Appendix 1

Cost Estimates
## Preliminary Construction Cost Estimate

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>ITEM DESCRIPTION</th>
<th>UOM</th>
<th>UNIT COST</th>
<th>QUANTITY</th>
<th>TOTAL COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Temporary Construction Fencing</td>
<td>LF</td>
<td>$10</td>
<td>2,000</td>
<td>$20,000</td>
</tr>
<tr>
<td>2</td>
<td>Temporary Shovel</td>
<td>LF</td>
<td>$5</td>
<td>500</td>
<td>$2,500</td>
</tr>
<tr>
<td>3</td>
<td>Temporary Construction Access (fabric w/ 12&quot; baserock, crane mat)</td>
<td>LF</td>
<td>$25</td>
<td>500</td>
<td>$12,500</td>
</tr>
<tr>
<td>4</td>
<td>Asphalt Concrete (Carmelo St)</td>
<td>TON</td>
<td>$10</td>
<td>100</td>
<td>$1,000</td>
</tr>
<tr>
<td>5</td>
<td>Sheet Piling Aesthetic Treatment (TBD)</td>
<td>SF</td>
<td>$10</td>
<td>15,000</td>
<td>$150,000</td>
</tr>
<tr>
<td>6</td>
<td>5,000 gpm Pump Station</td>
<td>LS</td>
<td>$500,000</td>
<td>1</td>
<td>$500,000</td>
</tr>
<tr>
<td>7</td>
<td>Treatment Wetlands (Stormwater BMP)</td>
<td>SF</td>
<td>$20</td>
<td>20,000</td>
<td>$400,000</td>
</tr>
<tr>
<td>8</td>
<td>Storm Drain Inlet</td>
<td>EA</td>
<td>$4,000</td>
<td>1</td>
<td>$4,000</td>
</tr>
<tr>
<td>9</td>
<td>Storm Drain Manhole</td>
<td>EA</td>
<td>$5,000</td>
<td>1</td>
<td>$5,000</td>
</tr>
<tr>
<td>10</td>
<td>24&quot; HDPE SDR 17 Storm Drain</td>
<td>LF</td>
<td>$60</td>
<td>700</td>
<td>$42,000</td>
</tr>
<tr>
<td>11</td>
<td>8&quot; PVC SDR 35 Sanitary Sewer</td>
<td>LF</td>
<td>$70</td>
<td>150</td>
<td>$10,500</td>
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<tr>
<td>12</td>
<td>Sanitary Sewer Manhole</td>
<td>EA</td>
<td>$5,000</td>
<td>1</td>
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<tr>
<td>13</td>
<td>Relocate Water Lateral at Crossing</td>
<td>EA</td>
<td>$20,000</td>
<td>5</td>
<td>$100,000</td>
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<tr>
<td>14</td>
<td>Relocate Gas Lateral at Crossing</td>
<td>EA</td>
<td>$20,000</td>
<td>10</td>
<td>$200,000</td>
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<tr>
<td>15</td>
<td>Total</td>
<td>$15,000,000</td>
<td>1</td>
<td>$15,000,000</td>
<td></td>
</tr>
</tbody>
</table>

### Escalation 2013 to 2018 dollars (at 5% per year)

- 128%  
- 128%  
- 128%  
- 128%  
- 128%  
- 128%  
- 128%  
- 128%  
- 128%  

### Total Project Cost

- $15,000,000
- $15,000,000
- $20,000,000
- $19,000,000
- $24,000,000
- $11,000,000
- $17,000,000
- $8,000,000
- $8,000,000
## PLANNING LEVEL COST ESTIMATE

**JOB # 7871**

**SCENIC ROAD SHORE PROTECTION**

Prepared: 05/16/13

Moffatt and Nichol

**Estimate By:** DT/NN

<table>
<thead>
<tr>
<th>#</th>
<th>DESCRIPTION</th>
<th>QTY.</th>
<th>UNIT</th>
<th>UNIT COST</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alt 1 – Rock Revetment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>MOBILIZATION / DEMOBILIZATION</td>
<td>1</td>
<td>LS</td>
<td>$48,000</td>
<td>$48,000</td>
</tr>
<tr>
<td>2</td>
<td>EXCAVATION</td>
<td>20000</td>
<td>CY</td>
<td>$6</td>
<td>$120,000</td>
</tr>
<tr>
<td>3</td>
<td>BEDDING</td>
<td>1200</td>
<td>TONS</td>
<td>$30</td>
<td>$36,000</td>
</tr>
<tr>
<td>4</td>
<td>ARMOR ROCK</td>
<td>6500</td>
<td>TONS</td>
<td>$70</td>
<td>$455,000</td>
</tr>
<tr>
<td>5</td>
<td>RESTORE BEACH ACCESS</td>
<td>1</td>
<td>LS</td>
<td>$25,000</td>
<td>$25,000</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$684,000</td>
</tr>
<tr>
<td>Contingency (25%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$171,000</td>
</tr>
<tr>
<td>Survey, Geotech, Engineering &amp; Design (15%)</td>
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<td></td>
<td>$128,250</td>
</tr>
<tr>
<td>Environmental Docs &amp; Permits (25%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$213,750</td>
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<tr>
<td>Contract Admin &amp; Construction Support (15%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$128,250</td>
</tr>
<tr>
<td><strong>TOTAL ALT 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$1,325,250</td>
</tr>
</tbody>
</table>

| **Alt 2 – Seawall + Revetment** | | | | | |
| 1 | MOBILIZATION / DEMOBILIZATION | 1 | LS | $162,000 | $162,000 |
| 2 | EXCAVATION | 8000 | CY | $6 | $48,000 |
| 3 | BEDDING | 670 | TONS | $30 | $20,100 |
| 4 | ARMOR ROCK | 3700 | TONS | $70 | $259,000 |
| 5 | SOLDIER PILE WALL | 450 | LF | $4,000 | $1,800,000 |
| 6 | RESTORE BEACH ACCESS | 1 | LS | $25,000 | $25,000 |
| **Subtotal** | | | | | $2,314,100 |
| Contingency (25%) | | | | | $578,525 |
| Survey, Geotech, Engineering & Design (12%) | | | | | $347,115 |
| Environmental Docs & Permits (10%) | | | | | $289,263 |
| Contract Admin & Construction Support (10%) | | | | | $289,263 |
| **TOTAL ALT 2** | | | | | $3,818,265 |

| **Alt 3 – Reinforced Earth Wall + Revetment** | | | | | |
| 1 | MOBILIZATION / DEMOBILIZATION | 1 | LS | $172,000 | $172,000 |
| 2 | EXCAVATION | 9000 | CY | $6 | $54,000 |
| 3 | BEDDING | 750 | TONS | $30 | $22,500 |
| 4 | ARMOR ROCK | 3900 | TONS | $70 | $273,000 |
| 5 | SOIL NAIL WALL | 12750 | SF | $150 | $1,912,500 |
| 6 | RESTORE BEACH ACCESS | 1 | LS | $25,000 | $25,000 |
| **Subtotal** | | | | | $2,459,000 |
| Contingency (25%) | | | | | $614,750 |
| Survey, Geotech, Engineering & Design (15%) | | | | | $461,063 |
| Environmental Docs & Permits (10%) | | | | | $307,375 |
| Contract Admin & Construction Support (10%) | | | | | $307,375 |
| **TOTAL ALT 3** | | | | | $4,149,563 |

| **Alt 4 – Full Height Wall and Revetment** | | | | | |
| 1 | MOBILIZATION / DEMOBILIZATION | 1 | LS | $333,000 | $333,000 |
| 2 | EXCAVATION | 8200 | CY | $6 | $49,200 |
| 3 | BEDDING | 500 | TONS | $30 | $15,000 |
| 4 | ARMOR ROCK | 2700 | TONS | $70 | $189,000 |
| 5 | SECANT PILE WALL | 850 | LF | $7,500 | $6,375,000 |
| 6 | RESTORE BEACH ACCESS | 1 | LS | $25,000 | $25,000 |
| **Subtotal** | | | | | $6,986,200 |
| Contingency (25%) | | | | | $1,746,550 |
| Survey, Geotech, Engineering & Design (15%) | | | | | $1,309,913 |
| Environmental Docs & Permits (10%) | | | | | $873,275 |
| Contract Admin & Construction Support (10%) | | | | | $873,275 |
| **TOTAL ALT 4** | | | | | $11,789,213 |
Appendix 2

Public Comment Letters
Begin forwarded message:

From: Brown Fred <fbcarmel@comcast.net>
Date: April 11, 2013, 14:24:12 PDT
To: "Holm, Carl P. x5103" <HolmCP@co.monterey.ca.us>, "Medema, Dirk x5647" <MEDEMAD@co.monterey.ca.us>
Subject: Scenic Armoring Project CSA1

To: Monterey County Resource Management Agency
Carl P Holm, AICP Deputy Director
Dirk Medema, Environmental Services Manager

From:
CSA1 Citizens Advisory Committee member Fred Brown

Recommendations regarding the
Scenic Road Armoring Project and the Ecosystem Protective Barrier

April 11, 2013

Dear Mr. Medema and Mr. Holm:

At the special CAC meeting for CSA1 held March 26, the committee members were given an overview of the alternative proposals put forth by Whitson Engineering for the Scenic Road Protection and Ecosystem Protective Barrier projects (Carmel River / Lagoon Community Meeting - Project Alternatives, March 25, 2013). Committee members were requested to review these proposals and each member was offered an opportunity to provide a recommendation for the one proposal that would provide the best solution.

First, allow me to address the problem and why a solution is necessary, as I do not believe any of these proposals have fully embraced the daunting task of envisioning the full extent of the eventual dynamics that will unfold.
It is my understanding, although only by inference, that the federal agencies who have responsibility for directing the Carmel River's egress into Carmel Bay have determined that the Carmel River will be mechanically diverted to the north end at the mouth of the river and that no other outlet, either by natural breaching or otherwise will be allowed. This is a very important point to consider, as this has never occurred at any time in the past. Additionally, soon the Carmel River is almost certain to have greater water flow than anytime in recent history with the impending removal of the San Clemente Dam and the reduced take by CalAm. Many have suggested that the average level of the ocean will increase incrementally over the next decades as well.

Assuming these convergent predictions come to pass, the management of the river water flowing solely in a northerly breach and the unknown dynamics of interacting with the ocean's wave action, fluctuating tides and storm surges presents a scenario that the proposals have not fully taken into consideration.

My concern for the underdeveloped analysis of the proposals is that I have witnessed the Carmel River when it has been breached to the north on two separate recent occasions. In my opinion, none of the proposals would have prevented the erosion of the parking lot, restroom facilities or the bluffs below Scenic Road. The water flow would have been too swift and the ocean wave action too strong for any of these solutions to offer the protection they suggest.

Any of the solutions offered would appear to work under normal conditions. That is not sufficient. It is exactly the abnormal conditions that must be taken into consideration.

When we have El Niño conditions and strong winter storms, the ocean flows over the top of the parking lot and down Carmelo Street. I have stood on Scenic Road where the sand ramp is currently and watched the waves flow up the beach and the bluffs and onto Scenic Road. Either of these conditions would allow the water from the ocean and the river to get in behind the armoring devices that are suggested. They would be crippled and soon washed away with the outgoing tide and wave backwash.

When the river has breached to the north, it has travelled along the base of the Scenic Road bluffs, removing all the sand on the beach. The river extended along the entire bluffs and exited past the cement steps leading down to the beach at Ocean View Avenue. There once was a large hill of dirt and sand that lay between the Ocean View Ave steps and the Valley View steps. The northern breach of the river created a large depression that collects rainwater and ocean water during high tides. None of these
proposals address the bluff scouring that will take place from the Valley View steps and beyond (which now are merely steps to a bench).

The small curvature at the termination of the "rip-rap" in alternative proposal #1 and #1A would not stop the flow from going where it has gone before. The river will proceed further along pushed by waves and flowing into the bluff, as this area under Isabella Avenue now is lowest part of the beach. The rip-rap is not high enough to withstand ocean wave surges, and it is probably not deep enough to avoid being undermined and destroyed. Therefore, I cannot support alternative #1.

It is apparent to me that with a continuous flow of water exiting the river that there will not be any sand covering the armoring, regardless of which alternative proposal is used, for most of the year. Therefore, these armoring devices will be exposed. The entire CRSB from the parking lot to the point would have very little sand after the river was opened and flowing, allowing the wave action to further cause havoc with the bluffs when the river flow subsided. Alternatives #2, #3 and #4 would leave the area looking like the Los Angeles River and are not feasible or worthy of consideration.

None of the armoring devices are natural or aesthetically acceptable for this location. A location near Carpenteria was given as an example of armoring and is unfortunately extremely undesirable. An additional problem is that the armoring using rip-rap tied together with cable will impede the access to the beach from the beach parking lot. The visiting public will be required to climb over the rock barrier to get to the beach. This is dangerous and may be in violation of coastal access laws.

The Ecosystem Protective Barrier does not seem necessary. The lagoon filled to approximately 10 feet 7 inches the other day and breached. The sandbags provided some protection, however, none of the properties experience any flooding. If the river is breached to the north, the lagoon level should never get any higher, and if it does the county could open the mouth as it has done in past. There is no need to spend millions of dollars on a wall that is not "eco-friendly" and would be an artificial impediment in the Carmel River Lagoon and Wetlands Natural Preserve. Also, note that a California State Preserve cannot have any roads in it and I'm quite sure that large cranes and heavy equipment in the Preserve would be highly detrimental to the wildlife that make their homes there - some of which actually have federal protection.

