Attachment B
Hydrodynamic Model Description and Summary

Tides and Wind-Generated Waves

A Delft3D hydrodynamic model was constructed describing near-bed shear stresses and depth-average velocities throughout Humboldt Bay under a variety of tide and wind conditions (see **Figures 1** and **2**). Each simulation was conducted over a 72-hour period with a 1/10th second time step. Model results were used to assess the erosion potential along the Waterfront Lease Site following site remediation and restoration, including backfilling clean sediments/soils but not including any shoreline protection features (**Figure 3**). Detailed model output was provided at a number of observation points placed along the Waterfront Lease Site (**Figure 2**). A brief description of model input data, model boundary conditions and model scenarios is provided below, followed by a summary of model results.

Model input data:

1. Bathymetric Data: 5-meter DEM downloaded from CeNCOOS at Humboldt State University (http://cencoos.humboldt.edu/?content=DEM_fusion&menu=menu2). Data collected between 2005 and 2006.
2. Upland Topographic Data: 10-meter DEM downloaded from USGS Seamless Server (http://seamless.usgs.gov/).
3. Tide and Wind Data: NOAA tidal and climatic data collected at the North Spit, Humboldt Bay, CA (Station No. 9418767).

Model boundary conditions:

1. Typical tide range (1.75 m) between the Great Diurnal Range (2.10 m) and the Mean Tide Range (0.58 m).
2. Extreme tide range (3.87 m) based on the highest and lowest observed water elevations.
3. Typical westerly wind of 10 m/sec.
4. Extreme westerly wind of 25 m/sec.

Model scenarios:

1. a) typical tidal range; b) typical tidal range and 10 m/sec westerly wind; c) typical tidal range and 25 m/sec wind.
2. a) extreme tidal range; b) extreme tidal range and 10 m/sec westerly wind; c) extreme tidal range and 25 m/sec westerly wind.

3. typical tidal range and 10/sec westerly wind with the Waterfront Lease Site ground surface elevation lowered to match offshore elevations, i.e., erosion of UPRR property, to evaluate erosion potential along property boundary.

Figures 1 through 3
Next Pages

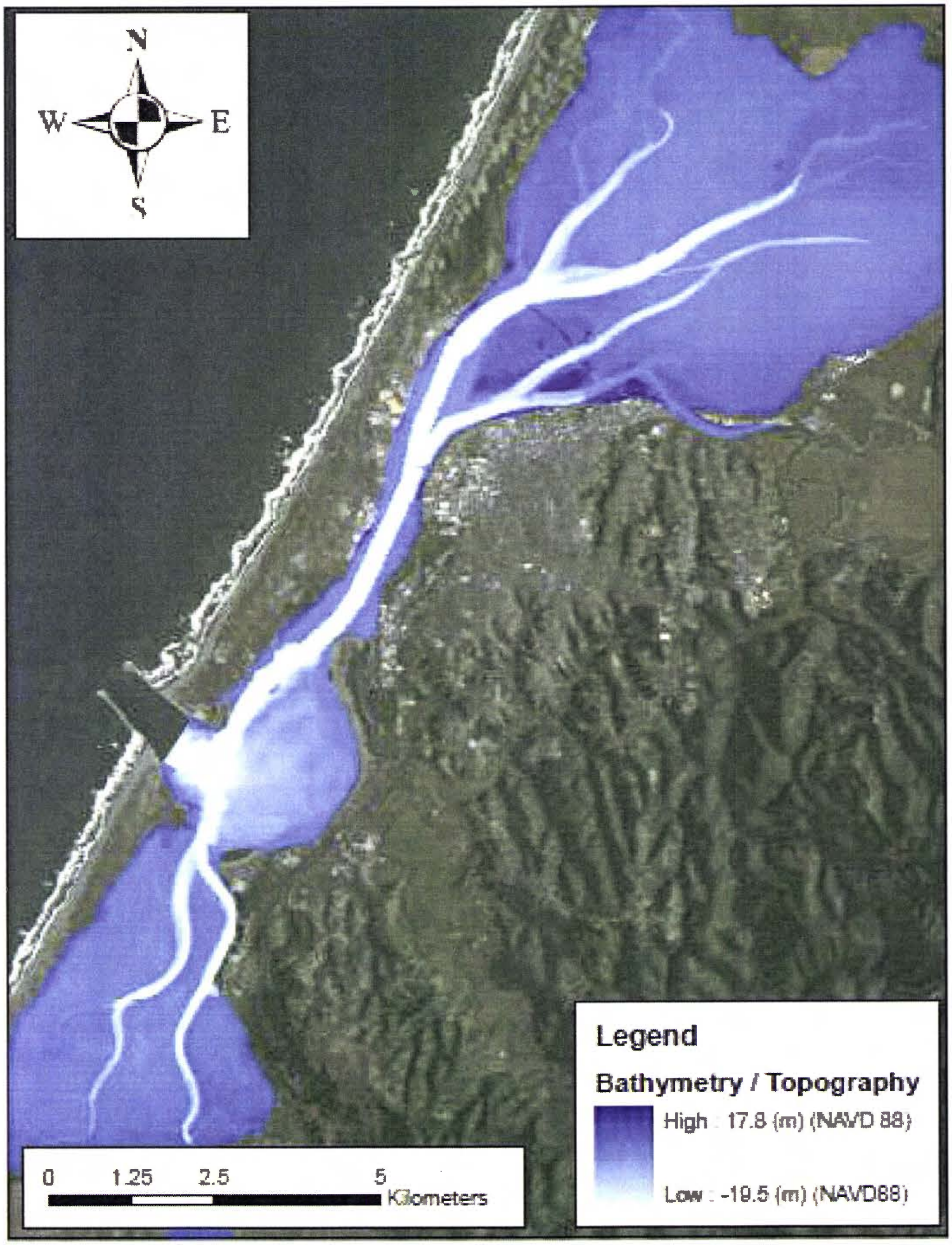

Figure 1. Map Illustrating Bathymetric and Topographic Data Used in Model Development.

Figure 2. Map Illustrating Model Mesh and Observation Points at Waterfront Lease Site.

