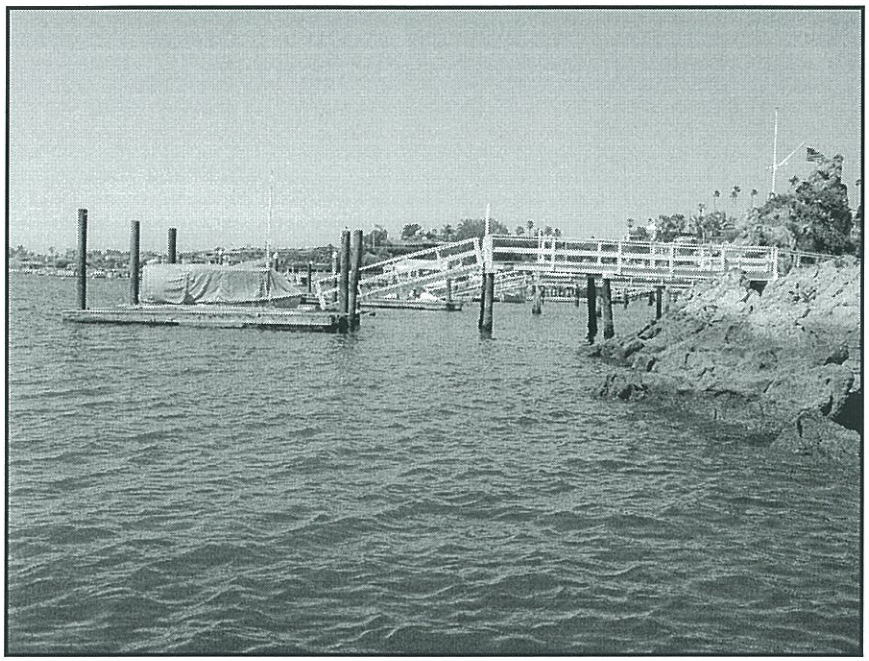
Appendix I

Eelgrass Survey

MARINE BIOLOGICAL IMPACT ASSESSMENT FOR A DOCK RENOVATION PROJECT LOCATED IN CARNATION COVE, CORONA DEL MAR, CA 92625



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1.0 INTRODUCTION

1.1 PROJECT BACKGROUND AND PURPOSE

1.1.1 Project History

Coastal Resources Management, Inc. (CRM) conducted a marine biological survey in Carnation Cove, Newport Bay, CA on 29 March, 2005 for P&D Technologies, Inc. The purpose of the investigation was to determine the distribution and abundance of eelgrass and other marine life within areas where a dock renovation project is being proposed. The project location is shown in Figures 1 and Photographs 1 through 3. At the time of the submittal, there were no design plans for proposed docks.

In March, 2007, CRM conducted additional surveys at the project site as part of the City's bay wide eelgrass mapping project (CRM, in progress). This survey provides the latest-to-date eelgrass habitat survey for the project site. Studies conducted since March 2007 in the vicinity of Bayside Drive in Corona del Mar indicate that no substantial changes to eelgrass habitat have occurred since the March 2005 survey and that the March 2007 eelgrass survey represents an up-to-date representation of eelgrass bed resources at the Carnation Cove project site.

Dock design plans for the project were provided to CRM from URS Cash & Associates. These were revised at the suggestion of CRM that initial dock designs be revised to avoid as much impact to eelgrass bed resources as possible (R. Ware pers. com with Randy Mason, URS Corporation, 1/9/2007).

1.1.2 Project Location

The project site is located along the southeast shoreline of Lower Newport Bay (Newport Harbor) in Corona del Mar, California. The site coordinates at the project site boat dock located are 33° 35.905' N, 117° 52.802' W (Figure 1). A small cove located in front of the residence consists of an intertidal sand flat and rocky intertidal shoreline (Photograph 2). Seaward of the cove, a two-slip boat dock is located at the north end of the property (Photograph 3).

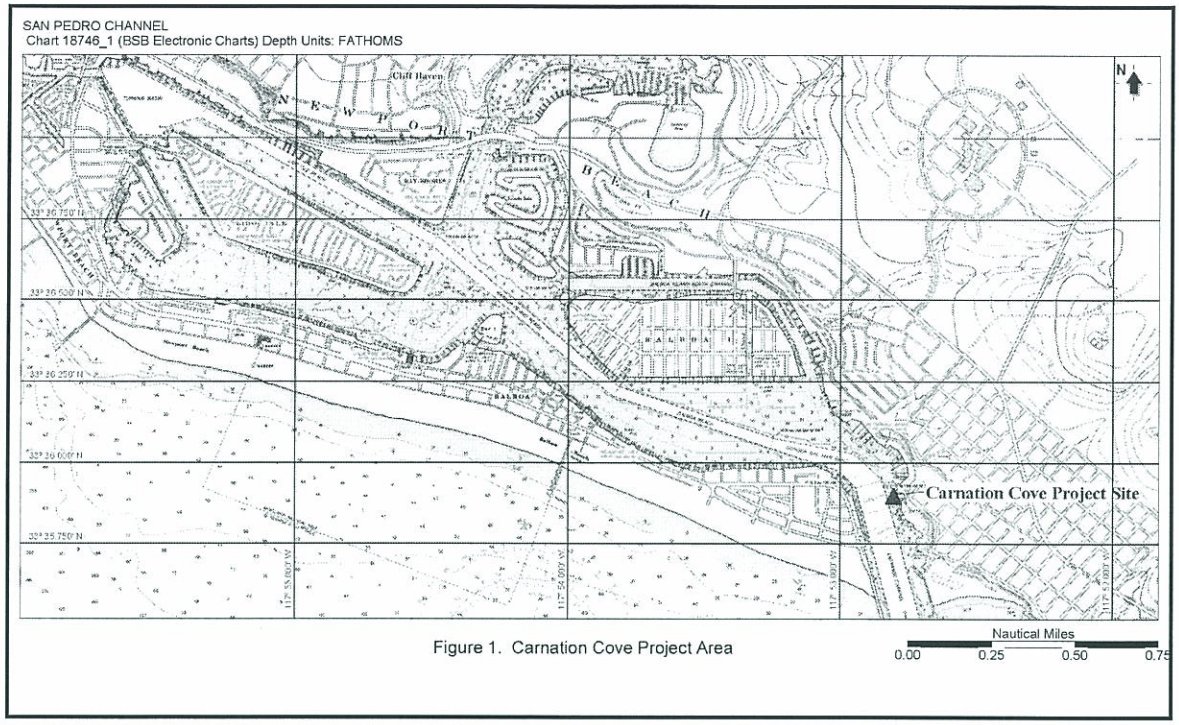
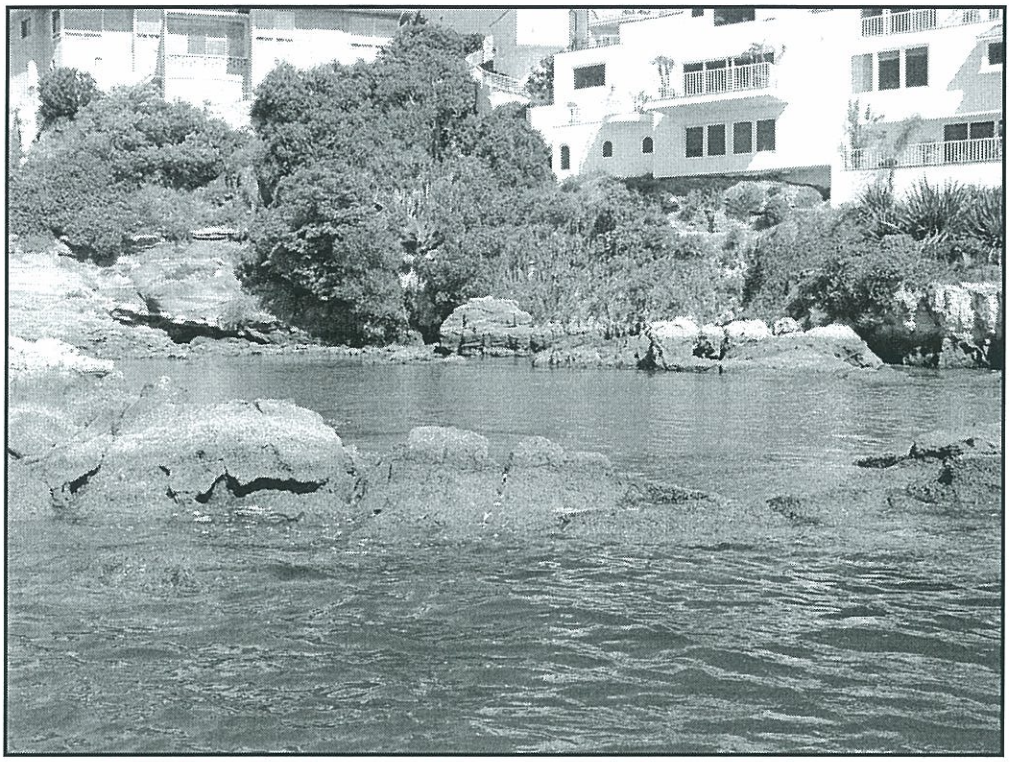
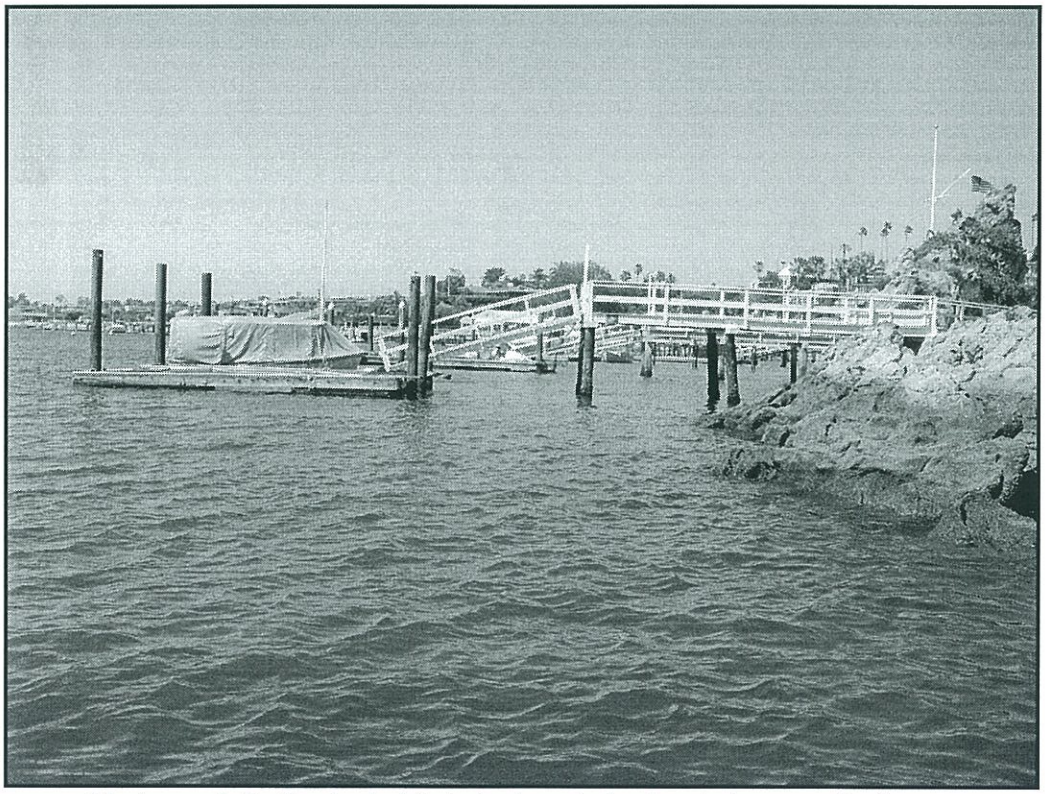


