Appendix C – Eelgrass Management Plan

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EELGRASS PROTECTION AND MITIGATION PLAN FOR SHALLOW WATERS IN LOWER NEWPORT BAY:

AN ECOSYSTEM BASED MANAGEMENT PROGRAM

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TABLE OF CONTENTS

Summary of the Eelgrass Protection and Mitigation Plan. i

Introduction. 1

Background. 2

Elements of the Plan. 5

1. City Assumes Lead Responsibility. 5
2. Tier Levels Based on Eelgrass Surveys. 10
3. Best Management Practices (BMPs). 14
4. Program to Promote Eelgrass Growth and Establishment. 16

Initial Program Actions. 17

Reporting and Adaptive Management. 18

Other Conditions Applicable to this Plan. 19

Acknowledgments. 21

References. 21

TABLES

Table 1. Eelgrass Tiers for Activities Occurring in the Project Area. v
Table 2. City Sponsored Shallow Water Eelgrass Surveys in Newport Harbor. 9

FIGURES

Figure 1. Location of sampling areas within the shallow water eelgrass zone of Lower Newport Bay. 8
Figure 2. Location of Stable, Transitional, and unvegetated eelgrass zones based on CRM (2010). 9
Figure 3. Tidal flushing in days for the lower and upper Newport Bay area. 12

Appendix A Project Area Maps
Appendix B Eelgrass Survey Data for the Project Area

SUMMARY OF THE EELGRASS PROTECTION AND MITIGATION PLAN

The purpose of this document is to describe the City of Newport Beach's eelgrass (*Zostera marina*) protection and mitigation plan (the Plan) to be used within Newport Harbor for routine maintenance dredging activities typically undertaken by individual property owners. The Plan focuses on the shallow water eelgrass protection and mitigation measures associated with the following action:

> (1) Minor maintenance dredging under and adjacent to currently authorized private, public, and commercial docks, floats, and piers. Dredging depth is not to exceed -10 feet mean lower low water (MLLW; plus 2 feet of allowable over depth).

These types of impacts to eelgrass are temporary in nature. Temporary refers to the fact that the maintenance dredging is short lasting and that immediately following the dredging, the area is subject to sedimentation. The area to be dredged generally consists of the area beneath the boat and dock where eelgrass is generally not found and therefore in these areas there is little or no impact to eelgrass. Eelgrass, however, may be found on the side slopes of the dredged area and therefore comprise only a small or minor area compared to the overall dredging footprint. The area outside the dredging footprint is usually not disturbed by the dredging activity; although there may be some temporary impacts due to turbidity. Maintenance dredging impacts would be minor, as they would occur in small areas within the RGP 54 and Plan boundaries, which cover a relatively small portion of Newport Harbor and the Stable and Transitional Zones.

Eelgrass has been observed to re-establish itself in these areas following dredging events as natural rates of siltation occur. Based on Newport Harbor-specific data reported by Coastal Resources Management Inc. (2010), the shallow water population of eelgrass is found at depths up to -6 to -15 feet relative to MLLW, with greater depth penetration in the portions of the harbor closest to the ocean inlet and lower penetration within Upper Newport Bay. Eelgrass is spread by seed, and it can colonize areas within a few years along the edges of the dredged area. Because eelgrass impacted by dredging is usually at the edge of a dredged area (i.e., it does not grow under the existing docks or boats), the depth of dredging is usually shallower at the sides than within the boat slip, and this slope is within the zone that can be occupied by eelgrass. Other studies have shown that eelgrass can occur within 1 to 2 growing seasons following dredging; however natural variation between years can be substantial and must be considered when evaluating recovery times (Sabol et al, 2005).

The area within Newport Harbor where maintenance dredging would occur is referred to as the Plan Area and comprises portions of the harbor defined as:

> The bulkhead to pierhead line plus 20 feet bayward, including those exceptions for structures that extend beyond this boundary as of 2013 in conformance with harbor development regulations or policy.

Within the Harbor, there are three zones that have been defined in terms of eelgrass presence:

> Stable Zone: An area within the Plan Area that exhibits little variation in overall abundance from year to year. This Zone contains the greatest amount of eelgrass in large contiguous beds and is the area closest to the harbor entrance.
>
> Transitional Zone: An area within the Plan Area that exhibits higher variation in overall abundance between surveys and has sparser coverage by eelgrass in scattered eelgrass beds.
>
> Unvegetated Zone: An area within the Plan Area within which eelgrass has not been observed during the surveys. This Zone is in the western end of the Harbor.

Maintenance dredging in compliance with the Plan will be limited to an annual maximum of 8 acres within the Stable and Transitional Zones, but is not otherwise limited in the Unvegetated Zone as long as the dredging meets all other conditions associated with the authorized permit for such dredging.

Within the 8 acres that may be dredged annually within the Stable and Transitional Zones, the maximum amount of allowable impacts to eelgrass will be limited to a fixed percentage of each Zone per year. The percentage of eelgrass that is allowed to be impacted and the best management practices to be implemented are based on Tier levels that have been established for each Zone.

Three Tiers are used:

> Tier 1: A level at which eelgrass is generally abundant and thriving based on the upper 40% of observations[1] from the last four biannual surveys of eelgrass within the Plan Area.

[1] The Tiers are based on a proportion of abundance observations taken between 2003 and 2014 assuming a normal distribution.

Tier 2: A level at which eelgrass is less abundant and may be under some environmental stress based on the middle 20% of observations from the last four biannual surveys of eelgrass within the Plan Area.

Tier 3: A level at which eelgrass has declined to lower levels and may be experiencing significant environmental stress based on the lower 40% of observations from the last four biannual surveys of eelgrass within the Plan Area.

The Tier level applicable will be determined from the most recent Plan Area survey, e.g. the amount of eelgrass present will be compared to the ranges set for each of the Tiers. The impacts to eelgrass allowed in the Stable and Transitional Zones will then be set —up to 5% of the population[2]/year in Tier 1 and up to 3% of the population/year in Tier 2. However, in no case, shall the total impact to eelgrass in the Stable and Transitional Zones within any year be greater than 1% of the estimated total abundance of eelgrass within Newport Harbor as determined from the most recent full Harbor[3] eelgrass survey. The Tier levels and the actions that the City will undertake are defined in Table 1, and a flow chart demonstrating the process is shown on Figure 1. The Tier levels may be adjusted in the future based on subsequent survey results, but only with approval by the federal and state agencies with permit authority over the maintenance dredging activities.

Mitigation for temporary loss of eelgrass, for activities covered under this Plan would be implemented under an approach that includes four elements:

(1) **City Assumes Lead Responsibility** – The City will enforce compliance with the Plan, subject to agency oversight.[4] Consistent with its management role, the City, rather than individual property owners, will generally be responsible for surveying and data gathering. This will ensure decisions are made based on the City's reliable, professionally gathered data, while relieving individual property owners of a burden they generally lack the expertise to effectively implement.

(2) **Biannual Surveys of Eelgrass Abundance** – The Plan promotes an ecosystem-based approach; the key metric of eelgrass protection is the maintenance of a

[2] The population acreage within each Zone used for this calculation is the average of the four baseline eelgrass surveys conducted between 2003 and 2014. This acreage is 16.78 acres for the Stable Zone and 3.81 acres for the Transitional Zone.

[3] The full Harbor survey includes the Plan Area and the subtidal areas outside of the Plan Area. The most recent full Harbor survey was conducted in 2013-2014 and was found to be 88.27 acres.

[4] The Plan will be implemented in coordination with Regional General Permit 54. Other projects that have temporary impacts to eelgrass that require Individual Permits under Section 404 of the Clean Water Act could qualify, if they occur within the Plan Area in Newport Bay and are within the thresholds established under this Plan.

sustainable shallow water eelgrass population. The focus of the City's management will be to protect and promote shallow water eelgrass populations. Dredging is conditioned on compliance with best management practices (BMPs) for avoiding eelgrass disturbance where possible. If the abundance of eelgrass decreases in the Plan Area, annual allowable impacts to eelgrass under this Plan will also decrease and increased mitigation will be implemented in a phased manner. If additional impacts to eelgrass within the Plan Area are proposed after the annual limit is reached or eelgrass acreage within the Stable or Transitional Zone is at or below Tier 3, the applicant will need to apply mitigation consistent with the California Eelgrass Mitigation Policy (CEMP) with approval from federal and state agencies.

(3) **Best Management Practices –** The City will approve the application of the Plan for projects subject to property owner compliance with BMP standards. BMPs include avoidance and, when appropriate under the Tier levels, active eelgrass establishment techniques, such as seeding using buoy deployed seed bags (BDSB) and/or use of TERFS™.[5] Other transplanting methods may also be used if they are effective in establishing and promoting eelgrass establishment. BMPs will minimize negative impacts to existing eelgrass and encourage additional population growth.

(4) **Program to Promote Regrowth and Establishment –** The City will encourage and support pilot testing of BDSB and TERF™ strategies, begin an education program to encourage the public to view eelgrass as a valuable component of the ecosystem rather than a nuisance weed that restricts boat and dock use, and where appropriate, consider other methods to create areas suitable for eelgrass.

The Plan provides an incentive to the City and property owners to promote a healthy eelgrass population in Newport Bay, as the increased eelgrass occurrence will be accommodated by the flexibility of the Plan to allow for greater temporary impacts. The Plan will encourage innovative and effective methods to be used to promote eelgrass establishment throughout the bay, where conditions are suitable, as opposed to limited project-by-project mitigation.

Based on the most recent survey (Appendix B) and the Tier levels established under this Plan, the Tier level starting in August 2015 for the Stable Zone is Tier 1 (19.3 acres in Stable Zone Plan area exceeds 17.2 acres) and for the Transitional Zone is Tier 2 (3.45 acres in Transitional Zone Plan area is within the range of < 4.5 to ≥ 3.1 acres).

[5] TERF™ refers to "Transplanting Eelgrass Remotely with Frame Systems." Adult plants are transplanted using a frame system to which the plants are attached.