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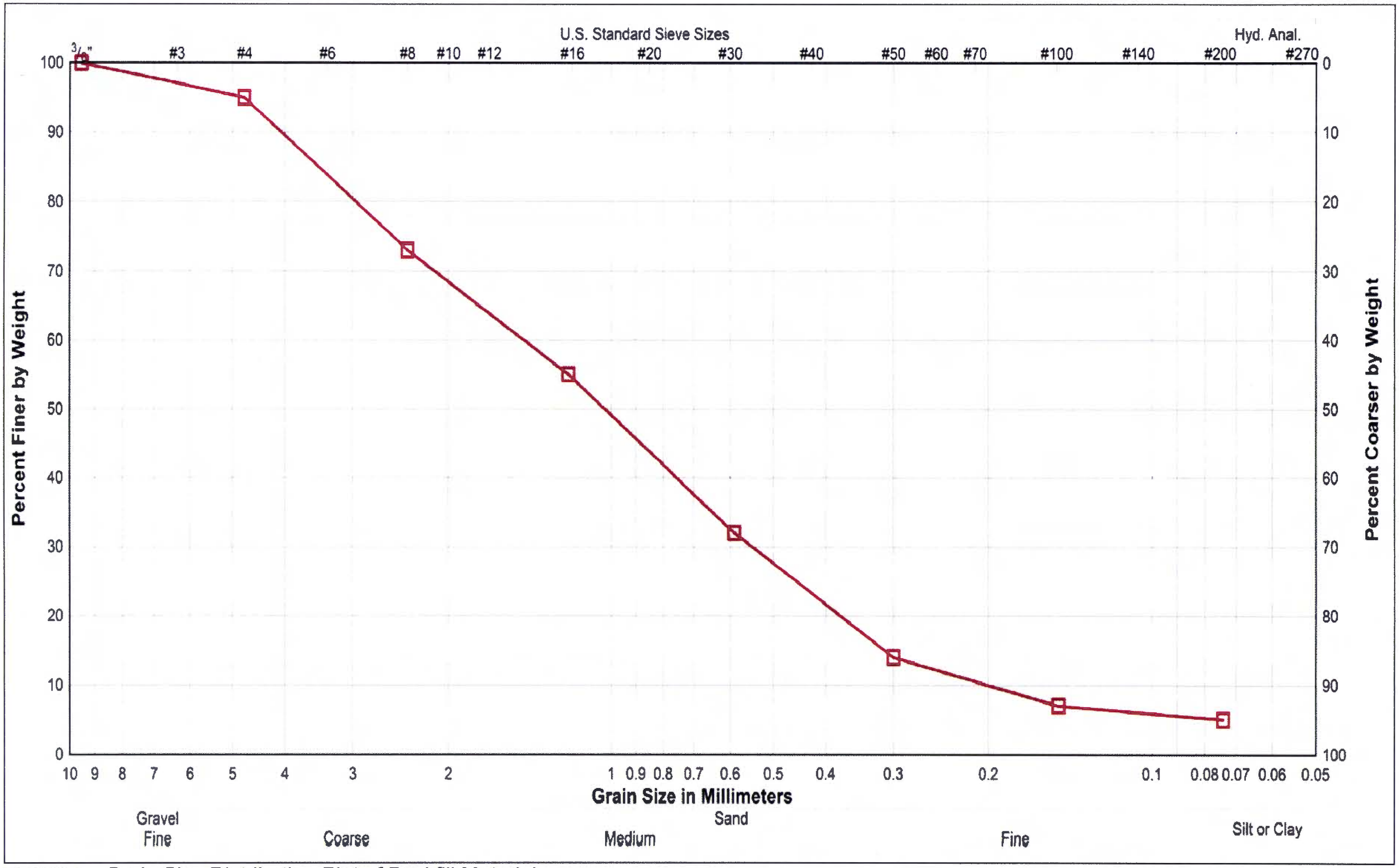

Figure 3. Grain Size Distribution Plot of Backfill Material.

Tide and Wind/Wave Model Results:

Figures 4 and **5** illustrate predicted near-bed shear stress from Observation Point No. 18 (see **Figure 2**) located immediately adjacent to the Waterfront Lease Site along the western end under typical and extreme tidal conditions, respectively. Also shown are predicted near-bed shear stress based on the combination of tides and winds, both 10 m/sec and 25 m/sec. All model scenarios were conducted over a 72-hour period; however, the initial 24-hour period was disregarded allowing time for the model to reach equilibrium conditions. The critical near-bed shear stresses required to mobilize 0.05 mm, 0.3 mm, and 0.59 mm grains (similar to the D_5, D_{14}, and D_{30} grain size – see **Figure 3**) based on a Shields type analysis (1936) and assuming a critical Shields Stress of 0.03. Based on these results, during a typical tidal event and an extreme westerly wind of 25 m/sec, the largest grain sizes predicted to erode are fine sands with a diameter of approximately 0.2 mm. Similarly, during an extreme tidal event and an extreme westerly wind of 25 m/sec, the largest grain sizes predicted to erode are medium sands with a diameter of approximately 0.4 mm.