Figure 1. Carnation Cove Project Area

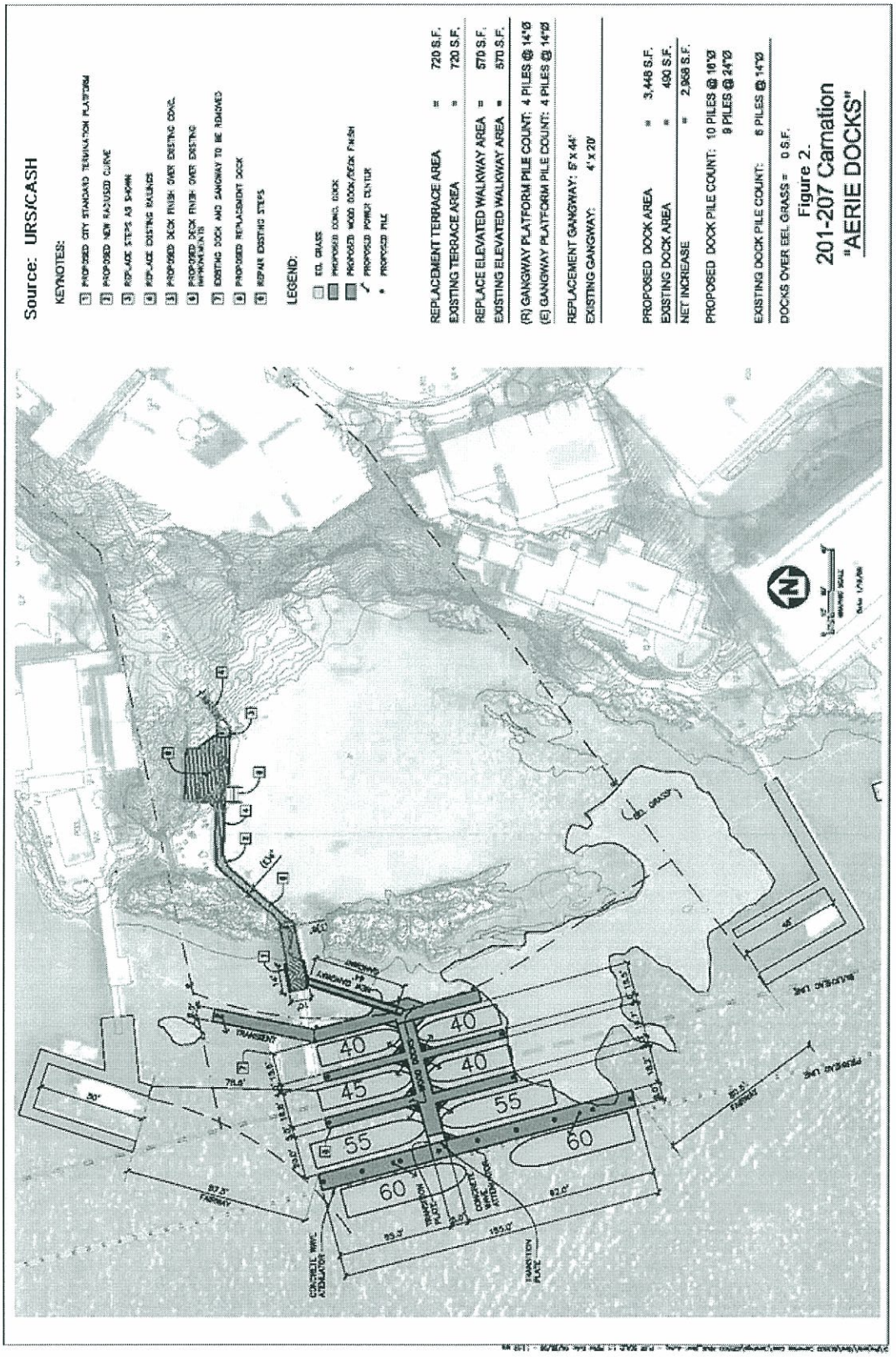
Photograph 1. Carnation Cove Project Area.