Table 1. Eelgrass Tiers for Activities Occurring in the Plan Area in Newport Harbor

Shallow Water Eelgrass in Plan Area		Allowable Annual Temporary Impacts to Eelgrass in the Plan Area[1]	City of Newport Beach Action
Stable Zone	Transitional Zone		
Tier 1			
Eelgrass extent in Plan Area ≥ 17.2 acres	Eelgrass extent in Plan Area ≥ 4.5 acres	Up to a total of 5% of the eelgrass in the Stable Zone Plan Area (= 0.84 acres[2]) subject to annual maximum limit below Up to a total of 5% of the eelgrass in the Transitional Zone Plan Area (=0.19 acres) subject to annual maximum limit below Annual maximum for Stable and Transitional Zone is no more than 1% of the total eelgrass in the most recent harbor wide survey. (Currently = 0.88 acres)	• The City will develop, test, and/or improve methods to collect and use eelgrass seeds for deployable seed bagging and to construct or use eelgrass TERFS™ devices. This work will be done by the City proportional to the amount of routine maintenance undertaken by the dock owners. • The City conducts surveys every 2 years to determine extent of eelgrass coverage in the Plan Area and every four years expanded to the full Harbor. • Conduct education program to help the public see eelgrass as a valuable ecosystem component rather than a nuisance weed that restricts boat and dock use • Encourage owners to minimize the size of docks and floating structures or use docks and floating structures that maximize light penetration • Continue to update BMP procedures to minimize impacts to eelgrass and to promote eelgrass coverage.
Tier 2			
Eelgrass extent in Plan Area < 17.2 to ≥ 16.3 acres	Eelgrass extent in Plan Area < 4.5 to ≥ 3.1 acres	Up to a total of 3% of the eelgrass in the Stable Zone Plan Area (= 0.5 acres) subject to annual maximum limit below. Up to a total of 3% of the eelgrass in the Transitional	• The City will require applicants to implement deployable seed bagging, TERFS™ , and/or other transplant method BMP at impact area. • The City conducts surveys every 2 years to determine extent of eelgrass coverage in Plan Area and every four years expanded to the full Harbor. • Conduct education program to help the public see eelgrass as a

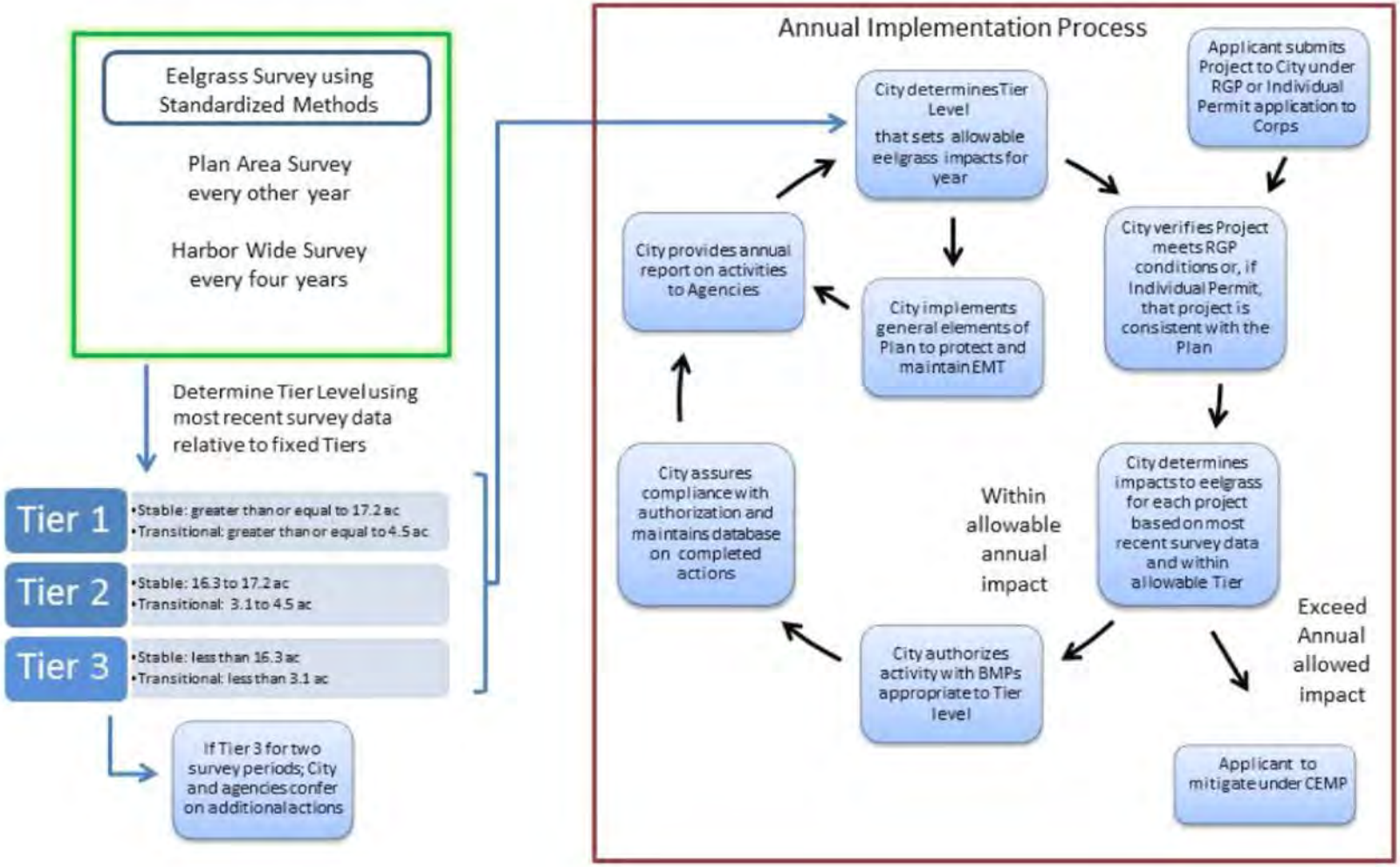
Shallow Water Eelgrass in Plan Area		Allowable Annual Temporary Impacts to Eelgrass in the Plan Area[1]	City of Newport Beach Action
Stable Zone	Transitional Zone		
		Zone Plan Area (= 0.11 acres) subject to annual maximum limit below. Annual maximum for Stable and Transitional Zone is no more than 1% of the total eelgrass in the most recent harbor wide survey. (Currently = 0.88 acres)	valuable ecosystem component rather than a nuisance weed that restricts boat and dock use • Encourage owners to minimize the size of docks and floating structures or use docks and floating structures that maximize light penetration • Continue to update BMP procedures to minimize impacts to eelgrass and to promote eelgrass coverage
Tier 3			
Eelgrass extent in Plan Area is < 16.3 acres	Eelgrass Extent in Plan Area is < 3.1 acres	Eelgrass impacts only allowed with standard CEMP mitigation	• Any impacts to eelgrass will be mitigated using the methods (e.g. transplanting), mitigation ratios, and performance standards in the National Marine Fisheries Service California Eelgrass Mitigation Policy. • If shallow water population remains below lowest Tier 3 level for two consecutive survey periods, the City will work with the agencies to determine the cause of the decline and, if necessary, initiate additional actions to improve or create habitat suitable for re-establishment of eelgrass populations. • The City conducts surveys every 2 years to determine extent of eelgrass coverage in the Plan Area and every four years expanded to the full Harbor.

Notes:

1 If additional impacts to eelgrass are proposed within the Plan Area after the Tier limit is reached during any annual reporting period, mitigation would be provided by the project proponent independent of this Plan and consistent with the CEMP or other applicable mitigation policy.

2 The allowable maximum acreage within each Zone has been determined from a percentage of the mean of the last four surveys conducted between 2003 and 2014.

Newport Bay Eelgrass Protection and Mitigation Plan



INTRODUCTION

The purpose of this document is to describe an Eelgrass Protection and Management Plan (the Plan) for temporary and minor impacts to eelgrass (*Zostera marina*), associated with maintenance dredging at boat docks typically undertaken by individual property owners and small commercial operators, and include:

> Minor maintenance dredging to be performed under and adjacent to currently authorized private, public, and commercial docks, floats, and piers. Dredging depth is not to exceed -10 feet mean lower low water (MLLW), plus 2 feet of allowable over depth.

The Plan is an outcome of the City of Newport Beach Harbor Area Management Plan (HAMP), as issued in April 2010 and approved by City Council in November 2010. The HAMP established goals and best management practices (BMPs) to ensure a healthy eelgrass population within Newport Harbor, including the development of the Plan.

Consistent with its role as Newport Bay's primary steward and the California Eelgrass Mitigation Policy's (CEMP), the City developed this Plan tailored specifically to Newport Bay's shallow waters adjoining residences. The Plan will govern practices related to a portion of Lower Newport Bay's existing eelgrass population—the shallow water eelgrass zone generally found at depths less than 10 feet below MLLW. Much of the shallow water eelgrass population is located in areas occupied by private piers, docks, and small commercial facilities. The Plan focuses on those impacts that are minimal and temporarily associated with maintenance dredging in these shallow waters.

Eelgrass is very resilient in these areas and recolonizes areas between dredging events as the areas silt in over time. There appears to be an abundant source of seeds to allow for eelgrass establishment in areas affected by the dredging activity. Based on Newport Harbor-specific data reported by Coastal Resources Management Inc. (2010), the shallow water population of eelgrass is found at depths up to -6 to -15 feet relative to MLLW, with greater depth penetration in the portions of the harbor closest to the ocean inlet and lower penetration within Upper Newport Bay. Because eelgrass impacted by dredging is usually at the edge of a dredged area (i.e., it does not grow under existing docks or boats), the depth of dredging is usually shallower at the sides than within the boat slip, and this slope is within the zone that can be occupied by eelgrass. Additionally, because maintenance dredging is not occurring in all areas at the same time, various stages of eelgrass recovery occur throughout the harbor.

The Plan will serve the principal goals of protecting and promoting a long-term sustainable eelgrass population while serving Lower Newport Bay's navigational and recreational

beneficial uses. The touchstone of the Plan is an ecosystem-based approach that works by protecting a sustainable eelgrass population in the Lower Newport Bay and enforcing BMPs that will promote eelgrass growth.

The approach to managing the Harbor's resources embodied in this Plan is consistent with the California Ocean Protection Council's (COPC) Five Year Strategic Plan to implement ecosystem-based management (EBM) (COPC 2006). According to COPC, the goal of EBM is, "to maintain an ecosystem in a healthy, productive, and resilient condition so that it can provide the services humans want and need. Ecosystem-based management differs from current approaches that focus on a single species, sector, activity, or concern."

Ecosystem-based management (EMB) recognizes there are multiple objectives and benefits provided by marine systems, rather than single ecosystem or species services. Such benefits include vibrant commercial and recreational fisheries, biodiversity conservation, renewable energy, and coastal protection. In addition, EMB is adaptable to changing conditions and taking into consideration that healthy systems exhibit resilience to disturbances; therefore, management measures should consider and adapt to large and small scale factors that affect ecosystem change. The EMB approach is also consistent with the *Final Recommendations of the Interagency Ocean Policy Task Force* (CEQ 2010), which emphasizes the concept of Coastal and Marine Spatial Planning for management of coastal resources. The National Marine Fisheries Service (NMFS) has taken a lead role in promoting and implementing EMB within its fisheries, coral reef, and marine sanctuaries management programs. The extension of this approach to eelgrass management in Newport Harbor is proposed in this Plan.

BACKGROUND

The City, as the primary steward of Newport Bay, has invested significant resources to ensure a healthy eelgrass population thrives in the Bay. For instance, the City has retained experts to develop this Plan, conducted eelgrass mitigation banking projects, engaged contractors to conduct bay-wide monitoring and surveying of eelgrass distribution using consistent and repeatable methods, and, most importantly, worked to make the bay more hospitable to eelgrass through the implementation of water quality protection measures. Most recently, the City approved a HAMP that sets an overall goal to, "support a sustainable estuary ecosystem able to be integrated with upstream sustainable watersheds and adjacent coastal area systems."

As a result of these extensive efforts, City staff, as well as the scientists and consultants who have been retained to assist the City, have developed considerable data, knowledge, and expertise about eelgrass ecology in Newport Bay.