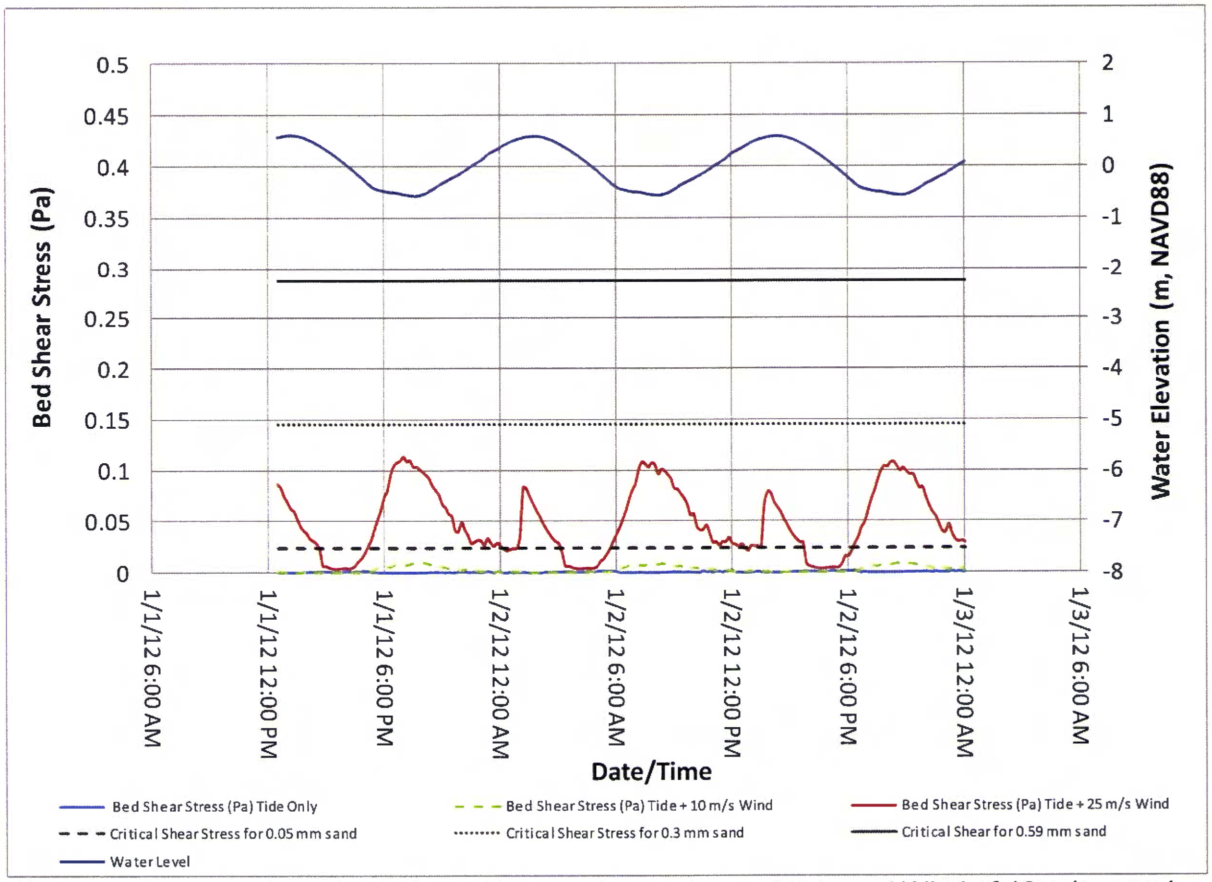

Figure 4. Predicted Near-Bed Shear Stresses During Normal Tide and Wind of 10 m/sec and 25 m/sec.

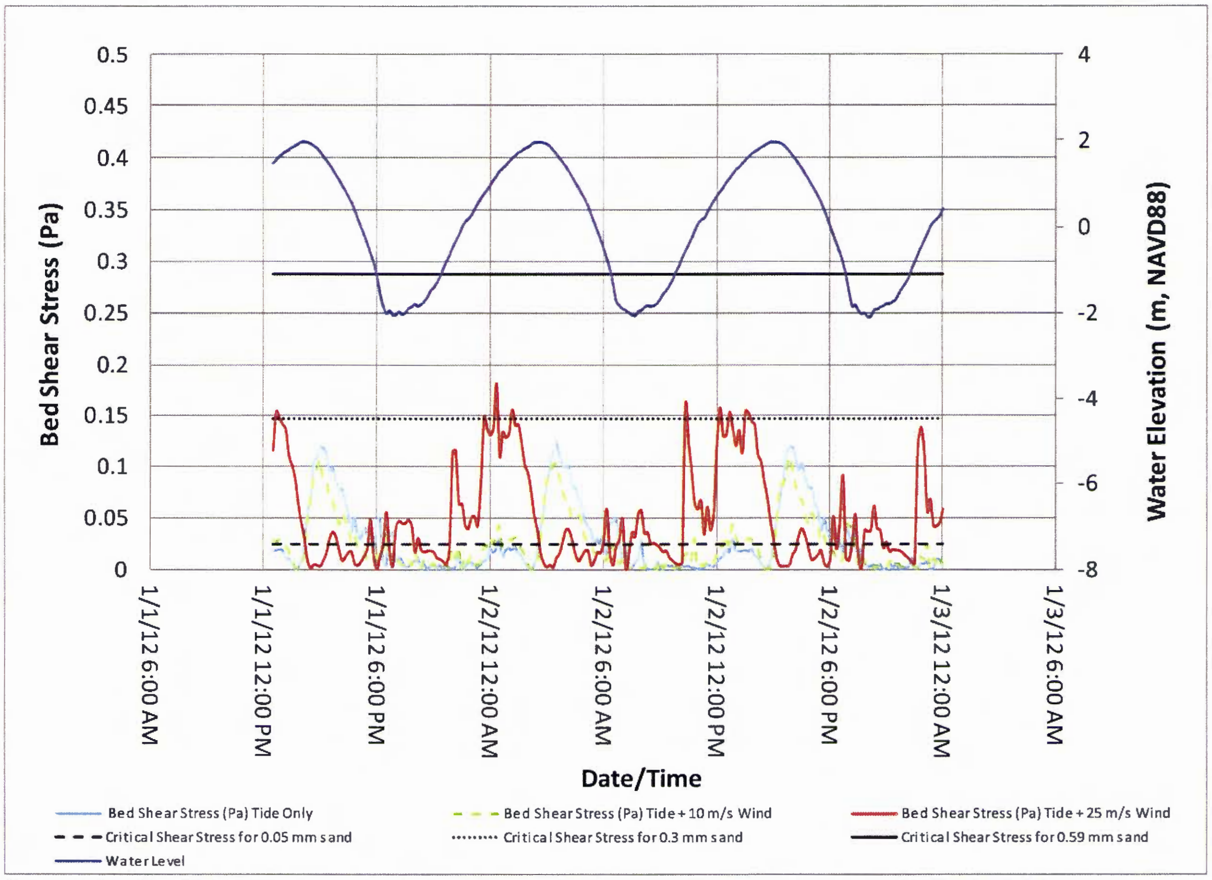

Figure 5. Predicted Near-Bed Shear Stresses During Extreme Tide and Wind of 10 m/sec and 25 m/sec.