Photograph 2. Carnation Cove sand flats located in front of project area residences

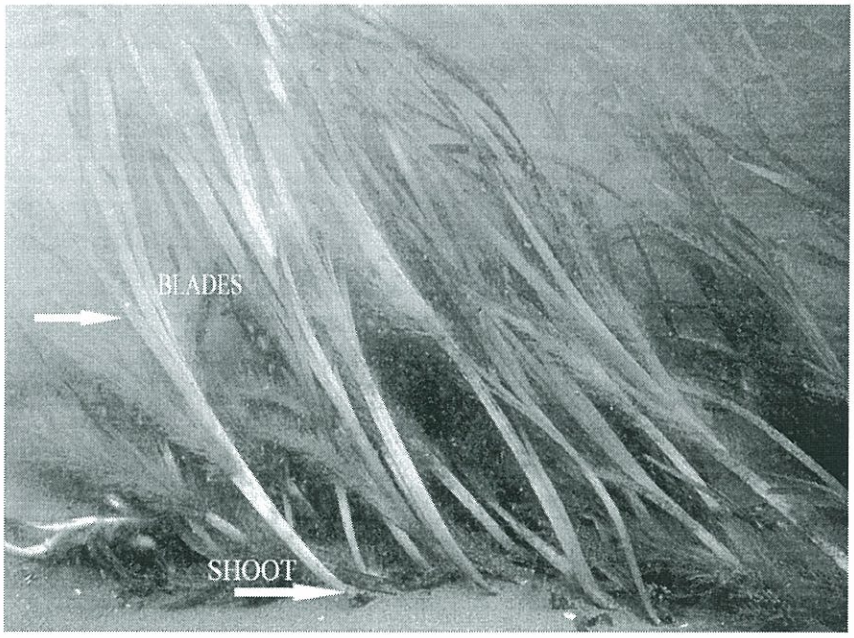


Photograph 3. Rocky habitat, dock and pier located seaward of cove.


Source: URS/CASH
KEYNOTES:
1 PROPOSED CITY STANDARD TERMINATION PLATFORM
2 PROPOSED NEW RAISED CURB
3 REPLACE STEPS AS SHOWN
4 REPLACE EXISTING RAILINGS
5 PROPOSED DECK FINISH OVER EXISTING CONC.
6 PROPOSED DECK FINISH OVER EXISTING IMPROVEMENTS
7 EXISTING DOCK AND GANGWAY TO BE REMOVED
8 PROPOSED REPLACEMENT DOCK
9 REPAIR EXISTING STEPS
LEGEND:
EEL GRASS
PROPOSED CONC. DOCK
PROPOSED WOOD DOCK/DECK FINISH
PROPOSED POWER CENTER
PROPOSED PILE
REPLACEMENT TERRACE AREA = 720 S.F.
EXISTING TERRACE AREA = 720 S.F.
REPLACE ELEVATED WALKWAY AREA = 570 S.F.
EXISTING ELEVATED WALKWAY AREA = 570 S.F.
(R) GANGWAY PLATFORM PILE COUNT: 4 PILES @ 14'0
(E) GANGWAY PLATFORM PILE COUNT: 4 PILES @ 14'0
REPLACEMENT GANGWAY: 5' X 44'
EXISTING GANGWAY: 4' X 20'
PROPOSED DOCK AREA = 3,448 S.F.
EXISTING DOCK AREA = 490 S.F.
NET INCREASE = 2,958 S.F.
PROPOSED DOCK PILE COUNT: 10 PILES @ 16'0
9 PILES @ 24'0
EXISTING DOCK PILE COUNT: 6 PILES @ 14'0
DOCKS OVER EEL GRASS = 0 S.F.
Figure 2.
201-207 Carnation
"AERIE DOCKS"
TRANSIENT
GANGWAY
PROPOSED DOCK
40
45
55
60
CONCRETE WAVE ATTENUATOR
TRANSITION PLATE
EEL GRASS
PROPOSED LINE
EXISTING LINE
FAIRWAY

1.2 IMPORTANCE OF EELGRASS

Eelgrass (Photograph 4) is a marine flowering plant that grows in soft sediments in coastal bays and estuaries, and occasionally offshore to depths of 50 ft. Eelgrass canopy (consisting of shoots and leaves approximately two to three feet long) attracts many marine invertebrates and fishes and the added vegetation and the vertical relief it provides enhances the abundance and the diversity of the marine life compared to areas where the sediments are barren. The vegetation also serves a nursery function for many juvenile fishes, including species of commercial and/or sports fish value (California halibut and barred sand bass). A diverse community of bottom-dwelling invertebrates (i.e., clams, crabs, and worms) live within the soft sediments that cover the root and rhizome mass system. Eelgrass meadows are critical foraging centers for seabirds (such as the endangered California least tern) that seek out baitfish (i.e., juvenile topsmelt) attracted to the eelgrass cover. Lastly, eelgrass is an important contributor to the detrital (decaying organic) food web of bays as the decaying plant material is consumed by many benthic invertebrates (such as polychaete worms) and reduced to primary nutrients by bacteria.



Photograph 4. Eelgrass, *Zostera marina (Source; CRM, Inc.)*

Because of the high ecological value of eelgrass meadows, it is important to document the location and amount of eelgrass in areas of proposed waterside developments in Newport Bay and to mitigate any losses by avoiding, reducing, or compensating for adverse effects on eelgrass habitats and communities.

2.0 SURVEY METHODS

An eelgrass habitat survey was conducted by CRM biologists Rick Ware and Stephen Whitaker on 30 March, 2007. The survey was conducted using Wide Area Augmentation System (WAAS) GPS (Global Positioning System) technology and a Thales Mobile Mapper GPS/GIS Unit to map eelgrass areas. A biologist in a kayak equipped with the GPS followed a SCUBA-diving biologist who towed a surface buoy to mark the perimeter of the eelgrass vegetation. To assist in the mapping process, Ocean Technology Systems (OTS) a surface-to-diver communications system was used by the team. The estimated GPS error of the Thales Mobile Mapper unit with post-processing correction was less than 1 meter. GPS data were initially entered into the Mobile Mapper Software and then transferred into GPS TRACKER and ARCVIEW GIS software. The amount of eelgrass habitat in the project area was calculated using ARCVIEW and Mobile Mapper Software. Turions are functional eelgrass units consisting of the above-ground live, green "shoot" and associated eelgrass leaves [blades] that sprout from the shoots. Replicate 0.07 square meter eelgrass turion density counts were taken throughout the shallow, mid, and deep portions of the eelgrass bed during the March 2005 survey. The counts were then converted to per-square-meter units. These data are considered to be representative of conditions that occurred during the 2007 survey.

Field survey depth data were standardized to Mean Lower Low Water (MLLW) based upon data for the Newport Bay NOAA tide station.

3.0 RESULTS

During the March 30th, 2007 survey, the study area consisted of a rocky intertidal shoreline surrounding a small beach cove with an intertidal sand flat habitat at depths between +3 ft Mean Lower Low Water (MLLW) and 0.0 ft MLLW; a rocky intertidal and rocky subtidal reef seaward of the cove that extends to a depth of -2 ft MLLW; and subtidal sand to sandy silt bay bottom habitat at depths between -2 and -14 ft MLLW. Water depths outside the pierhead line extend to 20 ft MLLW. Water temperature was 56 degrees Fahrenheit. Water visibility (horizontal) was moderate and ranged from 3 to 10 feet.

3.1 EELGRASS AREAL COVER AND TURION DENSITY

3.1.1 Eelgrass Distribution and Aerial Cover

Eelgrass habitat maps for the 2005 and 2007 are shown in Figures 3 and 4, respectively. In 2005, a total of 10,155.4 square feet (0.233 acre) of eelgrass was mapped in the project vicinity. Of this total, 0.231 acre (99%) was mapped south of the existing boat dock. One small patch occurred outside the project boundary, 42 ft north of the project area dock. The remaining eelgrass bed began 62 ft south of the dock, and extended past the project area boundaries to the docks located at the Channel Reef apartment complex. The epifaunal snail

Figure 3. Location of Eelgrass in the Project Area, March, 2005

Figure 4. Location of Eelgrass (Zostera marina) during the March 2007 Survey

Alia carinata, was present in low-to-moderate densities living on the eelgrass blades.

Eelgrass distribution in 2007 generally mimicked the distribution in 2005 with some slight boundary differences. The total amount of eelgrass in 2007 (10,062 sq ft; 0.231 acre) slightly declined compared to 2005 (Figure 3 and 4). A total of 9,888.12 square feet (0.227 acre) was mapped south of the project area dock, and another 0.04 acre was present north of the project area dock during the 2007 survey. The decline in eelgrass cover (0.02 acre), while small, was associated with bay-wide eelgrass habitat area reductions observed between 2005 and 2007 (CRM, in preparation).

