDLs and amendments, and other documents related to water quality compliance. Soil, water, and air sample collection, site investigation, and waste profiling in response to hazardous spills and other environmental site assessments are also provided by the team.

Firm Name

Rincon

Education

MESM, Water Resources and Conservation Planning, University of California, Santa Barbara, Bren School of Environmental Science and Management, 2012

BA, Philosophy and Business Management, Stony Brook University, 2007

Certifications

Qualified SWPPP Practitioner/Developer (QSP/D), No. 26402

Certified Professional of Storm Water Quality (CPSWQ), No. 1110

Certified Inspector of Sediment and Erosion Control (CISEC), No. 1517
Christopher Duran | Archaeologist and Paleontologist

Professional Summary
Mr. Duran serves as a principal and senior archaeologist for Rincon. He has more than ten years of professional experience in cultural resources management. Mr. Duran has conducted numerous cultural resources investigations in support of CEQA and Section 106 of the National Historic Preservation. He also has extensive recent experience with local tribes concerning the mitigation of cultural resources identified during field investigations and has authored a variety of cultural resources studies including archaeological surveys, archaeological testing and eligibility evaluation, data recovery, mitigation monitoring plans and reports, and peer reviews throughout southern California. Mr. Duran has also worked on multiple burial sites and has experience facilitating consultation for the recovery and treatment of human remains.

His relevant project experience includes the following.

Paradise Cove Heritage Recovery, Malibu, California
Principal investigator for the Paradise Cove Heritage Recovery project that involved the recovery of a Chumash cemetery identified during a utility upgrade. Developed the recovery methods for the identified inhumations and coordinated with tribal representatives for the dignified and respectful treatment of the human remains.

General Plan Update, Seaside, California
Archaeologist on this study that consisted of the update to the City of Seaside’s general plan. Provided senior oversight for the cultural resources analysis of the general plan, including outreach efforts to local tribes, a records search, summary of previous studies and resources in the area, and procedures for future cultural resources investigations.

General Plan Update, Pismo Beach, California
Archaeologist on this study that consisted of the update to the City of Pismo Beach’s general plan. Provided senior oversight for the cultural resources analysis of the general plan, including outreach efforts to local tribes, a records search, summary of previous studies and resources in the area, and procedures for future cultural resources investigations.

Community Plan, Avila, California
Principal investigator for the update to the City of Avila’s community plan. Provided senior oversight for the cultural resources analysis of the community plan, including outreach efforts to local tribes, a records search, summary of resources in the area, and procedures for future cultural resources investigations.
Jake Thickman | Coastal Scientist

Professional Summary
Mr. Thickman has worked across several coastal science fields to address issues related to coastal community hazard resilience as well as coastal ecosystem health and water quality. Through these diverse projects, Mr. Thickman has developed broad expertise in coastal data analysis, technical writing, and environmental policy analysis. As a coastal scientist for M&N, Mr. Thickman now applies these skills to resilience challenges in coastal zones, providing support in the areas of coastal hazards analysis, hazard mitigation, and adaptation strategy development for at-risk communities.

His relevant project experience includes the following.

Sea Level Rise Vulnerability Assessment, Avalon, California
Coastal scientist responsible for collection and review of existing SLR hazard data available for the City of Avalon as part of an update to the City’s LCP. Also assisted with documentation of community assets and outreach to determine hazard exposure under multiple SLR scenarios.

Sea Level Rise Vulnerability Assessment, Dana Point, California
Coastal scientist responsible for assisting in the preparation of adaptation strategies related to future SLR projections for the City of Dana Point to inform planning policies required as part of an update to the City’s LCP. Strategies covered a diverse coastline, including steep bluffs, an engineered harbor, and low-lying sandy beaches.

NOAA Digital Coast Fellowship, Madison, Wisconsin
Coastal scientist for this project designed to improve community resilience to coastal flood hazards through an analysis of current federal and state environmental policies and programs, ultimately seeking to establish a more holistic approach to coastal flood risk management.

Graduate Research Assistantship, Stony Brook, New York
Research assistant for the support and technical expertise on several projects dealing with coastal water quality and ecosystem health. Prepared written material, technical analyses, and data visualizations for federal reports and peer reviewed literature.

Resiliency Institute for Storms and Emergencies, New York
Research assistant responsible for analytic support focused on evaluating current ecosystem monitoring efforts and the impacts of large storm events on the coastal ecosystems of New York as part of Hurricane Sandy recovery efforts.
Lilly Rudolph, AICP | Environmental Planner

Professional Summary
Ms. Rudolph is a senior planner in Rincon’s environmental and sciences and planning group. In this capacity, she is responsible for managing assignments for municipal planning agencies and preparing and reviewing CEQA and NEPA environmental assessments, technical studies, and planning documents. Over her career in planning, community development, and economic development, Ms. Rudolph has developed a broad background of experience ranging from preparing community plans, form based codes, and historic resources surveys to overseeing civic engagement and outreach strategies. She has prepared and managed long range planning documents, including general plan updates, form based codes, design guidelines, community plans, and ordinances and is experienced in the preparation and management of CEQA documents for plan areas and development projects.

Her relevant project experience includes the following.

Coastal Zoning Permit (33834 Pacific Coast Highway), Malibu, California
Environmental planner for a coastal development permit to allow construction of a new 10,342-square-foot, 2-story single family residence and associated development; including a site plan review for construction in excess of 18 feet in height; and a demolition permit for the demolition of a 2-story single family residence and detached garage, driveway, pool/spa, stairway, and a portion of concrete landings, located in the rural residential district.

Coastal Zoning Permit (5939 Busch Drive), Malibu, California
Environmental planner for a coastal development permit to construct a new 7,350 square-foot, 2-story single-family residence and associated development; including a variance for the fuel modification of the residence to extend into environmentally sensitive habitat area, a site plan review for construction in excess of 18 feet in height; a minor modification for the reduction of the required front yard setback; and a demolition permit for the demolition of remnants of a 1,596-square-foot residence and 474-square-foot attached garage that were destroyed by the woolsey fire located in the rural residential-two acre zoning district.

Coastal Zoning Permit (25260 Malibu Road), Malibu, California
Environmental planner for a coastal development permit to allow a new 5,087-square-foot, single family residence and associated development and a permit for the demolition of a 2,400-square-foot, multi-family residential structure and sea wall and offer to dedicate lateral public beach access along the shoreline located in the multi-family beach front zoning district.

Coastal Zoning Permit (3881 Puerco Canyon Road), Malibu, California
Environmental planner for a coastal development permit amendment amending an administrative coastal development permit to relocate existing private retaining walls out of the public right-of-way, including a variance for construction on steep and a demolition permit for the removal of existing retaining walls, located in the rural residential five-acre zoning district.