Vessel-Generated Waves

In addition to tides and wind generated waves, discussed above, the wake of various water-craft (i.e., dredging boats, large and small commercial fishing boats, tugboats, recreational boats, and U.S. Coast Guard boats) that traverse Humboldt Bay near the Waterfront Lease Site can produce waves capable of eroding sediments. Typical wave heights were predicted using a United States Army Corps of Engineers (USACE) equation (1980) (Equation 1) and are found to vary between 0.2 m and 0.36 m.

The post-remediation bank gradient will be approximately 10 H:1 V. At this slope, with wave heights of between 0.2 m and 0.36 m, the predicted near-bed shear stresses are likely to vary between 1.5 Pa and 4.0 Pa. Again, assuming a Critical Shields Stress of 0.03, vessel-generated waves in the vicinity of the Waterfront Lease Site will likely be able to erode medium gravels with diameters as large as 10 mm, which is equal to the maximum grain size within the backfill material.

Conclusions

Application of the Delft3D hydrodynamic model to evaluate erosion potential during a variety of tide and wind conditions as well as an analysis of vessel-generated waves indicate that erosion of the proposed backfill material will likely occur in the absencescour protection placed at the Site as part of the project. A brief discussion of potential erosion rates, impacts to neighboring properties, and minimum design criteria is presented below. The results presented here are based on the bathymetric/topographic data and tidal/climate data publically available at the time of model development and are representative only of the model scenarios described above.

Estimated Erosion Rates – Tides and Wind-Generated Waves

Average annual unit width erosion rates were estimated using the Meyer-Peter Mueller Equation (1948) and the near-bed shear stress associated with tides and wind-waves assuming 1) a grain-size distribution similar to that of the proposed backfill material and 2) a 1-m-high bank. We have assumed that under typical tide and wind conditions the near-shore area is subject to very little erosion and that only during wind-wave events associated with winds greater than 10 m/sec is erosion likely to occur. As such, average annual erosion rates are derived by multiplying the predicted average daily sediment transport rates estimated using the Meyer-Peter Mueller Equation by the average annual duration of winds of between 7.5 and 15 m/sec and between 15 and 25 m/sec. Based on the past 2-year record of 6-minute wind measurements at the North Spit, Humboldt Bay, CA NOAA Station (No. 9418767), on average approximately 120 days per year are expected to have winds between 7.5 m/sec and 15 m/sec and only approximately 7 days per year have winds over 15 m/sec. Based on these results, an erosion rate of approximately 10 cm/year is expected at the Waterfront Lease Site from tides and wind-generated waves.

Estimated Erosion Rates – Vessel-Generated Waves

Similar to above, the average annual unit erosion rate associated with vessel-generated waves is calculated by estimating the average daily sediment transport rate from a vessel-generated wave of approximately 0.26 m – equal to about the average vessel-generated wave height of typical water-craft expected to traverse this portion of Humboldt Bay. Assuming that these waves will only be acting directly on the shore for between 10 and 20 minutes/day 5 days/week, the expected average annual erosion rate is 1.7 meter/year from vessel-generated waves. Boat traffic that results in greater wave activity than this (e.g., additional weekend traffic associated recreational boats) could accelerateerosion rates above this estimate.

Potential Impacts to Neighboring Properties from Erosion of Waterfront Lease Site

Based on the model results presented here, vessel-generated waves are predicted to have a greater impact on the stability of the Waterfront Lease Site that tides and wind-generated waves. Model results suggest that the average vessel-generated wave is able to erode all grain sizes within the proposed backfill material. Tidal and wind-generated waves are predicted to erode only the smaller size classes within the backfill material.

Assuming no shoreline protection measures included with the project, vessel–generated waves are predicted to erode the banks of the Waterfront Lease Site at a rate of approximately 1.7 m/year. The Site's shoreline areas would be expected to erode within 1 to 2 years into upland areas that contain soils and sediments that should be contained s a result of the remediation. As to potential longer term impacts, it is unlikely that this rate would remain constant over time. However, assuming it does, within 25 years the entire Waterfront Lease Site could be eroded away. Neighboring properties would certainly be affected by erosion due to wind- and vessel-generated waves well before the entire Waterfront Lease Site was eroded away. For example, model results at Observation Point 26 (see **Figure 2**) located approximately 15 meter (50 feet) inland along the Waterfront Lease Site eastern property boundary indicate that prior to site erosion the near-bed shear stress associated with normal tidal event and a westerly wind of 10 m/sec was zero; however, following site erosion (within approximately 7 years of site remediation assuming a constant erosion rate), the maximum near-bed shear stress at this location under identical tide and wind conditions is now 0.035 Pa (**Figure 6**). Again assuming a Critical Shields Stress of 0.03, this applied near-bed shear stress is capable of eroding fine sands and the potential exists for erosion of neighboring properties. Vessel-generated waves will also impact neighboring properties following erosion of the Waterfront Lease Site and are likely to generate significantly more erosion than the waves predicted based on the model scenario described here, i.e., normal tidal event and a westerly wind of 10 m/sec.

Minimum Design Criteria

Based on the potential for shoreline erosion from both wind- and vessel-generated waves, it is recommended that erosion protection be placed along the Waterfront Lease Site. From the work presented above, vessel-generated wakes present the greatest erosion hazard. Following the Hudson relationship (U.S. Department of Transportation (USDOT) 1989) (Equation 1) to estimate erosion protection from waves:

$$D_{50} = \frac{0.57H}{\cot^{\frac{1}{3}}\theta} \qquad \text{(Equation 1)}$$

where, D_{50} is the rock size for which 50 percent is finer by weight (ft), H is equal to the wave height (ft) and θ is the bank angle (here assumed to equal approximately 10 H:1 V). Assuming the largest predicted wave height of 1.2 ft (tugboat-generated wave) and the design bank angle of 10 H:1 V, we estimate a minimum D_{50} of approximately 4.0 inches. USDOT (1989) suggested that the D_{100} should be approximately 1.7 times the D_{50}, or approximately 7 inches. The thickness of this rock layer should be at least equal to the D_{100} and 1.5 times the D_{50} (USACE 1991) or approximately 7 inches. This shoreline protection should extend to an elevation of 8 ft (NAVD88).