3.1.2 Eelgrass Turion Density

Eelgrass turion density was not determined during the 2007 survey. In 2005, eelgrass turion density in Carnation Cove density averaged 115 +/32 shoots per square meter (n=22 replicates) at depths between 0.0 and -14.9 ft MLLW. By comparison, eelgrass shoot density in China Cove (located just south of Carnation Cove) during March 2004 averaged 115 +/ 69 turions per square meter (n=30 replicates). By July 2004, average turion shoot density in China Cove increased to 173 +/17 turions per square meter (n=60) at depths between -2 and -14 ft MLLW (Coastal Resources Management, 2005). North of the project site along Bayside Drive in Corona del Mar turion density was 143 turions per square meter in 2004 and 132 turions per square meter in 2007 (Coastal Resources Management, 2007, 2005). Based on this comparative analysis, eelgrass turion density in this region of Newport Harbor is relatively stable. Consequently, turion density estimates for July 2004 and March 2005 are likely representative of conditions at the Carnation Cove project site in March 2007.

3.2 OTHER MARINE LIFE OBSERVED IN THE PROJECT AREA

Carnation Cove supports an extremely diverse assemblage of plant and animal life due to its location near the Harbor Entrance Channel, and the combination of rocky outcrops and fine sands-to-silt substrates. This region of Newport Harbor shares many characteristics common to nearshore subtidal reef and sand bottom marine habitats and communities located off Corona del Mar. Carnation Cove is an important marine habitat that no longer exists in other areas of Newport Bay (R. Ware, pers. observations; MacGinitie and MacGinitie, 1968).

Carnation Cove Marine Life. Low-to-moderate densities of sand dollars (*Dendraster excentricus*) were found on the sand flats within the protected cove in numbers that varied between approximately 10 and 100 per square meter in 2005, and between 115 to 325 per square meter in 2007. The channel nassa snail *Nassarius fossatus* and the purple olive snail *Olivella biplicata,* typical of shallow sand bottom communities, were also found within the cove's sandy sediments and bottom habitat directly offshore of the cove.

<u>*Sand Dollar Populations*</u>. While the occurrence of sand dollars is not unusual for nearshore southern California sandy habitats at depths between -10 and -25 ft MLLW, the occurrence

of intertidal populations of sand dollar beds within Newport Bay is unique and rare; the population survives because wave motion/wave energy is moderate, sediments are sandy to silty sand, and tidal exchange is excellent. The population represents a condition that was once common on Newport Bay tidal sand flats. MacGinitie and MacGinitie (1968) who studied Newport Bay marine life in the early-to-mid 1900s at the Kerckhoff Marine Laboratory in China Cove, noted that up to 438 specimens per square yard (557 per square meter) of *Dendraster* could be found in Corona del Mar represented a maximum population (Page 239).

Rock Substrate. The marine biological community living on the low-intertidal rocky substrate surrounding Carnation Cove was dominated by high cover of the scaly worm snail (*Serpulorbis squamigerus*), and secondary, lower biological cover of barnacles (*Balanus* spp.), mussels (*Mytilus galloprovincialis*), green algae (*Enteromorpha/Ulva* complex), and brown algae (*Sargassum muticum,* and *Codium fragile).* Invertebrates observed on the shallow subtidal rock outside the cove included Kellet's whelk (*Kelletia kelletii*), ochre sea star (*Pisaster ochraceus*), warty sea cucumber (*Parastichopus parvimensis*), and lobster (*Panilurus interruptus*).

Sand Bottom Marine Life (deeper than -10 ft MLLW). At depths seaward of the eelgrass beds, the sandy-silt bayfloor in the Harbor Entrance Channel was colonized by sea pens (*Stylatula elongata*), sheep crab (*Loxorhynchus grandis*), Kellet's whelk, and the tube-dwelling polychaete *Diopatra ornata*.

Fishes. Nine species of fish were observed during 2005 and 2007 dive surveys. These included mullet (*Mugil cephalus*), topsmelt (*Atherinops affinis*), senorita (*Halichores semicintus*), California garibaldi (*Hypsypops rubicundus*), black perch *(Embiotoca jacksoni*), kelp bass (*Paralabrax clathratus*), barred sand bass (*P. nebulifer*), unidentified turbot (*Pleuronichthys* sp.), and round sting ray (*Urolophus halleri*).

3.3 PROTECTED SPECIES AND HABITATS

Table 1 lists potential federal and/or state endangered, rare, or non-listed sensitive species and that could be present within or nearby the project area during construction. Species of particular concern and relevance to this project are discussed in detail below.

3.3.1 Sensitive Habitats

Newport Harbor and Upper Newport Bay shorelines and waters are defined as wetland habitats under both the California Coastal Act and the National Environmental Policy Act. Consequently this water body is considered sensitive habitat and is afforded protection to conserve and protect the resource.

3.3.2 Plants-Eelgrass Habitat

The project area occurs within the vicinity of estuarine and eelgrass habitats, which are considered habitat areas of particular concern (HAPC) for various federally managed fish

TABLE 1
SPECIAL STATUS SPECIES

Scientific Name	Common Name	USFWS Status or NMFS Status	CDFG Status	Habitat	Potential to Occur
Plants					
Phyllospadix torreyi	surfgrass	Habitat Area of Particular Concern (HAPC)) for Fisheries Management Plan (FMP) Species under the Magnuson-Stevens Fishery Conservation and Management Act	–	Nearshore rocky intertidal/rocky subtidal	Low potential
Zostera marina	eelgrass	Habitat Area of Particular Concern (HAPC) for Fisheries Management Plan (FMP) Species under the Magnuson-Stevens Fishery Conservation and Management Act	–	Bays, harbors, shallow nearshore water sediments	High potential; observed on site
Invertebrates					
Haliotis cracherodii	black abalone	FE	-	Nearshore rocky intertidal/rocky subtidal	Extremely low potential to occur on rocky areas in front of the cove; very rare in southern CA.
Fishes					
Eucyclogobius newberryi	Tidewater goby	FE	–	Shallow marine waters, lower reaches of streams	No potential, extirpated from Orange County
Leuresthes tenuis	California grunion	–	–	Spawns on local open coastal beaches	Very low potential on site; may spawn on Big Corona Beach and the open coastal beaches of Newport Beach between March and August

Scientific Name	Common Name	USFWS Status or NMFS Status	CDFG Status	Habitat	Potential to Occur
Hypsypops rubicundus	California garibaldi	Protected under commercial and sport fish regulations	California State Marine Fish , Assembly Bill AB77, 1995	Subtidal rocky reef habitat; resident and territorial species in shallow subtidal rocky habitats	Two individuals observed associated with rocky reef habitat in front of cove in vicinity of proposed dock structure. Most common within entrance channel north to Coast Guard facility on Bayside Drive compared other areas of harbor
Paralichthys californicus	California halibut	–	–	Shallow coastal waters, open ocean	High potential
Reptiles					
Chelonia mydas	Green turtle	FE	–	Nearshore and open ocean waters	Rare visitor
Eretmochelys imbricata	Hawksbill sea turtle	FE	–	Nearshore and open ocean waters	Rare visitor
Birds					
Pelecanus occidentalis	Brown pelican	FE; proposed for delisting	CE; proposed for delisting; fully protected species	Bays, estuaries, nearshore waters	Forages and rests in project area
Sterna antillarum browni	California least tern	FE	CE	Nests on sparsely vegetated flat substrates, forages in nearby waters	Nesting habitat occurs in Upper Newport Bay and the Santa Ana River mouth; least terns will forage on juvenile baitfish in the nearshore waters, Newport Harbor and Upper Bay channels, usually within 5 mi of nesting sites .

Scientific Name	Common Name	USFWS Status or NMFS Status	CDFG Status	Habitat	Potential to Occur
Charadrius alexandrinus nivosus	Western snowy plover	FT	SSC	Nests on sandy beaches and shores	No nesting habitat present onsite, or for individuals to occur on site
Mammals					
Zalophus californianus	California sea lion	MMA		Nearshore and open ocean waters	Not abundant, but individuals are present in Newport Harbor
Tursiops truncatus	Bottlenose dolphin	MMA		Nearshore and open ocean waters	Rare visitor to Newport Harbor
Eschrichtius robustus	California gray whale	MMA		Nearshore and open ocean waters	Rare visitor to Newport Harbor

FE – Federal Endangered; FT – Federal Threatened; MMA – Protected under Marine Mammal Act
California Department of Fish and Game
CE – California Endangered
SSC – Species of Special Concern
HAPC are subsets of Essential Fish Habitat (EFH) which are rare, particularly susceptible to human induced degradation, especially ecologically important, or located in an environmentally stressed area. Designated HAPC are not afforded any additional regulatory protection under the Magnuson Stevens Fishery Conservation and Management Act (MSA); however, federally permitted projects with potential adverse impacts to HAPC will be more carefully scrutinized during the consultation process (NMFS 2008a)

species within the Pacific Groundfish FMP, (i.e., rockfishes). HAPC are described in the regulations as subsets of EFH which are rare, particularly susceptible to human induced degradation, especially ecologically important, or located in an environmentally stressed area. Designated HAPC are not afforded any additional regulatory protection under the Magnuson-Stevens Fishery Conservation and Management Act (1997). However, federally permitted projects with potential adverse impacts to HAPC will be more carefully scrutinized during the consultation process (National Marine Fisheries Service, 2007).