My conclusion is that the study performed by the engineering firm is woefully inadequate and does not come close to providing a feasible solution due in part to their misunderstanding of the extreme conditions that occur along Carmel River State Beach. The proposals, if implemented would, in the event
of a major storm, be washed away like toothpicks stuck in the sand and the bluffs beyond the armoring would be unprotected and severely compromised as in the past.

Therefore, I cannot recommend any of the proposals and would like to make it clear that I oppose all of them as being inadequate and uninspired.

My recommendation is that they go back to the drawing board, obtain more and better information, and design a solution that will actually provide the level of protection required. The proposed solutions will not work on any level.

Sincerely,

Fred R Brown
CSA1 Citizens Advisory Committee Member

PS: I would appreciate you forwarding this to all those involved in the proposals.
May 13, 2013

Mr. Carl Holm,

On behalf of the Carmel Area Waste Water District (CAWD) I am providing this letter to Monterey County to formally take part in the feasibility discussion of the Carmel Lagoon Ecosystem Protective Barrier (EPB). Historically the District has remained silent to projects in the vicinity of the wastewater treatment plant which have been proposed within the limits of the FEMA designated flood hazard. As you are aware the Wastewater treatment plant serving the City of Carmel, Pebble Beach and surrounding areas is located adjacent to the Carmel River West of Highway 1 and has been in this location since 1936. The district currently serves the occupants of more than 6000 residential and commercial units in its own service area and another 4500 units by contract in Del Monte Forest. The District is responsible to the constituents of the District to ensure the continuous operation and financial stability of the wastewater treatment facility, as well as maintain the health, safety and welfare of both employees and the public.

The Wastewater treatment plant is completely located within the FEMA flood hazard zone “AE” and has a Westerly base flood elevation (BFE) of 16ft MSL, NAVD88 and an average BFE of 18ft MSL. The treatment plant has been designed to be resistant to the periodic flooding which has occurred on several occasions over the decades. Outside of periodic storm related flooding the plant does not experience any adverse water related impacts. Development of the plant as well as the surrounding areas has been encouraged due to the current practice of maintaining the Carmel Lagoon water level through the practice of mechanically breaching the sand bar. It is very important that the District fully understand the impacts any deviation from this practice might impose.

I have requested that the CAWD Principal Engineer provide an evaluation of the potential foreseeable impacts of the EPB to the operation of the Wastewater treatment plant. Mr. Lander comes to the District with many years of experience with floodplain administration and was previously a FEMA
Certified Floodplain Administrator for the County of Napa. After careful evaluation of the information provided by the County thus far, as well as inspection of District topography and historic information there are three significant concerns which will require additional consideration:

1) The County has provided limited documentation regarding the proposed floodplain encroachment and potential effects on the effective Federal Insurance Study (FIS) adopted by the County. Understanding that the design process is early in development the District requests that the County provide for District review a copy of the duplicate effective model in HEC-RAS file format for the affected reach of the river as well as the proposed conditions model. Prior to final approval by the County to begin development of detailed construction plans (of any proposed design) the District requests that a Conditional Letter of Map Revision (CLOMR) per Chapter 44 Code of Federal Regulation (CFR) 65.8 be provided for review and comment.

2) The District has reviewed each of the design proposals presented by County staff. The District understands that all designs anticipate a potential Lagoon static water level of 16ft MSL or greater if the practice of breaching the lagoon is discontinued. This new water level would be of significant concern to the district as the elevation of the Treatment plant is 14ft MSL (Western boundary) to 17MSL (Eastern boundary). I can affirm that the Treatment plant is not protected by a levee or other flood barrier at this time and that any berms existing adjacent to the plant are neither continuous nor constructed to impede water. The District requests that the EPB be expanded to also include a protective barrier around CAWD to prevent water intrusion from elevated Lagoon water levels not associated with the historic and anticipated riverine flooding.

3) The District does have a number of geotechnical investigations which revealed that ground water elevations within the Treatment plant property ranged from 25ft below grade to 55ft below grade. Groundwater levels outside of the Treatment plant approaches 10ft from grade in locations. Design assumptions and construction procedures have been made based on these observed ground water elevations. The District would like to raise a concern that a change in the static water level of the lagoon for extended periods of time may effect ground water levels. The correlation of groundwater levels and the lagoon level have not been adequately analyzed and geohydrology is beyond the expertise of the District. Elevating the groundwater levels within 20ft of the surface in and around the Treatment plant property may have an effect on both the future construction of facilities as well as maintenance costs. You may be aware that the District is currently beginning design of major renovation of the existing facilities and the cost of operating the Plant falls on the residents of the district. Any additional costs to the Plant operation will be passed on to the Constituents which could be significant if this issue is not adequately addressed.

In conclusion I would like to request that the District be advised of the progress the County makes on pursuing the possibility of the EPB. Also I would like the County to assist in assuring the constituents of the District that the final proposal will not bring an increased cost to the District. Finally I would also like
to request that the County assist in the resolution of the above concerns so that the District can support the project when proposed.

Sincerely,

[Signature]

Barbara Buikema
General Manager
Thank you for the invitation to the two meetings this week on the Lagoon and Scenic Drive. I’ve reviewed the documents on the County web site and would like to propose an alternative to the Lagoon barrier that might be best considered during the environmental analysis in that it could be classified as a “no-build” option - but I’d prefer it be referred to as a Multi-Species Management Option.

**MULTI-SPECIES MANAGEMENT OPTION - WITHOUT A BARRIER**

As a landscape architect, life-long environmentalist, surfer, and homeowner living on the Carmel River Lagoon, I’ve been bothered that, while we are dismantling an old dam on the Carmel River, we are, at the same time, considering building one at the other end. I submit that a similar long-term outcome will befall the new one - mostly because like the first, neither is natural or self-sustaining. San Clemente Dam is less than 100 years old and was clearly non-functional decades ago. The proposed vinyl Lagoon wall will create a dead-zone behind it, disconnected from the Lagoon’s ecosystem and has a manufacturer’s projected life span of 50 years. What then?

1. A Multi-Species Management Plan benefits more than just Steelhead. Frogs, Foxes, Bobcats, Hawks, Voles, Rabbit, Deer, Egrets and other native species depend on the Lagoon and its littoral zone. A Multi-Species plan can use infrequent manual breaching instead of a vinyl wall for flood control - breaching would be inexpensive if allowed through weather/tide/wave prediction rather than emergency declaration (as it was done by the artichoke farmers decades ago). The trade-off is infrequent breaching in exchange for a Lagoon with a full littoral zone.

2. A vinyl barrier of either 16’ or 19’ will still require bulldozers on the beach - for summer closure and for breaching in the event of conditions that will over-top the barrier.

3. Instead of spending millions on a vinyl barrier, stormwater undergrounding and pumps, establish a fund for: beach management (enhancement and flood control), water quality facilities at the current surface run-off points, educational observation decks at the dead-ends of Camino Real, River Park, Monte Verde and somewhere along the open edge of Carmelo near the Carmel River State Park parking lot.

4. Long term management that values the whole ecosystem would not include a dead backwater behind vinyl sheet-pile. Instead, through education, the Lagoon’s littoral zone can be improved over the years by the cooperative efforts of adjacent land-owners. My own lot line is...
about 20’ out in the lagoon - beyond our landscaped use-area. Other lots vary, but all can improve the littoral zone. We all care about the Lagoon and it’s ecological health.

I am asking that the environmental analysis include a genuine effort to compare what is lost ecologically with what is gained between a vinyl barrier proposal and a multi-species management proposal with no barrier.

Paul Deering
Bill and Tom –

You may have received this already, but I didn’t see your names on this e-mail.

Larry Hampson, Senior Water Resources Engineer
Monterey Peninsula Water Management District
P.O. Box 85, Monterey CA 93942
(831) 659-2543 (office) or (831) 238-2543 (cell)

Friends of the Carmel River Lagoon:

I thought you all might like to read these oppositional views from some of the HELM neighbors, which have caused Clive and me to revise our EPB Project Plan to propose moving the barrier out into the lagoon at a site to be recommended by hydrologic engineers and to be approved by all pertinent agencies especially State Parks. This would remove the "backwater" concerns, and the barrier could be covered by reeds and other native vegetation so that it would be virtually invisible to homeowners along the Lagoon. The homeowners along the Lagoon would not need to consent to a permit for such a site. The goals would be wholly environmental--to increase the quality and quantity of water in the Lagoon and to allow natural breaching of the barrier beach.

Your comments are welcome, as ever.

Lorin
CRWC Secretary

Lorin Letendre
----- Forwarded Message -----

From: "jackandmj@comcast.net" <jackandmj@comcast.net>
To: Lorin Letendre <letendre@sbcglobal.net>
Sent: Mon, April 5, 2010 11:25:30 PM
Subject: Additional Info for MJ’s Report

Opposing Homeowners:

Carmelo: 30 - Stroud  
   29 - Deering / Kennedy  
   27 - Schiebold  
   26 - Cooperman

Camino Real: 25 - Baumgartner

Monte Verde: 48 - Brown

Notes with reasons from above list attached above. MJH
Subject: Lagoon Barrier Proposal Study Opposition / Lagoon Fronting Property Owners (All Part Time Residents)

We did not receive a ballot to vote on this study, but would like it recorded that we oppose funding this study. We feel that this wall would obstruct our "natural unobstructed view" of the beautiful hills, birds etc., this an important factor when we purchased our home. The protection of the steelhead and frogs are of much lesser significance to us! Hope we receive other ballots that are distributed.

Sally and Henry Baumgartner
26372 Camino Real
Carmel 93923 April 4, 2010
831-625-4062

From: "Kathleen Schiebold" <schiebold@sbcglobal.net>
To: jackandmj@comcast.net
Sent: Sunday, April 4, 2010 10:09:52 PM GMT -08:00 US/Canada Pacific
Subject: I vote NO

I own the property at 26371 Carmelo Street. I was in attendance at the 1/18 meeting.

I oppose the process to allow an engineering and feasibility study for the flood wall. Not only is the barrier unsightly, but it will adversely impact the natural beauty of our neighborhood.

Jack and M.J.,

We regret that we were unable to attend your Jan. 18 meeting. Our response to your survey is below.

(X) We oppose the process to allow an engineering and feasibility study which can lead to a protective barrier.

As homeowners of perhaps the longest frontage on the Carmel River Lagoon, we highly value the natural beauty of the Lagoon and the views from our homesite, and oppose any structure that would diminish the value of those natural assets.

Thank you,

Alice Brown
Donald Brown
26373 Monte Verde St. April 3, 2010
Jack & MJ,

We do wish to make clear our opposition to spending money studying any wall or barrier surrounding the Lagoon. Please see my earlier emailed PDF options comparison for our reasons for this opposition.

Annalisa & I really appreciate your efforts on this issue but we disagree with the solution being proposed.

Address - 26395 Carmelo
Paul Deering
DEERING DESIGN
530-756-9356

As homeowners who live on the Carmel River lagoon, we are opposed to erection of this unsightly wall because it is a man-made intrusion that will have a significant adverse impact on the natural beauty of our neighborhood. We don't believe that alternative solutions to the flooding issues have been adequately explored and, therefore, oppose spending any money on this proposal.

NAME: Linda and Daniel Cooperman ADDRESS: 26359 Carmelo Street DATE: April 3, 2010

Hi Jack and MJ,

As you know, I am completely opposed to the barrier for multiple reasons, including the effect it will have on the wild life. I believe you have my signature X in the no box, but want to be sure my voice is heard in the negative designation when you have this meeting, and thereafter.

Connie Stroud, 26407 Carmelo

An interesting comment: “It's intriguing that your neighbors would rather face periodic flooding than have their precious view minimally obstructed! Such is life...”
Comments on the Draft Technical Report for the EPB and Scenic Road Projects
By Lorin Letendre, Chair, CSA-1 Citizens Advisory Committee

Note: These comments and questions are based mostly on previous suggestions and input into earlier versions of these two projects by Larry Hampson and Kevan Urquhart of MPWMD, Jeff Haltiner of ESA/PWA, Tom Moss of the MPWRA, and Ed Ballman of Balance Hydrologics. In addition, I have asked Brian Cluer, fluvial geomorphologist at NOAA, to comment on the draft technical report (he volunteered to do so), but have not yet received his response.

**EPB Project:**
1. The Design Options are well-documented and adequate to achieve the goals of flood-protecting the homes along the north side of the lagoon, improving the lagoon habitat for threatened species, and providing for natural breaching of the barrier beach at the lagoon. In addition, many of the analyses recommended by the Lagoon Technical Advisory Committee were completed as part of this analysis and feasibility study.

2. For a variety of reasons, I favor Alternative 1A; Alignment #1 (15” off property lines); EPB wall height of 16 ft NAVD 88; No Bypass System (this may not be feasible though); and Limited Access.
   Some of the reasons are:
   --This allows for mostly natural drainage of storm water runoff rather than having to install expensive pumping systems
   --It moves the floodwall farther away from the houses, where it can be mostly covered with natural vegetation and thereby not adversely impact the view shed
   --It allows for natural breaching of the barrier beach but the lower wall height limits the impact on the view shed
   --It is less costly that the other alternatives
   --The construction impacts are less than with other alternatives
   --However I recognize that it will not remove the homes along the north side from the 100-year flood zone so they will still need flood insurance and the barrier beach may still need to be opened with bulldozers should the 16-foot level be insufficient to cause natural breaching.

3. There is a question as to whether the Options address the upstream flooding risks on Mission Ranch and Mission Fields or on the levees that protect these properties. These may have been considered but there is no indication in the report as to whether there are no risks for these areas as a result of the installation of the EPB wall.

4. Is it allowable under current state storm water regulations to pump untreated storm water directly into the lagoon (a wetlands preserve) during or after a storm event?

5. More mention needs to be made in the final version of this report of the ecological benefits of higher lagoon levels once the EPB is installed. The MPWMD staff and the CSUMB Watershed Institute staff have considerable knowledge in this area and should be consulted on this question. As Larry Hampson stated in his October 21, 2009 memo, “A higher level in spring before the onset of the dry season could result in improved aquatic habitat conditions for a longer period for steelhead and California red-legged frogs (CRLF).”
6. Is the projected completion date of 2018 really feasible? What is the detailed schedule that supports this completion date?

7. Are there issues with the CA State Department of parks and Recreation with regard to incursion of such an unnatural structure into their protected wetlands? Or will the CDPR cede that land to the County and let the County deal with the wetlands issue? Will there be a need to mitigate for loss of wetlands?

8. Who will pay for the on-going maintenance of the floodwall and pump system? Will there be a need to establish a new County Service Area to cover these costs?

9. What will be the process to ensure adjacent property owner buy-in to this project? This includes the property owners in Mission Fields, who have expressed concern over the possible impact on their levees and of flooding caused by a higher lagoon level.

10. What provisions are being made for terrestrial access to and from the lagoon once the floodwall is installed?

11. What are the provisions for ensuring that the CAWD facility is not flooded by the EPB wall?

12. Which governmental agencies will need to review and approve the EPB project?

13. What is the tie-in with the Big Sur Land Trust Lower Carmel River causeway project?

14. What is the likely percolation rate from the lagoon into the ocean when lagoon levels are higher than the current maximum height of 15 ft. NAVD88?

15. What are the likely effects on the lagoon levels once Cal-Am has ceased its over-umping of the River?

16. When will the Biological Analysis be completed for review?

17. How will we confirm that a natural breach of the barrier beach will occur at the present estimate of approx. 15 ft. NAVD88?

**Scenic Road Project:**

1. Thank you again for a well-considered and well-documented set of alternatives and a thorough analysis of the conditions at Carmel River Beach and the Scenic Road bluffs.

2. For a variety of reasons, I favor Alternative 1-Rip Rap for this project. Reasons are:
   --It is likely to be the least costly alternative
   --It requires the least amount of disruption to driving and walking traffic on Scenic Road
   --It protects the bluffs and parking lot both against River erosion from a natural, northerly breach as well as high wave erosion
   --It is more natural-appearing and will be covered by sand or vegetation most of the year
   --It can divert the River during a northerly breach away from the bluffs near Valley View
   --It avoids the disadvantages of a seawall that can affect beach access and even remove much of the sand from the beach through scour
--As your report states, it has several significant benefits: minimized costs, flexibility, energy dissipation, reparability, and visual appearance—more benefits than accrue from the other three alternatives.

3. Is it still possible that the River or high waves can divert around the “toe” or westerly end of the rip-rap and erode the bluffs near Valley View and west of that area?

4. Will public access to the beach be restored at the Valley View steps?

5. Will there be any changes to the size and height of the State Parks parking lot, e.g. will some of the spaces that were eroded by river action in recent years be restored?

6. How will the maintenance costs of whichever alternative is selected be covered?

7. Were there enough soil samples taken along Scenic Road and its bluffs to support the analysis?

I recognize that some of these questions may be addressed and answered at the upcoming Community Meeting and CSA-1 public meeting, and I look forward to hearing your presentations.
Annette S. Thorn MD MPH  
26435 Scenic Road  
Carmel, CA 93923  
Tel 831 233-8824  
Email: annathorn@aol.com

April 17, 2013

Board of Supervisors  
Monterey County  
Salinas, CA

Dear Members of the Board:

Thank you for the hard work that has gone into developing the conceptual alternatives for the proposed Scenic Road Armoring Feasibility Report and Ecosystem Protection Barrier Feasibility Report. It is very encouraging to see progress being made in the analysis and planning process. As requested, I am offering the following public input for consideration by the Board of Supervisors.

My understanding is that a rip rap system is the least costly solution and therefore the most desirable solutions. It would seem that it also offers the most flexible design for modification should there be unanticipated consequences over time. Therefore, I support Alternative 1A - the rip rap alternative, with the followings considerations:

1. The rip rap armoring is extended to Valley View Avenue on the North, the EPB/Carmelo St on the South, and Scenic Road on the East.

   On many occasions over the years, the community and County staff have watched the ocean push the river behind designed outlets and undermine the bank near Valley View, have watched high tides, high wave events, or high river flows erode the foot of Scenic Road, and have watched high flows from the lagoon erase the southern end of the parking lot and the peninsula beyond that. It does not seem that the length, width, and depth of the current proposal adequately protects against these extreme events, which would seem to make the current designs destined for failure. It can be made successful by increasing the length, width up the road slope, and depth of the current proposal.

2. The rip rap armoring is increased in the weight of the rock.

   It does not seem that the current rock size is adequate to withstand both very high anticipated ocean forces as well as very high river flow rates.

3. The rip rap armoring is composed of rock chosen to blend with the natural surroundings.

   While the rip rap will predominantly be covered, when it is exposed it should look like other rock on the beach.

4. The rip rap armoring filter cloth is replaced with a permanent aggregate system or designed and funded for periodic replacement.
A properly sized gravel system would seem preferable, since it should be permanent. If that is not considered effective for some reason, a very long lasting geotech fabric could be considered as long as a plan for replacement and funding is established in advance.

5. The project includes design to ensure the integrity of the road at the top of slope as well as the toe of the slope.

The slope embankment along this section of Scenic Road has been eroded over the recent years so that it is currently steeper than the angle of repose of the sandy soil. Consequently, many areas of Scenic Road between Carmelo and Valley View continue to crumble and result in a continued narrowing of the pavement. As part of this project the slope embankment of the road needs to be stabilized to avoid failure.

6. More geotechnical exploration along Scenic Road.

If the depth of the bedrock assumptions are wrong, the preliminary engineering concept may need to be changed so funds are not wasted on environmental studies of a concept that must be changed. It is important to know the armoring has a solid foundation; otherwise it is destined for failure.