Figure 6
Next Page

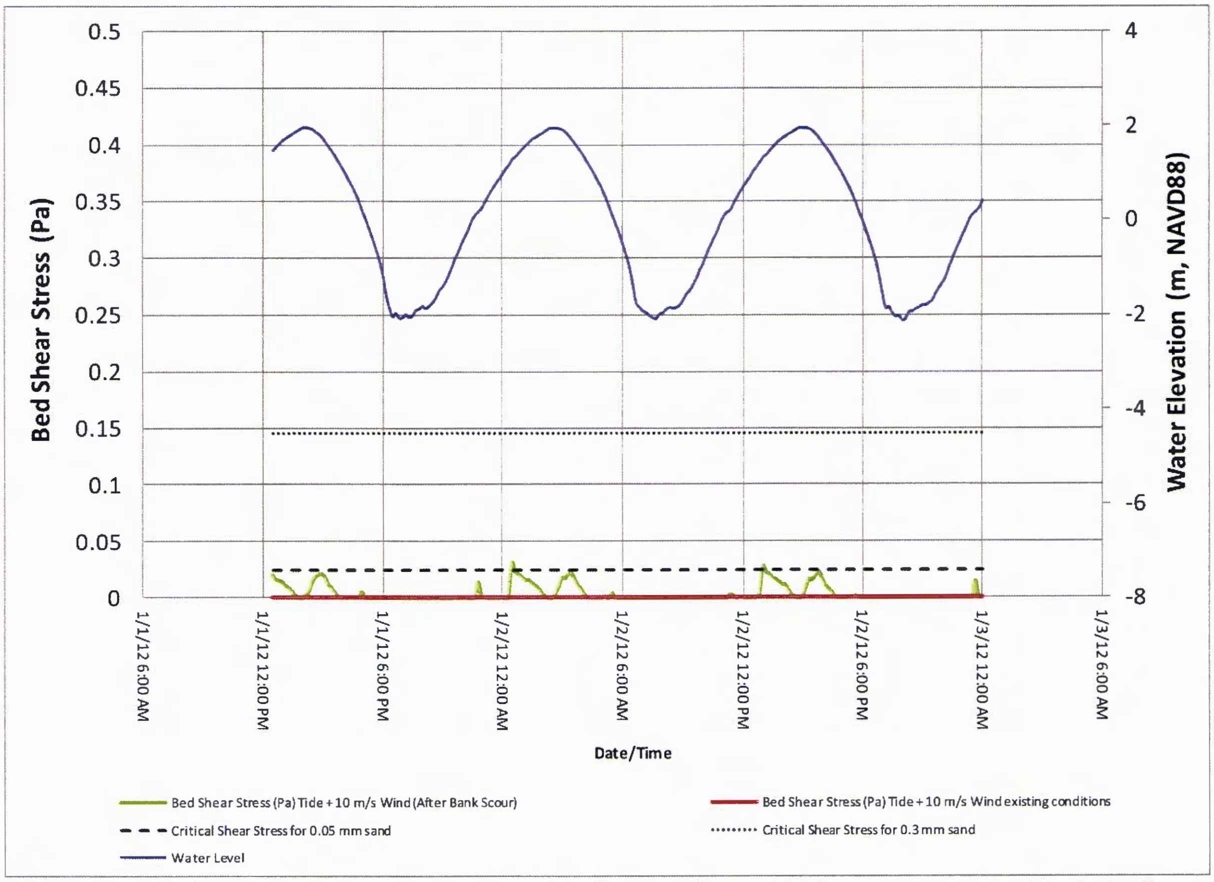

Figure 6. Predicted Near-Bed Shear Stresses During Normal Tide and Westerly Wind of 10 m/sec During Existing Conditions and Following Potential Erosion of Waterfront Lease Site.

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2475 Hanover Street
Palo Alto, CA 94304

ENVIRONMENT

Subject:
Coastal Development Permit – Response to Request for Additional Information
Union Pacific Railroad Company
Eureka, CA - Waterfront Lease
(Former G&R Metals)

Date:
April 4, 2012

Contact:
Scott Davis

Phone:
707-776-0865, ext. 22

Email:
Scott.Davis@arcadis-us.com

Our ref:
RC000720.0003

Dear Mr. Whitlock:

ARCADIS U.S., Inc. (ARCADIS) has prepared this letter on behalf of the Union Pacific Railroad Company (UPRR), to provide additional information to the California Coastal Commission (CCC) in support of the Coastal Development Permit (CDP) for the remediation/restoration project at the Waterfront Lease Site (formerly G&R Metals) located at 701 First Street in Eureka, California (the Site).

This letter was prepared in response to two separate discussions between UPRR, CCC staff, Pillsbury Winthrop Shaw Pittman, LLP (Pillsbury), and ARCADIS on March 21 and 22, 2012. In order to respond in a timely manner, ARCADIS has made professional judgment assumptions regarding select situations and/or items.

Two general topics were discussed on the calls, 1) shoreline protection design life and maintenance and 2) feasibility evaluation for remediating the upland soil to aquatic standards. This letter responds to both items (herein "Shoreline Protection Design" and "Feasibility Evaluation") and their associated intricacies. We understand from our participation in the conversation that these requests were made to facilitate the Coastal Commission staff's review of the remediation/restoration plan that is currently pending before the Coastal Commission. For purposes of this discussion, that plan includes two important elements:

EXHIBIT NO. **16**
APPLICATION NO.
1-11-007 - UNION PACIFIC RAILROAD
MEMO ON SHORELINE PROTECTION STRUCTURE & CLEAN-UP ALTERNATIVES
(1 of 10)

- Cleanup of the site's upland area to achieve the upland remedial goals pursuant to a Remedial Action Plan (RAP) approved by the Regional Water Quality Control Board (RWQCB) on March 22, 2011, and
- Replacement of the existing revetment with a shoreline protection feature to protect the site following completion of remediation.

The Coastal Commission staff has requested additional information to evaluate the issues whether another cleanup alternative besides that approved by the RWQCB is feasible and, if it is not, whether the shoreline protection feature proposed by Union Pacific will serve the intended purpose of containing materials left in place and thereby providing the necessary protection of water quality.

SHORELINE PROTECTION DESIGN

The following information is provided to address the design life and planned long-term maintenance of the erosion control features as well as the planned future uses and maintenance of the Site.