3.3.3 Invertebrates. In 1998, the National Oceanographic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS) added black abalone (*Haliotis cracherodii*) to the candidate species list for possible listing under the federal ESA, and on January 14th, 2009, NMFS listed black abalone as an endangered species (Federal Register / Vol. 74, No. 9 / Wednesday, January 14th, 2009 /Rules and Regulations). Black abalones usually inhabit surf-battered rocks and crevices from the intertidal zone to shallow subtidal zone down to 20 ft (6 m). It is a long-lived species, attaining an age of 25 years or more. Now a rare species, the black abalone was abundant in California until the mid-1980's. It once occurred in such high concentrations that individuals were observed stacked on top of one another. This species was not observed during the CRM surveys, and is unlikely to be in the project area rocky habitat at the mouth of Newport Harbor. While other species of abalone are also federally endangered, this species would be the only one that would have any potential to occur within the project area (very low potential).

Sand dollar populations in the cove are unique intertidal populations as described in Section 3.2. However, sand dollars do not have any special species status locally, within the State of California, or on a federal level.

3.3.4 Fishes

California Grunion *(Leuresthes tenuis).*_The California grunion (*Leuresthes tenuis*) is a fish that uses the high intertidal sandy beach habitat of many southern California beaches as spawning habitat (Walker, 1952), including Newport Beach (CRM and Chambers Group, 2002). The grunion is a member of the silversides family, Atherinidae, along with the jacksmelt and topsmelt. They normally occur from Point Conception, California, to Point Abreojos, Baja California. Occasionally, they are found farther north to Monterey Bay, California and south to San Juanico Bay, Baja California. They inhabit the nearshore waters from the surf to a depth of 60 feet. Grunion are not expected to be located in the local project area within Carnation Cove.

California halibut (*Paralichthys californicus*). Although the California halibut does not have a formal special species status, it is considered a sensitive species by resource agencies because of its commercial value and a continued region-wide reduction of its nursery habitat in bays and wetlands. California halibut spawn at sea and the larval stages are planktonic. After several months, the larval fish settle to the bottom, and migrate into shallow coastal waters, including Newport Bay. Halibut are distributed

throughout the waters of Newport Harbor and Upper Newport Bay, primarily as juveniles, although larger individuals are caught near the ocean entrance and in offshore waters. Young-Of-The-Year (YOTY) prefer shallow waters between about –0.45 meter (1.5 ft) and –1.0 meter (3.5 ft) Mean Lower Low Water (MLLW), whereas juveniles prefer deeper channel bottoms to a maximum depth of approximately 4.5 meters (15 ft) MLLW. After spending nearly nine months in Newport Bay, juveniles will move out into the open coastal environment. This species has a low to moderate potential to occur in the shallow waters of the project area because of the nature of the sand shoreline and the relatively wide shelf of sandy silt sediments.

Garibaldi (*Hypsypops rubicundus*). The garibaldi is the largest of the damselfish family (Pomacentridae); adults, orange in color, typically reach 14 inches in length. It is found in shallow waters off the Southern California coast and Mexico (California Department of Fish and Game, 2001. Males build the nests, the female enters several of them and then makes her decision. The garibaldi is one of the few fish to use the same nesting site every year. In 1995 the California Legislature designated the Garibaldi as the Official State Marine Fish and banned any further commercial take. Garibaldi populations have rebounded from the local effects of commercial take and are in good condition throughout their range in southern California. Sports fishing take of this species is also prohibited. (http://www.dfg.ca.gov/marine/pdfs/oceanfish2008.pdf).

3.3.5 Marine Birds

California least tern (*Sterna antillarum browni*). The State and Federally-listed California least tern is a spring-and-summer resident in southern California during the breeding and nesting season. The least tern does not breed or nest near the project site but will forage in Newport Bay and nearshore coastal waters during their March through September breeding season. The nearest least tern nesting sites are located approximately **2.5** miles west (upcoast) at the mouth of the Santa Ana River and **4.2** mi northeast in Upper Newport Bay near the Jamboree Bridge.

California brown pelican (*Pelecanus occidentalis*). The California brown pelican is a federally endangered species, but is proposed for delisting by both the federal government and the State of California due to its population resurgence along the California coastline. On 5 February, 2009, the California Fish and Game Commission voted unanimously to remove the California brown pelican from the state endangered species list. The Commission's decision to delist the brown pelican will now be reviewed by the Office of Administrative Law before the large seabird can be officially removed from the Endangered Species list. This species is found in Newport Bay year-around but does not breed locally. The brown pelican utilizes Newport Harbor waters for foraging on baitfish, and the shoreline as resting habitat. The California brown pelican is designated as a Fully Protected Species under the Fish and Game Code, and that will not change as a result of the delisting. It is still illegal to kill or harm a brown pelican in California.

3.3.6 Marine Reptiles

Marine reptiles do not utilize the local marine waters as a permanent breeding or foraging habitat. However, the green turtle (*Chelonia mydas*) and hawksbill (*Eretmochelys imbricata*), will occasionally occur in the nearshore environment offshore Orange County. Green sea turtles have been reported in the San Gabriel River where they encounter the warmer, discharged waters of the power generating facilities located farther up the River and Alamitos Bay. (Vivian Cook, Marine Bureau; Allen Powder, Long Beach Lifeguards pers. comm. with R. Ware, CRM, 27 July 2007). Their occurrence within Newport Bay, located 20 miles east of Long Beach is expected to be rare although because Newport Bay has a productive eelgrass system, green sea turtles may utilize the seagrass beds within the bay as one source of their nutritional requirements.\

3.3.7 Marine Mammals

Three species of marine mammals have a potential to occur within the project site; the California sea lion (*Zalophus californica*), the bottlenose dolphin (*Tursiops truncatus*) and the California gray whale (*Eschrichtius robustus*).

The California sea lion (*Zalophus californicus*) and bottlenose dolphin are occasional visitors in Newport Harbor. Individuals are found primarily between the Pavilion and the harbor entrance channel, but may occasionally wander farther into Newport Harbor and Upper Newport Bay.

In June 1994, the California gray whale eastern pacific population was removed from the Federal Endangered Species List, due to recovery of population numbers to near the estimated sustainable population size. The gray whale migrates through the SCB twice each year, traveling between its feeding grounds in Alaska and its breeding grounds in Baja California. The southern migration through the SCB occurs from December through February, with pregnant females moving through the area first. The northward migration begins in February and lasts through May, peaking in March (Dailey et al. 1993). Solitary animals generally lead the northbound migration with cow-calf pairs following 1 to 2 months later (Foster and Schiel 1985). Gray whales migrate within 125 miles (200 km) of the shoreline and many are sighted within 9 miles (15 km) of shore (Dailey et al. 1993). On the northbound migration, cow-calf pairs are believed to more closely follow the shoreline rather than the offshore route (Dailey et al. 1993). On rare occasions, they have been known to enter Newport Bay.

4.0 FISH MANAGEMENT PLAN SPECIES

This assessment of Essential Fish Habitat (EFH) for the Carnation Cove Project is being provided in conformance with the 1996 amendments to the Magnuson-Stevens Fishery Management and Conservation Act (FR 62, 244, December 19, 1997). The 1996 amendments to the Magnuson-Stevens Act set forth a number of new mandates for the National Marine Fisheries Service, eight regional fishery management councils, and other

federal agencies to identify and protect important marine and anadromous fish habitat. The councils, with the assistance from NMFS are required to delineate EFH for all managed species. Federal action agencies which fund, permit, or carry out activities that may adversely impact EFH are required to consult with NMFS regarding the potential effects of their actions on EFH, and respond in writing to the NMFS recommendations.

EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity". An adverse effect is "any impact which reduces the quality and/or quantity of EFH". Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to benthic organisms, prey species, and their habitat, and other ecosystem components. Adverse effects may be sites specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions [50 CFR 600.910(a)].

Impacts to Habitat Areas of Particular Concern (HAPC) are described in the regulations as subsets of EFH which are rare, particularly susceptible to human induced degradation, especially ecologically important, or located in an environmentally stressed area, including eelgrass. Eelgrass habitat is discussed in Section 2.2.

The proposed project is located within an area designated as EFH for the Coastal Pelagics Management and the Groundfish Management Plan designated species.. Four coastal pelagic species, the northern anchovy, pacific sardine, jack mackerel, and Pacific mackerel potentially occur in the waters offshore of Newport Beach. Six groundfish species also potentially occur within the local project area, including California scorpion fish, vermillion rockfish, calico rockfish, California skate, spiny dogfish shark, and leopard shark. Of these species, only the northern anchovy comprises a significant portion of fish that occur, and contribute moderate-to-heavy abundances to the nearshore fish, but much less so within Newport Bay. Northern anchovy comprise a portion of the commercial bait fishery in San Pedro Bay and a commercial bait fishing operation operates in the Newport Harbor entrance channel that provides northern anchovy to sports fishermen. This species is a planktivore, and is preyed upon by larger fish and seabirds. Larvae of northern anchovy are also part of the Newport Bay ichthyofauna and icthyoplankton community. Although several other coastal pelagic and groundfish FMP species are known from the project area, temporal data indicate that their presence in the project area is likely sporadic and their numbers in the project region would be extremely low (Coastal Resources Management, 2008).

5.0 INVASIVE SPECIES

Caulerpa taxifolia

Caulerpa (Figure 7) has a potential to cause ecosystem-level impacts on California's bays and nearshore systems due to its extreme ability to out-compete other algae and seagrasses. *Caulerpa taxifolia* grows as a dense smothering blanket, covering and killing all native aquatic vegetation in its path when introduced in a non-native marine habitat. Fish, invertebrates, marine mammals, and sea birds that are dependent on native marine

vegetation are displaced or die off from the areas where they once thrived. It is a tropical-subtropical species that is used in aquariums. It was introduced into southern California in 2000 (Agua Hedionda Lagoon and Huntington Harbour) by way of individuals likely dumping their aquaria waters into storm drains, or directly into the lagoons. While outbreaks have been contained, the Water Resources Board, through the National Marine Fisheries Service and the California Department of Fish and Game require that projects that have potential to spread this species through dredging, and bottom-disturbing activities conduct pre-construction surveys to determine if this species

Figure 7. The invasive algae, *Caulerpa taxifolia*. Source: NOAA/NMFS

is present using standard agency-approved protocols and by National Marine Fisheries Service/California Department of Fish and Game Certified Field Surveyors.

Biologists did not observe any invasive algae, *Caulerpa taxifolia* in the general vicinity of the project site during either 2005 or 2007 surveys. The total APE was 47,418 sq ft (1.08 acres), of which 15,525 sq ft (42.9%) in the main channel was covered, and 11,193 sq ft (0.26 acre), 100%, was covered in Carnation Cove.

6.0 IMPACT ASSESSMENT

6.1 PROPOSED CONSTRUCTION METHODS

The existing two-slip dock will be removed and replaced with a six-slip wooden dock with and outside 155 ft-long wave attenuating concrete dock (Figure 2). A new elevated walkway and 44 ft-long gangway will connect to the new dock.

Old components will be detached and floated away, then loaded onto a truck or trailer and trucked offsite for demolition. The new dock components will be built offsite, floated into place, and attached on site.

The new gangway platform at the end of the pier-supported elevated walkway will have (4) 14-inch diameter piles. The wood dock will have (10) 16-inch diameter piles, and the concrete wave attenuator will have (9) 24-inch diameter piles. All will be steel piles drilled into the near-surface rock layer. Embedment is anticipated at 15 feet (per City guidelines) for the 16-inch diameter piles and 20 feet for the 24-inch diameter piles.

6.2 IMPACTS ON WATER QUALITY AND MARINE RESOURCES

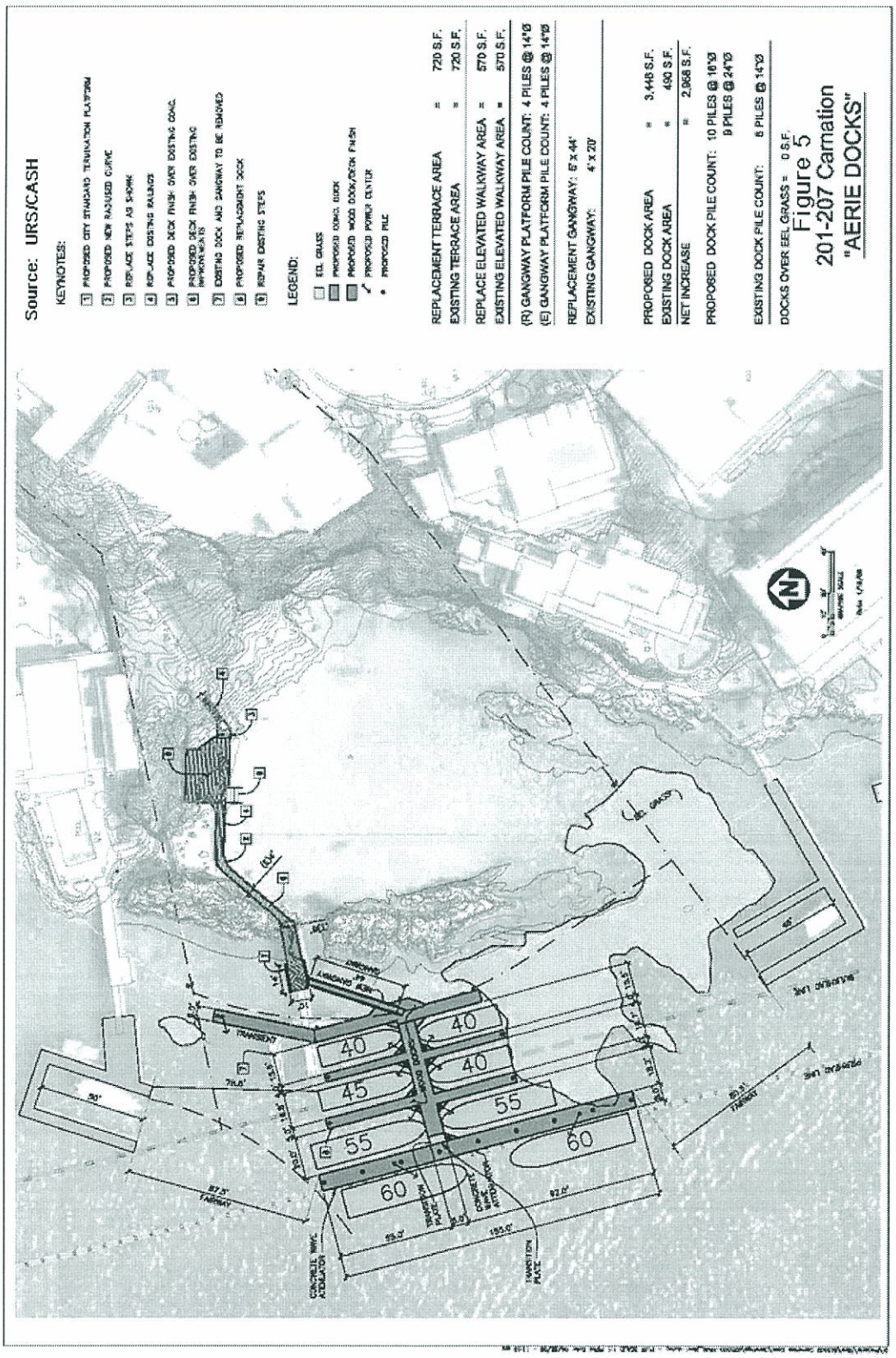
The location of eelgrass habitat relative to the proposed dock layout is shown in Figure 5.

6.2.1 Construction Activities

Potential Water Quality Impacts on Eelgrass Habitat. During the pile removal and emplacement process, water turbidity will increase when the new piles are driven into the sediments. Turbidity may also increase if vessel propellers impact the bay floor or prop wash stirs up bottom sediments.