7. An analysis of past and projected river flow rates is added to the feasibility report.

The San Clemente Dam Removal, the EPB, and other watershed and climatic changes could greatly increase episodic flow rates. Failure to design for higher than current flow rates could again result in a design destined for failure.

If these measures are not taken, or a rip rap system becomes more costly, the next priority should be the low wall set away from the road, which should be more durable if properly anchored.

If it is necessary to build the armoring within the road right of way because of ownership or permitting constraints, it would be preferable to use the cement pile wall rather than the shotcrete with tie backs. The shotcrete with tie backs is the least acceptable alternative because of potential undermining by the river and ocean, less structural stability of the tie-backs in sandy soil, and potential interference with current and future utility needs below the road.

It is desirable to design for safe public access to the beach and facilities for all beach users. The beach is a deeply important place for the community, including the older and physically challenged individuals, so appropriate accommodations should be incorporated into the design.

Finally, the County permits for the 101 causeway project and the dam removal projects need to be examined in light of the costs that the County is having to assume to mitigate the increased number of high river flow boluses at Carmel River Beach that can be created by these projects. Also increased sediment may fill in the lagoon or block the outflow. The permitting process should ensure these consequences are financially mitigated.

Hopefully, the final report will include a life-cycle cost analysis (capital & maintenance cost estimate / usable life expectancy) of each alternative to identify the most cost effective alternative under these worst case scenarios. Again I want to thank the County and their contractors for moving ahead on this very important work.
Sincerely,

Annette S. Thorn MD MPH
26435 Scenic Rd
Carmel, CA 93923
831 233-8824
annathorn@aol.com

cc
Supervisor Dave Potter,
Carl Holm,
Dirk Medema,
Lorin Letendre,
Fred Brown,
Dick Perry
Had a call from a neighbor on Carmello that asked a couple good questions relative to pump;

On average, how many events would trigger use of pump
Approx duration pump would run.

Wants to get sense of noise impact…

Thanks
Carl
From: Holm, Carl P. x5103 <HolmCP@co.monterey.ca.us>
Sent: Friday, March 22, 2013 4:09 PM
To: Moss, Tom Ext.4968; Richard Weber; Nathaniel Milam; Pascua, Jonathan L x8963
Subject: Fwd: [MALWARE FREE]Concern with EPB alignment

FYI

Sent from Carl Holm

Begin forwarded message:

From: "Michael L. Waxer, A.I.A." <mlwaxer@carmeldevelopment.com>
Date: March 22, 2013, 16:05:20 PDT
To: "Holm, Carl P. x5103" <HolmCP@co.monterey.ca.us>
Cc: "Michael L. Waxer, A.I.A." <mlwaxer@carmeldevelopment.com>, Sue Carota <sue@missionranchcarmel.com>
Subject: [MALWARE FREE]Concern with EPB alignment

Carl, good afternoon,
Can't believe how quickly this week came and went.
I'd been meaning to call you to let you know of a large concern I have as regards the draft EPB alignment.

By terminating at the school, the lower Mission Ranch areas will be inundated with water for weeks at a time, potentially, if this were to be built and if it worked properly.

Even though the buildings in the lower are of MR are both 1 foot above the 100 year floodplain level (old datum) so their floor levels will not be adversely affected, the Lagoon would back up between the Bunkhouse and the Quadplex, completely inundating the lower parking lots, and all of the tennis courts, and separating the upper MR area from the lower area by a mass of water.

It would mean that a hotel guest would need to take a boat out to the quadplex unit.

From the very beginning of the EPB conversation it was ALWAYS identified that MR would not be negatively affected, and it was just a matter of selecting the best alignment for the EPB. We had suggested the old fenceline that one sees if they look carefully out to the pasture, and this would have the benefit of maintaining the historic sheep pasture as it is, and letting the lagoon expand to that fenceline.

I understand from reading the draft report that the alignments shown look like they have more to do with analyzing how the stormwater will collect from the developed area to be able to drain properly, which I understand.

Nonetheless, we are concerned when any alignment starts to get shown which would have a deleterious effect on Mission Ranch.

I had shared this information early on with the County, with Rich Weber of Whitson, and with others. What is the best way to get this corrected?
Obviously we hope to attend the meeting coming up Monday.
Can you please clarify the time of that meeting?
Monday is the first night of Passover, so that may affect the ability of some folks, like myself, to attend.

- -  Michael
Appendix 3

Materials from Public, CSA 1, and CSA 50 Meetings
Carmel River Lagoon  
Community Meeting  

Monday, March 25, 2013  

Do We Have Your Contact Information?  

You do not have to sign-in to attend the meeting. Providing information is voluntary.

<table>
<thead>
<tr>
<th>NAME</th>
<th>ORGANIZATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sue Carstens</td>
<td>Mission Ranch</td>
</tr>
<tr>
<td>Michelle Wizer</td>
<td>Mission Ranch, CRWC</td>
</tr>
<tr>
<td>Mark Strudley</td>
<td>NOAA NWS (Weather Service)</td>
</tr>
<tr>
<td>Barbaree Rainow</td>
<td>CRWE</td>
</tr>
<tr>
<td>Tom Moss</td>
<td>MCWRA</td>
</tr>
<tr>
<td>Mark Moncason</td>
<td>Cypress/Carmel Highland/Cal Fire</td>
</tr>
<tr>
<td>Dirk Medema</td>
<td>RMA-PW</td>
</tr>
<tr>
<td>Ricardo Dauphine</td>
<td>Self</td>
</tr>
<tr>
<td>Penny Yau</td>
<td>Century RMA</td>
</tr>
<tr>
<td>Rebaum путешествия</td>
<td></td>
</tr>
<tr>
<td>Steve Backman</td>
<td>Rodriguez et al.</td>
</tr>
<tr>
<td>Nancy A. Armendariz</td>
<td>HELM</td>
</tr>
<tr>
<td>Terry Cline</td>
<td>CSA 750</td>
</tr>
<tr>
<td>Jack M. Hammacorn</td>
<td>32325 Queen Park Rd.</td>
</tr>
<tr>
<td>Lorin Letendre</td>
<td>CRWC &amp; CSA-1</td>
</tr>
<tr>
<td>Barbara Buikema</td>
<td>CAWD</td>
</tr>
<tr>
<td>Drew Landers</td>
<td>CAWD</td>
</tr>
<tr>
<td>Annette S. Thorn</td>
<td>CPLA</td>
</tr>
<tr>
<td>Don Brown</td>
<td>Home Owner</td>
</tr>
<tr>
<td>Jonathan Pascua</td>
<td>RMA-PW</td>
</tr>
<tr>
<td>Rich Weber</td>
<td>Whiston Engineers</td>
</tr>
<tr>
<td>Larry Hampson</td>
<td>MPWMD</td>
</tr>
</tbody>
</table>
Carmel River/Lagoon Community Meeting

Project Alternatives

March 25, 2013
PROJECT(S)

• Alternatives
  – Ecosystem Protective Barrier
    • 3 Alternatives
    • Height Range
  – Scenic Road Protection
    • 4 Alternatives

• Objectives
  – Avoid Beach Management to the maximum extent feasible
  – Protect public infrastructure (e.g.; Scenic Road) from flood damage
  – Protect private homes from flood damage

• Issues
  – River Flow
  – Ocean Tide
  – Urban Runoff
  – Regulatory Requirements
    • US Army Corp
    • US Fish & Wildlife
    • National Marine Fisheries Service
    • CA Water Board
    • CA Fish & Wildlife
    • CA Coastal Commission

• Elevation Reference
  – 1929 Datum (13.0’)
  – 1988 Datum (15.7’)
  – Sand Bag Barrier (16.0’).
Ecosystem Protective Barrier
Sand Bag Barrier

Monte Verde

Camino Real

Sand Bag Barrier
Approximate Height of 16’ EPB

River Park
3. Performance

Concrete was eliminated due to the cost and weight issues related to the soil conditions. Steel likewise was eliminated due to cost, aesthetics, and other life cycle factors. In addition, the corrosion of steel requires on-going maintenance. CMI’s UC-30 UltraComposite FRP Sheet Piling was chosen for the wall due to proven performance, long life cycle, ease of handling, and cost. UC-30 UltraComposite sheets also work better than steel or concrete in small workspaces due to its lightweight characteristics. The wall has protected the homes from many flood events and winter storms which can drastically increase tidal flows. During construction there was a substantial flood event that tested and confirmed the integrity of the sheets and structure even before the installation process was completed.

4. Construction

The sheet piling sub-contractor, Foundation Pile, Inc., began installation of over 2000 feet of CMI UltraComposite sheet piling after being awarded the job in the summer of 2005. Installation was accomplished using a PileClaw™ mandrel and vibratory hammer attached to a medium to large motor/truck crane. The sheets were driven at a rate of up to 100 feet per day in a challenging and limiting marsh environment. The 28’ long sheets were driven more than 20’ into the ground in most cases. The subsurface soils ranged from clayey silts and stiff clays to organic fill. The project was concluded ahead of schedule and under budget.

5. Wall Specifications

<table>
<thead>
<tr>
<th>UC-30 UltraComposite</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth</td>
</tr>
<tr>
<td>Length</td>
</tr>
<tr>
<td>Wall Area</td>
</tr>
</tbody>
</table>
Carpinteria Salt Marsh Enhancement Project Photos

Installation was accomplished using a PileClaw™ mandrel attached to a medium to large motor/truck crane.

The patented i-Beam™ interlock plus hydrophilic sealant minimizes any chance of permeability in the structure.

The 230-acre salt marsh is a very rare area in California where ocean and land actually meet.

The flood control structure was also designed to provide seepage protection for the adjacent roadway.
SCENIC ROAD

Protective Barrier
ALTERNATIVE 3 - REINFORCED EARTH & RIPRAP
CROSS-SECTION
ALTERNATIVE 4 - PILE WALL AT EDGE OF ROAD
RECOGNITION

- EPB Feasibility Study (MCWRA)
  - Wildlife Conservation Board
  - California Department of Fish & Wildlife
- Scenic Road Feasibility Study (RMA)
  - Monterey Peninsula Water Management District
  - California Department of Water Resources
    - Integrated Regional Water Management (IWRM)
Appendix 4

Project Site Photographs
Bluff below Scenic Road, March 8, 2011

State Beach parking lot, March 28, 2011
Photos of EPB site / existing sandbag barrier, 1/25/2013

Camino Real, looking west

Camino Real, looking east
River Park Place, looking southwest

River Park Place, looking southeast
River Park Place, looking southwest

River Park Place, looking southeast
Monte Verde street, looking southwest
Aerial photographs of project area. Source: CaliforniaCoastline.org
Appendix 5

Photographs of April 10, 2013 EPB Mock-Up
And Mock-Up Location Map
View of EPB mock-ups from an eye height of approximately 19' elevation.

View of EPB mock-ups from an eye height of approximately 16' elevation.
View of mock-ups and sandbag barrier at River Park Place.

View of mock-ups from Carmel River State Beach.
Close-up of EPB mock-ups for Alternatives 1A-19'/1B-19' (left) and 1A-16'/1B-16' (right). EPB Alternative 2A seen in background.

Close-up of EPB mock-ups for Alternatives 2A-19' (left) and 2A-16' (right, obscured)
Appendix 6

Brochures and Photographs:
Carpinteria Salt Marsh Enhancement Project
Martinez Marina
Redwood Shores Levee Project
FRP sheet piling being installed at Martinez Marina using vibratory hammer mounted on an excavator arm.

Photos courtesy and © B&B Hughes Construction. www.bbhughesconst.com
FRP sheet piling being installed using vibratory hammer mounted on an ABI piling rig.

Photo courtesy and © B&B Hughes Construction.  www.bbhughesconst.com
FRP sheet pile flood wall at the Carpentaria Wetlands Salt Marsh Preserve. Mid-construction shown above, completed wall with fence board facing shown below. Photographs courtesy and © Crane Materials International. www.cmisheetpiling.com
Carpinteria Salt Marsh Enhancement Project
Carpinteria, CA

Santa Barbara County Flood Control
Santa Barbara Water Conservation District
Carpinteria Salt Marsh Reserve
The Land Trust for Santa Barbara County
City of Carpinteria
Moffat & Nichol
Fugro

Summer 2005
Project Name:
Carpinteria Salt Marsh Enhancement

Location:
Santa Barbara County, Carpinteria, CA

Owner:
Carpinteria Salt Marsh Reserve
The Land Trust of Santa Barbara

Contractor:
Granite Construction
Foundation Pile, Inc.

Engineers:
Moffat & Nichol
Fugro
Santa Barbara Department of Public Works

1. Background

The salt marsh in Carpinteria is one of the last of its kind along the California coast. The 230-acre wetland is one of the few places in California where land and the ocean meet. It provides a unique environment where endangered fish spawn, rare birds nest, and leopard sharks feed in the summer. It is also home to many rare and exotic plants. For many decades, the marsh and its ecosystem have been severely altered due to highway, residential, and commercial construction. Some parts were even used as dumping ground for tires and other junk. In 1977, the Carpinteria Salt Marsh Reserve was established to protect the area.

2. Project Scope

To enhance the marsh, dredging was planned to increase the tidal flow of saltwater that had been limited by sediment, non-native plants and roads. The increase in tidal flow and removal of non-native plants would allow native plants and animals to thrive once again. However, the increased flood risk to the surrounding homes, of substantial value, had to be addressed. After much analysis, it was determined a flood wall would be necessary to protect the 40 homes in question. As well as providing flood protection, the structure was also designed to provide seepage protection for the adjacent roadway. Concrete, Steel, and FRP sheet piling were considered for the wall.

3. Performance

Concrete was eliminated due to the cost and weight issues related to the soil conditions. Steel likewise was eliminated due to cost, aesthetics, and other life cycle factors. In addition the corrosion of steel requires on-going maintenance. CMI’s UC-30 UltraComposite FRP Sheet Piling was chosen for the wall due to proven performance, long life cycle, ease of handling, and cost. UC-30 UltraComposite sheets also work better than steel or concrete in small workspaces due to its lightweight characteristics. The wall has protected the homes from many flood events and winter storms which can drastically increase tidal flows. During construction there was a substantial flood event that tested and confirmed the integrity of the sheets and structure even before the installation process was completed.

4. Construction

The sheet piling sub-contractor, Foundation Pile, Inc., began installation of over 2000 feet of CMI UltraComposite sheet piling after being awarded the job in the summer of 2005. Installation was accomplished using a PileClaw™ mandrel and vibratory hammer attached to a medium to large motor/truck crane. The sheets were driven at a rate of up to 100 feet per day in a challenging and limiting marsh environment. The 28’ long sheets were driven more than 20’ into the ground in most cases. The subsurface soils ranged from clayey silts and stiff clays to organic fill. The project was concluded ahead of schedule and under budget.

5. Wall Specifications

UC-30 UltraComposite

<table>
<thead>
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<th>Depth</th>
<th>Length</th>
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<td></td>
<td>28 ft</td>
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<td></td>
<td>8.5 m</td>
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<tr>
<td>Wall Area</td>
<td>56,700 ft²</td>
<td>5268 m²</td>
</tr>
</tbody>
</table>
Installation was accomplished using a PileClaw™ mandrel attached to a medium to large motor/truck crane.

The patented I-Beam™ Interlock plus hydrophilic sealant minimizes any chance of permeability in the structure.

The 230-acre salt marsh is a very rare area in California where ocean and land actually meet.

The flood control structure was also designed to provide seepage protection for the adjacent roadway.
Redwood Shores Levee Project
San Mateo County California

City of Redwood City
San Mateo County
San Francisco Bay Conservation and Development Commission
US Fish & Wildlife Service
Federal Emergency Management Agency

January 2010
Flood Protection
Redwood Shores Levee Project

Project Name:
Redwood Shores Levee Project

Location:
Redwood Shores, San Mateo County, San Francisco Bay

Owner:
City of Redwood City

Contractor:
Valentine Corporation

Engineers:
Jacobs
Bohley Consulting
The Covello Group

Background:
Redwood Shores is located on San Francisco Bay and is protected from the bay by a system of levees that were constructed many decades ago. The Federal Emergency Management Agency (FEMA) periodically updates Flood Insurance Rate Maps (FIRMs), and these FIRMs determine whether or not an area is considered a flood plain or a Special Flood Hazard Area (SFHA). Areas that are deemed an SHFA are then required to purchase very costly flood insurance. Law mandates that all federally insured mortgages in SFHAs require flood insurance. Since over 90% of mortgages are federally insured, (Fannie Mae, Freddie Mac, FHA, VA) most communities fall under this mandate and aggressively seek a cost-effective solution to avoid SFHA designation.

Project Scope:
In 2008 FEMA began updating maps in the San Mateo County area. These maps had not been updated since 1982. With changes such as new mapping technology, increased concerns about “Katrina-like” flood events and sea level rise, much of the levee system was deemed unacceptable. In fact, the preliminary map released by FEMA in April of 2008 classified Redwood Shores as an SFHA. In order to reverse the SFHA designation, the city along with San Mateo County officials started an intense effort to work with FEMA and the community to find a viable, economically feasible solution to increase the height, stability and overall integrity of their levee system. Adding to the city’s challenge, environmental hurdles appeared at every turn including breeding seasons for endangered species, various US Fish & Wildlife regulations and a very limited construction time window. After analyzing multiple options including steel and concrete, a substantial portion of the improved levees were designed with ShoreGuard™ Vinyl Sheet Piling. The cantilevered flood wall raises the effective level of the levees by adding 4-5 feet of freeboard. Additionally, the sheet piling also provides seepage protection and defends the levee from rodent damage.

Performance:
ShoreGuard had several performance advantages over steel and concrete. First, steel walls need continuous, costly upkeep to prevent excessive corrosion. ShoreGuard is a corrosion resistant product and is virtually maintenance free. Secondly, steel and concrete require heavy equipment at the jobsite for unloading and staging. ShoreGuard is comparatively light and easy to handle which is valuable in environmentally sensitive areas. ShoreGuard and its high strength to weight ratio was a better choice than heavy concrete in the unstable soils of the bay. ShoreGuard provided proven performance in multiple similar California projects and is a sustainable, low-carbon footprint product. Two patented features also figured heavily in the material selection process. The CMI patented I-Beam Interlock™ design is optimized to provide lock integrity and maximum stiffness during high-impact installations. The advantages of the I-Beam Lock have long been recognized and specified by industry experts such as the USACE. In addition, the project utilized the patented ShoreGuard 24” box profile which allows for faster installation and minimal seepage.

Construction:
Due to delays in the permitting process, Valentine Construction had only one month to install the sheet piling wall. During that month, intense storms forced a complete shutdown of the jobsite for almost a week. Teaming up with experienced subcontractor Hughes Construction, crews worked extended hours but they were able to complete the work by the hard deadline. One crew utilized an excavator mounted MKT vibratory hammer while the other used an ABI Mobilram unit. The ABI system is a vertical mast fixed to a track mounted carrier capable of manipulating and controlling the sheet piling to a higher degree than is typically possible with an excavator or crane. Crews were able to achieve over three times the production rate with the ABI unit compared to the excavator. Soil conditions were typical of the Bay Area comprised mostly of soft to firm clays and sandy clay loams.

Wall Specifications:
ShoreGuard 325 Vinyl Sheet Piling

<table>
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<th>Depth</th>
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<th>~4 - 6 m</th>
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<tbody>
<tr>
<td>Length</td>
<td>1,675 ft</td>
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<tr>
<td>Wall Area</td>
<td>26,800 ft²</td>
<td>2490 m²</td>
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</table>
An ABI mobilram unit helped complete installation of nearly 1700 linear feet wall in about 3 weeks.

ShoreGuard Sheet Piling offers a low carbon-footprint, and was an ideal solution to work space limitations and soil conditions at the jobsite.

Completion of this project allowed Redwood Shores to be relieved from the very costly Special Flood Hazard Area FEMA Insurance.