Design Life of Erosion Control Features

The erosion control features provided in the remedial design include the use of buried marine mattresses and gabion baskets. These features consist of baskets in various geometries made of zinc wire mesh coated with PVC, which are filled with rocks, sized to meet the design requirements established by the erosion evaluation. The marine mattresses are long and flat whereas the gabion baskets are more square.

The wire mesh used for both types of features, operating under "normal" (non-saline) conditions, has a design life of 75 years. In saline conditions similar to the UPRR site, the design life of the wire mesh is estimated to be between 20 and 25 years.[1] However, it is important to note that the types of failures that are expected after that period of time are localized failures of the mesh material itself. The result of this type of failure is anticipated to be localized movements of the rocks inside of the baskets and mattresses. The rocks will not be mobilized under the tidal and wave action expected at the site because the rocks have been designed to withstand the Site conditions. Generally, the rocks will continue to operate as designed and intended past the design life of the wire mesh.

As stated in the British Board Authority (BBA) certificate for the wire mesh used to construct the gabion baskets and marine mattresses:

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[1] Telephone conversation with technical representative at Maccaferri; Williamsport, MD. 301-223-6910

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> The design of the wire mesh and the fact that the strength of the mesh is not used in the design of the structure as a whole indicate that this local damage will not affect the integrity of the structure.[2]

Even after localized failures of the wire mesh, the marine mattresses and gabion baskets will continue to operate in a similar manner as rip rap, with a similar design life.

Regarding long-term maintenance of the gabions and marine mattresses, over time it is expected that vegetation will grow over and within the gabions or marine mattresses. The vegetation will not affect the performance of the gabions or marine mattresses, and will in fact help to keep the structure in place. As stated in the BBA literature:

> A gabion wall will permit the growth of vegetation which will contribute to the integrity of the structure and to maintaining a natural appearance.[1]

Future Uses and Site Maintenance

The RWQCB-approved RAP prepared for the Site in advance of the final design addressed how future site uses would be compatible with the final remedy. It specifically stated that an environmental covenant will be attached to all deeds and lease of the property and will include "...a soil management plan (which will limit and govern the handling of contaminated soils) and any long-term obligations for operations, monitoring, maintenance, and/or inspection requirements." The plan will be attached to the environmental covenant, both of which will be reviewed and approved by the RWQCB, and will include details regarding how future site owners will be required to maintain the site to ensure the remedy is functioning as designed. Examples include monitoring and maintaining shoreline protection features and guidelines regarding excavations and handling of site soils during any subsurface work.

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[2] British Board of Agreement Roads and Bridges Agreement Certificate No 93/R075: Maccaferri Gabions.

FEASIBILITY EVALUATION

In response to the request to provide details regarding the anticipated construction methods and procedures to remediate the upland soil to aquatic standards, the following items and their impacts are provided for consideration:

Description of Anticipated Construction Activities / Excavation Stabilization

The existing construction plan entails phased excavations to specific depths in accordance with the RAP prepared by ARCADIS and dated January 24, 2012 to meet cleanup standards for upland areas approved by the RWQCB on March 22, 2011. Significant modifications to the RAP would need to be implemented to excavate to deeper depths to achieve "aquatic standards" as cleanup goals. The aquatic standards are described in the following section.

Groundwater is encountered at the site at approximately 5 feet below ground surface (bgs). As such, modifications to the remedial construction activities would need to address how to best remove contaminated soil in saturated conditions. Under the current design and to meet upland cleanup standards, excavation depths vary across the site, but the average depth of excavation is approximately 4 to 5 feet bgs. It is estimated that the excavation depth in the upland area would need to extend to at least 5 feet below the water table (i.e., 10 feet bgs, or at least doubling the current average excavation depth) across the Site to achieve the aquatic standards. This is a conservative assumption because the actual depth of excavation that would be necessary to achieve aquatic standards is currently unknown. The current plan also includes replacing the existing shoreline revetment to protect residual soils that will remain following cleanup to upland standards.

Several options are available to accomplish deeper and more extensive excavations that would be necessary to meet aquatic standards; however, due to time constraints in preparing and submitting this response, two options are provided herein to describe the additional work that would be required.

Option 1

A perimeter sheet-pile wall would be installed at the property line (at the breakpoint of the slope along the north [bay] side) under this option. Soil would then be excavated and removed. Processing (i.e., dewatering) of wet soils would be required prior to off-site shipment. The use of sheet-piling would be relatively expensive, but would provide a control barrier for water migration to the bay. Continuous dewatering of the excavation area to prevent groundwater infiltration would likely be required to maintain an open excavation for efficiency and confirmation sampling. Rock backfill would be placed in the bottom of the excavation to the high water line to mitigate saturated soil (backfilling soils into a water-filled excavation would create an unstable slurry).

Option 2

Excavation and backfill would be accomplished around the perimeter using a slide-rail shoring system to 10 feet deep or more in this option. A slide-rail shoring system consists of temporary horizontal sheeting braced on the ends by slide-rails. As the contractor excavates deeper, the sheeting is advanced along the slide rails, and additional sheets are added to the top. During backfilling, the process is reversed and the horizontal sheets are removed as the bottom of the excavation is filled in. The system would be extended out laterally into the interior of the site until a distance is reached that would allow sloping around the perimeter without creating instability (typically 1:1 or 1.5:1 depending on soil type). The interior of the site would be excavated and backfilled sequentially (i.e., west to east). Processing (i.e., dewatering) of wet soils would be required prior to off-site shipment. Continuous dewatering of the excavation area would likely be required to maintain an open excavation for efficiency and confirmation sampling. As described above, rock backfill would need to be placed to the high water line to mitigate saturated soil.

Description of Revised Remedial Goals for Upland Soil

The current RWQCB approved RAP includes remedial goals as provided in Table1.

Table 1. Remedial Goals for Upland Soil and Waterfront Sediment

Chemical of Concern	Upland Soil (mg/kg)		Waterfront Sediment* (mg/kg)
	Maximum	Average (95UCL)	
Arsenic	NA	10	NA
Copper	NA	NA	270
Lead	1,000	320	218
Mercury	NA	NA	0.71
Zinc	NA	NA	410
PAHs	NA	0.13	NA
PCBs	1	0.3	0.18

* Aquatic Life Standards

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Note that upland soil remedial goals were designed to address commercial/industrial receptors because a deed restriction will be placed on the property to prevent residential and other sensitive uses (such as hospitals, day care facilities, schools, etc.). The remedial goals protective of commercial/industrial workers are also protective of recreational/open space future uses.

Aquatic life standards were not assessed for upland soils since the reasonably anticipated future use is an upland Waterfront Commercial area. The upland portion of the site also was not characterized for potential effects to aquatic life if the soil became sediment in the aquatic environment, e.g., through erosion. As shown above, the chemicals of concern identified at the site were different in the aquatic and upland areas. Concentrations above the sediment remedial goals have been detected at 8 feet below ground surface, but in most areas deeper samples are not available. Therefore, the extent of remediation that would be required to protect the aquatic environment in the event the site became submerged or significant quantities of soil were released to the aquatic environment is highly uncertain, but would likely extend well below the groundwater table.

Additional Volume of Waste Soil and Clean Backfill

Under the currently proposed remedy to excavate site soils to meet the upland cleanup remediation goals, approximately 14,000 cubic yards of soil would be excavated and disposed, and the excavation backfilled. On average, the excavation as currently designed extends to approximately 4 to 5 ft below ground surface. If the site were required to be cleaned up to aquatic life standards, it is estimated that the soil would have to be excavated to at least 10 feet below ground surface (bgs) across the site. This would result in excavation and associated disposal of at least 38,000 cubic yards of soil, or 2.7 times the amount of material being removed to meet the upland goals, using the sheet pile approach (Option 1). The quantity of soil excavation and disposal would significantly increase using the side rail shoring approach (Option 2). The excavations would also require significant additional backfill volume. The actual quantities would necessarily be determined during redesign.

Increases in excavation volume would also result in an increased number of trucks transporting material to the offsite disposal locations, an increased number of trucks bringing backfill to the site, and an associated increase in the carbon footprint for the remedy. It would also lengthen the duration of construction activities, resulting in greater impacts to the surrounding community, and increase the remedial cost. These issues are discussed further in subsequent sections.

Groundwater Control

Increasing the size and depth of the excavation would result in additional groundwater infiltration into the excavation, which would have to be continuously pumped out and treated. Under the current design, any water pumped out of the excavation will be treated using an onsite temporary water treatment system. The treated water will be collected and held pending analytical testing results showing that the water meets City of Eureka sanitary sewer discharge standards, so that it can be batch discharged into the City's sanitary sewer system. If upland soils were cleaned up to aquatic standards, the quantity of groundwater requiring treatment, storage, and subsequent discharge would significantly increase but is likely to increase by at least an order of magnitude, resulting in millions of gallons of water to treat and discharge. The actual volume of increase is currently unknown, but it may be infeasible to handle the revised quantity due to the number of tanks that would be required for a batch storage and discharge approach and capacity limitations of the City of Eureka's wastewater treatment plant. If the water could not be contained and discharged at the site, alternative methods of discharging the water would need to be considered, including trucking the water offsite. Offsite storage areas for tanks could also be necessary.

Currently, the design includes one onsite temporary storage tank with a 21,000 gallon capacity for handling excavation dewatering. A tank of this size requires approximately 500 square feet of space. If the dewatering volume increased by an order of magnitude, it is possible that 10 tanks of this size may be required, which would require 5,000 square feet of space. Because excavation activities would be occurring from site boundary to site boundary, and because the site is only 2.6 acres, some if not all of the tanks would need to be staged offsite and currently there are no offsite access agreements in place to do so. The actual volume of water is highly dependent on the site conditions, excavation staging, discharge frequency, and timing of construction activities, and could be more than what is estimated here.

To accurately estimate the actual quantity of groundwater requiring treatment, a groundwater model would need to be completed. Modeling would require additional site investigations, including well installation and pumping tests, and collection of water levels over time. The hydraulic connection between the site and Humboldt Bay would also be evaluated, as the proximity of the Bay could have impacts on the engineering feasibility of drawing down the water level in the excavation.

Schedule Impacts

If the site were to be proposed to be cleaned up to aquatic standards, the following steps would be required:

- Additional site characterization to define the depth of necessary excavation and to collect inputs for a groundwater model to estimate excavation dewatering water volumes (4-6 months)
- Revision of the RAP (4-6 months)
- Recirculation of RAP for public review and finalization (2 months)
- Likely revision of CEQA document; due to increase in potential impacts, this could involve preparation of an EIR (1 year)
- Revision of existing permits (2-4 months)
- Some of the work listed above could be done in parallel. However, the total duration associated with process and permit requirements is likely to be 2 years

Furthermore, due to increased complexity and quantity of remediation as well as windows during which the work would need to be completed, construction duration would likely span at least 2 construction seasons (2-3 years).

Therefore, the overall delay in schedule could range from 4 to 5 years (2 years for process-related components and 2-3 years for actual construction).

Other: Increase in Community Impacts (e.g., Safety, Noise, etc.)

The significant increase in remediation volumes and construction duration as well as the changes in the construction methods could result in the following increases in community impacts:

- Safety: the additional truck traffic would potentially contribute to traffic accidents. A large open excavation would be in place. Although fencing and security would be employed, a large open excavation poses a safety hazard.
- Air Quality: although dust control measures would be used, there would be additional impacts related to equipment use and truck traffic
- Noise: the duration and intensity of noise would increase due to the longer duration and the types of equipment needed to complete the work under the new scenario (i.e., driving sheet pile, installing shoring)
- Utilities/Hydrology and Water Quality: the large amount of additional water generated could impact the wastewater treatment system. Saltwater intrusion could also occur along the shoreline due to excavation dewatering activities

- Traffic: a significant amount of additional truck traffic would be necessary. The number of trucks to transport soil to offsite disposal locations would increase from around 1800 to over 5000. If the volume of water generated by dewatering could not be handled under the current batch disposal scenario, trucking water offsite would be necessary, and number of trucks necessary for this purpose would increase significantly over these levels. Additionally, the public roadway in the vicinity of the site would necessarily be closed for a longer period of time over at least two construction seasons. Traffic and related air quality issues were amongst the most significant in the existing CEQA review, so this issue would require significant additional analysis.
- Aesthetics: the project is in the downtown area of Eureka. Traffic will be rerouted and construction equipment and noise will be ongoing for 2-3 years.

Additionally, the City of Eureka has indicated that it expects to begin its Waterfront Drive extension project in the next 1-2 years. A portion of the roadway will pass through a right-of-way that is on the Waterfront Lease property and the contamination in this corridor would impede that portion of the City's project if not remediated prior to initiation of road construction.

Further, the lack of shoreline protection would need to be evaluated under the CEQA process. Based on the potential for erosion impacts to neighboring properties projected, that analysis would show the need for mitigation. There could be difficulty in gaining approval for the CEQA document. The lack of approval of the CEQA document would prohibit the project from moving forward. Additionally, the City of Eureka needs to grant a grading and erosion control permit for this project to move forward. It is unclear whether this permit would be granted in the absence of an adequate shoreline protection plan given the potential to impact City property.

Cost Impacts

Increases to the cost of the remedy are difficult to estimate prior to completion of a revised design. As discussed previously in this memorandum, it is likely that the excavation would need to be increased to 10 feet below ground surface across the site, requiring more complex excavation shoring, increased excavation dewatering, additional material handling, transportation, and disposal. Rough estimates indicate that these additional requirements could result in project costs increasing by 2.5 to 4 times the current design estimate. More accurate estimates of potential cost increases would not be possible until additional site characterization data was collected and evaluated.

We trust that this analysis, which is based on the best information currently available, addresses the Coastal Commission Staff's requests. If you or the Staff need further clarification regarding the information presented in this letter or if you would like us to resubmit any of the materials listed above, please contact the undersigned. We sincerely appreciate your assistance with this important project.

Sincerely,

ARCADIS U.S., Inc.

J. Scott Davis, PE (C66639)
Program Manager/Principal Engineer

Bridgette R. DeShields
Principal Scientist

Copies:
James Diel, UPRR
James Eisert, ARCADIS
Brooke Bonkoski, ARCADIS

Eureka, CA – Waterfront Lease

Image Date – June 2010 (Google Earth)

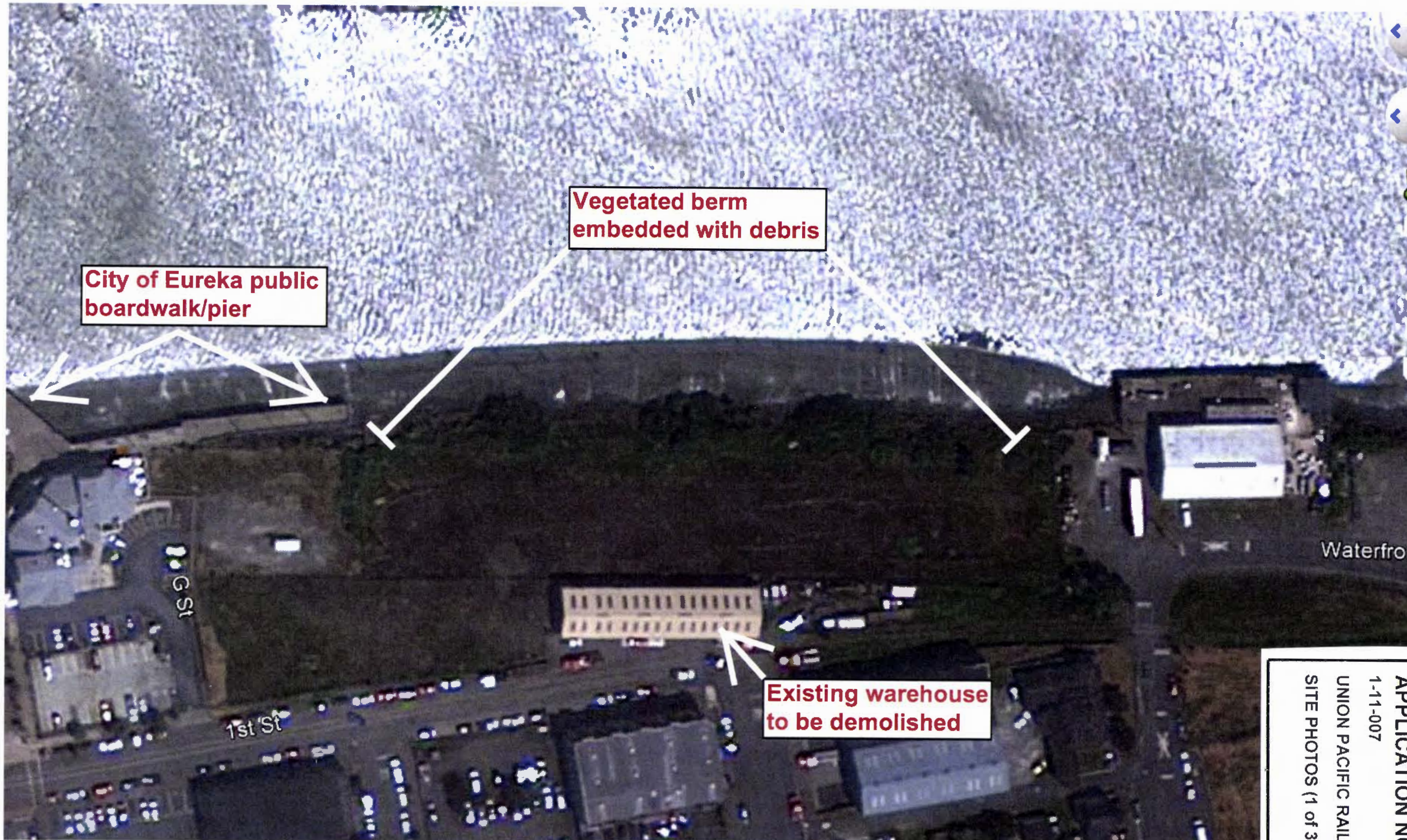

EXHIBIT NO. **17**

APPLICATION NO.

1-11-007

UNION PACIFIC RAILROAD

SITE PHOTOS (1 of 3)

EXISTING SHORELINE LOOKING WEST

EXISTING SHORELINE LOOKING EAST