To prevent the spread of any turbidity plume out of the area, Best Management Practices (BMPs) should be implemented such as the installation of a silt curtain around the dock and pile sleeves. Implemented BMPs that will eliminate any disposal of trash and debris at the project site will assist in preventing water quality and eelgrass habitat degradation. Construction debris on the bay floor should be removed completely and transported offsite. See Section 5 for mitigation measures and BMPs.

Potential Vessel-Related Impacts on Eelgrass Habitat. The sand flats and shallow bay floor in the immediate vicinity and adjacent properties are vegetated with eelgrass (CRM 2005a, CRM 2005b, 2007; Figures 3 and 4, this document). Consequently barges and work vessels working in the project area nearby or over existing eelgrass beds have a potential to adversely affect eelgrass through (1) deployment of anchors and anchor chain within eelgrass habitat (2) grounding over eelgrass habitat and (3) propeller scarring and prop wash of either the barge or support vessels for the barge. These activities would create furrows


Source: URS/CASH
KEYNOTES:
1 PROPOSED CITY STANDARD TERMINATION PLATFORM
2 PROPOSED NEW RAISED CURVE
3 REPLACE STEPS AS SHOWN
4 REPLACE EXISTING RAILINGS
5 PROPOSED DECK FINISH OVER EXISTING CONC.
6 PROPOSED DECK FINISH OVER EXISTING IMPROVEMENTS
7 EXISTING DOCK AND GANGWAY TO BE REMOVED
8 PROPOSED REINFORCED DOCK
9 REPAIR EXISTING STEPS
LEGEND:
EEL GRASS
PROPOSED CONC. DOCK
PROPOSED WOOD DOCK/DECK FINISH
PROPOSED POWER CENTER
PROPOSED PILE
REPLACEMENT TERRACE AREA = 720 S.F.
EXISTING TERRACE AREA = 720 S.F.
REPLACE ELEVATED WALKWAY AREA = 570 S.F.
EXISTING ELEVATED WALKWAY AREA = 570 S.F.
(R) GANGWAY PLATFORM PILE COUNT: 4 PILES @ 14'@
(E) GANGWAY PLATFORM PILE COUNT: 4 PILES @ 14'@
REPLACEMENT GANGWAY: 6' x 44'
EXISTING GANGWAY: 4' x 20'
PROPOSED DOCK AREA = 3,448 S.F.
EXISTING DOCK AREA = 490 S.F.
NET INCREASE = 2,958 S.F.
PROPOSED DOCK PILE COUNT: 10 PILES @ 18'@
9 PILES @ 24'@
EXISTING DOCK PILE COUNT: 8 PILES @ 14'@
DOCKS OVER EEL GRASS = 0 S.F.
Figure 5
201-207 Carnation
"AERIE DOCKS"
EEL GRASS
PROPOSED LINE
EXISTING LINE
TRANSITION PLATE
CONCRETE WAVE ATTENUATOR
FAIRWAY

and scars within the eelgrass vegetation and would result in adverse losses of eelgrass habitat that would require an eelgrass mitigation program. Implementing mitigation measures identified in Section 5 are intended to minimize disturbances related to vessel operations and vessel anchor positioning. Barge operations will have minimal shading effects on eelgrass since the position of the barge will shift each day, preventing continuous shading of any one part of the eelgrass bed.

6.2.2 Direct, Eelgrass Habitat Losses Related to Construction

Pile Emplacement. Pre-stressed concrete piles will be set into boreholes pre-drilled to the required embedment depth with the annular space backfilled with grout to develop proper contact with sides of the borehole, thereby eliminating the need for pile driving (Leighton Associates, Inc. 2008). The bedrock material is expected to be drillable using equipment similar in horsepower and energy rating as a typical EZ-Bore bucket auger drilling rig that is used for hillside geologic explorations in similar bedrock formations. Nineteen (19) piles will be embedded in the bay floor. These piles will have a cumulative surface area of 39.1 sq ft. None of the piles will be directly embedded within eelgrass habitat. However, two piles on the wave-attenuating dock and two piles at the end of the wood dock are within several feet of where eelgrass occurs. There is potential that placement of these four piles could disturb eelgrass through burial or sediment disturbances around the perimeter of the area to be affected during the drilling process for pile emplacement. Implementing turbidity and sediment control measures during pile emplacement such as installing silt curtains and sleeves around pilings will mitigate potential eelgrass habitat losses due to pile emplacement activities.

6.2.3 Indirect, Long-term Impacts Related to Shading Impacts

The total surface area of the dock structures will be 3,448 square feet. A small portion of the existing eelgrass bed (approximately 30 sq ft) will potentially be affected by shading effects from vessels docked within the slips and the wave-attenuating concrete dock structure (Figure 5). The area of eelgrass habitat that is actually affected by long-term shading will be determined during post-construction monitoring surveys per National Marine Fisheries Service (NMFS) Southern California Eelgrass Mitigation Policy (NMFS 1991 as amended).

Mitigation for the reduction in eelgrass habitat as a consequence of shading is discussed in Section 5.

6.2.4 Impacts Related to Sand Transport. The project area lies within an area of active sand transport near the harbor entrance channel that is subjected to periodic sand movement through mechanisms related to wave exposure and tidal energy transport. Sediments are transported from the entrance channel to the Orange County Sheriff Harbor Patrol Beach along Bayside Drive (Chia Chi Lu, Noble Consultants, Inc. pers. com. with R. Ware, Coastal Resources Management, 8 May 2008). Piles, revetment, jetties, and other structures have a potential to interrupt and/or disrupt sand transport that could result in either an increase in sand deposition or sand erosion. Biologically, changes in sediment patterns and

changes in sediment grain size can alter biological communities including the distribution and abundance of eelgrass. Based upon a review of sand transport at the project site, Noble Consultants, Inc. (2008) concluded that sand transport would not be substantially altered due the to placement and configuration of piles in a single row that is in the parallel, and not perpendicular to the direction of sand transport. Therefore, the placement of dock piles will not result in the disruption or loss of eelgrass habitat, or other biological communities as a result of any alternation in local sand transport mechanisms.

6.3 IMPACTS TO SENSITIVE RESOURCES

6.3.1 Invertebrates-Sand Dollar Beds and Sand Flat Habitat in Carnation Cove

The sand flats within the Carnation Cove should be avoided by construction personnel and equipment. Disturbances to the sandy cove intertidal and shallow subtidal habitat, eelgrass, and sand dollar bed within the cove would be considered a significant adverse impact to on-site marine resources. In addition, residents should be made aware of the sensitivity of the cove as a unique marine biological habitat within Newport Bay. Mitigation to prevent a significant impact to this resource is presented in Section 5.

6.3.2 Fishes

The proposed project will not have any significant impacts on marine fishes, including Fisheries Management Plan (FMP) species. California garibaldi that are present in the rocky habitats inshore of the proposed dock will be subjected to short-term effects of drilling related to pile emplacement, including increased noise turbidity impacts, but the project will not result in any mortality. Schooling fishes such as topsmelt will avoid the construction zone during construction and will return to the area following the completion of construction activities.

6.3.3 Marine Reptiles

No impacts to sea turtles will occur. Sea turtles are not expected to be within the local project area.

6.3.4 Marine Mammals

The proposed project will not result in adverse impacts to marine mammals. The occurrence of gray whales and bottlenose dolphins in the area around the docks would be expected to be an extremely rare event. Drilling activity and pile emplacement construction activity will not adversely affect California sea lions. These animals have adapted to harbor conditions including vessels, ambient noises, and other disturbances.

6.3.5 Marine Birds

Between early spring to late summer and California least terns will forage in the waters of Newport Bay, including the waters of the Corona del Mar Reach and Entrance Channel near

the project area. California brown pelicans will forage in the harbor year-around. The presence of temporary, stationary vessels and drilling activity required for pile emplacement will not adversely affect seabirds that forage in the open waters of Newport Harbor. These birds will forage in the presence of boating activity and will avoid activity that is potentially harmful. The proposed project is not expected to adversely affect rare, endangered, or sensitive species of birds that are in the general project area.

6.4 IMPACTS TO FISHERIES MANAGEMENT PLAN SPECIES

The proposed project will not have any significant impacts on FMP species. A discussion of impacts to Habitat Areas of Special Concern (eelgrass) is discussed in Section 6.2.1 through 6.2.4.