The City, as part of its commitment to the 2010 HAMP, developed this Plan for the shallow water eelgrass population in the Lower Bay that promotes a healthy eelgrass habitat and maintains the Bay's navigational, commercial, and recreational uses. The Plan specifically addresses the temporary and minimal impacts to eelgrass resulting from maintenance dredging projects associated with those facilities with the Plan Area. The Plan Area is defined as follows:

> The bulkhead to pierhead line plus 20 feet bayward and including those exceptions for structures that extend beyond this boundary as of 2013 in conformance with harbor development regulations or policy.

The specific boundary of the Plan Area has been established based on harbor surveys of existing docks and is attached as Appendix A of this document.

The Stable and Transitional Zones are those areas within the Harbor where eelgrass has been known to occur based on long-term surveys and is scientifically based on known oceanographic factors (e.g., circulation, turbidity, salinity, and temperature) that affect eelgrass establishment and growth. Further discussion of these zones and a map showing their occurrence are found on Figure 2.

The Plan consists of four main parts:

(1) The first part establishes the City as the primary steward of eelgrass habitat in the Bay by placing the responsibility for approving use of the Plan for small maintenance dredging projects, as well as monitoring, surveying, and data gathering on the City rather than on individual property owners. The City would take lead responsibility for initial screening of maintenance dredging projects within the Plan Area and assuring that such projects are consistent with this Plan. In addition, the City would assure compliance with permit conditions and all reporting requirements under the Regional General Permit and any other authorization for maintenance dredging in the Plan Area.

(2) The second part establishes a procedure by which various amounts of impact to eelgrass from maintenance dredging may occur with the assumption that natural recolonization will allow for recovery over time. However, at lower abundance levels of eelgrass, increasing direct actions will be undertaken to promote eelgrass recovery. The Tiers represent various acreage levels of eelgrass within the Plan Area.

(3) The third part establishes BMPs in order to minimize negative impacts and encourage eelgrass population growth, especially following periods when natural events may reduce eelgrass population levels.

(4) The fourth part establishes a program by which the City will implement methods to promote eelgrass growth and promote public education on eelgrass and includes measures to implement adaptive management as new information is developed.

The City has met with NMFS in the development of this Plan and has incorporated the Service's comments and recommendations into the Plan. The City has also met with the Los Angeles District of the Corps of Engineers, the Santa Ana Regional Water Quality Control Board, the U.S. Fish and Wildlife Service, the California Department of Fish and Wildlife, and the California Coastal Commission during the development of this Plan. Comments received from these agencies have been incorporated into the Plan as well as the compliance with Special Condition 2 contained in the Coastal Development Permit 5-14-020 as approved by the Commission in June 2015.

With approval from the federal and state permitting agencies, this Plan will be considered a special management plan area under the CEMP and will be used for maintenance dredging within the Plan Area. Applicants whose maintenance dredging projects qualify will reference the Plan when proposing work in areas containing eelgrass, and the resource agencies will use the Plan as a basis for compliance with eelgrass mitigation. The City will prepare annual reports on its progress in implementing the Plan and will maintain records of projects approved under the Plan.

ELEMENTS OF PLAN

CITY ASSUMES LEAD RESPONSIBILITY

The City will have responsibility for implementing the Plan and will comply with all reporting requirements to the permitting agencies. Applicants will be required to submit an application to the City to use the Plan as mitigation for impacts to eelgrass. The City will consider the nature of the project and area of eelgrass impact that would result from the routine maintenance dredging. If the City approves the applicant's use of the Plan, the applicant will reference the Plan in their regulatory permit application, including verification by the City certifying the work. For those projects covered under the Regional General Permit (RGP) issued to the City, the reporting and permitting will be undertaken as specified in the RGP.

The City's eelgrass survey and maps will replace the requirement for individual applicants to conduct eelgrass surveys and can be used in support of the agency regulatory approval process. Eelgrass impacts would be calculated by the City using GIS software-by overlaying dredge footprint data with the most recent eelgrass data collected during comprehensive biannual surveys. If eelgrass was present within a dredging footprint during the previous biennial survey, its presence at the time of dredging must be assumed and the size of the presumed eelgrass loss documented. That area shall be examined specifically during all following biennial surveys and the distribution and cover of eelgrass documented to determine recovery time.

The City will be responsible for tracking eelgrass distribution in the Plan Area based on the most recent survey completed prior to the proposed work and for reporting those impacts to the agencies in compliance with the RGP. The City will not authorize any maintenance dredging within the Plan area in excess of 8 acres per year in the Stable and Transitional Zones and in accordance with the Tier levels. In addition to the Tier level limitations, the City will not authorize more annual impacts of more than 1% of the total eelgrass found during harbor wide surveys conducted every four years. The City will report to the agencies when the dredging limit has been reached for the year.

The designation of the various survey areas is shown on Figure 1. The survey procedure is done using a SCUBA diver and GPS and is very accurate in terms of determining the distribution of eelgrass throughout the Harbor. Both eelgrass extent and turion density are recorded. These data are reported in the biannual survey results. During the initial six year period in which this Plan is in effect, the City will conduct a minimum of three comprehensive eelgrass surveys of the Plan Area. The first and third of these surveys will also cover the area outside of the Plan Area within the entire Newport Harbor. The first survey will begin no later than one year after the issuance of all permits authorizing the use of the Plan.

Eelgrass vegetation was mapped using a Global Position System (GPS) and a team of biologists consisting of a diver and a surface support biologist in a kayak. To assist in the mapping process, an Ocean Technology Systems (OTS) surface-to-diver communications system was employed. Eelgrass depth ranges were recorded during this phase of the field operations. A Thales Mobile Mapper Wide- Area Augmentation System (WAAS) GPS/GIS Unit was employed to map eelgrass beds and small eelgrass patches. The estimated GPS error of the Thales Mobile Mapper unit, with post-processing differential correction is less than 1 meter with clear open skies; however, in some instances, the error was higher because the team was working near bulkheads, underneath piers, and between docks where a clear view of the sky was not always possible. In these instances, the error was estimated to be 1 to 3 meters.

The biologist-diver first located the beginning of an eelgrass bed and marked it with a yellow buoy. The surface support biologist working from a kayak then initiated tracking of the biologist diver with the GPS as the diver swam the perimeter of the individual eelgrass bed. Once the diver returned to the beginning point, the GPS polygon area mapping was terminated. Eelgrass patches that were too small to survey or located in difficult areas to obtain a GPS signal (i.e., behind docks/under piers) were referenced as a GPS "point" and a size of the eelgrass patch was estimated by the diver.

In order to assess eelgrass turion density, thirty (30) eelgrass turion counts were made at each of 15 stations throughout the study area by SCUBA-diving biologists that counted the number of live, green shoots at the sediment/shoot interface within replicated 0.07 square meter (sq m) quadrats. These counts were conducted along an underwater transect between the shallow-and-deep edges of eelgrass at each sampling site. Prior to conducting the survey, the team standardized their counting methods to ensure the accuracy of counts between different team members.

The survey data will be important in assessing the long-term trends in eelgrass within the Harbor as well as providing regional information to compare with other embayments in the southern California bight. Without the biannual survey, the agencies would not have information on the quantity of eelgrass in the Bay. Under site-by-site permitting, permitting agencies would not know if eelgrass trends were positive, stable, or trending towards significant loss. Natural variation in eelgrass abundance is large as has been seen in Morro Bay, but without knowing the trends occurring over time, it is hard to pinpoint the factors controlling its distribution or when specific problems may be arising to cause large scale declines. The survey data will provide the needed information to reduce maintenance dredging should declines in eelgrass abundance be observed. In addition, regional monitoring programs on subtidal habitats are desired, but hard to fund (SCCWRP 2010). The proposed biannual surveys funded by the City of Newport Beach will fill one critical gap for southern California estuaries.

Basis for City Responsibility for Surveys

Since 2003, the City has been conducting routine surveys throughout the harbor on eelgrass distribution and density (Table 2). The data have been entered into a Geographic Information System (GIS) Database maintained by the City's Harbor Resources Division. This information is among the most detailed long-term data set on eelgrass distribution available in Southern California. For portions of the northwestern harbor (e.g., Newport Channel west of Bay Island and portions of Lido Isle), no eelgrass has been found during any of the surveys, whereas in other areas, it thrives from year to year. The distribution of eelgrass in the Lower Newport Bay is related primarily to light availability and tidal flushing times. Those areas with the most rapid tidal flushing times and best light availability are most likely to be colonized by eelgrass.

Based on the detailed studies completed by the City's consultant, Coastal Resources Management (CRM), there are three eelgrass zones within the Lower Bay (Figure 2).

- **Stable Eelgrass Zone –** A zone where eelgrass distribution appears relatively stable from year to year. This zone is located primarily within the Lower Bay and includes the channel entrance, the southern and eastern portions of Balboa Island and Grand Canal, Corona del Mar, and lower Balboa Peninsula. This zone is also characterized by a tidal flushing time of less than 6 days, which contributes to the higher water clarity.
- **A Transitional Eelgrass Zone –** A zone where eelgrass is susceptible to year-to-year variation in extent and density. This zone is largely found in the central part of the Lower Bay in areas such as Harbor Island, Linda Isle, the northern and western portions of Balboa Island, and the northern side of the Lido Channel. This zone is characterized by a tidal flushing time of 7 to 14 days and is located in a zone that is influenced by turbidity from San Diego Creek discharge during winter months.
- **An Unvegetated Zone–** A zone where eelgrass has not been found or is rarely found. This zone is primarily within the western portion of the Lower Bay and also areas of the Upper Bay north of Castaways Park. These areas are characterized by a tidal flushing time of greater than 14 days.

The survey data provides a depiction of the eelgrass dynamics in the Lower Bay and, because of their detail, can be used as a substitute for the current site-specific survey requirements contained in the CEMP. The City will conduct these surveys once every 2 years.

Figure 1. Location of sampling areas within the shallow water eelgrass zone of Lower Newport Bay.

Table 2. City-Sponsored Shallow Water Eelgrass Surveys in Newport Harbor

Survey Dates	Eelgrass in the Plan Area (Acres)	Notes
December 2003 to August 2004	24.51	Largest shallow water eelgrass population recorded in the harbor to date. Water quality conditions ideal with low winter rainfall.
December 2006 to October 2007	18.87	Decline in eelgrass area, primarily around north Balboa Island, Harbor Island, Linda Isle, and Upper Newport Bay.
December 2009 to November 2010	16.20	Decline in transitional zones attributed to strong winter storms, which contributed to high turbidity.
March 2012 to April 2014	22.76	Overall increase in eelgrass observed in Stable and Transitional Zones and additional survey conducted in the deep channel

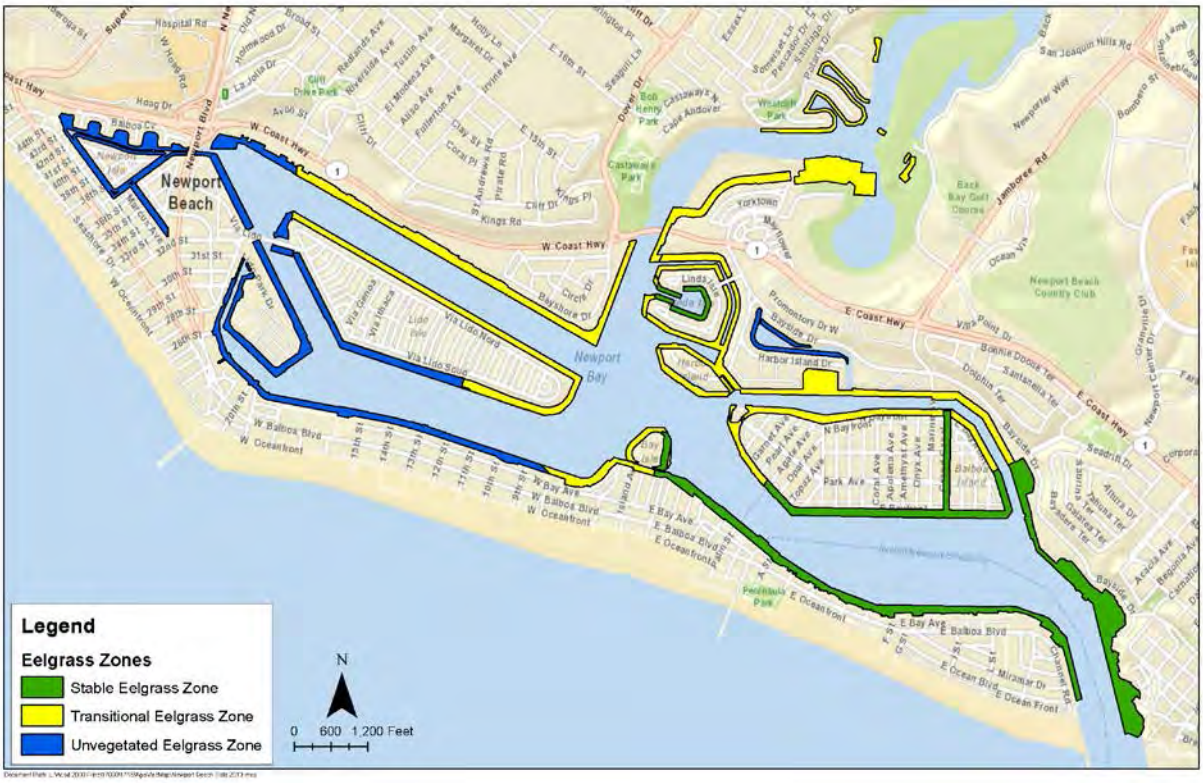


Figure 2. Location of Stable, Transitional, and unvegetated eelgrass zones based on CRM (2010).

TIER LEVELS BASED ON EELGRASS SURVEYS

The Tier level concept is an ecosystem-based approach designed to take advantage of years of data, research, and knowledge on eelgrass in Newport Bay. The Tier levels will allow for greater impacts to occur when eelgrass is most abundant and environmental conditions are favorable for its recovery into temporarily disturbed areas. As eelgrass abundance decreases due to natural variation, more active restoration actions are implemented with the goal of accelerating the recovery of eelgrass.

Combined with the eelgrass populations in other areas of the harbor, the limitations on eelgrass impacts under the Plan would allow for eelgrass to persist throughout Newport Bay, while accommodating maintenance needs arising from the Bay's other recognized beneficial uses such as navigation and recreation. BMPs that will promote eelgrass growth and establishment will minimize potentially deleterious consequences of maintenance projects via avoidance measures, and in the event the eelgrass declines below specific population levels, will promote the continued proliferation of eelgrass through seeding and other measures.

Maintenance dredging within the Stable and Transitional Zones of the Plan Area will be limited to a maximum of 8 acres per year[6]. On an ecosystem-basis, the total of 8 acres of dredging within the areas occupied by eelgrass on an annual basis represents a small percentage of the total harbor area. The Plan Area covers approximately 240 acres and the Stable and Transitional Zones where eelgrass occurs is approximately 170 acres. Within the 170 acres, the total acreage of eelgrass is 20.5 acres or approximately 12%. Therefore, in most instances, the dredging activity will have limited direct impacts on eelgrass, and some projects will have no direct impact on eelgrass. The maximum of 8 acres of dredging in the Stable and Transitional Zones represents only 3% of the Plan Area and provides for sufficient areas available for the spread of the eelgrass.

The Plan establishes Tier levels that determine the BMPs that will be implemented. The Tiers were established using the 2003-2014 survey data and assumed that the observations obtained can be described using a normal distribution. Tier 1 was determined by the acreage that represented the upper 40% of observations, Tier 2 by the middle 20% of observations, and Tier 3 by the lower 40% of observations. Tier levels are set independently for each of the eelgrass zones.

Tier 1 applies when the Stable Zone above 17.2 acres and the Transitional Zone is above 4.5 acres. Up to 5% of the eelgrass population may be temporarily impacted in the Stable zone

[6] There is no limit established for dredging within the unvegetated zone except for those established under the Regional General Permit and/or any applicable Individual Permit authorization for activities not covered under the RGP.

(=0.84 acres[7]) and Transitional zone (=0.19 acres) using the baseline survey data. However, the total limit on annual eelgrass impacts cannot exceed 1% of the harbor wide survey (=0.88 acres).

Tier 2 applies if the shallow water eelgrass population, based on the most recent survey in the Plan Area, drops below 17.2 acres, but remains at or above 16.3 acres in the Stable Zone or at or above 3.1 acres in the Transitional Zone. In Tier 2, allowable temporary impacts to eelgrass will be set at 3 % of the average eelgrass present in each zone. Using the mean of the 2003 to 2014 survey data, the allowable impacts in the Stable Zone are 0.5 acres and 0.11 acres within the Transitional Zone.

Tier 3 applies if the shallow water eelgrass population drops below the Tier-2 levels. During Tier 3, maintenance dredging resulting in any temporary impacts to eelgrass will require the applicant to mitigate pursuant to the CEMP, including retaining responsibility to meet the performance criteria after 5 years of monitoring. Five years of monitoring and reporting would be completed by the applicant independent of the City's biannual monitoring, and reporting by the applicant to the agencies on an annual basis for the five year duration of the required monitoring period. Consistent with the CEMP, if the mitigation success is not met after five years, the applicant (not the City) would be responsible for providing additional mitigation to meet the success criteria.

Based on the most recent survey (Appendix B) and the Tier levels established under this Plan, the Tier level starting in August 2015 for the Stable Zone is Tier 1 (19.3 acres in Stable Zone Plan area exceeds 17.2 acres) and for the Transitional Zone is Tier 2 (3.45 acres in Transitional Zone Plan area is within the range of < 4.5 to ≥ 3.1 acres).

In the future, the Tier levels and associated allowable impacts may be updated with subsequent survey information, but any change is subject to review and approval by the City and the permitting agencies based on data and information collected in Newport Bay. If additional impacts to eelgrass are proposed within the Plan Area, after the annual limit imposed at the specific tier level is reached, mitigation would be provided by the project proponent independent of this Plan and consistent with the CEMP.

Basis for Tier Level Approach for each Zone

The areas with stable eelgrass populations are influenced by ocean water as they are subject to the higher flushing rates in the portion of the Harbor nearest the inlet channel (Figure 3). As a result, they are less affected by turbidity reduction from inflow of the San Diego Creek into the Upper Bay. There has been little to no dredging for private docks within eelgrass

[7] The allowable impacts in each Zone of the Plan Area has been determined by multiplying the mean of the eelgrass abundance determined from four surveys conducted between 2003 to 2014 by the appropriate percentage under the applicable Tier.

areas during the period covered by the surveys; so, it is expected these numbers represent the baseline conditions.[8]

In the Stable Zone, the amount of eelgrass averaged approximately 16.8 acres for the Plan Area in the four survey periods with a 95% confidence limit of 1.9 acres.

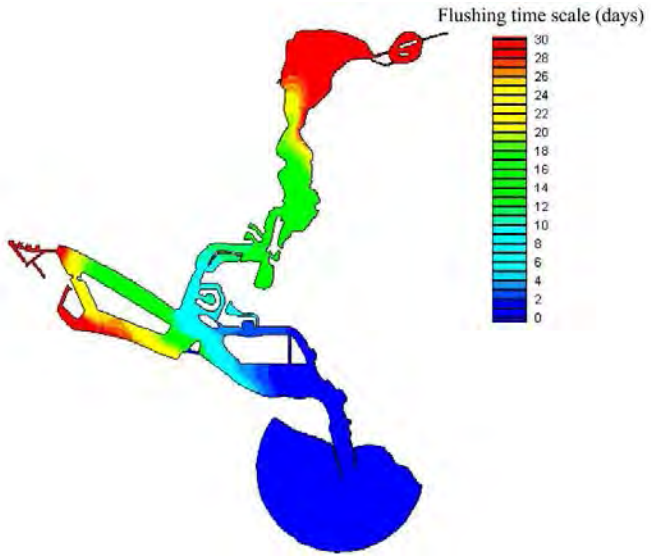


Figure 3. Tidal flushing in days for the Lower and Upper Newport Bay area. Everest Consulting (from CRM 2005).

The Transitional Zone is strongly influenced by reductions in light penetration and perhaps lowered salinities during normal to above normal rainfall years.[9] The significant decline observed from 2003 to 2010 is likely the result of higher rainfall years during the sampling events. Eelgrass in some areas within the Transitional Zone has disappeared during years of high runoff and low light penetration. This is particularly true when strong winter storms in 2009 to 2010 contributed to high turbidity throughout the Harbor. The cooler water temperatures observed in the summer of 2010 may have also stalled recovery by slowing growth (R. Ware, pers. comm.). During the most recent survey, rainfall was lower and therefore turbidity was reduced. For the Transitional Zones, the average within the Plan

[8] According to the dredging permit activity log maintained by the City, minimal to no dredging of eelgrass has occurred during this analysis period due to the difficulty and cost of completing mitigation associated with eelgrass impacts. So, it is assumed the eelgrass population as measured represents a natural variation from periods of high growth (2003 to 2004 data) and lower growth due to higher turbidity (most recent data).

[9] CRM has found that very small differences in mean light intensity can affect whether eelgrass will establish and grow at specific locations (CRM 2010). Based on light measurements taken in 2008 to 2009, CRM observed the mean light intensity in eelgrass occupied areas was 354 μmol m^{-2} s^{-1} compared to 294 μmol m^{-2} s^{-1}, and that generally light energy in eelgrass beds was greater by approximately 100-200 μmol m^{-2} s^{-1}.

Area was 3.8 acres with 95% confidence limits of the mean at ± 2.6 acres. The variation observed over the four sampling periods is larger than that seen in the Stable Zones.

The inter-annual variation in the transitional areas contributes to most of the variation of shallow water eelgrass as this area is most influenced by variation on turbidity associated with outflows from San Diego Creek and Upper Newport Bay (CRM 2010). Primary emphasis on sustaining eelgrass populations in the Harbor should be placed on maintenance of acreage within the Stable Zone (from which seeds are likely produced to re-establish eelgrass in transitional zones).

In addition to restrictions on the amount of dredging that could occur within the Stable and Transitional Zones each year, the location of those impacts would be restricted. Because dredging requires substantial pre-project planning and the cost of dredging for small projects is high, adjoining landowners may wish to combine their efforts and conduct dredging over several properties. This may have an impact on the local population of eelgrass; therefore, it is proposed that no contiguous properties will impact more than 25% of the allowable annual eelgrass impacts under the Tier currently in effect for that Zone. Because there are some areas of the bay, such as Carnation Cove and portions of Balboa Island and Channel, where this restriction may present an economic hardship, especially as the eelgrass population increases, should any eelgrass impacts exceed these restrictions, written approval from NMFS and Coastal Commission would be obtained to exceed these levels.

Maintaining the eelgrass population at various Tiers

With a healthy eelgrass population, there will be ample seeds available in this well-mixed tidal system that most viable areas will be supplied with seeds naturally, such that seeding would be unnecessary. When eelgrass is in Tier 1, the dock owner has no mitigation responsibilities but the City institutes eelgrass seeding and planting activities proportional to the amount of routine maintenance dredging undertaken by dock owners and pursues an educational program to increase the understanding of the ecological importance of eelgrass and encourage practices that contribute to eelgrass health.

The City will begin an education program to assist property owners in coming to view eelgrass as a valuable ecological resource rather than a nuisance weed that impedes navigation and recreation.

If the shallow water eelgrass population in the Plan Area is within the Tier-2 level, the allowable impacts to eelgrass would decrease to 3% of the population within each Zone. In addition, the City will require those property owners who undertake maintenance dredging in the Stable or the Transition Zones to implement active regrowth efforts at the impact site by deploying seed bags or by using TERFS off their docks in the areas of suitable depth within their lot(s).

If the population falls within the Tier-3 level, any temporary impacts to eelgrass would need to be mitigated pursuant to the CEMP.

If population within the Plan Area remains in Tier 3 for two consecutive survey periods, the City will evaluate, in conjunction with the permitting agencies, the field data to determine if the cause is related to natural events such as consecutive heavy rainfall years. If no natural causes for this decline can be determined, the City will consider options to increase eelgrass habitat within the Harbor in consultation with the agencies.

BEST MANAGEMENT PRACTICES

The City will require the use of BMPs as part of the review process when owners propose maintenance dredging within the Plan Area appropriate to the tier level. Approvals determined by the City will be conditioned on individual property owner's compliance with the BMPs.

The type of dredging equipment would be determined by the contractor(s) on a per project basis; this flexibility is necessary given the variety to potential project locations, placement sites, and volumes. Dredging would be conducted on a performance-based requirement (e.g. dredge footprint and depths) that the contractor is required to follow, which would be confirmed through pre-and post-dredge surveys. Regardless of the method of dredging employed by the project, the contractor will be required to comply with the terms and conditions of the RGP 54.

Basis for the BMPs

The purpose of the BMPs is to avoid and minimize the temporary impacts to eelgrass to the extent practicable and, where possible, to implement measures to promote eelgrass establishment. The overall plan provides incentives to property owners and the City to promote eelgrass establishment, as it will reduce costs and time associated with the current permitting and mitigation requirements. The BMPs allow the City and the property owners to address maintenance needs while promoting eelgrass stewardship.

Depending on site-specific conditions, the BMPs would include the following:

- **When Shallow Water Eelgrass in the Plan Area is in Tier 1:**
    - **Avoidance Where Practicable –** The City will review proposed maintenance dredging projects to ensure avoidance of existing eelgrass beds is maximized to the extent practicable. Avoidance measures may include reducing the proposed dredging area or shifting the dredging area.

- **City Restoration Actions** -- When eelgrass is in Tier 1, the dock owner has no mitigation responsibilities but the City will institute eelgrass seeding and planting activities proportional to the amount of routine maintenance dredging undertaken by dock owners.
  - **Educate Property Owners –** The City will develop a public education program on the importance of eelgrass beds and the reasons they should be protected, so boat owners and property owners view the establishment of eelgrass as a positive outcome. The program will likely consist of information on the City's web site and a fact sheet attached to permit application packages.

- **When Shallow Water Eelgrass in the Plan Area is in Tier 2:**

  - **Promote Population Growth –** After maintenance dredging is concluded for projects that impact eelgrass, the City will require the property owners to use either of the following means:

    - **Buoyed Deployed Seed Bags (BDSB) –** These will be used to improve seeding adjacent to the disturbed area (Pickerell et al. 2006; Boyer et al. 2008). This method will allow for natural re-seeding of the temporarily disturbed areas and will likely be more successful than transplanting adult plants, because viable seed will be spread throughout the area and will germinate and survive in those areas best suited for eelgrass. It does not require significant expertise, intensive and expensive site-selection studies, or the use of divers, all of which are needed for transplanting. Seeds may be collected from the area prior to disturbance or from donor beds in the Stable Eelgrass Zone.

    - **TERFS™** – These are designed to allow for the stable transplanting of adult plants and will be deployed by the property owners if sufficient suitable area is available in the area surrounding the dredging activity. This would allow for re-establishment within its most suitable habitat area. TERFS will be deployed by the property owner who undertook the routine maintenance dredging.

Over time and through biennial monitoring, the City will be able to determine those methods that are most effective. As part of the annual reporting commitment, the City will include an appendix that includes detailed images of areas that were previously dredged under the proposed RGP 54, which would allow the City and agencies to track the success and re-growth of eelgrass and the effectiveness of the best management practices (BMPs; such as buoyed deployed seed bags) applied during Tier 2. It is expected that BMPs will

evolve or additional ones will be adopted over time, as the City continues its efforts to acquire more information about the ecology, light requirements, and seedling survival rates of eelgrass.

If the shallow water eelgrass population in the Plan Area is within the Tier-3 category for two survey periods, the City will undertake a rigorous adaptive management program. The City will examine the field data collected in conjunction with its survey program to determine if the decline is the result of natural causes, e.g. consecutive years of high runoff, or is caused by anthropogenic causes. The City will also work with the regulatory and resource agencies to consider more transplanting or seeding methods or creation of suitable areas for eelgrass colonization. The permitting agencies will meet to discuss possible causes for the decline, determine actions that should be taken, and if necessary, reduce or cease maintenance dredging authorization under their permitting authorities until eelgrass recovery occurs.

PROGRAM TO PROMOTE EELGRASS GROWTH AND ESTABLISHMENT

The City will test eelgrass propagation methods in order to ensure eelgrass is maintained through the use and development of restoration techniques, such as BDSBs (Pickerell *et al.* 2006) and TERFS™ (Short and Coles 2001).

The City is committed to minimizing temporary impacts to eelgrass by individual property owners through BMPs in the Plan Area. The City has undertaken an extensive monitoring program within the Harbor to assess light levels, salinity, and temperature throughout the year. It is expected these data can be useful not only in explaining inter-annual differences in eelgrass populations but to also determine areas most feasible for methods that can best promote eelgrass growth.

The City will promote expanding eelgrass habitat within the Bay through the use of the following techniques:

- Use BDSBs to disperse seeds into Transitional Eelgrass Zone areas when population levels decline to promote more rapid recovery of eelgrass (Pickerell et al. 2006). BDSBs are mesh bags that contain inflorescences (with ripened seeds) that are deployed over the area where eelgrass has a potential to grow but has been eliminated by some natural cause such as seasonally low light levels caused by storm events. This method could also be used to improve eelgrass regeneration in areas temporally impacted by dredging that have suitable conditions for eelgrass growth. In San Francisco Bay, BDSBs have been found to also increase genetic diversity over transplant techniques (Boyer et al. 2008).

- Use TERFS to establish eelgrass in areas of high wave action but with suitable light and substrate conditions. The purpose would be to test the ability of TERFS to provide stable structures for the initial establishment of eelgrass in more wave-prone areas.

It is expected that these programs will be undertaken in Stable and Transitional Zones to determine their effectiveness.

INITIAL PROGRAM ACTIONS

The City will undertake several program actions once the Plan is approved by the permitting agencies. While eelgrass does re-establish itself rapidly in areas subject to temporary disturbance, some initial temporal losses may occur during the initial period of plan implementation. These measures will have the effect of promoting eelgrass growth in the Newport Harbor immediately upon approval of the management plan by the agencies and are in addition to the measures to be implemented as part of the overall plan.

The measures proposed include:

- An annual $10,000 contribution to the CoastKeeper or other appropriate non-profit organization over 3 years that will be directed toward a program to benefit eelgrass in Newport Bay[10]. In 2008, the Coastkeeper initiated a partnership with the Bay Back Science Center and the California Department of Fish and Game. It includes an educational program for life science and biology classes and provides teachers with training and classroom materials on eelgrass protection. The program includes an eelgrass cultivation and research program that is directed toward answering critical questions on the future conservation, management, and restoration of eelgrass in Newport Bay. Experimental tanks have been installed to test hypotheses on how best to establish eelgrass in the Upper Bay. The donation will be used to support these programs and to encourage the experimental transplantation of eelgrass in Newport Bay.

- The City will promote the use of dock designs that may improve light intensity below and adjacent to docks. While the City is not in a position to require that dock owners retrofit dock and piers, they can provide information to dock owners who are seeking changes or modifications on methods that could be employed that would improve dock design, such as translucent or grated deck materials, light concentrators, or other materials that may be suitable for use in areas where eelgrass is present. The City will work with NMFS and the California Department of Fish

[10] The City has already made its first contribution to the Coastkeeper to test various planting methods in the Upper Newport Bay.

and Wildlife to identify those materials or modifications that have been proven effective and do not compromise safety and structural strength.

REPORTING AND ADAPTIVE MANAGEMENT

The City will prepare annual reports, due by July 1 (starting in 2016) of each year, on the activities undertaken to implement and manage the Plan. The report will document individual maintenance dredging projects that have been approved to use the Plan and the amount of eelgrass that has been impacted during that year. The report will include: (a) estimates of the time required for eelgrass recovery with and without on-site restoration activities, (b) estimates of the total temporal loss of eelgrass due to dredging (acres and acre-years), (c) estimates of the total area of off-site eelgrass restoration accomplished, and (d) the net mitigation accomplished. The report will be submitted to the National Marine Fisheries Service, the Corps of Engineers, the Santa Ana Regional Water Quality Control Board, the California Department of Fish and Wildlife, and the California Coastal Commission.

Restoration undertaken by the City and Orange County Coastkeeper (with funding from the City) under Tier 1 and Tier 2, and restoration undertaken by dock owners under Tier 2, will be documented and reported annually, including time and duration of restoration activities and types of activities undertaken. If Orange County Coastkeeper restoration activities are funded through sources in addition to the City, annual reporting will document these additional funds and sources and include an estimate of the proportion of total restoration that can be attributed entirely to funding provided by the City. The annual reports will also evaluate the success of the restoration in terms of eelgrass bed size, cover, and turion density.

As new information is made available on eelgrass distribution and ecology in the Plan Area, the City will, in concert with agency review and input, may propose revisions to the Plan and the Tier levels. In addition, new technology related to eelgrass ecology will also be incorporated into possible revisions. The resource and permitting agencies will review any new proposals and will provide consent to implement changes.

Given the investment made by the City and the commitments to prospective individuals wishing to dredge, the Plan will remain in effect for 6 years and may be revised by the City in consultation with the agencies. The final report for the six-year trial period of the Regional General Permit 54 program and Eelgrass Protection and Mitigation Plan shall assess the net effect of dredging and restoration activities on the presence of eelgrass within the Plan Area in the context of natural trends. The agencies may seek modifications to the Plan following review of the biennial eelgrass survey data or should there be a precipitous drop in the eelgrass populations in the Bay. Should eelgrass populations fall precipitously or remain at Tier 3 for two sampling periods, the City and the agencies will meet to review actions needed to preserve and protect eelgrass in the lower Bay. The City and the agencies will

work together to resolve implementation issues that were unforeseen when the Plan was developed. However, any proposed changes to the approved final plan shall be reported to the Executive Director of the Coastal Commission. No changes to the approved final plan shall occur without a Commission amendment to the Coastal Development Permit and a new consistency certification unless the Executive Director determines that no amendment and consistency certification is legally required.

As part of its reporting, the City will designate reference sites to be used for long term assessment of the eelgrass variation over time. The reference sites will be located within the Stable and Transitional Zones and will designated by the City in the first annual report. The City will provide the basis for its selection of these sites and report on the trends observed in these sites since 2003 to demonstrate that they reflect Harbor wide trends. For example, reference sites could be based the four 'clusters' of eelgrass distributions present within the Harbor (2 within the Stable Zone and 2 within the Transitional Zone) (see Figure 19 of CRM 2014). Four areas of approximately 300 ft long by 100 feet wide will be designated within the selected regions in which eelgrass populations will be tracked over time. Should a maintenance dredging activity occur within any of the selected reference areas, an alternate area will be selected. The eelgrass distribution within these reference sites will then be plotted over time to determine long-term trends and compared to Harbor wide trends in which dredging activities have occurred. Harbor wide trends will be considered similar to reference sites as long as the Harbor wide trends are no worse than the lowest performing reference site.

Should there be a decline in overall eelgrass abundance at the end of six years in the Plan Area, the City, the California Coastal Commission, the California Department of Fish and Wildlife, and the National Marine Fisheries Service will evaluate the causes of such decline and use that information collected at reference sites and other information to revise the Plan going forward for subsequent authorization by the agencies, however, there will not be any requirement placed on the City to retroactively mitigate for any adverse conditions occurring to eelgrass during the initial six years of the Plan.

OTHER CONDITIONS APPLICABLE TO THIS PLAN

1. If invasive algae (*Caulerpa taxifolia*) are found within the Plan Area, the City and anyone with a legal right to dredge or dispose of dredged material shall immediately (within 5 days) report it to the Executive Director of the Coastal Commission, the National Marine Fisheries Service, and the Surveillance Subcommittee of the Southern California Caulerpa Action Team. The City and anyone with a legal right to dredge or dispose of dredged material shall not proceed with any dredging or disposal of dredged material in the Plan Area until the City has provided evidence to the Executive Director that all *Caulerpa taxifolia* discovered within the Plan Area has been eliminated in a manner

that complies with all applicable governmental approval requirements, including but not limited to those of the California Coastal Act.

2. The demolition, repair and in-kind replacement of docks (including piers, gangways, floats, and piles), bulkheads, and piles with similar structures is excluded from the current approved Regional General Permit 54 program. These activities shall require a separate coastal development permit from the California Coastal Commission.

3. Eelgrass impacts as a result of beach replenishment or disposal of dredged material in front of an existing bulkhead are not covered under this Plan. If an unexpected impact to eelgrass occurs during disposal of dredged material, such impact shall be documented and reported to the Coastal Commission in the same manner that dredging impacts on eelgrass are documented and reported. If an impact was detected (as defined above), the report will include a summary of how the California Eelgrass Mitigation Policy will be complied with. Implementation of mitigation shall require a new coastal development permit unless the Executive Director determines that no amendment or new permit is required. The following implementation measures shall be applied:

i. If eelgrass was present within 15 feet (in any direction) of a potential dredged material disposal site (in any direction) at the time of the most recent comprehensive eelgrass survey, that site shall be assumed to support eelgrass and cannot be used as a disposal site;

ii. If eelgrass was present between 15-30 feet from a potential dredged material disposal site (in any direction) at the time of the more recent comprehensive eelgrass survey, then monitoring of the site for potential eelgrass impacts from disposal operations shall be required. Monitoring shall consist of pre- and post dredging transects placed perpendicular to the shoreline and spaced five feet apart which map the eelgrass bed. Enough transects shall be used to extend the length of the dredging footprint. Along each transect, the extent of eelgrass shall be measured. Any decrease in eelgrass extent along any transect (pre-dredging vs. post-dredging) will constitute an impact. The pre-dredging transects shall be conducted no sooner than 60 days prior to the start of dredging and the post dredging transects shall be conducted no later than 30 days following the completion of dredging.

Should the monitoring identify an impact to a mapped eelgrass bed as a result of beach replenishment disposal of dredged material in front of an existing bulkhead, then mitigation consistent with the provisions of the California Eelgrass Mitigation Policy shall apply. An eelgrass monitoring report shall be submitted to the Army Corps of Engineers, National Marine Fisheries Service, and California Coastal Commission no later than 90 days following completion of disposal of dredged material on a beach or in front of an existing bulkhead(s).

ACKNOWLEDGEMENTS

This Plan was prepared by WRA, Inc., for the City's Harbor Resources Division. Dr. Michael Josselyn of WRA, Inc. was the primary preparer of the Plan. Larry Paul of Larry Paul and Associates, Don Schmitz, of Schmitz and Associates, Inc., Adam Gale of Anchor QEA, LLC, City of Newport Beach Harbor Commissioner Doug West and City of Newport Beach Harbor Resources Manager Chris Miller participated in the revisions of the Plan. Rick Ware of Coastal Resources Management, Inc, provided technical support for this Plan. The participation of the National Marine Fisheries Service during the review and revision of the Plan, especially that of Bryant Chesney, is greatly appreciated.

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APPENDIX A

MAPBOOK SHOWING PROJECT AREA COVERED BY PLAN

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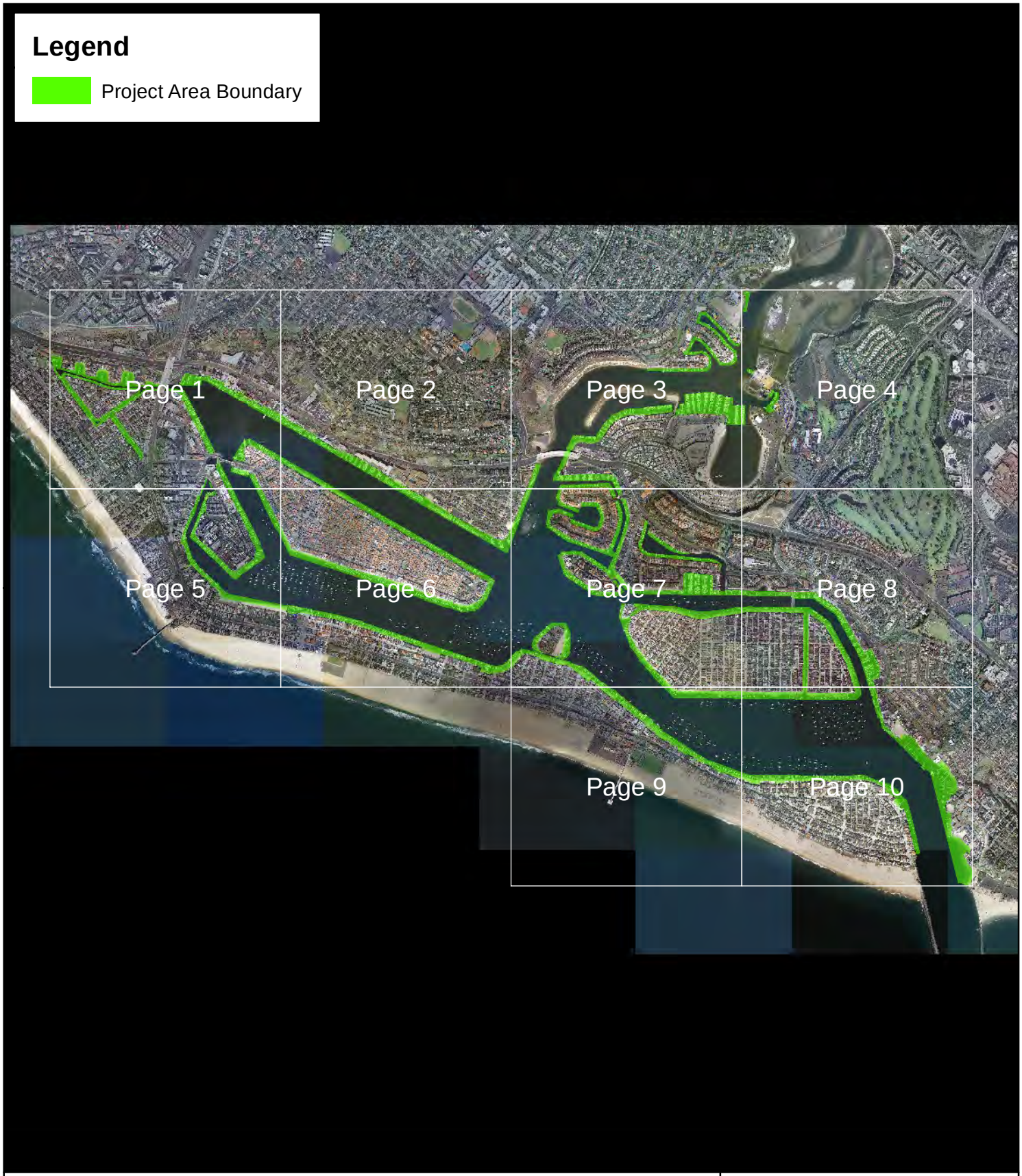

Newport Beach Harbor Eelgrass Survey -
Index

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Newport Beach Harbor Eelgrass Survey -
Page 1

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Newport Beach Harbor Eelgrass Survey -
Page 2

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Newport Beach Harbor Eelgrass Survey -
Page 3

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Newport Beach Harbor Eelgrass Survey -
Page 4

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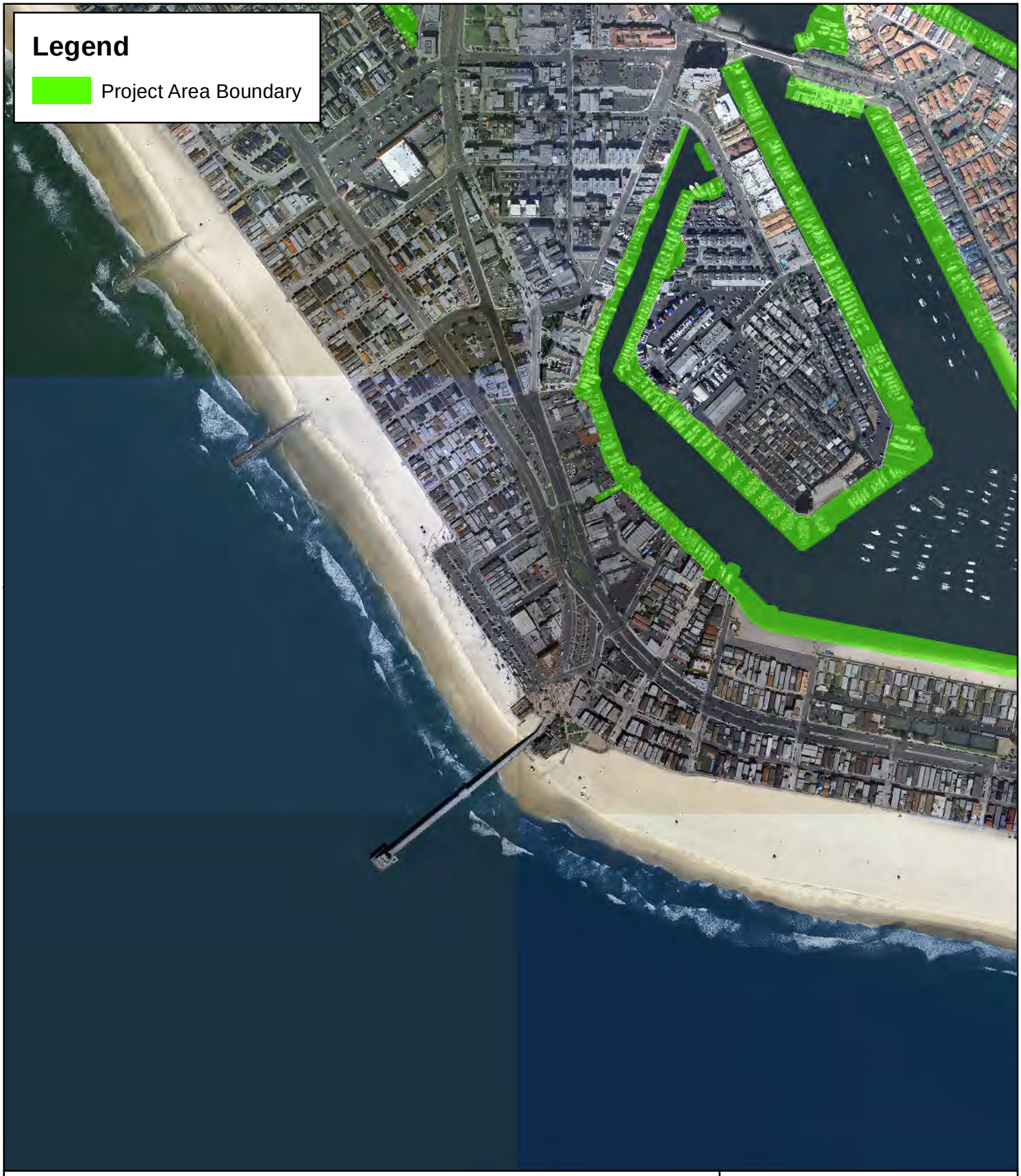

Newport Beach Harbor Eelgrass Survey -
Page 5

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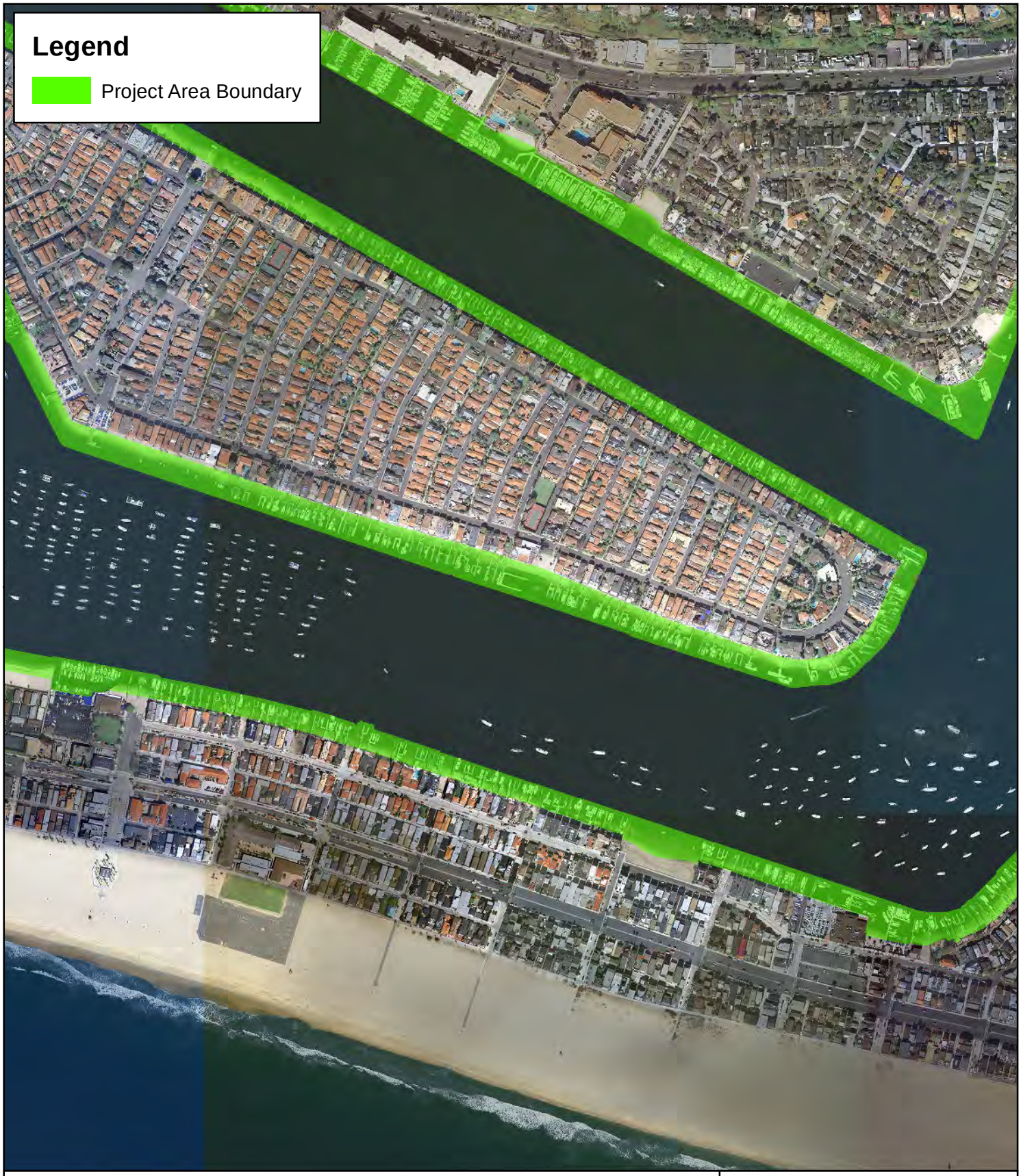

Newport Beach Harbor Eelgrass Survey -
Page 6

City of Newport Beach
Orange County, California

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Date: May 2013
Map By: Chris Zumwalt, WRA, Inc.

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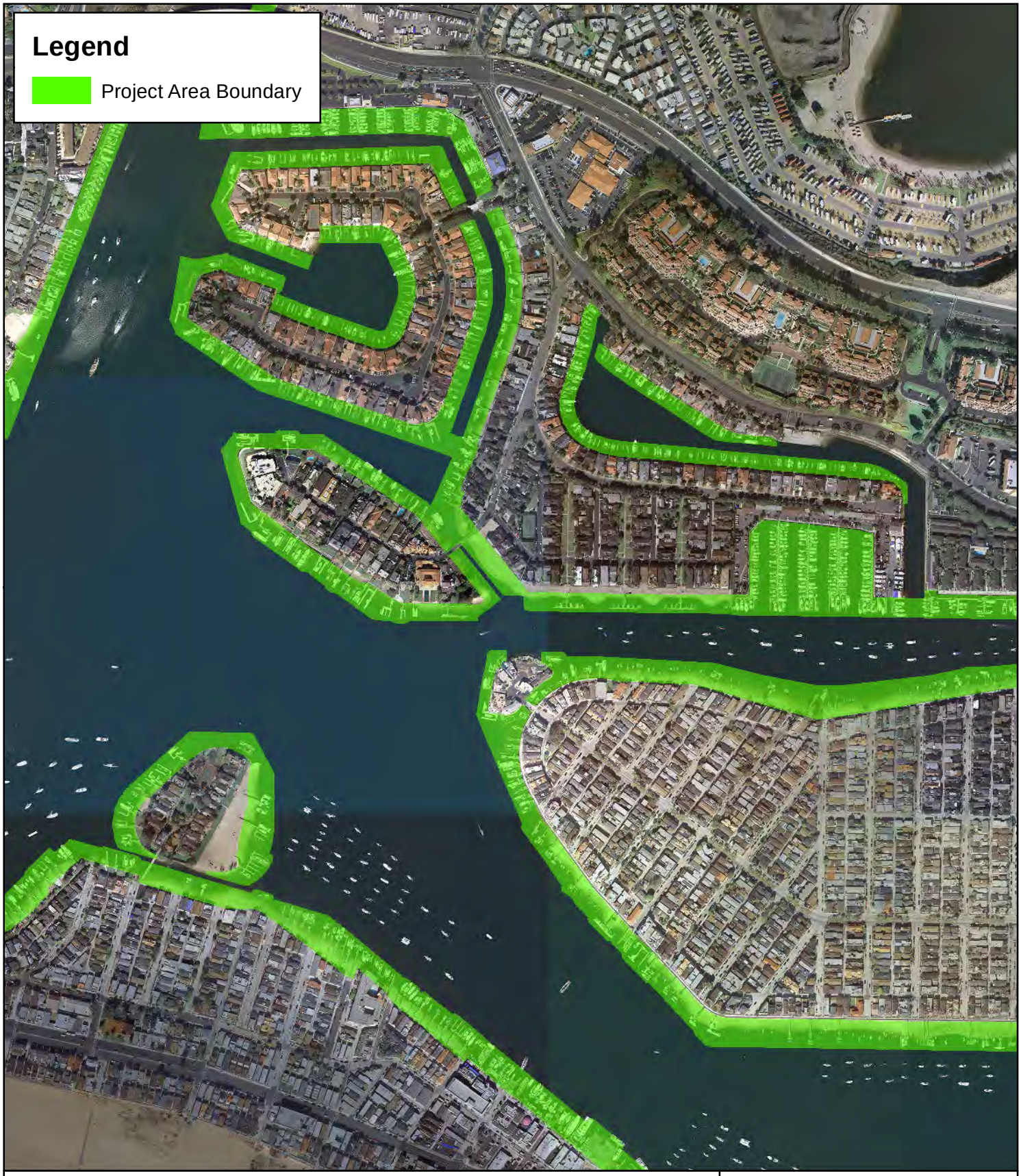


Newport Beach Harbor Eelgrass Survey -
Page 7

City of Newport Beach
Orange County, California

N
W E
S

0 300 600
Feet

Date: May 2013
Map By: Chris Zumwalt, WRA, Inc.

Path: L:\Acad 2000 Files\17000\17169\gis\ArcMap\Eelgrass Mapbook.mxd

Newport Beach Harbor Eelgrass Survey -
Page 8

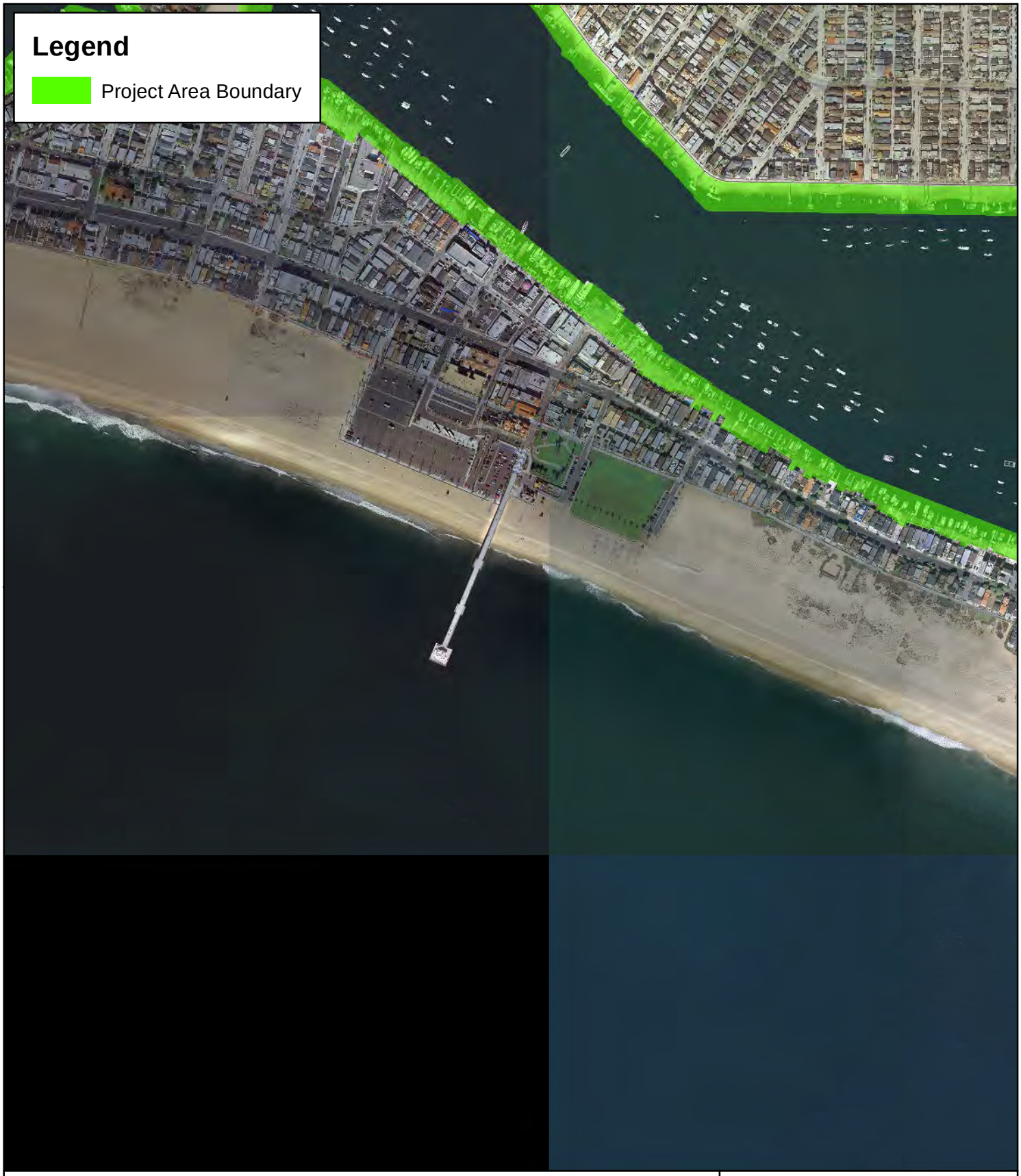
City of Newport Beach
Orange County, California

N
W E
S

0 300 600
Feet

Date: May 2013
Map By: Chris Zumwalt, WRA, Inc.

Path: L:\Acad 2000 Files\17000\17169\gis\ArcMap\Eelgrass Mapbook.mxd



Newport Beach Harbor Eelgrass Survey -
Page 9

City of Newport Beach
Orange County, California

N
W E
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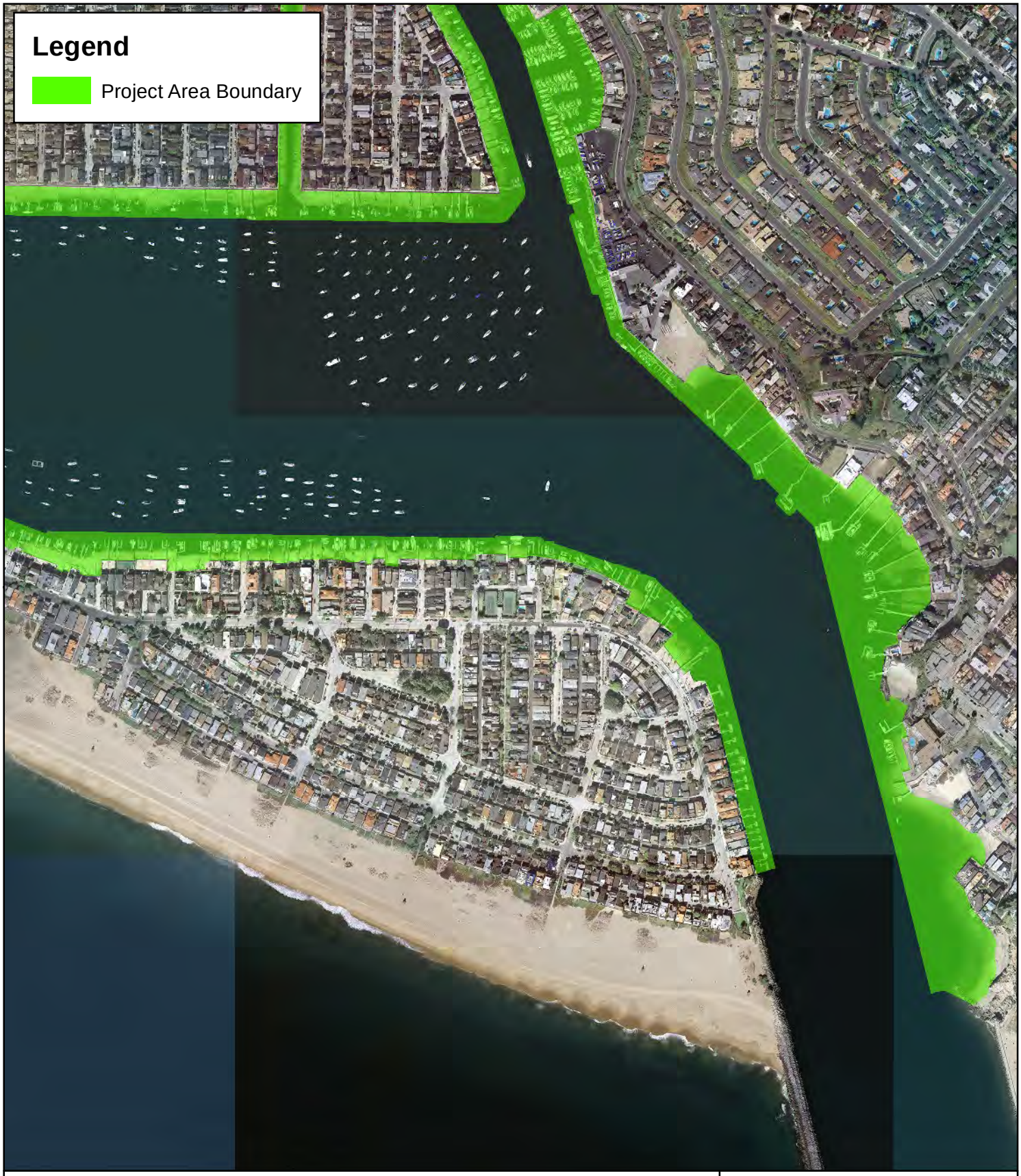
0 300 600
Feet

Date: May 2013
Map By: Chris Zumwalt, WRA, Inc.

Path: L:\Acad 2000 Files\17000\17169\gis\ArcMap\Eelgrass Mapbook.mxd



Newport Beach Harbor Eelgrass Survey -
Page 10

City of Newport Beach
Orange County, California

N
W E
S

0 300 600
Feet

Date: May 2013
Map By: Chris Zumwalt, WRA, Inc.

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APPENDIX B

EELGRASS SURVEY DATA FOR PLAN AREA

SUMMARY OF SURVEY DATA FROM 2003 TO 2014 FOR THE PLAN AREA

DATA FROM COASTAL MARINE RESOURCES

SHALLOW WATER EELGRASS WITHIN PLAN AREA	2003-2004	2006-2007	2009-2010	2012-2014	MEAN (acres)	STANDARD DEVIATION
STABLE ZONE						
Balboa Island/Collins Isle	4.16	3.43	2.40	3.34	3.33	0.72
Bay Island	0.11	0.05	0.04	0.27	0.12	0.11
Corona del Mar (Bayside)	8.36	8.13	8.49	9.90	8.72	0.80
East Balboa Peninsula	1.58	1.52	1.38	2.22	1.67	0.37
Grand Canal	0.9	1.14	0.62	1.06	0.93	0.23
Linda Isle Inner	0.05	0.51	0.30	0.98	0.46	0.39
Yacht Club/Basins	1.68	1.42	1.53	1.53	1.54	0.11
STABLE ZONE WITHIN PLAN AREA	***16.84***	***16.20***	***14.76***	***19.30***	***16.78***	1.90
TRANSITIONAL ZONE						
Balboa Island/Collins Isle	1.88	0.94	0.58	1.13	1.13	0.55
Bay Island	0.01	0.00	0.00	0.02	0.01	0.01
Bayshores	0.74	0.65	0.00	0.15	0.39	0.36
Castaways	0.00	0.00	0.00	0.01	0.00	0.00
Dover Shores	0.00	0.00	0.00	0.01	0.00	0.00
Dunes Marina	0.00	0.00	0.00	0.00	0.00	0.00
Harbor Island	2.22	0.62	0.40	0.90	1.04	0.82
Lido Isle	0.02	0.00	0.00	0.02	0.01	0.01
Inner DeAnza Peninsula	0.00	0.00	0.00	0.00	0.00	0.00
Linda Isle Inner	0.04	0.03	0.03	0.07	0.04	0.02
Linda Isle Outer	1.29	0.11	0.07	0.37	0.46	0.57
Mariner's Mile	0.23	0.07	0.07	0.31	0.17	0.12
North Balboa Channel and Yacht Basin	0.61	0.11	0.12	0.12	0.24	0.25
West Balboa Peninsula	0.03	0.03	0.01	0.10	0.04	0.04
Outer DeAnza Peninsula	0	0.00	0.00	0.00	0.00	0.00
Yacht Club/Basins	0.6	0.11	0.16	0.24	0.28	0.22
TRANSITIONAL ZONE IN PLAN AREA	***7.67***	***2.67***	***1.44***	***3.45***	***3.81***	2.70
TOTAL FOR PLAN AREA	**24.51**	**18.87**	**16.20**	**22.76**	**20.58**	3.75