7.0 MITIGATION MEASURES

7.1 WATER QUALITY

During construction, the following mitigation measures and Best Management Practices (BMPs) are recommended to prevent water quality degradation in Newport Bay and to reduce potential adverse impacts on marine resources.

- All debris and trash shall be disposed in suitable trash containers on land or on the work barge at the end of each construction day;
- discharge of any hazardous materials into Newport Bay will be prohibited;
- a silt curtain will be placed around all water-side construction activity during the construction of the dock system to limit the spread of turbidity. If prolonged turbidity is observed outside the silt curtain then the silt curtain shall be re-deployed and re-positioned in a manner to correct the problem. Removal and emplacement of the piles will be conducted using Best Available Technology (BAT) that limits the re-suspension of sediments and the creation of turbidity plumes; and
- debris bins will be placed at the project site. Material collected will be removed on a daily basis. The amount, type, and location of any large debris (piles, dock parts, concrete, etc) that is deposited on the seafloor will be documented and removed prior to the completion of the project. The project marine biologist shall also inspect the seafloor following the completion of construction to ensure that all debris has been removed.

7.2 MARINE RESOURCES PROTECTION PLAN FOR CONSTRUCTION IMPACTS

The following mitigation measures will be implemented during construction to avoid adverse impacts to eelgrass and other marine resources.

- The project marine biologist shall mark the positions of eelgrass beds in the vicinity of the dock and gangway construction area with buoys prior to the initiation of any construction activities;
- the project marine biologist shall meet with the construction crew prior to construction to orient them to specific areas where eelgrass occurs;
- support vessels and barges should maneuver and work over eelgrass beds only during tides of +2 feet MLLW or higher to prevent grounding within eelgrass beds, damage to eelgrass from propellers, and to limit water turbidity;
- anchors and anchor chains shall not impinge upon eelgrass habitat;
- construction activities associated with the elevated walkway leading to the gangway, and construction personnel should avoid impacts to rocky intertidal habitat, eelgrass beds, and to sand dollar habitat within the Carnation Cove;
- post signage at key at access points in front of beach and on the elevated walkway that state that access is limited to the elevated walkway during construction. Mark area off from access with yellow tape to prevent access. Construction crews will not access the water or rocky shorelines within the cove;
- the project marine biologist will perform weekly on-site inspections to ensure that BMPs and mitigation measures are being implemented during construction; and
- post-construction marine biological surveys (per permit conditions) will be performed to map eelgrass cover in the project area using the same methodology as the pre-construction survey and also to document the condition and density of the sand dollar beds within the cove.

7.3 MITIGATION FOR POTENTIAL HABITAT LOSSES

7.3.1 Direct, Construction-Related Eelgrass Habitat Losses

No direct losses of eelgrass are anticipated as a result of the Carnation Cove dock construction project. Post-construction surveys will be conducted to verify that no eelgrass losses have occurred. In the event that losses are identified during the post-construction survey, then an eelgrass mitigation program will be implemented to offset any losses.

7.3.2 Indirect, Long-term Eelgrass Habitat Losses and Potential Measures to Reduce Eelgrass Habitat Losses

Approximately 30 sq ft of eelgrass vegetation could be affected by long-term dock shading effects (Figure 5). The reduction of eelgrass habitat as a consequence of shading will be mitigated by conducting an eelgrass transplant program, should impacts occur, in accordance with the Southern California Eelgrass Mitigation Policy (NMFS 1991 as amended) following loss determination at the end of a two-year monitoring program (see Section 5.4.3). The location and the amount to be transplanted shall be determined following the results of the two annual monitoring efforts (NMFS 1991 as amended).

7.3.3 Direct, Long-term Use of Carnation Cove and Reduction of Habitat Quality

Residents of the Carnation Cove residential development should be made aware of the special biological significance of the Cove, avoid trampling intertidal eelgrass, and taking biological resources (i.e., sand dollars) out of the sand flat habitat.

8.0 MONITORING SURVEYS

8.1 PRE-CONSTRUCTION SURVEY

An updated, pre-construction eelgrass and invasive algae survey will be completed within 30 days of the initiation of proposed dock and gangway construction. The results of this survey will be used to update the results of the March 2007 eelgrass survey and to identify, if any, potential project-related eelgrass losses and the presence or absence of the invasive algae, *Caulerpa taxifolia* per NMFS requirements.

8.2 POST-CONSTRUCTION SURVEY

A post-construction project eelgrass survey will be completed within 30 days of the completion of project construction in accordance with the Southern California Eelgrass Mitigation Policy (NMFS 1991 as amended, Revision 11). The report will be presented to the resource agencies and the Executive Director of the California Coastal Commission within 30 days after the completion of the survey. If any eelgrass has been impacted in excess of that determined in the pre-construction survey, then any additional impacted eelgrass will be mitigated at a ratio of 1.2:1 (mitigation to impact).

8.3 POST-CONSTRUCTION SHADING EFFECT SURVEYS

A determination regarding the amount of eelgrass to be mitigated will be made based upon two annual monitoring surveys which document the changes in the bed (areal extent and density) in the vicinity of the footprint of the boat dock, moored vessel(s), and/or related structures during the active-growth period for eelgrass, typically March through October.

Any impacts determined by these monitoring surveys shall be mitigated per requirements

of the Southern California Eelgrass Mitigation Policy (NMFS 1991 as amended, Revision 11). A statement from the applicant indicating their understanding of the potential mitigation obligation which may follow the initial two-year monitoring is required. If losses are identified, a final eelgrass mitigation plan will be submitted to the applicant and resources agencies for review and acceptance.

9.0 REPORTING

Pre-construction and post-construction eelgrass survey results will be submitted to the resource agencies and the Executive Director of the California Coastal Commission in report format within 30 days following each survey.

The reports will present eelgrass area and density data, an assessment of the potential amount of eelgrass habitat affected (pre-con survey), the actual amount of eelgrass habitat affected (post-con survey), the functional biological quality of the area, a qualitative assessment of invertebrate and fish use of the area, and an eelgrass mitigation plan, (post-con) if it is deemed necessary.

Each of the two-year shading effects surveys will present eelgrass area and density data, an assessment of the eelgrass habitat affected, the functional biological quality of the area, a qualitative assessment of invertebrate and fish use of the area, and an eelgrass mitigation plan (2^{nd} year shading study) if habitat impacts are identified.

10.0 LITERATURE CITED

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Photograph 1. View of discharge pipe with African umbrella sedge mixed with other ornamentals. Photograph taken on 12-10-2008.

Photograph 2. This photograph depicts irrigation lines visible immediately above the area vegetated with African umbrella sedge. Photograph taken on 12-10-2008.

GLENN LUKOS ASSOCIATES

EXHIBIT 3

AERIE PROPERTY

Site Photographs

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Aerie Project site City/County: Orange Sampling Date: 12/10/08
Applicant/Owner: Manatt, Phelps + Phillips State: CA Sampling Point: 1
Investigator(s): Moonkemp / P Schwartz Section, Township, Range: T7S, R10W, sec 1
Landform (hillslope, terrace, etc.): Slope Local relief (concave, convex, none): Slope / none Slope (%): 40-50
Subregion (LRR): Med Lat: 33°35'54.0 N Long: 117°52'45.6 W Datum: WGS 84
Soil Map Unit Name: Myford NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? No Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? NO (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	Is the Sampled Area within a Wetland? Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. Pittosporum undulatum	10	N	UNK
2. Ligustrum sp.	10	N	UNK
3.			
4.			
Total Cover:			
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:			
Herb Stratum			
1. Cyperus involucratus	80%	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:			
Woody Vine Stratum			
1.			
2.			
Total Cover:			

% Bare Ground in Herb Stratum ____ % Cover of Biotic Crust ____

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:
X Dominance Test is >50%
___ Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? * Yes X No ____

Remarks:
* Appears to be supported by irrigation for adjacent landscaping + nuisance water

SOIL

Sampling Point: 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-14	10yr 2/1	100	NONE				Loamy Sand	Smells very fresh i.e. good garden soil - no hydric indicators of any kind

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ 1 cm Muck (A9) (LRR D)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ___ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (Riverine)
- ___ Sediment Deposits (B2) (Riverine)
- ___ Drift Deposits (B3) (Riverine)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): _____

Water Table Present? Yes ___ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): _____

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: