

FINAL

**DAMAGE ASSESSMENT and RESTORATION PLAN/
ENVIRONMENTAL ASSESSMENT FOR THE 18 MAY 2011 OMEGA 707
AIR TANKER CRASH**

At

AT NAVAL BASE VENTURA COUNTY, POINT MUGU, CALIFORNIA

April 2016



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Abstract

Designation: Damage Assessment and Restoration Plan/ Environmental Assessment

Title of Proposed Action: Damage Assessment and Restoration Plan/ Environmental Assessment for the 18 May 2011 Omega Air 707 Tanker Crash at Naval Base Ventura County, Point Mugu, California.

Project Location: Naval Base Ventura County, Point Mugu, California

Lead Trustee for the EA: Department of the Navy, Navy Region Southwest

Other Trustees: U.S. Dept. of the Interior, U.S. Fish and Wildlife Service; California Department of Fish and Wildlife - Office of Spill Prevention and Response

Affected Region: Ventura County, California

Action Proponent: Department of the Navy, Navy Region Southwest

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Date: April 2016

The Department of the Navy, Navy Region Southwest, along with the U.S. Dept. of the Interior, U.S. Fish and Wildlife Service and California Department of Fish and Wildlife, Office of Spill Prevention and Response, as the Natural Resource Damage Assessment (NRDA) Trustees have prepared this Damage Assessment and Restoration Plan/Environmental Assessment (DARP/EA) in accordance with the Oil Pollution Act (OPA) and its accompanying regulations and the National Environmental Policy Act (NEPA), as implemented by the Council on Environmental Quality Regulations and Navy regulations for implementing NEPA and the Lempert-Keene-Seastrand Oil Spill Prevention and Response Act - Govt. Code 8670.1 et seq. (OSPRA). The DARP/EA presents a description and quantification of injuries to natural resources and evaluates compensatory restoration alternatives required to account for interim natural resource losses resulting from Omega Air's 2011 air tanker crash and release of jet fuel into wetlands on Naval Base Ventura County, Point Mugu. Specifically, Alternative 1/Preferred Alternative would re-establish a tidal connection to enhance approximately 3.0 acres of salt marsh habitat in order to improve habitat for birds, fish, and other biota, and provide other ecological services such as sediment stabilization and storm buffering. The project would occur after funding is secured and actual construction would take approximately eight weeks. This DARP/EA evaluates the potential environmental impacts associated with the two action alternatives, Alternative 1/Preferred Alternative, Alternative 2, and the No-Action Alternative to the following resource areas: water resources, cultural resources, and biological resources.

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EXECUTIVE SUMMARY

Proposed Action Summary

The Proposed Action would restore wetland habitat in order to compensate for the natural resource injuries to wetland habitats at Naval Base Ventura County (NBVC) Point Mugu caused by Omega Air's 18 May 2011 air tanker crash and subsequent release of fuel oil. The Alternative 1/Preferred Alternative would improve tidal exchange by installing two culverts under Laguna Road and thereby enhancing approximately 3.0 acres of salt marsh habitat. This habitat enhancement would benefit birds, fish and other biota, and provide sediment stabilization and storm buffering. The project would occur after funding is secured and construction would last approximately eight weeks.

This Damage Assessment and Restoration Plan Environmental Assessment (DARP/EA) describes the injury to natural resources that occurred and evaluates the potential environmental impacts from two action alternatives and the no- action alternative proposed to compensate for those injuries.

Proposed Action Background and Purpose and Need

The Omega Air Tanker crash site is located on the southern end of the NBVC Point Mugu Airfield, southwest of Runway 3/21 and Taxiway Alpha, on the western arm of Mugu Lagoon (Figure 1-1 and 1-2) at mean sea level (MSL) within the lagoon mudflats. The topography surrounding the crash site is relatively flat with slightly mounded vegetated wetland areas at 2 ft above MSL. Hydrology at the site is influenced by tidal fluctuations from Mugu Lagoon. The average tidal elevation fluctuates between minus 3 to plus 5 feet (ft) MSL. On 18 May 2011, a Boeing K707 aerial refueling tanker, carrying at least 10,000 gallons of jet fuel and operated by Omega Air, Inc., crashed during take-off on Runway 21 into Mugu Lagoon, at the end of Taxiway Alpha. Emergency crews responded by extinguishing the fire and sandbagging interconnecting culverts in the wetlands around the oil spill area. These emergency actions successfully minimized the area of impact to approximately 79 acres.

During the response, the aircraft fuselage and crash debris were removed from the lagoon, a sediment contamination study was conducted, and contaminated sediment was excavated and, by mid-Nov 2011, replaced with clean wetland-consistent sediment. The Natural Resource Trustees assessed injuries to natural resources resulting from the crash, including a detailed benthic macro invertebrate (BMI) study. The Trustees then conducted a habitat equivalency analysis (HEA) quantifying injuries to those natural resources. The crash site natural resources are still recovering from the incident though primary restoration actions (for example, removal of oil, ash, toxins from cleanup activities) have been completed. However, compensatory restoration actions (compensation for the ecological functions lost for a period time after crash, during cleanup, and until site is fully restored and functioning) have not yet taken place. The OPA and OSPRA require compensatory restoration to compensate for interim losses from the date of the incident until the time of full recovery. This DARP/EA presents the analysis of the injuries, the compensatory restoration required, and the Trustees proposed restoration alternatives.

Reasonable Alternative Screening Factors

A reasonable range of potential compensatory restoration alternatives was developed by the Trustees based on OPA and OSPRA regulations requiring that alternatives provide the same type and quality of resources and services as those injured, or if that is not possible to provide a comparable type and quality of resources and services. These alternatives were evaluated using the following general criteria from the 15 CFR § 990.54:

(1) The cost to carry out the alternative;

- 1 (2) The extent to which each alternative is expected to meet the Trustees' goals and objectives in
2 returning the injured natural resources and services to baseline and/or compensating for interim losses;
3 (3) The likelihood of success of each alternative;
4 (4) The extent to which each alternative will prevent future injury as a result of the incident, and avoid
5 collateral injury as a result of implementing the alternative;
6 (5) The extent to which each alternative benefits more than one natural resource and/or service; and
7 (6) The effect of each alternative on public health and safety.
8

9 The following project specific screening criteria were also applied to narrow the range of reasonable
10 alternatives to those deemed most preferred:
11

- 12 (7) Must implement restoration on NBVC Point Mugu to maximize local benefit, ensure long term
13 protection, and conform to Navy policy;
14 (8) Must restore/enhance an area with wetland characteristics such as hydrophytic vegetation, hydric
15 soils, and wetland hydrology;
16 (9) Must restore/enhance an area with existing wetland habitat that is demonstrably in need of
17 improvement (site lacks biodiversity, site lacks adequate tidal water flow, site requires grade lowering,
18 etc);
19 (10) Must not harm NBVC Point Mugu operational mission by: a) not causing the loss of any developable
20 lands, b) not increasing Bird Air Strike Hazards; or c) not using sites slated for use as mitigation for future
21 military construction projects.

22 Applying the above criteria, the Trustees narrowed the range of restoration alternatives to two action
23 alternatives that meet the purpose and need for the Proposed Action. The Trustees also evaluated a No
24 Action Alternative. Alternative 1/Preferred Alternative would install road culverts under Laguna Road in
25 order to allow approximately 3.0 acres of habitat to receive tidal waters and thus increase the site's
26 wetland habitat quality. Alternative 2 would involve removing a berm perpendicular to Beach Road to
27 extend drainage swales, and lower elevations to improve tidal flow to approximately 4.4 acres of salt
28 marsh habitat. These alternatives would enhance existing wetland habitats.

29 NEPA requires the Trustees to consider a No Action Alternative, and the OPA and OSPRA regulations
30 require consideration of a roughly equivalent "natural recovery" alternative. Under this alternative, the
31 Trustees would take no direct action to restore injured natural resources or to compensate for lost
32 services. Instead, the Trustees would rely on natural processes for recovery of the injured natural
33 resources. The principal advantages of the natural recovery approach are the ease of implementation
34 and the absence of monetary costs. However, while natural recovery may occur over time for many of
35 the injured resources, the interim losses suffered by those resources would not be compensated under
36 the No Action Alternative.

37 This DARP/EA provides detailed analysis of the Proposed Action's potential environmental effects on the
38 following resource areas: water resources, cultural resources, and biological resources. Table ES-1
39 summarizes the potential environmental consequences associated with implementation of the
40 alternatives.
41

1 **Public Involvement**

2 The Navy published a Notice of Intent on 17 July 2015 in the Federal Register and solicited comments
 3 from 17 July 2015 through 17 August 2015. The Notice of Intent was also published in the Ventura
 4 County Star newspaper on 24-26 July 2015 and similarly requested comment until 17 August 2015. No
 5 public comments were received during the scoping period.

Table ES-1. Summary of Potential Impacts and Avoidance Measures

Resource Area	Laguna Road Culvert Installation and Tidal Channel Grading Alternative 1/Preferred Alternative	Beach Road Berm and Sewer Line Removal and Tidal Channel Grading Alternative 2	No Action Alternative
Water Resources	<p>No Significant Impact. The primary impact would be improved tidal flow in 3 acres of salt marsh habitat.</p> <p>Implementation of the Proposed Action would not substantially alter local drainage patterns outside the 3 targeted acres of saltmarsh, existing runoff volumes or velocities, or involve any direct use of groundwater. The Proposed Action would result in installation of two culverts and the grading and contouring of two drainage swales in order to re-establish a tidal connection to wetlands. The Proposed Action would not negatively impact groundwater recharge and filtration and no facilities that would potentially affect groundwater quality would be constructed or used (e.g., underground fuel storage tanks or septic systems). While the Proposed Action is located within a mapped 100-year floodplain, no associated significant impacts would result from implementation of the Proposed Action, because no new or modified conditions that would potentially expose people or structures to flood-related hazards would occur. Compliance with the applicable existing regulatory controls and associated guidelines pursuant to applicable requirements of the Clean Water Act (CWA), National Pollutant Discharge Elimination System (NPDES) and related NBVC planning documents would also ensure that no significant impacts associated with water resources would occur.</p>	<p>No Significant Impact.</p> <p>Impacts under Alternative 2 would be the same as those under Alternative 1. The primary impact would be improved tidal flow in the targeted 4.4 acres of habitat.</p>	<p>No Significant Impact.</p> <p>There would be no change to existing conditions; therefore no impacts would occur, however, the public would not be compensated for natural resource injuries as required under the Oil Pollution Act And the Lempert-Keene-Seastrand Oil Spill Prevention and Response Act - Govt. Code 8670.1 et seq.</p>
Cultural Resources	<p>No Significant Impact. The proposed undertaking is the type of activity that could affect historic properties, assuming they were present. However, there are no archaeological and historic resources present. Therefore, the</p>	<p>No Significant Impact.</p> <p>Impacts under Alternative 2 would be the same as those</p>	<p>No Significant Impact.</p> <p>There would be no change to existing conditions; therefore,</p>

Table ES-1. Summary of Potential Impacts and Avoidance Measures

Resource Area	Laguna Road Culvert Installation and Tidal Channel Grading Alternative 1/Preferred Alternative	Beach Road Berm and Sewer Line Removal and Tidal Channel Grading Alternative 2	No Action Alternative
	project meets the standard for a finding of no historic properties affected, consistent with 36 CFR 800.4(d)(1). Implementation of the Alternative 1/Preferred Alternative would not result in significant impacts to historic or archaeological resources.	under Alternative 1.	no impacts would occur, however, the public would not be compensated for natural resource injuries as required under the Oil Pollution Act and the Lempert-Keene-Seastrand Oil Spill Prevention and Response Act - Govt. Code 8670.1 et seq.
Biological Resources	No Significant Impact. Potential impacts to wildlife from increased noise, dust, and activity could occur in association with the Preferred Alternative Action, but would be temporary and localized. Wildlife species would likely avoid the work area temporarily and return following completion of the work, or would utilize other nearby comparable habitat. The Proposed Action would comply with the Migratory Bird Treaty Act (MBTA), Executive Order (EO) 13186 (Responsibilities of Federal Agencies To Protect Migratory Birds), the U.S. Fish and Wildlife Service/Department of Defense Memorandum of Understanding (MOU) to "Promote the Conservation of Migratory Birds," and the NBVC Point Mugu and Special Areas Integrated Natural Resources Management Plan (INRMP), so there would be no significant effects on MBTA-protected species. With implementation of management strategies outlined in the INRMP, no significant effects from invasive plant species would occur from the Proposed Action. Though there would be short-term impacts within the footprint due to re-contouring within the wetlands, there would be net positive impacts on wetlands from the Proposed Action as the action is anticipated to enhance existing wetlands.	No Significant Impact. Impacts under Alternative 2 would be the same as those under Alternative 1.	No Significant Impact. There would be no change to existing conditions; therefore, no impacts would occur, however, the public would not be compensated for natural resource injuries as required under the Oil Pollution Act and the Lempert-Keene-Seastrand Oil Spill Prevention and Response Act - Govt. Code 8670.1 et seq.

Environmental Assessment

Damage Assessment and Restoration Plan and Environmental Assessment for the 18 May 2011 Omega Air 707 Tanker Crash at Naval Base Ventura County, Point Mugu, California.

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List of Appendices (Bound Separately)

- A – Public Involvement (Notices, Responses)
- B – Trustee Correspondence
- C – Record of Non-Applicability (RONA) and Air Quality Data
- D- Agency Consultation Documentation
- E- Benthic Macro-Invertebrate Survey
- F – Natural Resource Damage Assessment (NRDA) Cost Estimates

Abbreviations and Acronyms

Acronym	Definition	Acronym	Definition
°C	Degrees Celsius	EO	Executive Order
AICUZ	Air Installation Compatible Use Zone	ESA	Endangered Species Act
APE	Area of Potential Effect	FONSI	Finding of No Significant Impact
BASH	Bird/Wildlife-Aircraft Strike Hazard	ft	feet
BMI	Benthic macro-invertebrate	GHG	greenhouse gas
BMP	best management practice	HEA	Habitat Equivalency Analysis
BTEX	benzene, toluene, ethylbenzene, and xylenes	IAS	Initial Assessment Study
CAA	Clean Air Act	INRMP	Integrated Natural Resources Management Plan
CDFG	California Department of Fish and Game	IR	Installation Restoration
CNRSW	Command Navy Region Southwest	MMPA	Marine Mammal Protection Act
CDFW OSPR	California Department of Fish and Wildlife Office of Spill Prevention and Response	MBTA	Migratory Bird Treaty Act
CEQ	Council on Environmental Quality	MOA	Memorandum of Agreement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	MOU	Memorandum of Understanding
CFR	Code of Federal Regulations	MSL	mean sea level
CO ₂	carbon dioxide	NAS	Naval Air Station
COPC	Contaminants of potential concern	NAVFAC SW	Naval Facilities Engineering Command Southwest
CRAM	California Rapid Assessment Method	NBVC	Naval Base Ventura County
CWA	Clean Water Act	NEPA	National Environmental Policy Act
CZMA	Coastal Zone Management Act	NHPA	National Historic Preservation Act
DARP	Damage Assessment and Restoration Plan	NMFS	National Marine Fisheries Service
DoD	United States Department of Defense	NOAA	National Oceanic and Atmospheric Administration
DoN	United States Department of the Navy	NPDES	National Pollutant Discharge Elimination System
EA	Environmental Assessment	NRSW	Navy Region Southwest
EIR	Environmental Impact Report	NRDA	Natural Resource Damage Assessment
		ODD	Oxnard drainage ditches
		OEA	Overseas Environmental Assessment
		OPA	Oil Pollution Act

**Abbreviations and Acronyms
(Cont.)**

OSPRA	Lempert-Keene-Seastrand Oil Spill Prevention and Response Act - Govt. Code 8670.1 et seq.
PAH	Polycyclic aromatic hydrocarbon
PFMC	Pacific Fishery Management Council
PPV	Public Private Ventura
RONA	Record of Non-Applicability
RP	Responsible Party
SHPO	State Historic Preservation Officer
SVOC	Semivolatile organic compound
SWPPP	Storm Water Pollution Prevention Plan
TMDL	Total maximum daily loads
TPH-e	Extractable petroleum hydrocarbons
UAS	Unmanned aircraft systems
USFWS	U.S. Fish and Wildlife Service
U.S.C.	United States Code
USV	Unmanned surface vehicle
VOC	Volatile organic compound
yd ³	Cubic yard

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1 Purpose of and Need for the Proposed Action

1 1.1 Introduction

2 This Draft Damage Assessment and Restoration Plan and Environmental Assessment (DARP/EA)
3 addresses primary and compensatory restoration for natural resources injured by the 18 May 2011
4 Omega Air tanker crash and resulting discharge of jet fuel at Naval Base Ventura County (NBVC). The
5 document describes the affected environment, the injuries to natural resources, and evaluates
6 proposed restoration alternatives. It was developed in accordance with the Oil Pollution Act of 1990
7 (OPA), 33 United States Code (U.S.C.) §2701, its implementing regulations, 15 Code of Federal
8 Regulations (CFR) part 990, and the Lempert-Keene-Seastrand Oil Spill Prevention and Response Act -
9 Govt. Code 8670.1 et seq. Under the OPA and OSPRA, designated Trustee agencies are responsible to
10 the general public for ensuring the assessment of impacts and implementation of actions to restore,
11 rehabilitate, replace, or acquire the equivalent of the natural resources or services injured as a result of
12 an unpermitted discharge of oil.

13 This DARP/EA also addresses the requirements of the National Environmental Policy Act (NEPA), 42
14 U.S.C. §4321 and its implementing regulations, 40 CFR parts 1500-1508. NEPA requires that federal
15 agencies analyze the potential direct, indirect and cumulative impacts of proposed major federal
16 actions and alternatives; and to involve the public in the process.

17 1.2 Point Mugu Location and Environment

18 The NBVC Point Mugu is located along the California Coast in Ventura County between Oxnard and Point
19 Mugu State Park (See Figure 1-1). NBVC operates an airfield with two runways and a 36,000 square mile
20 sea test range extending more than 180 nautical miles seaward from shore. NBVC consists of 4,490
21 acres of which approximately 2,000 acres are developed. It also includes Mugu Lagoon, the largest salt
22 marsh estuary in Southern California. Mugu Lagoon is at the terminus of the Calleguas Creek watershed
23 and includes approximately 2,100 acres of wetland habitat largely composed of estuarine coastal salt
24 marsh. It provides food, nesting, sheltering, breeding, and nursery grounds for numerous species of fish,
25 wildlife, and plants, including federally listed special status species (See Figure 1-2).

26 In the lower intertidal salt marsh, California horn snails (*Cerithidea californica*), lined shore crabs
27 (*Pachygrapsus crassipes*), and yellow shore crabs (*Hemigrapsus oregonensis*) are abundant, and Light-
28 footed Ridgway's rails (*Rallus longirostris levipes*) forage (Tetra Tech 2005). Channels and tidal creeks at
29 Mugu Lagoon are important foraging and resting areas for a variety of bird life, including shorebirds,
30 dabbling and diving ducks, and wading birds. Several special status species utilize Mugu Lagoon,
31 including the Light-footed Ridgway rail. Much of the habitat in the area is typical of Southern California
32 low salt marsh habitat, and is dominated by halophytic plant species such as pickleweed (*Salicornia*
33 spp.), salt grass (*Distichlis spicata*), and jaumea (*Jaumea carnosa*).

34 Background water quality and biological conditions present at Point Mugu vary according to the physical
35 and ecological stressors. Some areas exhibit anoxic (dark soils) silty-clay sediments and minimal to no
36 tidal flushing or freshwater inputs yielding warmer water temperatures, low dissolved oxygen levels,
37 high conductivity, and high salinity. Water bodies with elevated daily water temperature have a
38 reduced ability to hold oxygen and approach near anaerobic environmental conditions, thus decreasing
39 dissolved oxygen levels that are vital to sustain aquatic biota. These conditions result in a shift in the
40 benthic assemblage to pollution tolerant insect groups. Insects must get all oxygen directly from the
41 atmosphere in oxygen compromised systems. Organisms occupying these harsh and extreme habitats

1 usually range from moderate to highly tolerant insect taxa and have adapted to these conditions by
2 developing highly transitory or short-lived life cycles, being highly motile and having the ability to
3 reproduce in high numbers. These insect groups can tolerate a wide range of salinities and can survive
4 temperatures from 0 degrees Celsius (°C) to 30°C. Taxa that are indicators of mid-range water quality
5 include: Isopoda (sow bug), Amphipoda (scuds), Bivalvia (clams and mussels) and Tipulidae (crane flies).
6 Insect groups that are indicators of poor water quality would include: oligochaetes (aquatic worms),
7 Chironomidae (midge-fly), Syrphidae (flower fly), Physidae (left-handed snail), and Tricladida (planariid
8 flatworms).

9 **1.3 Incident Overview**

10 On the evening of 18 May 2011, a Boeing K707 aerial refueling tanker, carrying jet fuel (JP-8), operated
11 by Omega Air, Inc., crashed during take-off onto Runway 21 in Mugu Lagoon at the end of Taxiway
12 Alpha). The plane carried 10,000 gallons of fuel for which most either burned through that first night
13 and/or was taken out by the high tide. There were 2,000 gallons remaining in one of the wings which
14 was pumped out later in the clean-up process.” The crash scattered debris and different portions of the
15 plane throughout the crash site, scoured tracks into the marsh, and left the remaining fuselage partially
16 buried in the mudflat (Figures 1-3 and 1-4).

17 In response to the Incident, a Unified Command structure was established by staff from NBVC Point
18 Mugu, California Department of Fish and Wildlife, Office of Spill Prevention and Response (CDFW OSPR),
19 U.S. Coast Guard, U.S. Fish and Wildlife Service (USFWS), and the aircraft owner Omega Air, Inc. The
20 team oversaw the emergency response which included immediate actions to minimize potential impacts
21 to the entire Mugu Lagoon. Due to the time of the crash, darkness limited initial actions to control and
22 document fuel transport through the lagoon system. Response actions conducted on 19 May 2011 were
23 more extensive and included (1) installation of sandbags at the various culverts to reduce further
24 transport of fuel through Mugu Lagoon and (2) surveys to identify presence of fuel, debris, and any oiled
25 wildlife. Dead biota observed during the initial response included dead crabs and snails in the areas
26 closest to the crash and subsequent fire site.

27 Salvage operations to remove the crash debris and plane fuselage were conducted in early June 2011.
28 Additional information on the initial debris removal actions can be found in the *Work Plan IIIB Salvage*
29 *for Omega Air/Point Mugu 707 Sites* (Patriot Environmental Services 2011). (See Chapter 6 references)
30 An initial assessment study identified contaminants to determine sediment excavation requirements.
31 Excavation of contaminated sediment involved three phases. Phase I consisted of planning, including
32 obtaining a categorical exclusion and utility excavation permit for the work, coordination of the
33 excavation scheduling, operations, and laydown with military operations, safety planning, and a limited
34 topographic survey and grid placement to identify grids for removal and confirmation sampling following
35 excavation. Phase II was comprised of the excavation and de-watering of contaminated sediment.
36 Excavation required the (1) placement of temporary roadways (crane mats) at both ends of the plane,
37 (2) use of cranes to move larger pieces whereas smaller pieces were dragged via a truck winch, (3)
38 removal of fuel from the wing, and (4) placement of additional containment and sorbent boom across
39 the adjacent marsh/mudflat. Phase III consisted of off-installation disposal of waste water and
40 contaminated sediment. Ultimately, the crash resulted in a fire, the scattering of aircraft debris, and the
41 introduction of fuel and other contaminants into the wetland. Other potential sources of impact include
42 the deposition of ash, the use of fire retardant, changes to hydrology, and cleanup activities, such as
43 removal of debris, excavation of contaminated sediment, and associated use of heavy equipment.

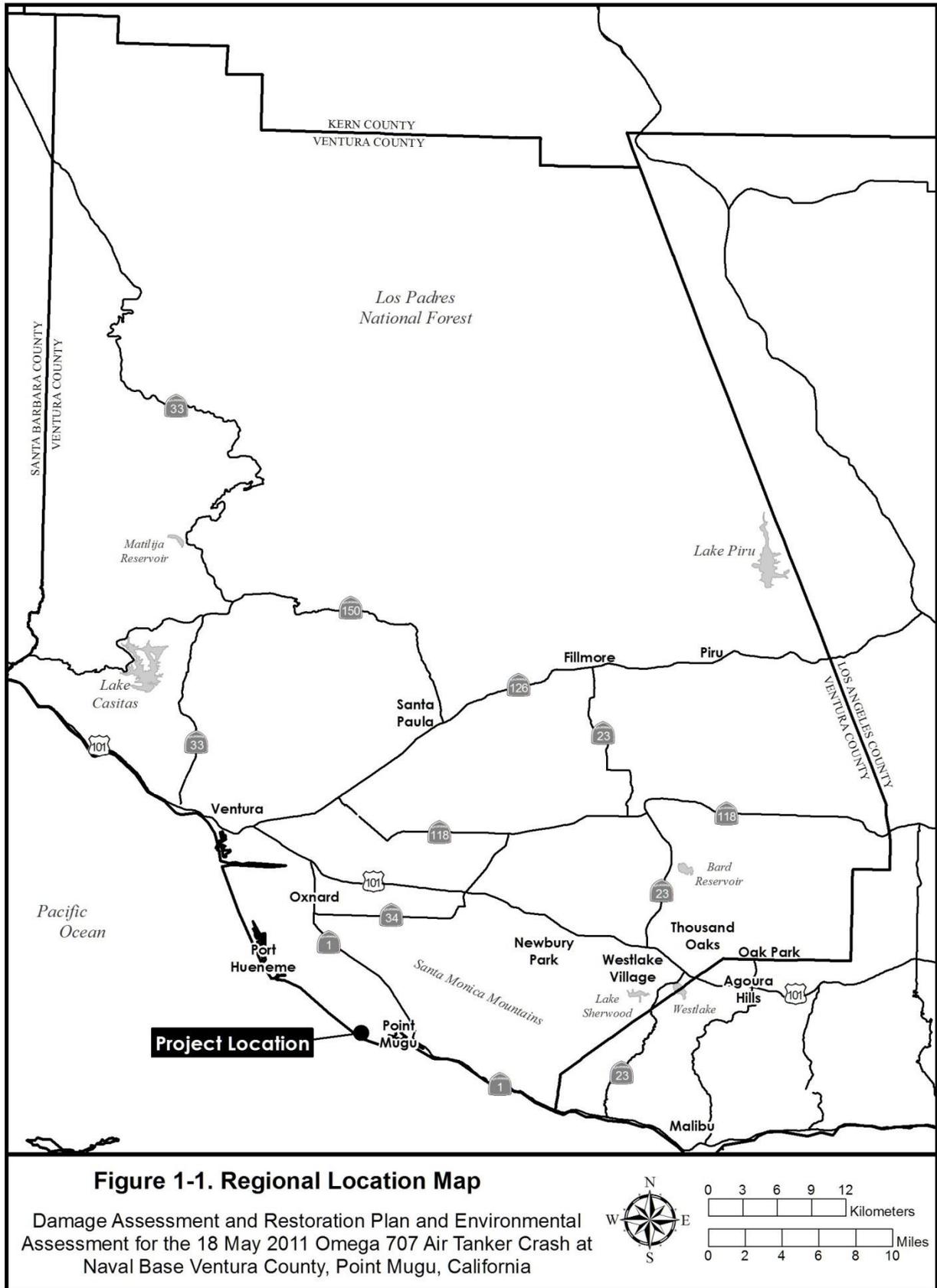


Figure 1-1. Regional Location Map

Damage Assessment and Restoration Plan and Environmental Assessment for the 18 May 2011 Omega 707 Air Tanker Crash at Naval Base Ventura County, Point Mugu, California

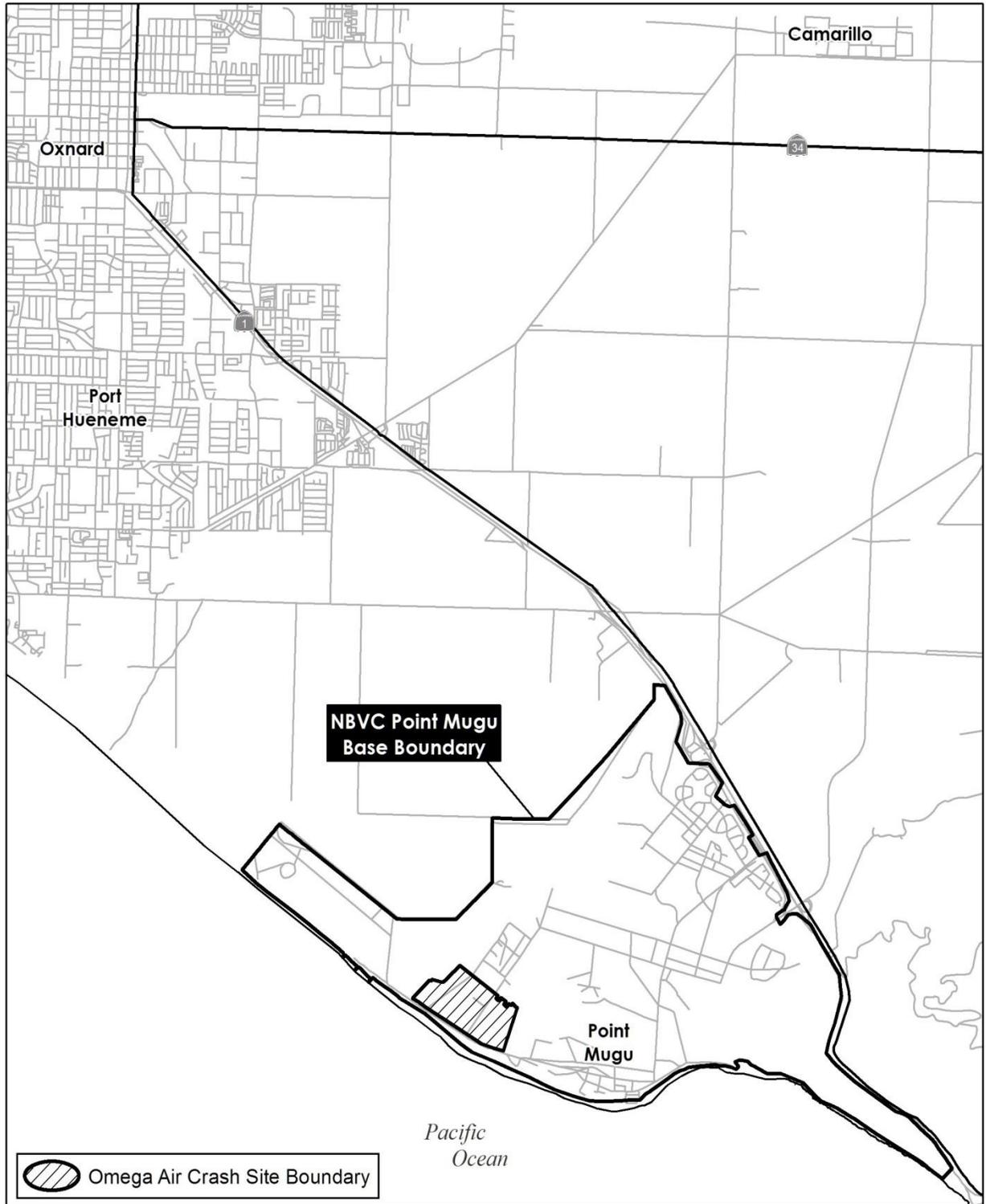


Figure 1-2
Project Vicinity Map
Damage Assessment and Restoration Plan
and Environmental Assessment for the
18 May 2011 Omega 707 Air Tanker Crash
At Naval Base Ventura County, Point Mugu, California

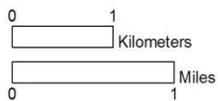




Figure 1-3
Photo of Plane Crash
Damage Assessment and Restoration Plan
and Environmental Assessment for the
18 May 2011 Omega 707 Air Tanker Crash
At Naval Base Ventura County, Point Mugu, California

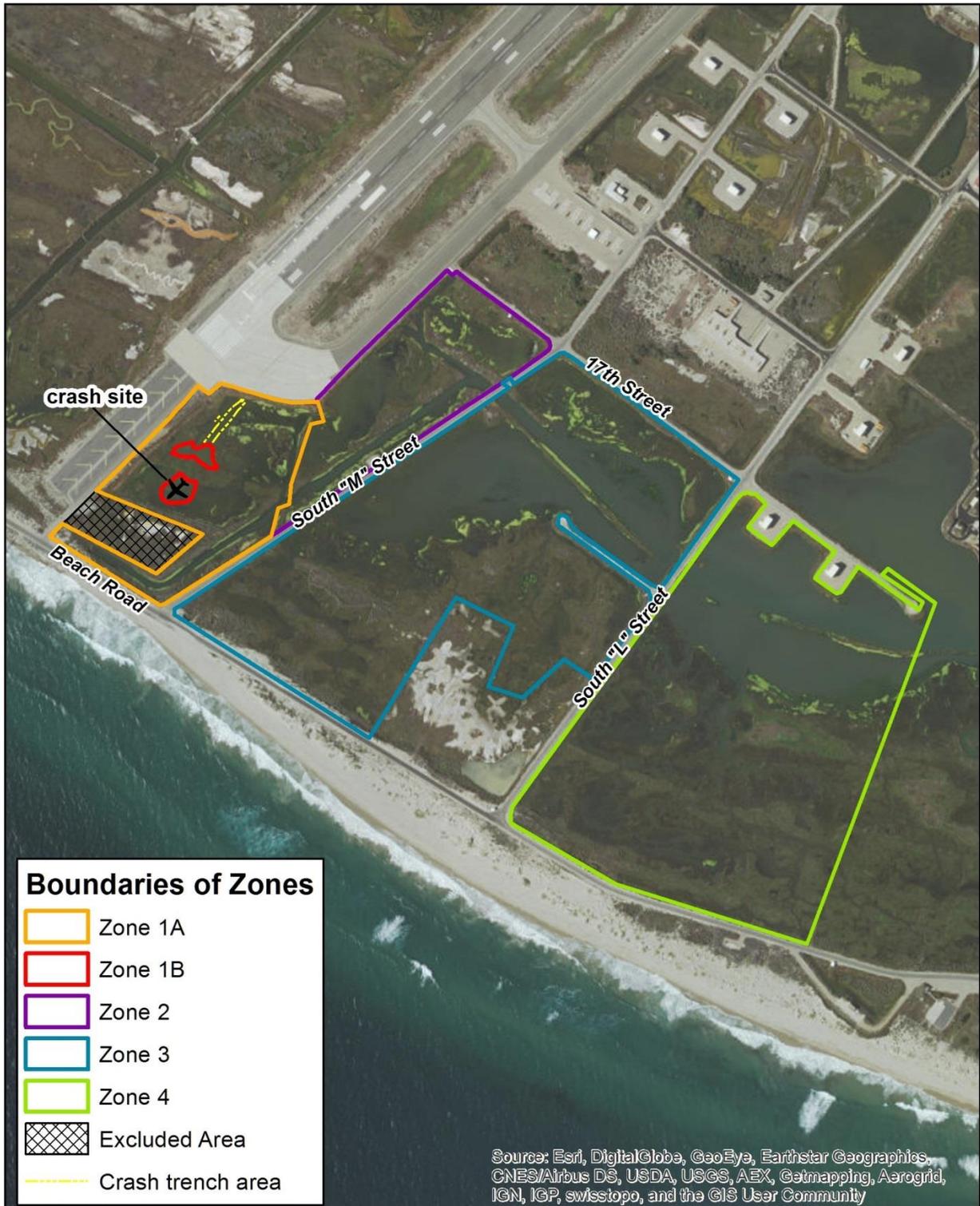
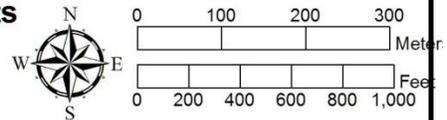


Figure 1-4. Aproximate Locations of Potential Impacts

Damage Assessment and Restoration Plan and Environmental Assessment for the 18 May 2011 Omega 707 Air Tanker Crash at Naval Base Ventura County, Point Mugu, California



1.3.1 Excavation/Cleanup: Initial Assessment Study

Following the removal of the aircraft fuselage and crash debris from the lagoon, an Initial Assessment Study (IAS) was conducted to identify and assess the site's potential threat to human health and/or the environment. The IAS involved the collection and analysis of surface and subsurface sediment samples to evaluate potential contamination resulting from the plane crash, the resulting fire, release of jet fuel, and associated emergency response. The contaminants of potential concern (COPCs) include metals, volatile organic compounds (VOCs), extractable petroleum hydrocarbons (TPH-e) and semivolatile organic compounds (SVOCs). Detailed results of the IAS are presented in the *Sediment Sampling Technical Memorandum, Omega Air Crash (OAC) Site, NBVC Point Mugu* (Insight 2011).

Based on the sediment sample data, the COPCs in sediment at the crash site were antimony, arsenic, cadmium, lead, molybdenum, vanadium, TPH-e, benzene, toluene, ethylbenzene, and xylenes (BTEX), and SVOC (Insight 2011c). A decision was made to excavate the contaminated sediment from 0 to 3 ft below ground surface to protect ecological receptors and human health.

A pre-excavation topographic survey was performed on 21 September 2011 to establish existing grades and to assess the pre-removal site topographic features, such as high and low points. Once the temporary road had been constructed, excavation of the contaminated sediment at the crash site began on 6 October 2011. The effectiveness of the remedial action was quantified by analyzing confirmation soil samples obtained from the bottom of each excavation grid cell for site-specific COPCs. Based on those results, two additional rounds of site excavations occurred between 13 and 19 October 2011. On 26 October 2011, all sediment removal activities ceased and no further excavation was necessary. Overall, 2,035 cubic yards (yd³) of contaminated sediment were removed (Insight 2011). The extent of the excavation and locations of other features are shown on Figures 1-5 and 1-6.

At the completion of sediment excavation activities, a topographic survey was used to delineate the extents of excavation and the associated backfill required. Backfilling operations at the crash site began on 26 October 2011 and concluded on 10 November 2011 (Insight 2011c). Excavations were backfilled with two sources of material, comprised of sediment at the bottom of several excavations within the crash site and an on-site upland borrow area, a stockpile of former Mugu Lagoon dredge material. The lower portion of the excavation up to 6-8 inches below grade was backfilled with sandier material imported from the borrow site. Due to the unique physiochemical soil characteristics of the Mugu Lagoon mudflat sediment, sediment at the bottom of excavations within certain cells (D1, D2, C2, C3 and B3, below the defined depth of contamination removal), was used as backfill material. The harvested mudflat sediment was temporarily stockpiled in the vicinity of cell F2 (Figure 1-5 and 1-6) (Insight 2011).

Mechanical backfilling was performed, followed by slurry mixture placement across the excavation site using a 6-inch hydraulic submersible sand/slurry pump to disperse a slurry of the remaining sandy backfill material and upper harvested top cover material (Insight 2011). Overall, approximately 1,450 yd³ of imported sediment from the existing on-base borrow site and 585 yd³ of harvested mudflat material were used during the backfilling process, during which approximately 34,182 square feet of mudflat was restored to approximate pre-crash ground surface.

At the completion of all backfill activities, a survey was performed during a low tide to assess the site topographic features. The survey included areas outside of the excavation where the aircraft traversed the lagoon creating scour trenches along the path to where it finally came to rest (Figure 1-3). Re-contouring of the entire area was completed in January 2012. A Remedial Action Activity Report was generated in March 2012 to document this activity.

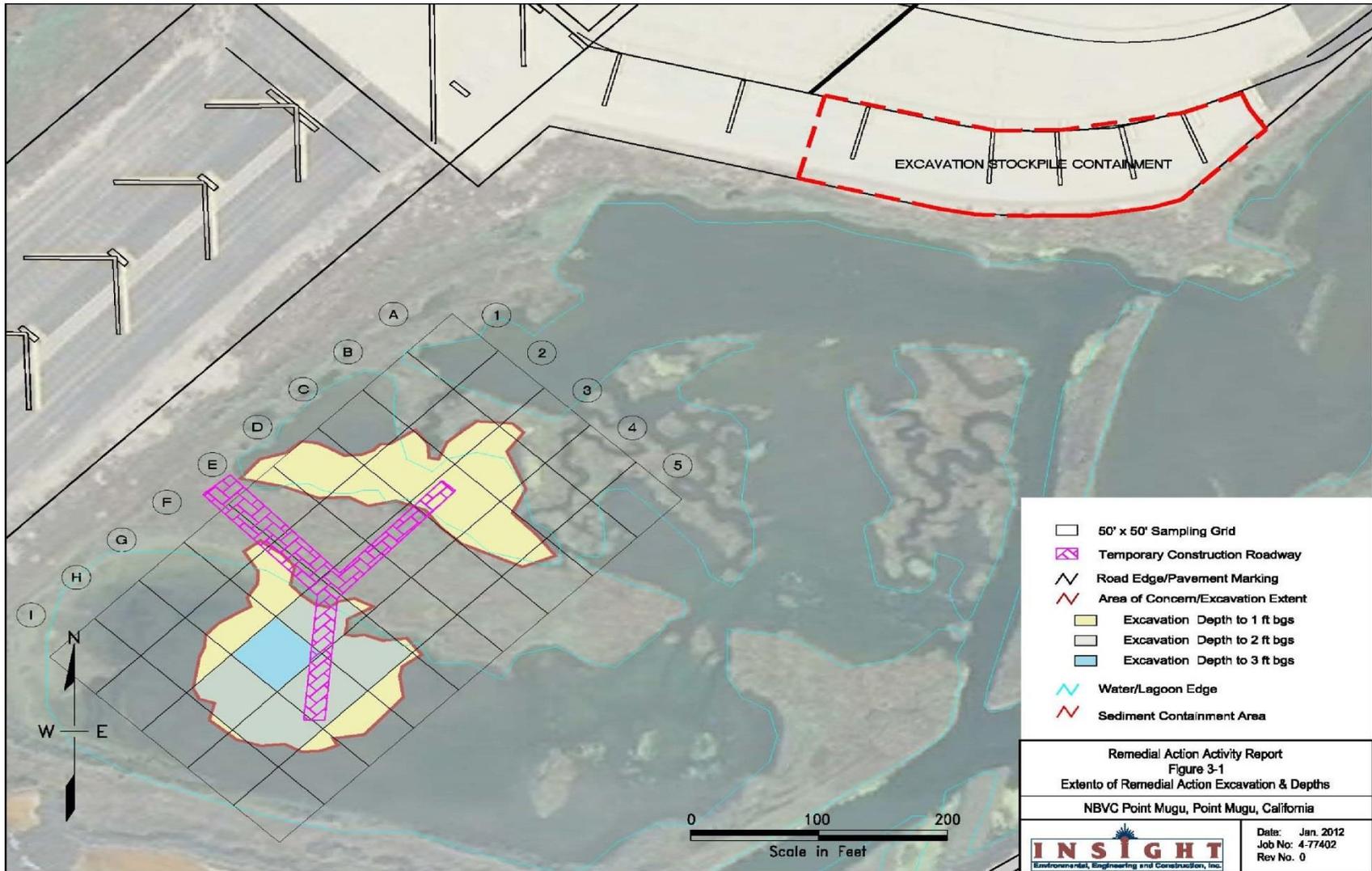


Figure 1-5. Extent of Remedial Action Excavation and Depths (Remedial Action Activity Report Fig. 3-1).
Damage Assessment and Restoration Plan and Environmental Assessment for the
18 May 2011 Omega 707 Air Tanker Crash at Naval Base Ventura County, Point Mugu, California

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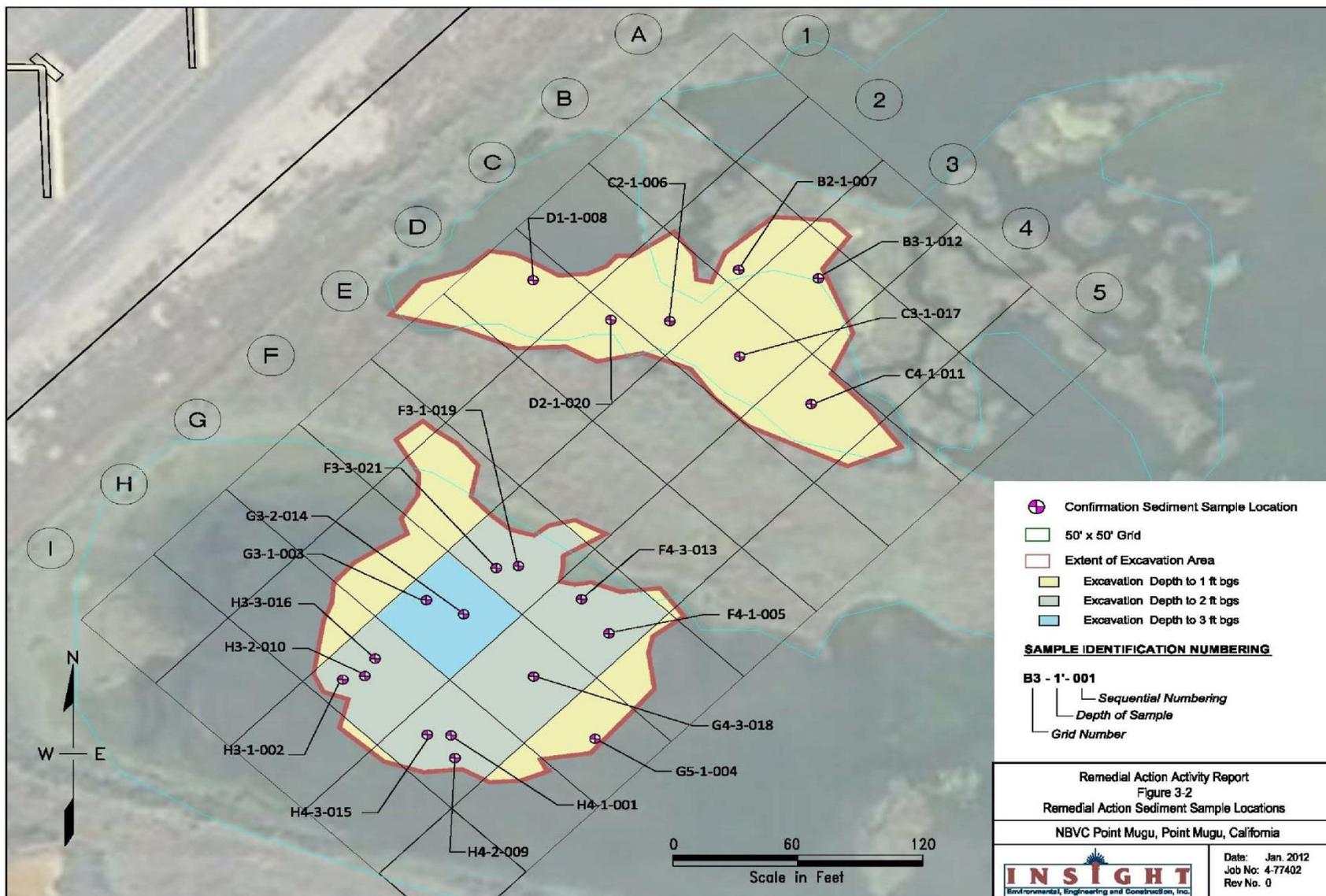


Figure 1-6. Sediment Sampling Locations (Remedial Action Activity Report Fig. 3-1).
 Damage Assessment and Restoration Plan and Environmental Assessment for the
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1 Additional information on the excavation of contaminated sediment can be found in Insight
2 Environmental, Engineering & Construction, Inc. 2012. Excavation, backfill and grading of the crash site
3 was completed in January 2012.

4 **1.4 Natural Resource Trustees and Authorities**

5 ***Regulatory Setting***

6 *Both federal and state laws establish liability for natural resource damages to compensate the public for*
7 *injury, destruction, and loss of such resources and services resulting from unpermitted oil spills. Natural*
8 *Resource Trustees are authorized to act on behalf of the public to assess these injuries to natural*
9 *resources. The Trustees are also empowered to bring legal action to address damages, while also*
10 *planning and implementing restoration actions to restore natural resources injured and lost as a result of*
11 *oil spills. These natural resources are defined as "land, fish, wildlife, biota, air, water, ground water,*
12 *drinking water supplies and other such resources belonging to, managed by, held in trust by,*
13 *appertaining to, or otherwise controlled by the United States, any State or local government or Indian*
14 *tribe, or any foreign government" (33 U.S.C. § 2701(20)).*

15 *The Trustees' mandates under the OPA (33 U.S.C. §2706(c)) and OSPRA are to make the environment and*
16 *the public whole from injuries to natural resources and services resulting from the discharge of oil. This*
17 *requirement must be achieved through the restoration, rehabilitation, replacement, or acquisition of*
18 *equivalent natural resources and services.*

19 The federal and state Trustees for this incident include the U.S. Navy as Lead Trustee, USFWS and
20 CDFW-OSPR. The US Navy and USFWS are designated Trustees for natural resources pursuant to
21 subpart G of the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR § 300.600 et
22 seq.) and Executive Order 12580 (3 CFR, 1987 Comp. p. 193, 52 Fed. Reg. 2923 (January 23, 1987) as
23 amended by Executive Order 12777 (56 Fed. Reg. 54757 [October 19, 1991]). CDFW-OSPR has been
24 designated as a state Trustee for natural resources pursuant to Section 1006(b)(3) of the OPA and the
25 administrator for oil spill response under section 8670.4 of the OSPRA. Collectively these government
26 agencies are referred to as the "Trustees" or the "Natural Resource Trustees." Each of the agencies acts
27 as a Natural Resource Trustee pursuant to the OPA and OSPRA.

28 *The OPA and OSPRA provide the statutory and regulatory framework and authority for Natural Resource*
29 *Trustees to carry out the necessary studies to determine injuries and plan and implement actions to*
30 *restore natural resources and resource services injured or lost as a result of an unpermitted discharge of*
31 *oil. Injury is defined as "an observable or measurable adverse change in a natural resource or*
32 *impairment of a natural resource service." Restoration, under the OPA and OSPRA, means, restoring,*
33 *rehabilitating, replacing or acquiring the equivalent of injured natural resources and services and*
34 *includes both primary restoration (returning injured natural resources and services to pre-spill (or*
35 *baseline) conditions) and compensatory restoration (returning the interim losses of natural resources*
36 *and services that occurred from the date of the incident until full recovery) (15 CFR § 990.30).*

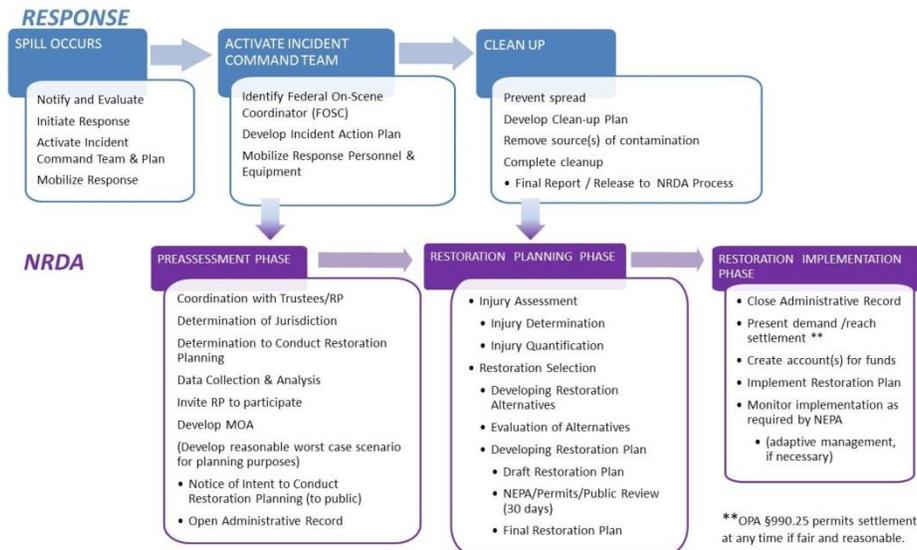
37 *A Natural Resource Damage Assessment (NRDA), as described under section 1006 of the OPA (33 U.S.C.*
38 *§2706) and its implementing regulations (15 CFR part 990) and OSPRA and its implementing regulations*
39 *consists of three phases: (1) Pre-assessment; (2) Restoration Planning; and (3) Restoration*
40 *Implementation. The Trustees may initiate a damage assessment once it has been determined that: an*
41 *incident (a discharge or substantial threat of discharge of oil into or upon navigable waters) has*
42 *occurred; the incident is not from a public vessel or an onshore facility subject to the Trans-Alaska*

1 Pipeline Authority Act; the incident is not permitted under federal, state or local law; and Trustee natural
 2 resources may have been injured as a result of the incident (15 CFR §990.41).

3 In compliance with the OPA and OSPRA, the Trustees completed the Pre-assessment Phase and
 4 determined that jurisdiction to pursue restoration under the OPA and OSPRA exists for this incident.
 5 The crash and subsequent jet fuel spill constitutes an unpermitted incident that resulted in injury to
 6 natural resources under the authority of the Trustees. On 17 July 2015, the Trustees issued a Notice of
 7 Intent to Conduct Restoration Planning and Preparation of a Damage Assessment and Restoration
 8 Plan/Environmental Assessment and published it in the Federal Register (Appendix A).

9 The purpose of the Restoration Planning phase is to evaluate the potential injuries to natural resources
 10 and services, and to use that information to determine the need for, and scale of, associated
 11 compensatory restoration actions. This phase provides the link between injury and restoration through
 12 injury assessment, restoration scaling, and restoration selection. The goal of injury assessment is to
 13 determine the nature and extent of injuries to natural resources and services, while restoration scaling
 14 determines the amount of compensatory restoration needed. When the injury assessment is complete,
 15 the Trustees must identify a reasonable range of restoration alternatives, evaluate and select the
 16 preferred alternative, develop a draft DARP/EA; and present the alternatives to the public, solicit public
 17 comment on the draft DARP/EA, and consider those comments before issuing a final DARP/EA. Table
 18 1-1 below illustrates the sequence of events under the OPA and OSPRA.

19
 20 **Table 1-1. Incident Response Actions and NRDA Process Phases**



22
 23

1.4.1 Trustee Coordination and the Responsible Party

Regulatory Setting

Under section 1002 of the OPA (33 U.S.C. § 2702), each party responsible for a facility from which oil is discharged, or which poses a substantial threat of a discharge of oil, is liable for natural resource damages resulting from the incident involving such discharge or threat. Under sections 8670.3(w) and 8670.56.5 of OSPRA, the “transporter of oil” is a responsible party “absolutely liable” for any damages incurred by any injured party that arise out of, or are caused by a spill, including injury to, destruction of, or loss of natural resources. The Responsible Party (RP) for this spill is Omega Air, Inc.

Shortly after the crash, the Trustees entered into a cooperative Memorandum of Agreement (MOA) with the RP to establish a framework for the NRDA process (See Appendix B). In that MOA, the parties agreed that injury to natural resources occurred. They also agreed to a cooperative approach to determining and quantifying the injuries to natural resources and conducting restoration planning in a manner that would be cost-effective, avoid duplication, and effectively use limited resources. Such an agreement is consistent with the OPA and OSPRA regulations, and is intended to provide the opportunity for settlement of damage claims without litigation. However, the final authority to make determinations regarding injury and restoration rested solely with the Trustees.

Throughout the damage assessment and restoration planning process, the Trustees worked together to meet their respective Natural Resource Trustee responsibilities under OPA and OSPRA, and other applicable federal and state laws. All parties visited Mugu Lagoon to view the impact zones and potential restoration sites. The Trustees met or conferenced regularly to review and discuss the progress of the injury assessment and subsequent restoration planning efforts. Trustees and the RP collaborated on the design of studies and interpretation of data. Information collected by all parties was shared, as were the results of those analyses that were undertaken independently by the Trustees.

Following the determination and quantification of injuries, the Trustees began developing restoration alternatives. Following initial coordination with the Trustees, the RP declined to engage further in restoration planning. The Trustees continued with the Restoration Planning Phase. A complete timeline of events surrounding the incident, initial response, and pre-assessment process is presented below in Table 1-2.

1.4.2 Injury Assessment

Regulatory Setting

In order to assess injury to natural resources, Trustees must quantify the degree, and spatial and temporal extent of injuries relative to baseline. Trustees may quantify injuries in terms of: 1) the degree, and spatial and temporal extent of the injury to a natural resource 2) the degree, and spatial and temporal extent of injury to a natural resource, with subsequent translation of that adverse change to a reduction in services provided by the natural resource; or 3) the amount of services lost as a result of the incident (15 CFR §990.52(b)). To quantify injury, trustees must estimate, quantitatively or qualitatively, the time for natural recovery without restoration, but including any response actions.

1

Table 1-2. Omega Crash & Response Timeline

DATE	EVENT
18 May 2011	Plane Crash resulting in Fire/ Emergency Response
19 May 2011	Continuation of response actions (sand bags, surveys)
20-23 May 2011	Observations of Impacts to Natural Resources
26 May 2011	Sandbags removed from culverts in Zones 2 to 4
13 Jun 2011	CNRSW designated as Natural Resources Trustee for US Navy
Early Jun 2011	Salvage operations (crash debris, plane fuselage)
June 2011	Initial Assessment Study commences
28 June 2011	Benthic Macroinvertebrate (BMI) Reconnaissance site visit
19-20 Jul 2011	BMI field survey and samples collection
21 Sep 2011	Pre-excavation topographic survey conducted
27 Sep 2011	Removal Action Work Plan approved
3-5 Oct 2011	Installation of turbidity/silt curtain booms and temp roadway
6 Oct 2011	1st contaminated sediment removal/excavation
13-18 Oct 2011	2nd contaminated sediment removal/excavation
19 Oct 2011	3 rd contaminated sediment removal/excavation
26 Oct 2011	Completion of contaminated sediment removal
26 Oct-10 Nov 2011	Backfilling of excavation areas with appropriate materials
Mid Nov 2011	Sandbags and turbidity/silt curtain booms removed from Zone 1
7 Dec 2011	MOA executed between Trustees & RP
Jan 2012	Re-contouring of excavated area and post-excavation topographic survey conducted
23 Mar 2012	Final Remedial Action Activity Report
30 Jul 2012	BMI Final Report produced
13 Nov 2012	RP BMI Report review comments
15 Nov 2012	Trustees/RP Teleconference to discuss BMI/comments received
10 Jan 2013	BMI Report Addendum produced
9 Apr 2013	RP Comments to BMI Addendum received
17 Jul 2015	DARP/EA Notice of Intent published in Federal Register

2

1 **Assessment Zones**

2 To assist with injury assessment and quantification, four Assessment Zones (Zones 1 to 4) were
3 identified and delineated based on the geographic extent of potential impact types, observations of fuel
4 and dead biota during initial incident responses, habitat features, and existing roads and levees (Figure
5 1-7). In general, two habitat types occur within these four zones: (1) shallow marsh habitat with muted
6 tidal influence that is permanently wetted; and (2) dredged channel habitat with greater tidal influence
7 and currents. Reference Zones 5, 6, and 7 were established as reference zones to provide baseline
8 comparisons. These zones were not impacted by the crash, fire, or resulting oil spill.

9 The plane crash, fire, resulting oil spill, and associated response actions altered the pre-existing
10 hydrology and water quality within the assessment zones. Several wetted channels and small drainages
11 in Zone 1 (Crash Site and Debris Pool) were impacted by fires that significantly increased water and
12 sediment temperatures, altered water quality, and caused physical injury to marsh habitats. During the
13 initial phases of response operations, flow between areas of Point Mugu was altered by placement of
14 sandbags to control fuel spread, which altered the amount and mechanism of tidal inputs and flushing.
15 As a result of tidal muting to control further fuel spread, average tidal fluctuations at the crash site
16 changed from an estimated 0 to +5 ft MSL before placement to +2 to +3 ft MSL after installation. These
17 conditions likely resulted in rapidly changing and artificially higher water temperatures, increased
18 salinity and conductivity levels, low percent oxygen (% O₂), and dissolved oxygen levels.

19 The main source of contamination to the site was JP-8. JP-8 is made from jet fuel A and jet fuel A-1, is
20 kerosene based), and is a complex combination of over 200 aliphatic and aromatic hydrocarbon
21 compounds. JP-8 is a "middle distillate", having both lighter, more volatile compounds (such as such as
22 benzenes, toluene, and xylenes) and more persistent constituents, such as polycyclic aromatic
23 hydrocarbon (PAHs), showing two separate patterns of impact and persistence. JP-8 has a higher flash
24 point than several other jet fuels, and lower vapor pressure (so less fuel is lost to evaporation). The
25 precise composition of JP-8 varies by batch, but is known to contain the following components:
26 kerosene, sulfur, nitrogen, benzene, alkylbenzenes (such as toluene), and C9-C13 aliphatic and aromatic
27 hydrocarbons.

28 Short-term hazards from some of the lighter, more volatile and water-soluble compounds include direct
29 physical impacts, and acute toxicity to aquatic life in the water column, especially in confined areas.
30 Long-term potential hazards of some of the lighter compounds could include groundwater
31 contamination if a groundwater supply is threatened. Long-term effects from PAHs include chronic
32 effects on the liver, kidneys, heart, lungs, and nervous system. PAHs in this product have shown
33 enhanced toxicity in sunlight. Metabolites of some JP-8 components may cause biological impacts and
34 system perturbations long after the parent hydrocarbon compounds have degraded, including chronic
35 low-level releases, bioaccumulation from dying organisms, and lysed cellular material. The Material
36 Safety Data Sheet notes that JP-8 is a known animal carcinogen, is toxic to fish, aquatic invertebrates,
37 and algae, and has hazardous decomposition products, namely carbon oxides. Fat or adipose tissues are
38 a major storage deposit for JP-8 components. Exposure to combinations of the components in JP-8 is
39 known to yield greater or lesser effects due to interactions among the components' effects. Effects of
40 exposure to toxics often varies by route of exposure (inhalation, ingestion, dermal, etc.), organism,
41 duration (chronic or acute), dose (e.g. low level or high level) and individual susceptibility factors.



Figure 1-7. Habitat Assessment Zone Map.

Damage Assessment and Restoration Plan and Environmental Assessment for the 18 May 2011 Omega 707 Air Tanker Crash at Naval Base Ventura County, Point Mugu, California

1 Recently dead macroinvertebrates (crabs and snails) were observed during the initial response and
2 subsequent NRDA assessment activities in Zones 1 to 4 (California Department of Fish and Game [CDFG]
3 and Weston Solutions Inc. 2012). Dead crabs and snails were observed on-site in Zone 1 during the
4 initial response, BMI reconnaissance visit and benthic sampling survey. Clusters of dead crabs were also
5 observed in Zones 3 and 4 during the initial response. A sub-set of 24 dead crabs were collected on May
6 20 and May 23 and carapace width and length were measured. In addition, recent dead snails were
7 present in BMI sediment core samples in greater numbers from Zones 1 and 2 than from Reference
8 Zone 7. No recent dead snails were present in BMI samples collected from Zone 3, Zone 4, or Reference
9 Zone 6.

10 In addition to Zone 1, dead crabs and snails were observed in zones with fuel contamination and
11 expected changes in water quality due to fire, fire retardant, and tidal muting (Figure 1-8). In contrast to
12 post-spill observations, NBVC staff do not usually observe dead crabs when conducting routine surveys
13 for Light-footed Ridgway's rail including their prey. Natural crab mortality events on NBVC that have
14 been otherwise observed were usually linked to large freshwater inputs (Dick Zembal pers. Comm.),
15 which had not occurred during this period post-crash.

16 **Zone 1**

17 Zone 1 contains the crash pool, debris pool, grounded crash trajectory, and immediately adjacent areas
18 contained within the sandbag containment berms. It is bounded by the runway, Beach Road, M Street,
19 and by the sand bags that restricted flow into Zone 2. The sandbags were placed around the crash site
20 and at the M St. culvert on 19 May 2011. These areas were exposed to immediate, direct physical
21 impacts of the crash and fire, removal of the plane and associated debris, and fuel and fire retardant.
22 The Trustees excluded an upland area to the west that was not likely affected by the crash trajectory,
23 fuel or other chemical contaminants, fire and smoke, fire retardant, or debris and sediment removal
24 ("excluded area" on Figure 1-7). The habitat at the Zone 1 crash pool specifically is more distinct as a
25 saline mudflat with little tidal influence and subject to periodic inundation and drying. In addition to the
26 impacts associated with the Incident, this area is potentially stressed by natural ecological conditions.

27 1. Crash Pool and Debris Pool (Zone 1A): These sections of Zone 1 are the areas that underwent
28 complete excavation to remove contaminated sediment described in Section 1.4 above. This area
29 contained the final resting locations of the plane and its wing. These two sites, or pools, were the most
30 immediately affected by fuel and contaminants leaking from the plane, melting equipment from the fire,
31 and removal of approximately 2,035 yds³ of contaminated sediment. Petroleum hydrocarbon sheen
32 (rainbow and silver), ash, plane fragments and debris, and fire retardant residues were observed in Zone
33 1 on 28 June 2011. Dead biota were also observed including shore crabs (*Hemigrapsus nudus*) and horn
34 snails (*Cerithidea californica*), several of which were burnt. The sandbags placed around the crash site
35 to restrict flow through the small drainage channels were left in place until mid-November. The specific
36 excavation and backfill activities are described in Section 1.4 above.

37 2. Remainder of Zone 1 (Zone 1B): The remaining area of Zone 1 outside of the excavated areas
38 contains the trenches caused by wing and plane trajectory through the marsh (see Figure 1-7) and
39 immediately adjacent areas within the most proximate set of sandbag containment berms that were
40 installed on 19 May 2011. These areas were exposed to immediate, direct physical impacts of the crash
41 and fire (burnt vegetation, crabs, snails, ash and burnt sand), removal of the plane and associated debris
42 (including laydown of temporary roadways for heavy equipment), and fuel and fire retardant. Surface
43 water flow was restricted or muted (necessarily leading to increases in water temperature and
44 decreases in dissolved oxygen; water flow was never completely eliminated) to facilitate ongoing
45 remediation until it was completed in mid-November 2011. Turbidity/silt curtain booms were placed

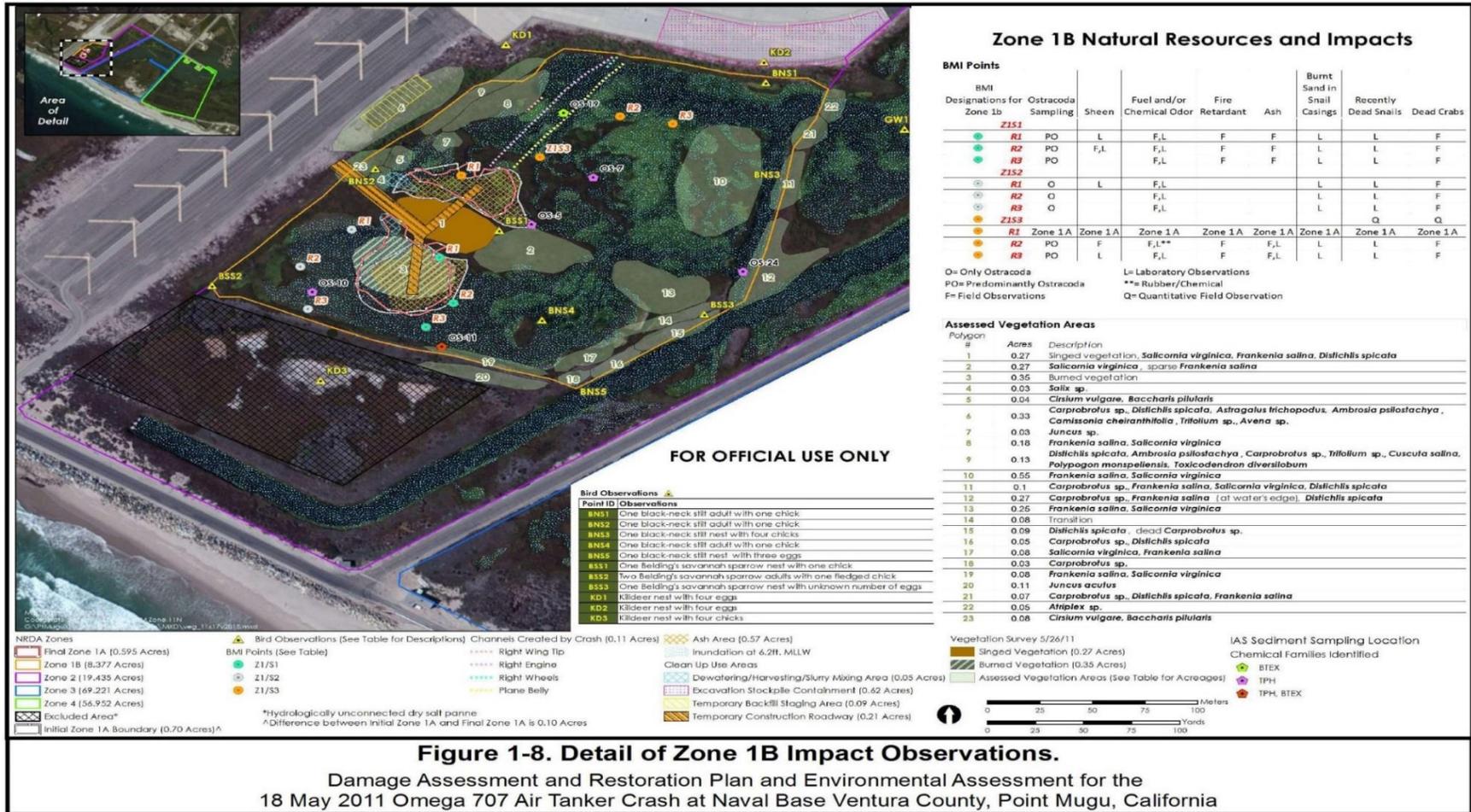


Figure 1-8. Detail of Zone 1B Impact Observations.
 Damage Assessment and Restoration Plan and Environmental Assessment for the
 18 May 2011 Omega 707 Air Tanker Crash at Naval Base Ventura County, Point Mugu, California

1 across the marsh/mudflats around the sediment excavation areas to minimize transport of fuel and
2 sediment disturbed by debris removal and excavation and suspended sediment (Figure 1-7, Insight,
3 2011c). Recently dead crabs and snails, with fire damage and burnt sand inside their shells, ash, and fuel
4 and other sheens were observed in the field or found in the biological samples taken throughout this
5 zone (CDFG and Weston Solutions Inc. 2012).

6 **Zone 2**

7 Zone 2 is bounded by the runway, M Street, 17th Street, and to the South by the sand bags restricting
8 flow from Zone 1 into Zone 2. Sand bags at the M Street culvert were removed 26 May 2011, whereas
9 those around Zone 1 were removed following excavation and backfill in mid-November 2011. This area
10 experienced less direct impacts from the fire, but was directly exposed to fuel and hydrological changes.
11 Disturbances to physical habitats and hydrology due to cleanup actions in the adjacent areas of Zone 1
12 also occurred.

13 **Zone 3**

14 Zone 3 is bounded by M Street, L Street, 17th Street, and Beach Road. Surface water flow into and out
15 of this area is through culverts at M Street and L Street. Sand bags reduced flow from 19-20 May for M
16 Street and L Street culverts, respectively until they were removed on 26 May 2011. This zone did not
17 experience direct physical impacts from the crash and fire, but contains locations where fuel sheen and
18 dead crabs were observed and collected by NBVC staff during the initial response. Multiple locations of
19 fuel sheen providing evidence of JP-8 were observed 19-20 May 2011 (already several days after the
20 crash). Approximately 300 dead crabs were observed *en masse* 20-23 May in this zone.

21 **Zone 4**

22 Zone 4 is bound by L Street, 17th Street, Beach Road, and to the east by the end of 17th Street. This
23 zone was the furthest area away from the crash site where fuel sheen was observed. The eastern
24 boundary of Zone 4 was a line extending from the end of 17th Street down to Beach Road
25 approximately parallel to M Street and L Street. Surface water flow into this area from the west (Zone 3)
26 was reduced until the L Street culvert was opened on 26 May 2011. Zone 4 includes locations where
27 dead crabs were observed and collected by NBVC staff during the initial response. This Zone contained
28 fuel sheen indicative of JP-8 furthest from the crash on 19 May 2011 and approximately 100 dead crabs
29 were observed *en masse* 20-23 May 2011.

30 **1.4.3 Injury Assessment Procedures**

31 The NRDA trustees developed an initial conceptual model soon after the crash that identified natural
32 resources potentially at risk of injury (such as birds, mammals, marsh vegetation, fish, and invertebrates)
33 and potential pathways of exposure (such as fuel into water column and surface soils and fire and water
34 temperature). The NRDA trustees identified potential ephemeral data collection needs and discussed
35 them with the RP representative. Some ephemeral data needs are typically addressed by Response,
36 such as surveys for impacted wildlife and documenting fuel, debris, ash, and response activities. In
37 addition, the NRDA team coordinated with the Response to conduct an aerial imagery overflight to
38 assess distribution of fuel and any initial changes in vegetation. NRDA teams also conducted site visits
39 early during the spill.

40

1 **Benthic Macro Invertebrate (BMI) Survey**

2 Given the potential pathways of exposure, the importance of BMI to the overall aquatic food web, and
3 their site fidelity, the NRDA team quickly identified benthic invertebrates as important indicator
4 community that is not generally addressed by Response and therefore began planning for further
5 assessment activities for BMI. BMI surveys are conducted as part of statewide monitoring efforts with
6 standard protocols for field sampling and laboratory processing by individuals with standardized
7 training. Agency and environmental consultant staff with extensive BMI survey experience applied
8 these methods with the necessary modifications to address constraints presented by spill assessments,
9 such as timing and location.

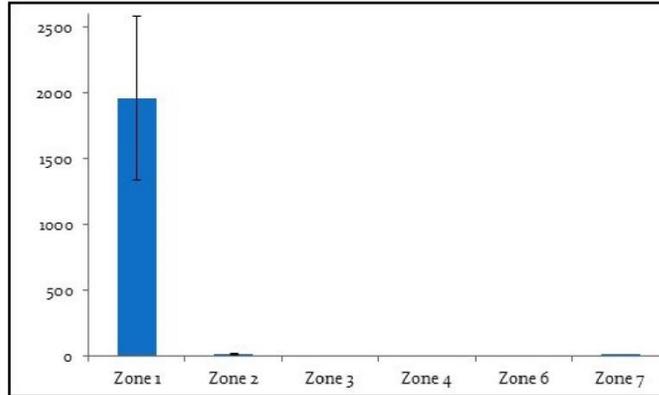
10 The overall objective of the study was to assess possible impacts to the existing BMI assemblages
11 inhabiting the Mugu Lagoon salt marsh system after an emergency crash landing of a Boeing 707 aircraft
12 on May 18, 2011. The overall hypothesis being tested was whether the crash (and associated impacts)
13 adversely affected the BMI community within and between the four assessment zones. The study
14 assessed the BMI benthic community, primarily the in situ, sedentary BMI present in sediment cores
15 with incidental (non-systematic) field observations of motile and/or water column species. The study
16 also characterized the sediment and water quality conditions for each zone. A reconnaissance survey
17 was conducted on 28 June 2011, followed by the benthic sampling survey on 19-20 July 2011,
18 approximately 2 months after the crash.

19 Access to the site was restricted until after crash investigations and salvage operations occurred and had
20 to be coordinated outside periods of active air operations. Due to these and other factors, field
21 reconnaissance work for the BMI study did not begin until late June 2011. The subsequent BMI
22 sampling occurred 19-20 July 2011, approximately two months after the crash. This delay is likely
23 reflected in the in the higher numbers of early colonizing species that elevated the overall BMI
24 abundance. A second BMI survey following sediment excavation was initially considered, but no further
25 planning or implementation occurred due to the severe level of impacts in Zone 1.

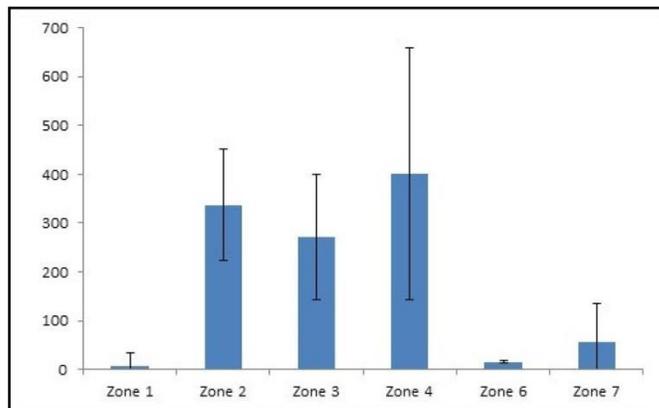
26 Results from the BMI survey confirmed the severity of impacts in Zone 1b, and lesser impacts in Zones 2,
27 3, and 4. Zone 1 had a lower quality benthic community than Reference Zones 6 and 7, as well as Zones
28 2, 3, and 4. Indicators of acute impacts in Zone 1b included very large numbers of recently dead
29 organisms (including charred shells and ash inside shells, Figure 1-9 (Graph A), reduced abundance and
30 diversity of benthic macro-invertebrates compared to other zones (Figure 1-9 [Graph B]). Zone 1 was
31 populated almost entirely with *Ostracoda* (seed shrimp), a motile organism with high fertility rates
32 known to be early re-colonizers after disturbances. *Ostracoda* were found in Zone 1b in quantities that
33 were orders of magnitude beyond what was found in other zones.

34 **1.4.4 Habitat Equivalency Analysis (HEA)**

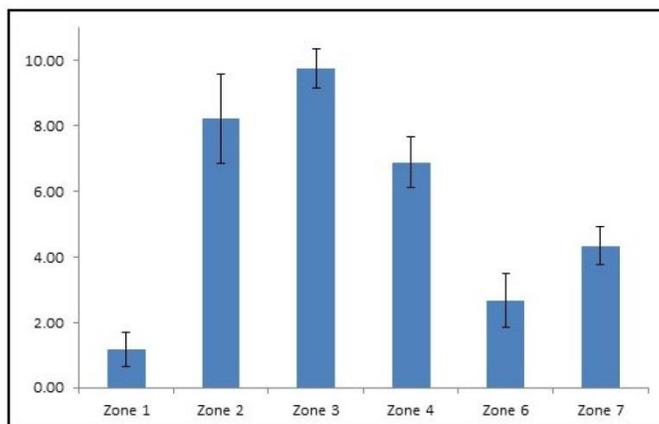
35 Habitat Equivalency Analysis (HEA) is a standard method for calculating compensation for impacts to
36 ecological services in NRDA. The method is based on compensating for ecosystem service losses via
37 habitat restoration projects that provide resources equivalent to the losses incurred. The HEA process
38 seeks to answer the question, "what scale of compensatory restoration action will compensate for the
39 interim loss of natural resources and services from the time of the incident until full recovery of the
40 resources?" The end result is measured in terms of area (e.g. acres), but includes considerations of
41 degree and area of impacts, time to recovery, compensatory restoration acreages and service increases,
42 and the time until restoration projects provide full benefit. The full cost of conducting a restoration
43 project of the type and size needed therefore becomes the cost of compensatory damages.



Graph A: Average of recently dead snails by zone. Data from number per site, BMI report, Table 5.



Graph B: Average abundance of non-Ostracoda by zone. The Zone 6 average (14.83) is double that of Zone 1 (7.44).



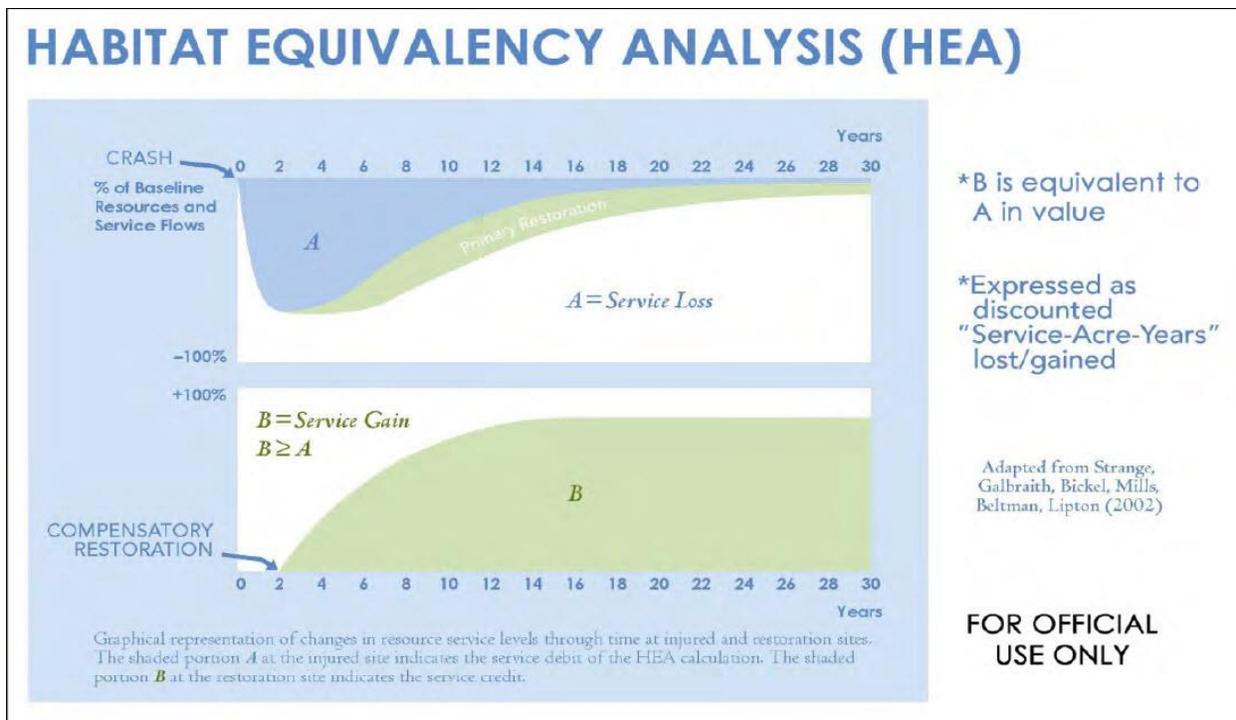
Graph C: Average diversity of non-Ostracoda by zone. The Zone 6 average (2.67) is double that of Zone 1 (1.17).

Figure 1-9. BMI Results by Zone (Graphs A, B, & C).

Damage Assessment and Restoration Plan and Environmental Assessment for the 18 May 2011 Omega 707 Air Tanker Crash at Naval Base Ventura County, Point Mugu, California

1 HEA receives as inputs: the injury or impact as a percent of service loss, the number of acres impacted,
 2 the time until recovery, the discount rate (incorporating the economic concept that values held today
 3 are worth more than those held in the future), and the expected benefit associated with natural
 4 resources and/or services improvements provided by compensatory restoration actions. Estimates of
 5 time to full recovery can be based on information about the life history of the organisms present (e.g.
 6 longevity), available scientific literature on recovery, and professional judgment of Trustees and their
 7 representatives. When estimating percent service loss, Trustees incorporate considerations of on-site
 8 ecological and biophysical characteristics such as soil, vegetation cover, and hydrology which affect the
 9 ability of an ecosystem to provide ecological services and (although they are not the only indicators of
 10 how the environment provides services) may be used as a proxy for services. Due to the complex nature
 11 of the HEA process, specific calculations are not included in this document, only the assumptions used in
 12 the calculation.

13 Services after an incident or spill decrease from baseline, and then slowly recover. In some situations,
 14 the Trustees may also pursue active restoration of the impacted site(s) to restore natural resources and
 15 services in an accelerated timeframe. This type of restoration is called 'primary restoration'. In
 16 contrast, compensatory restoration usually takes place outside the injured areas. Due to the time it
 17 takes to identify, plan, and implement compensatory restoration projects, there is often a delay before
 18 compensatory restoration actions provide ecological benefits. This is seen in the bottom graph where
 19 services at a compensatory restoration site begin rising after Year 2 (Figure 1-10). The overall concept is
 20 that "A" on the top graph (the nation's or public's loss of ecological services through time until they are
 21 fully recovered at the impacted site[s]) is equivalent to "B" in the bottom graph (the nation's or public's
 22 gain of ecological services through time from a compensatory restoration site, discounted for time).
 23



24
 25
 26

Figure 1-10. Compensatory Restoration Concept

1 Several definitions are important in understanding the HEA process:

- 2 • Baseline: condition of natural resources and services that would have existed had the incident
3 not occurred.
- 4 • Services: functions performed by a natural resource for the benefit of another natural resource
5 and/or the public.
- 6 • Injury: observable/measurable adverse change in a natural resource or service.
- 7 • Primary restoration: any action, including natural recovery, which returns injured resources and
8 services to baseline.
- 9 • Compensatory restoration: any action taken to compensate for interim losses of natural
10 resources/services, from the date of the incident until recovery.
- 11 • Natural recovery: recovery of the impacted area(s) and resource(s) unassisted by primary
12 restoration.
- 13 • Time to full recovery: the time between the impact and when services have returned to pre-
14 impact baseline levels.

15 HEA recovery trajectories were created for each impact area, to enable calculation of injuries in areas
16 (zones) affected by varying impacts to varying degrees, and recovery over time from the time of impact
17 until the time of full recovery (when services have returned to baseline levels). Since recovery of
18 structural components of the ecosystem (vegetation cover, species-specific recovery, etc.) often serve
19 as surrogates for recovery of overall services in a HEA calculation, understanding the relative recovery
20 of different components of the ecosystem compared to recovery of overall services is important.
21 Examples of recovery trajectories are provided in Table 1-3.

22 **Table 1-3. Years to Full Recovery for a Range of Salt Marsh Services and Metrics**
23 **(Strange et al., 2002)**

Ecological Service	Metric	Time (Year)	Recovery (%)	Type of Project	Location of Marsh	Source
Primary production	Above Ground biomass	2-3	100	Created	NC	Craft, et al. (1999)
	Below Ground biomass	3	100	Restored	NC	Broome, et al. (1986)
	Stem Density	5-6	100	Restored	NC	Broome, et al. (1986)
Soil Development and biogeochemical Cycling	Organic Matter	24	29	Created	TX	Lindau and Hossner (1981)
	Nitrogen	24	50	Created	TX	Lindau and Hossner (1981)
	Carbon	5	8	Created	NC	Craft, et al. (1991)
	Macroorganic matter	15-30	100	Created	NC	Craft, et al. (1988)
	Dissolved organic C	5	34	Created	NC	Craft, et al. (1991)
	Dissolved organic N	5	60	Created	NC	Craft, et al (1991)
Invertebrate Food Supply	NH4-N	5	25	Created	NC	Craft, et al. (1991)
	Infauna Density and Species Richness	15-25	100	Created	NC	Craft, et al. (1999)
	Infauna community composition	1-17	100	Created	TX	Sacco, et al. (1994)
Secondary Production	Shellfish Density	3-15	93	Created	TX	Minello and Webb (1994)
	Fish Density	3-15	41	Created	TX	Minello and Webb (1994)
	Shellfish Density	5	20	Created	TX	Minello and Zimmerman (1992)
	Fish Density	5	100	Created	TX	Minello and Zimmerman (1992)

1 Due to the complete excavation of Zone 1a, impacts were considered 100%. Figure 1-8 depicts
 2 observations of natural resource impacts in Zone 1b. Consideration of impacts in Zone 1b were
 3 important due to its adjacency to the crash site and the directional flow of JP-8 on an outgoing tide, but
 4 initially impacts were unclear due to lack of direct physical disturbance from debris, excavation, or fire.
 5 Based on results from the BMI analysis, initial impacts to Zone 1b were estimated at 90%. Lower injury
 6 percentages were assessed in Zone 2, 3, and 4, based on results of the BMI study, combined with
 7 observations of dead organisms and known acute toxicity of JP-8 based on the scientific literature.

8 **Estimate of Natural Resource Damages**

9 The extent of overall impacts in each zone were based on the predominant source of impact, such as
 10 excavation for Zone 1A, and fuel and water quality changes related to inundated areas in Zones 2 to 4
 11 and the completed BMI study which confirmed minimal long term impact to Zones 2-4. The cumulative
 12 injury for all zones (based upon extent, % injury, and recovery times) was used in the HEA to estimate
 13 the amount of compensatory restoration necessary. The degree of injuries by zone detailed in Table 1-4
 14 resulted in acreage estimates of 3.0 to 4.4 acres requiring compensatory restoration (depending on final
 15 site selected). The Trustees identified a number of potential restoration options and the most
 16 appropriate and mission-compatible restoration sites were identified.

17 **Table 1-4. Injury HEA Calculations by Zone**

Injuries at Point Mugu				Percent of Total Injury
Zone	Acres	Initial Injury* (%)	Time to Full Recovery (yrs)	
Zone 1A	0.60	100%	9	6%
Zone 1B	8.38	90%	5	70%
Zone 2	9.64	10%	3	8%
Zone 3	28.36	5%	3	11%
Zone 4	27.11	5%	3	5%
Total:	74.09			100%

18

19 **1.4.5 Restoration Planning**

20 OPA and OSPRA require the Natural Resource Trustees to develop and implement plans to restore,
 21 rehabilitate, replace, or acquire the equivalent of injured natural resources under their trusteeship and
 22 provide the public with an opportunity to review and comment on these plans prior to implementation.
 23 The Trustees jointly prepared this draft Damage Assessment and Restoration Plan and Environmental
 24 Assessment (DARP/EA), in accordance with OPA and OSPRA requirements and applicable regulations
 25 and guidance concerning restoration planning and implementation. This DARP/EA documents the
 26 information and analyses that support the Trustees' evaluation of: 1) Injuries to natural resources and
 27 natural resource services caused by the Omega Air tanker crash; 2) proposed restoration alternatives;
 28 and 3) rationale for the Trustees' preferred restoration alternative.

1 This document also serves, in part, as the agencies' compliance with NEPA. (*See*, 42 U.S.C. § 4371 *et seq.*
2 and its implementing regulations, 40 CFR Parts 1500-1508).

3 The Navy has prepared this DARP/EA based upon federal laws, applicable state law, statutes,
4 regulations, and policies that are pertinent to the implementation of the proposed action, including the
5 following:

- 6 • NEPA (42 U.S.C. §4321 *et seq.*), which requires an environmental analysis for major federal
7 actions that have the potential to significantly impact the quality of the human environment
- 8 • Oil pollution Act of 1990 (33 U.S.C. § 2701 *et seq.*) and its accompanying regulations (15 CFR part
9 990)
- 10 • National Oceanic and Atmospheric Administration (NOAA) Damage Assessment Regulations (15
11 CFR Part 990 *et seq.*)
- 12 • Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions
13 of NEPA (40 CFR parts 1500-1508)
- 14 • Navy regulations for implementing NEPA (32 CFR part 775), which provides Navy policy for
15 implementing CEQ regulations and NEPA
- 16 • Clean Air Act (CAA) (42 U.S.C. §7401 *et seq.*)
- 17 • Clean Water Act (CWA) (33 U.S.C. §1251 *et seq.*)
- 18 • Coastal Zone Management Act (CZMA) (16 U.S.C. §1451 *et seq.*)
- 19 • National Historic Preservation Act (NHPA) (16 U.S.C. §470 *et seq.*)
- 20 • Endangered Species Act (ESA) (16 U.S.C. §1531 *et seq.*)
- 21 • Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (16 U.S.C. §1801
22 *et seq.*)
- 23 • Marine Mammal Protection Act (MMPA) (16 U.S.C. §1361 *et seq.*)
- 24 • Migratory Bird Treaty Act (MBTA) (16 U.S.C. §703-712)
- 25 • Bald and Golden Eagle Protection Act (16 U.S.C. §668-668d)
- 26 • EO 11988, Floodplain Management
- 27 • EO 13653, Preparing the U.S. for Impacts of Climate Change
- 28 • the Lempert-Keene-Seastrand Oil Spill Prevention and Response Act - Govt. Code 8670.1 *et seq.*
29 (OSPRA)

30 This DARP/EA includes an analysis of potential environmental impacts associated with the action
31 alternatives and the No Action Alternative. The environmental resource areas carried forward for
32 detailed analysis in this DARP/EA include: biological resources, water resources, and cultural resources.
33 The study area for each resource analyzed may differ due to how the Proposed Action interacts with or
34 impacts the resource.

35 **1.4.6 Public Involvement and Plan Implementation**

36 The Trustees solicited public scoping comments through the 17 July 2015 Federal Register publication of
37 a Notice of Intent to Proceed with Restoration Planning and Preparation of a DARP/EA. A similar notice
38 was published in the Ventura County Star newspaper on 24-26 July 2015. The public scoping comment
39 period lasted for 30 days from 17 July 2015 through 17 August 2015.

1 The Public review of the draft DARP/EA was also integral component to the restoration planning
2 process. The OPA and NOAA Damage Assessment Regulations (15 CFR Part 990 *et seq.*), as well as NEPA
3 and its implementing regulations (40 CFR Parts 1500-1508), and OSPRA and its regulations, required that
4 the public be provided an opportunity to review and comment on oil spill restoration plans. The draft
5 DARP/EA and Final DARP/EA and FONSI were advertised in the Ventura County Star, the local newspaper
6 in the community adjacent to the oil spill. Through this review process, the Trustees sought public
7 comment on the projects being proposed to restore injured natural resources from the Omega Air
8 Tanker Crash spill.

9 No public review comments on the public draft DARP/EA were received.

10 Copies of the documents are also available at the Navy Region Southwest (NRSW) website
11 <http://cnic.navy.mil/regions/cnrsw/html> under "Popular Links." Additional copies of the Final DARP/EA
12 and FONSI are also available by contacting Ms. Deb McKay, Navy Region Southwest, 937 N. Harbor
13 Drive, Bldg. 1, 5th Floor, San Diego, California 92106 (Deborah.McKay@navy.mil). The documents are
14 also available for review at the following libraries:

15 John Spoor Broome Library CSUCI	South Oxnard Branch Library
16 www.library.csuci.edu	oxnardlibrary.net
17 1 University Dr, Camarillo, CA 93012	4300 Saviers Rd, Oxnard, CA 93033
18 (805) 437-8561	(805) 385-8129

19

20 **1.4.7 Other Agency Coordination**

21 The Trustees have also completed all required agency consultations with the receipt of Negative
22 Determination (ND-0039-15) from the California Coastal Commission; a No Permanent Adverse Affect to
23 Essential Fish Habitat determination from the National Marine Fisheries Service; and a No Historic
24 Properties Affected Concurrence from the California State Historic Preservation Office (SHPO). See
25 Appendix D for consultation correspondence.

26

2 Proposed Action and Alternatives

1 2.1 Goals and Objectives of Restoration/Proposed Action

2 The goal of restoration under OPA and OSPRA is to compensate the public for the loss of natural
3 resources and services resulting from the oil spill.

4 This requirement must be achieved through the restoration, rehabilitation, replacement, or acquisition
5 of equivalent natural resources and/or services. Thus, for a restoration project to be considered, there
6 must be a connection between natural resource injuries and proposed restoration actions.

7 Restoration actions are defined as primary or compensatory. Primary restoration expedites the return
8 of injured resources to their baseline condition; compensatory restoration addresses interim losses of
9 natural resources from the time of injury until their full recovery to baseline conditions. Natural
10 recovery, in which no human intervention is taken to restore the injured resources, is considered a
11 primary restoration alternative. This option is appropriate where the injured resources will recover
12 relatively quickly without human intervention or where feasible or cost-effective primary restoration
13 actions are not available. The scale of the compensatory restoration project depends on the nature,
14 extent, severity, and duration of the resource injury. Primary restoration actions that speed resource
15 recovery will reduce the scale of compensatory restoration.

16 Based on observations of the Omega Air crash site made during the injury assessment studies, scientific
17 literature, and the best professional judgment of the scientists retained for those studies, the Trustees
18 determined that no further primary restoration actions were required at the crash site and only
19 compensatory restoration alternative measures are necessary.

20 The compensatory restoration goal is to enhance self-sustaining wetlands and buffer areas by improving
21 wetland functional conditions at the proposed wetland restoration sites. The restoration objective is to
22 increase native plant cover, and habitat for native fauna, and support federally listed species recovery
23 by restoring hydraulic function and tidal influence at the site. As a result of the final HEA presented in
24 Section 1.4.4, it was determined that approximately 3-4.4 acres of restoration was required to
25 compensate for the natural resource injuries resulting from the plane crash and oil spill.

26 Therefore, the proposed action is to meet the compensatory restoration goal of 3-4.4 acres.

27 2.2 Reasonable Alternative Screening Factors

28 The OPA's, NEPA's, and OSPRA's implementing regulations provide guidance on the consideration of
29 alternatives to restoration. Only those alternatives determined to be reasonable and that meet the
30 purpose require detailed analysis.

31 2.2.1 Development of Alternatives

32 Since no further primary restoration is appropriate, the focus in this DARP/EA is solely compensatory
33 restoration to compensate for the interim loss of natural resources and services.

34 When evaluating compensatory restoration actions, Trustees must consider actions that provide
35 services of the same or comparable type and quality as those injured.

36 2.2.2 Evaluation of Alternatives

37 A reasonable range of restoration alternatives were developed by the Trustees and evaluated using the
38 following criteria:

- 1 (1) The cost to carry out the alternative;
- 2 (2) The extent to which each alternative is expected to meet the trustees' goals and objectives in
3 returning the injured natural resources and services to baseline and/or compensating for interim losses;
- 4 (3) The likelihood of success of each alternative;
- 5 (4) The extent to which each alternative will prevent future injury as a result of the incident, and avoid
6 collateral injury as a result of implementing the alternative;
- 7 (5) The extent to which each alternative benefits more than one natural resource and/or service
8 particularly listed species; and
- 9 (6) The effect of each alternative on public health and safety;
- 10 (7) Must accomplish restoration on NBVC Point Mugu to maximize local benefit, ensure long-term
11 protection of resources, and conform to Navy policy;
- 12 (8) Must restore/enhance an area with wetland characteristics such as hydrophytic vegetation, hydric
13 soils, and wetland hydrology;
- 14 (9) Must restore/enhance an area with existing wetland habitat that is demonstrably in need of
15 improvement (site lacks biodiversity, lacks adequate tidal water flow, site requires grade lowering, etc.);
- 16 (10) Must not harm NBVC Point Mugu operational mission by: a) causing the loss of any developable
17 lands, b) increasing Bird Air Strike Hazards; or c) using sites already slated for use as military
18 construction mitigation.

19 **2.3 Range of Restoration Alternatives Considered**

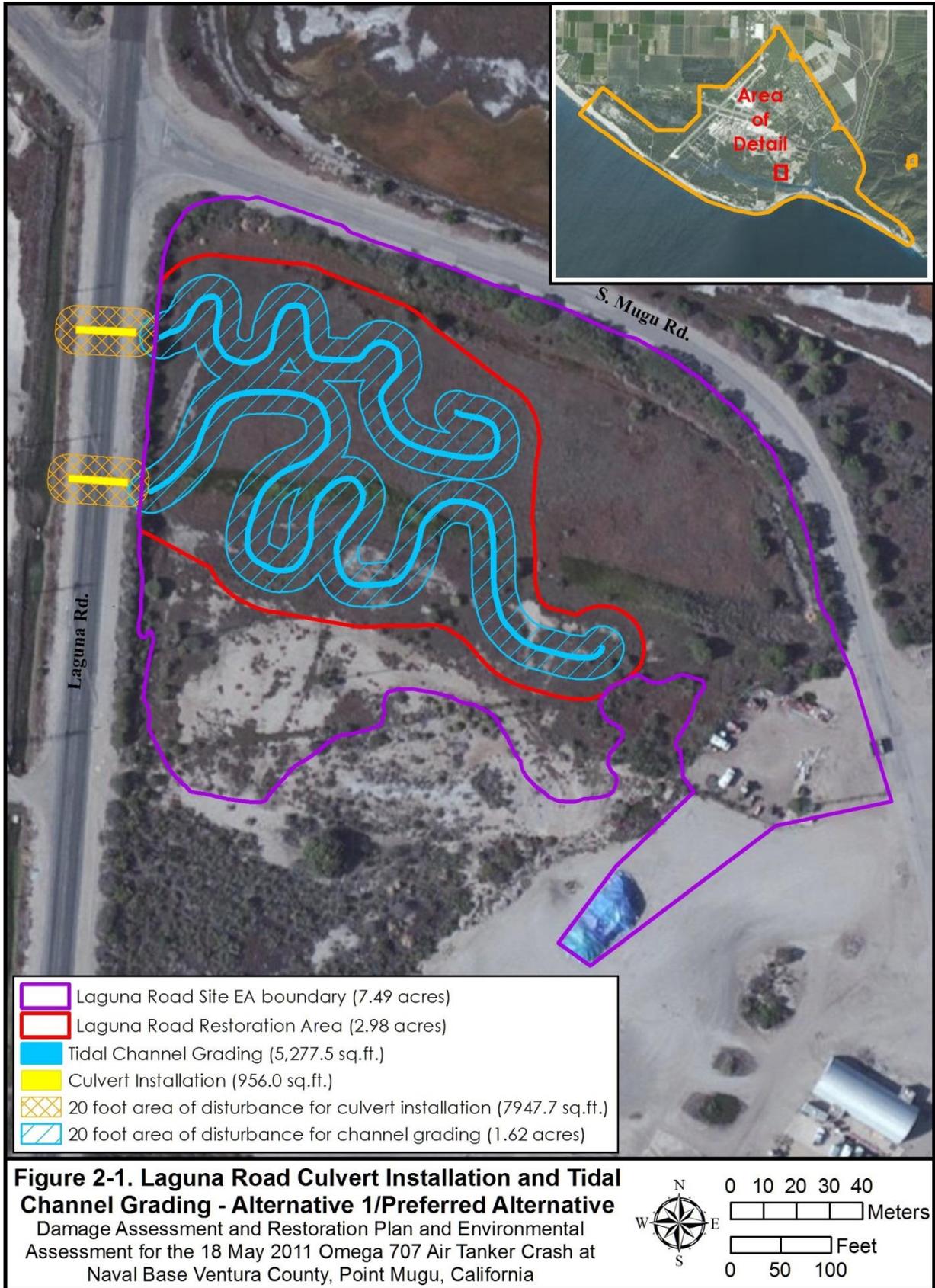
20 Two of the action alternatives identified met the evaluation criteria above. The two action alternatives
21 as well as the No Action Alternative are further analyzed below.

22 **2.3.1 Laguna Road Culvert Installation and Tidal Channel Grading – Alternative 1/Preferred** 23 **Alternative**

24 The Laguna Road Culvert Installation (Alternative 1/Preferred Alternative) (see Figure 2-1) would
25 connect the existing wetland at Laguna Road with an existing tidally-influenced drainage channel by
26 installing two 60 ft long, 8 ft X 8 ft pre-cast culverts under the existing asphalt paved road. Specifically
27 required construction tasks would include: asphalt cutting and removal, soil excavation, channel
28 contouring, culvert placement with a crane, backfilling soil, gravel, and riprap, compacting soil, and
29 repaving the asphalt road. A small amount of excess sediment would be trucked to the Simi Valley
30 Landfill and Recycling Center, an approved upland disposal facility.

31 The project would also grade and contour two new meandering 3 ft wide and 1 ft deep drainage swales
32 (see Figure 2-1) from the road culvert terminus east across the adjacent wetland parcel. The swales are
33 conceptually planned to be 655 ft long and 1100 ft long respectively. The 20 ft wide disturbance areas
34 along the full width of the construction would disturb a maximum of 1.82 acres. The action would
35 improve the restoration site water quality and hydrology, habitat for fish and wading birds the diversity
36 of BMI, and native coastal salt marsh plant diversity and cover. In addition, invasive plants within the
37 restoration site would be removed or treated to promote recruitment and seed bank germination of
38 native salt marsh plants.

39



1 It is estimated that the following heavy equipment would be used to accomplish the above described
2 work: one 48 HP backhoe loader, one 4 cubic-yard front end loader, one 30,000 pound grader, one 80
3 ton hydraulic crane, one asphalt paver, one tandem roller, one dump truck, and two pickup trucks. It is
4 estimated that ten construction workers and two biological monitors would be required to perform the
5 required work, which would last approximately 8 weeks. After construction, biological monitoring and
6 maintenance and adaptive management would be required for five years. Maintenance and culvert
7 inspection would help ensure that the culverts remain open and functional allowing free flow to
8 continue. Most years a mere visual inspection will be required but occasionally, heavy equipment may
9 be required to be used from the roadside to reach into the culverts and clear them of debris and soil.

10 This project would be implemented after funding is secured and after NBVC performs technical studies
11 including elevation surveys, sediment testing, biological resource surveys for special status species
12 (federally threatened and endangered, MBTA, etc.), and updating the vegetation map. Permitting
13 required prior to construction would include a Clean Water Act Section 404 and 401 permit. No
14 Endangered Species Act Section 7 consultations are expected to be required as the site is not known to
15 support any endangered species. The environmental protection measures listed in Section 2.5 would be
16 implemented as part of this alternative.

17 Existing utilities (water, sewer and gas lines) would be encountered during the project construction at
18 the Alternative 1/Preferred Alternative (Laguna Road) site. However, road closure would not be
19 required because the construction work would be on only one side of the road at a time to allow for
20 through traffic during the approximately eight week construction effort. The construction contractor
21 would implement a traffic control plan for the project in order to ensure that no significant traffic or
22 recreational impacts occur.

23 This restoration alternative would enhance 2.98 acres of wetlands habitat by increasing tidal action and
24 benefitting fish, wading birds, benthic invertebrate diversity, and increasing tidal plants. The restoration
25 alternative is also expected to benefit special status species including the Beldings savannah sparrow
26 (state listed) and salt marsh birds beak (federally listed). Following construction, this restoration
27 alternative is expected to provide restoration benefits for 40 years. In addition, the project does not
28 eliminate a future NBVC mitigation bank option. The estimated costs for this restoration alternative is
29 \$911,755 including an estimated 5 years post-construction monitoring (Appendix F).

30 **2.3.2 Beach Road Berm and Sewer Line Removal Alternative and Tidal Channel Grading–** 31 **Alternative 2**

32 The Beach Road Berm and Sewer Line Removal Alternative (See Figure 2-2) would entail excavating
33 approximately 0.40 acres to remove an existing earthen berm (width of the berm is approximately 24 ft
34 and extends northward for 465 ft and abandoned sewer line restricting tidal flows to the adjacent 4.41
35 acres of land. The average elevation of the berm top is 6.42 ft MSL and the surrounding wetland
36 elevation at the toe of slope averages 4.38 ft MSL. A target elevation of 4.38 ft would require the
37 removal of approximately 843 yd³ of fill. Excavation work would require accessing the northern section
38 from a dirt access road at the north. Excess sediment and biomass (such as invasive iceplant,
39 *Carpobrotus*) would be trucked to the Simi Valley Landfill and Recycling Center, an approved upland
40 disposal facility. Minor grading would be required to create tidal channels connecting to an existing tidal
41 creek mid-way along the berm. Area B would include excavating 570 ft of 3-ft-wide and 1-ft-deep
42 channels and Area C would require 1550 ft of 1 to 2-ft-wide and 1-ft-deep channels.



1 These actions would enhance existing wetland habitat by encouraging growth of native wetland plant
2 species, and providing increased habitat for wetland birds including special status species, fish, and BMI.
3 It is estimated that construction would last approximately eight weeks and require five years of
4 monitoring, maintenance and adaptive management. The environmental protection measures listed in
5 Section 2.5 would be implemented as part of this alternative.

6 This restoration alternative would enhance 4.41 acres of wetlands habitat by increasing tidal action and
7 benefit wetland plants, invertebrates, and fish. Following construction, this restoration alternative is
8 expected to provide restoration benefits for 40 years. However, the restoration alternative has
9 uncertain benefits to special status species. In addition, the project eliminates a future NBVC mitigation
10 bank option. The estimated costs for this restoration alternative is \$790,567 including five years of post-
11 construction monitoring (Appendix F). Where two or more restoration alternatives exist that are equally
12 preferable based on the applied screening factors, the Trustees are required to select the most cost-
13 effective alternative. Though this alternative is the less costly alternative, benefits to special status
14 species are uncertain, and it eliminates a future NBVC mitigation bank option and therefore harms the
15 NBVC operational mission. Accordingly, this alternative is not the Preferred Alternative.

16 **2.3.3 No Action Alternative**

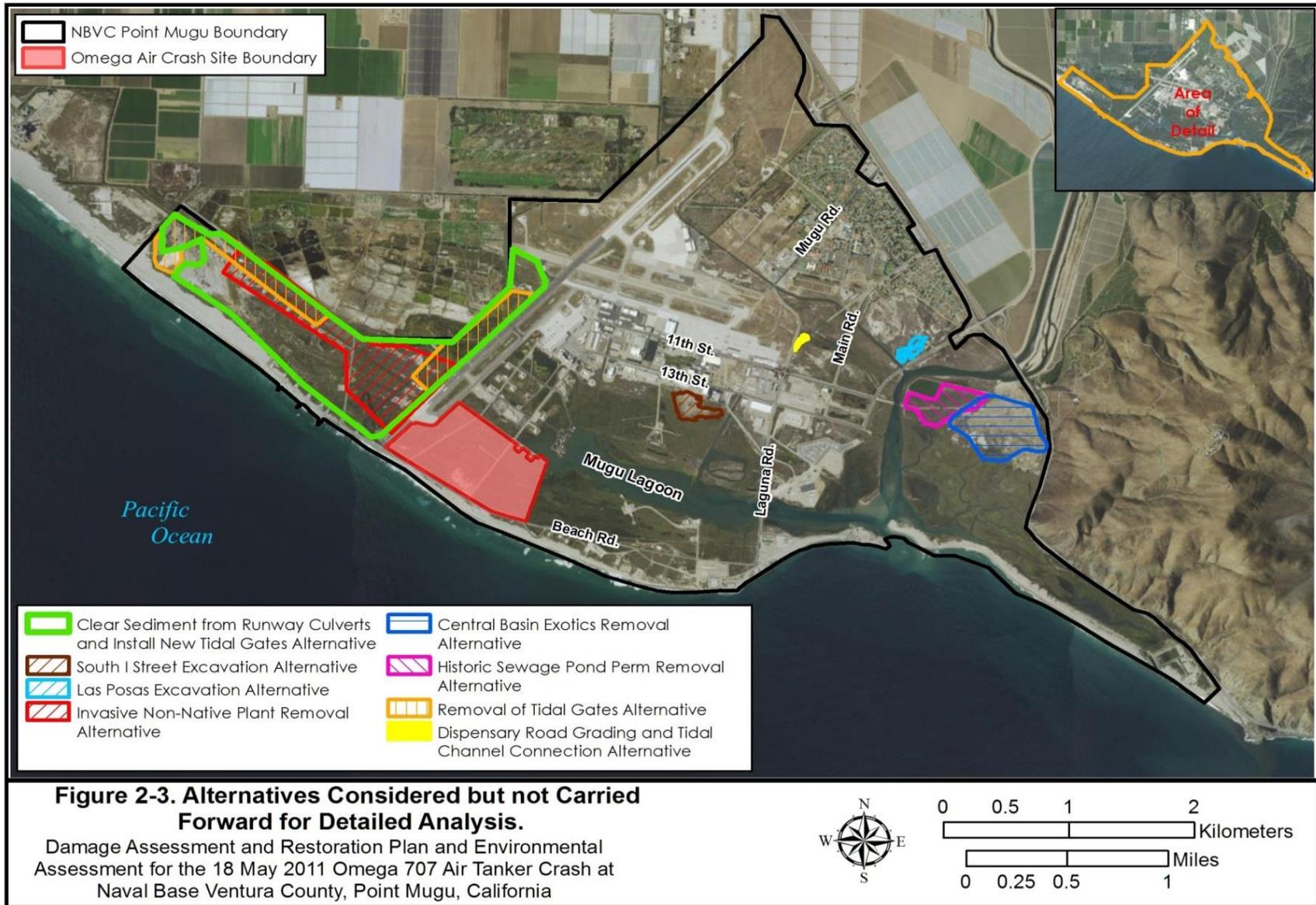
17 Under the No Action Alternative, the Proposed Action would not occur. Under the No Action
18 alternative, no compensatory restoration for the 2011 Omega Air Tanker Crash injuries would be
19 accomplished. Under this scenario the mandates of the OPA and OSPRA requiring that the environment
20 and the public be made whole for damages would not be met. The ongoing natural recovery at the
21 crash site itself would be expected to continue. Wetland enhancement at the Beach Road site and the
22 Laguna Road site would likely not occur as future separate projects as neither site offers significant
23 mitigation banking credits for NBVC. The No Action Alternative would not meet the purpose and need
24 for the Proposed Action; however, as required by NEPA, the No Action Alternative is carried forward for
25 analysis in this EA and provides a baseline for measuring the environmental consequences of the action
26 alternatives.

27 **2.4 Alternatives Considered but not Carried Forward for Detailed Analysis**

28 The following alternatives (Figure 2-3) were considered, but not carried forward for detailed analysis in
29 this DARP/EA as they did not meet the purpose and need for the project and satisfy the reasonable
30 alternative screening factors presented above.

31 **2.4.1 Dispensary Road Grading and Tidal Channel Connection Alternative**

32 Under this alternative, the DoN would have graded an approximately 1.2 acre site to remove an average
33 of 4 ft of soil across the site and the soil taken to an upland landfill. This alternative would have also
34 extended the existing adjacent tidal channel by grading to an average of 3.5 ft, totaling 1,565 yd³ of soil
35 removed. The site is currently an upland habitat site and currently supports invasive non-native plants
36 such as *Carpobrotus*. This alternative is no longer viable as a significant portion of the site was restored
37 as mitigation for another military project and therefore further action at the remaining upland area was
38 not considered further.



1

1 2.4.2 South I Street Excavation Alternative

2 Under this alternative, the DoN would grade some portion of an overall 12.85 acre site (exact acreage
3 available for restoration to be determined) to an average of 2 ft to restore tidal influence. Removed
4 soils would be taken to an upland landfill. The existing site functions as a dry bare salt panne wetland.
5 This alternative would also include excavation for tidal channels to extend tidal influence across the site.
6 Channel excavation would require an average 4 ft of soil removal. This alternative was dismissed as the
7 project site supports rare tiger beetles (*Cincindela haemorrhagica*, *C. gabbi*), the removal of which would
8 be unacceptable, and tidal influence seemed to be sufficient and naturally increasing.

9 2.4.3 Las Posas Excavation Alternative

10 Under this alternative the DoN would grade an approximately 3.6 acre site to remove an average of 2 ft
11 of soil across the site (7,744 yd³) and the soil would be taken to an upland landfill. This alternative
12 would also include excavation for tidal channels to extend tidal influence across the site. Channelization
13 excavation of an average of 3.5 ft would add another 1,565 yd³ of soil to be removed for this purpose.
14 The site is currently an upland habitat site and currently supports invasive non-native plants such as
15 *Carpobrotus*. This alternative was dismissed from further analysis in this EA after a significant portion of
16 the site was restored as mitigation for another military project.

17 2.4.4 Removal of Tidal Gates Alternative

18 Under this alternative two existing but non-functional tidal gates would be removed and replaced with
19 new ones located closer to a shared property line. However, it is uncertain how much the tidal flushing
20 would increase and whether an increase would benefit existing habitat. Beneficial effects would be hard
21 to measure and would likely only be apparent over a period of many years. Additionally, if the action
22 resulted in significantly increased hydrology, this could lead to increased flooding of the endangered salt
23 marsh bird's beak populations beyond the tidal gate which would be an adverse effect. The endangered
24 light-footed Ridgway rail also occupies freshwater habitat past one of the tide gates. Hydrologic
25 changes could also adversely impact their habitat. This alternative was considered but is not being
26 carried forward for detailed analysis in the EA due to the uncertainty about positive effects, the length
27 of time required to monitor results on site, and potential negative impacts to listed species found on
28 site.

29 2.4.5 Clear Sediment from Runway Culverts and Install New Tidal Gates Alternative

30 Under this alternative three existing sediment-clogged 700 ft long culverts under the runway would be
31 cleared to increase and restore tidal flushing to the estuary. This enhancement alternative would
32 include removal of the sediment from the three culverts and installation of new tidal gates. However,
33 without a significant effort of mapping the existing elevations and depths of creeks on both sides of the
34 culverts, NBVC could not accurately project hydrological changes to determine the potential effects of
35 clearing culverts. Elevation data would help determine if the change in tidal flushing would result in
36 benefits to existing wetlands. Wetland areas adjacent to the culverts may flush and drain better after
37 culverts are cleared. However they may just remain ponded if the wetland area elevations are lower
38 beyond the culvert. If that is the case, it would lead only to increased effects of high tides. Increase of
39 high tides may have a beneficial effect on upper marsh habitat where non-native species are invasive,
40 but also may have an adverse effect of the endangered salt marsh birds beak populations by increased
41 flooding. The project may have a positive effect and enhance salt marsh habitat for the endangered
42 light-footed Ridgway's rails, but also may have an adverse effect on freshwater habitat currently
43 occupied by Ridgway's rails. This alternative was considered but is not being carried forward for

1 detailed analysis in the EA due to the cost associated with determining elevations, the uncertainty of
2 positive effects, and the potential impacts to listed species.

3 **2.4.6 Invasive Non-Native Plant Removal Alternative**

4 This project would entail the application of herbicides to 24 acres of salt marsh currently dominated by
5 ice plant (*Carpobrotus edulis*). This alternative was considered but is not being carried forward for
6 detailed analysis in the EA as implementation would not offer the same type of habitat as that impacted
7 by the Omega crash event. It was also dismissed from further consideration because most sites have
8 already been treated or are slated for treatment.

9 **2.4.7 Central Basin Non-Native Plant Removal Alternative**

10 This project would entail removal of invasive non-native plants and an undetermined amount of grading
11 to create tidal channels where tidal sediment deposits have degraded habitat. This project would
12 require excavation through existing wetlands and extensive surveys and mapping in order to estimate
13 the required effort. Creating tidal channels that link to existing tidal creeks would potentially cause
14 significant impacts to high quality wetland habitat, due to digging and heavy equipment accessing the
15 site. The site location is not ideal because it would require continually driving heavy equipment 0.25
16 miles across marginal wetlands to get to the project site and to export excavated material. Also, rising
17 sea-levels may naturally cause this area to become inundated more frequently and therefore naturally
18 enhance the area if no grading project is executed there. This alternative was considered but is not
19 being carried forward for detailed analysis in the EA because of the uncertainty of any positive effects
20 due to lack of recent elevation data, the potential for negative impacts from site disturbance, and the
21 potential for the site to recover naturally.

22 **2.4.8 Historic Sewage Pond Berm Removal Alternative**

23 This project would entail excavation of historic sewage pond berms (approximately 3500 ft long, 50 ft
24 wide, 10 ft high) to enhance several acres of existing wetlands. This removal would require sediment
25 testing, locating an upland disposal site, and significant trucking. Due to extensive soil disposal, this
26 alternative would be significantly more expensive than the alternatives carried forward for further
27 analysis. This alternative was considered but is not being carried forward for detailed analysis in the EA
28 because of the uncertainty in expected benefit to existing wetlands in comparison with the high level of
29 effort required for implementation.

30 **2.5 Environmental Protection Measures**

31 Implementation of either action alternative would incorporate the following environmental
32 protection measures to ensure the avoidance or minimization of negative environmental impacts.

33 ***Water Resources***

34 *Measure 1.* Before demolition and construction activities, a Storm Water Pollution Prevention
35 Plan (SWPPP) would be prepared, which would include the type, placement, and maintenance of
36 erosion control features to be used during and following demolition and construction activities. The
37 plan would include:

38 Placement of Straw Wattle Buffers. Before the start of site demolition and construction activities,
39 straw wattle buffers would be placed within and around the project site to reduce surface water
40 flow velocities, and retard soil erosion and off-site transport;

1 Avoidance of Excavated Areas. Construction equipment would be directed to avoid places where
2 pavement has been removed to prevent soil erosion; and

3 Stockpiled Materials. Sites for temporary stockpiling and handling of recyclable wastes would be
4 established on site. When appropriate, stockpiled materials would be covered with tarps or other
5 suitable materials, and the piles would be enclosed with a sediment fence to prevent wind- or rain-
6 induced runoff and dispersion. All contaminated materials would be disposed of in accordance with
7 applicable federal, state, and local requirements.

8 As part of the SWPPP, Best Management Practices (BMPs) would be implemented to prevent
9 inadvertent runoff of contaminants, such as construction debris, petroleum products, and hazardous
10 materials. Specifically, BMPs would include:

11 Tarping of Washout Trap. If rain occurs, place a tarp or some other impermeable material over
12 culvert alignments to avoid inadvertent runoff with contaminants;

13 Asphalt Overage. Construction contractor will be instructed to bring on base no more asphalt
14 than required for the project and the contractor will be made responsible for removing any
15 extra or unneeded asphalt from the installation. This will be specified on all applicable
16 construction plans and be in place before any asphalt paving occurs. In the event asphalt
17 cutting is performed with a wet saw, all water would be contained and residual solids would
18 be cleaned up;

19 Vehicle and Work Area Maintenance. Upon entering the site and daily thereafter, equipment would
20 be inspected and maintained prior to working on site. Any leaks or hoses/fittings in poor
21 condition would be repaired before the equipment begins work. Construction equipment would be
22 staged on site in designated staging areas. All vehicles leaving the site would be inspected to
23 prevent dirt/debris from being transported off site. All material/waste storage areas would be
24 inspected daily to ensure containers are in good condition. All storm drain inlets in the work area
25 would be protected to prevent dust and/or debris from entering the drain(s);

26 Storm drain catch basins in the construction area shall be covered so that sediment
27 and debris do not enter the catch basins during construction;

28 Sediment and debris from the work site shall be swept up and properly disposed, so
29 that they will not be tracked off site and enter a storm drain or receiving water;

30 For projects that occur during the rainy season (October through May), any soil, gravel, or debris
31 stockpiles shall be covered/bermed to prevent rain from washing away the stockpiles;

32 If metal cutting, grinding, or welding is part of the project (such as concrete reinforcing bars or metal
33 fencing), measures shall be put in place to prevent those pollutants from entering the water or
34 storm drain systems. Also, at a minimum, metal slag/residues/shavings must be swept up and
35 properly disposed of at the end of each work day;

36 Drip pans shall be placed under equipment to catch leaks. These drip pans shall be cleaned
37 periodically. During rain events, these drip pans shall be moved so that the storm water runoff does
38 not become contaminated from their contents;

39 Wash water and residue from construction efforts shall not be discharged into the storm drain or
40 sanitary sewer systems. Wash water shall be contained in a concrete washout area and allowed to
41 evaporate, with the remaining solids disposed of as solid waste. Construction contractor may

1 request from installation's environmental staff but is not guaranteed, the option to
2 discharge wash water onto a pervious soil surface and allow it to infiltrate into the soil.
3 Any remaining residue shall be disposed of as solid waste;

4 The project shall avoid the use of galvanized materials, or add an additional coating
5 to the material to reduce the potential for zinc leaching into surrounding lands.
6 Examples of items that may contain galvanized materials include fencing, flagpoles,
7 corrugated roofing used in lean-to sheds, and sacrificial anodes;

8 If BMPs currently in place are found to be ineffective in controlling storm water pollution,
9 they shall be amended as soon as possible to correct the problem; and

10 Hazardous Materials Management Plan. A Hazardous Materials Plan would be prepared prior
11 to operation of demolition and construction equipment. This plan would include, but not
12 necessarily be limited to:

- 13 1. Specific bermed equipment maintenance and refueling areas;
- 14 2. Bermed and lined hazardous material storage areas on site that are covered during the
15 rainy season;
- 16 3. Hazardous material spill cleanup equipment on site (e.g., sorbent pads, shovels, and
17 bags to place contaminated soil in);
- 18 4. Workers trained in location and use of cleanup equipment;
- 19 5. Material Safety Data Sheets for all hazardous materials expected to be used. This
20 includes paints, adhesives, and any other possible product that has a Material Safety
21 Data Sheet with it; and
- 22 6. Hazardous Waste Generation information to include what materials are to go out as
23 hazardous waste in what volume, who is transporting it, who shall sign the manifests
24 for which type of wastes, and where the hazardous waste is going.

25 This is a list of minimum BMPs that should be implemented. Additional BMPs may be required
26 depending on the specific project. Construction project managers would work with NBVC
27 environmental representatives to ensure the project meets both environmental compliance
28 requirements and project timelines.

29 ***Air Quality/Climate Change***

30 *Measure 2.* Dust control measures would be implemented to comply with the requirements of
31 Ventura County Air Pollution Control District Rule 55, Fugitive Dust, during all proposed ground
32 disturbance and building demolition activities.

33 *Measure 3.* Construction equipment control measures would be implemented during all proposed
34 activities, where feasible.

- 35 1. Maintain equipment according to manufacturer specifications.
- 36 2. Restrict idling of equipment and trucks to a maximum of five minutes at any location.
- 37 3. Use diesel oxidation catalysts and/or catalyzed diesel particulate traps.

- 1 4. Use electricity from power poles rather than temporary diesel- or gasoline-powered generators.
- 2 5. Provide temporary traffic control, such as a flag person, during all phases of construction and/or
- 3 demolition activities to maintain smooth traffic flow.
- 4 6. Keep construction/demolition equipment and equipment staging areas away from sensitive
- 5 receptor areas.
- 6 7. Re-route construction trucks away from congested streets or sensitive receptor areas.
- 7 8. Use construction equipment with engines that meet U.S. Environmental Protection Agency Tier 3
- 8 and 4 non-road standards.
- 9 9. Use alternatively fueled construction equipment, such as compressed natural gas, liquefied natural
- 10 gas, or electric where practicable.

11 **Public Health and Safety**

12 *Measure 4.* Prior to the start of demolition activities, a Health and Safety Plan would be prepared by
13 the Construction Contractor, to describe the strategy for handling and disposing of all demolition
14 debris and maximizing diversion of the demolition waste from landfills through recycling. Personal
15 Protection Plan standards for venomous insect protection will be included in the Health and Safety
16 Plan.

17 The construction methods, health and safety procedures, and disposal methods would conform to the
18 regulations of federal, state, and local regulatory agencies. All required notifications would be made to
19 the Ventura County Air Pollution Control District and California Division of Occupational Safety and
20 Health. A contractor certified by the Contractors State License Board and registered with the
21 California Division of Occupational Safety and Health would perform any required abatement work.

22 **Biological Resources**

23 *Measure 5.* To promote passive recruitment of desired vegetation by treating noxious weeds a Five Year
24 Maintenance and Monitoring Plan would be implemented during which weed removal would be
25 accomplished as needed.

26 *Measure 6.* To minimize potential for unnecessary discharge of sediments and weeds into wetlands, the
27 project would use a variety of sediment stabilization and disturbance minimization methods. Those
28 methods would include the use of: weed-free wattles at the project site perimeter and placed as close
29 to the work site as possible; sand bags, tightly butted in a row; silt screens placed as close to the work as
30 possible if there is insufficient space between the project and jurisdictional wetlands; rubber-wheeled
31 vehicles for work in jurisdictional wetlands (tracked vehicles or other types of vehicles that kick-up
32 sediments will not be allowed); equipment ensured to be clean and free of weed species and mud
33 before entering the jurisdictional wetlands; and matting, boards, or other plate-like structures placed in
34 the pathway of vehicles to minimize soil damage. To minimize potential for unnecessary disturbance of
35 wetland habitat any and all heavy equipment will be required to be supported on stable ground or some
36 other fabricated/interim means so as to prevent that equipment from sinking into soft wetland areas.

37 *Measure 7.* To avoid impacts to migratory and resident birds the project would occur outside of the
38 migratory/resident bird nesting season (March 1-Sept 31).

1 **Cultural Resources**

2 *Measure 8.* To avoid any impacts to historic properties all project grading activities will be monitored by
3 a qualified archaeologist.

4 **2.6 Monitoring for Restoration Effectiveness**

5 Wetland monitoring would be performed for five years to determine whether the project's goals and
6 objectives have been achieved, and whether corrective actions are required to meet the goals and
7 objectives. The monitoring would adhere to NBVC Wetland Restoration & Monitoring Program protocol,
8 including:

- 9 1. Conducting a baseline California Rapid Assessment Method for Wetlands (CRAM) assessment to
10 establish the varying wetland functions at each site before restoration begins on both the proposed
11 restoration site and a reference site. The assessment consists of four main attribute scores (Buffer
12 and Landscape Context, Hydrology, Physical Structure, and Biotic Structure) which are further
13 divided into different metrics (a measurable component of an attribute).
- 14 2. Monitoring various wetland functions (BMI, fish, plants, wildlife, and soils) begins one year post-
15 restoration and would be conducted annually for five years. Monitoring data collected from
16 reference sites is used to evaluate whether the restoration is progressing toward providing wetland
17 functions at or near the level of the reference site. The NBVC Wetland Program has established U.S.
18 Army Corps of Engineers-approved protocol for monitoring wetland restoration projects. As listed in
19 Table 2-1, the assessment will consist of four main attributes (Buffer and Landscape Context,
20 Hydrology, Physical Structure, and Biotic Structure) which will be further divided into different
21 metrics (a measurable component of an attribute).
- 22 3. Preparing a site-specific work plan to include specific measurable targets associated with each
23 objective based on the most appropriate reference site and time period in question to provide a
24 means of monitoring success or shortcomings of restoration activities and facilitate adaptive
25 management. The restoration success criteria will be evaluated during the 5-year wetland
26 restoration monitoring period on an iterative basis. The scope of implementation, monitoring,
27 and adaptive management incorporates corrective action by the responsible implementing
28 contractor in the event of any success criteria falling short of their target.

29 Details concerning the above monitoring would be incorporated into the design plan and approved by
30 the Trustees prior to implementation of the project. The monitoring details would be available for
31 review in the Administrative Record, and would continue until monitoring requirements are completed.

1
2

Table 2-1. Potential Scoring Trends for Laguna Road and Beach Road Sites Post Restoration using California Rapid Assessment Method

		Site Name	Laguna Road	Beach Road
		CRAM Wetland Module	Estuarine	Estuarine
CRAM Attributes	CRAM Metric and Submetrics	Attribute Score		
Landscape Connectivity and Buffer	Landscape Connectivity	Increase	Increase	
	Buffer	Increase	Increase	
	Buffer submetric: Percent of Assessment Area with Buffer	Decrease	No change	
	Buffer submetric: Average Buffer Width	Decrease	No change	
	Buffer submetric: Buffer Condition	Increase	No change	
Hydrology	Water Source	Increase	Increase	
	Hydroperiod	Increase	Increase	
	Hydrologic Connectivity	Increase	Increase	
Physical Structure	Structural Patch Richness	Increase	Increase	
	Topographic Complexity	Increase	Increase	
Biotic Structure	Plant Community: Number of Plant Layers	Increase	Increase	
	Plant Community: Number of Co-dominants	Increase	No Change	
	Plant Community: Co-dominant Invasive Species	Increase	No Change	
	Horizontal Interspersion	Increase	No Change	
	Vertical Biotic Structure	Decrease	No change	

3

3 Affected Environment and Environmental Consequences

1 This chapter presents a description of the environmental resources and baseline conditions that could
2 be affected from implementing the Proposed Action and an analysis of the potential direct and indirect
3 effects of each alternative.

4 In compliance with NEPA, CEQ, and 32 CFR part 775 guidelines, the discussion of the affected
5 environment (i.e., existing conditions) focuses only on those resource areas potentially subject to
6 impacts. Additionally, the level of detail used in describing a resource is commensurate with the
7 anticipated level of potential environmental impact.

8 “Significantly,” as used in NEPA, requires considerations of both context and intensity. Context means
9 that the significance of an action must be analyzed in several contexts such as society as a whole (e.g.,
10 human, national), the affected region, the affected interests, and the locality. Significance varies with
11 the setting of a proposed action. For instance, in the case of a site-specific action, significance would
12 usually depend on the effects in the locale rather than in the world as a whole. Both short- and
13 long-term effects are relevant (40 CFR part 1508.27). Intensity refers to the severity or extent of the
14 potential environmental impact, which can be thought of in terms of the potential amount of the likely
15 change. In general, the more sensitive the context, the less intense a potential impact needs to be in
16 order to be considered significant. Likewise, the less sensitive the context, the more intense a potential
17 impact would have to be in order to be significant.

18 Although all potentially relevant environmental resource areas were initially considered for analysis in
19 this DARP/EA, some resources are understood to have negligible or non-existent potential for significant
20 impacts under the proposed project and they are not analyzed in detail in this EA for the reasons
21 described below:

22 **Geological Resources:** NBVC Point Mugu is located within the Oxnard Plain. Several geologic faults are
23 located near NBVC Point Mugu, including the McGrath Fault and the Bailey Fault. Although Ventura
24 County is a seismically active region, major seismic activity has not occurred along either of these faults
25 in recent history. Seismic hazards can include landslides, ground-shaking, surface displacement and
26 rupture, liquefaction, and tsunamis.

27 No significant changes to terrain, other than superficial soil disturbances, would occur as a result of the
28 Proposed Action. Potential improvements include shallow drainage swale creation, and under-road
29 culvert installation. Significant grading, and grading beyond minimal topsoil relocation is not anticipated
30 and despite the extremely limited nature of the proposed construction, project implementation would
31 adhere to the provisions of the Unified Facilities Criteria. Therefore, the Proposed Action has no
32 potential to cause significant impacts to geology and topography.

33 **Coastal Resources and Land Use:** The Coastal Zone Management Act (CZMA) of 1972 (16 U.S.C. Section
34 1451) encourages coastal states to be proactive in managing coastal zone uses and resources. CZMA
35 established a voluntary coastal planning program and participating states submit a Coastal Management
36 Plan to the National Oceanic and Atmospheric Administration for approval. Under the CZMA, federal
37 agency actions within or outside the coastal zone that affect any land or water use or natural resource
38 of the coastal zone shall be carried out in a manner that is consistent to the maximum extent practicable
39 with the enforceable policies of the approved state management programs. Each state defines its
40 coastal zone in accordance with the CZMA. Excluded from any coastal zone are lands the use of which
41 by law is subject solely to the discretion of the federal government or which is held in trust by the
42 Federal government (16 U.S.C. 1453). This Proposed Action is located in a designated U.S. military

1 installation under the exclusive jurisdiction of the U.S. Navy, and is not open to the public. NBVC Point
2 Mugu land is federal government property and excluded from the coastal zone but as a part of a federal
3 consistency determination a Coastal Consistency Negativity Determination was prepared for the project
4 (Appendix D), submitted to the California Coastal Commission on 8 December 2015 and a Negative
5 Determination ND-0039-15 was received back from the Coastal Commission on 4 January 2016. Project
6 construction would take place outside peak recreational seasons (Spring and Summer) and would be of
7 only short duration (eight weeks) so would not impact the installations recreational uses. The Negative
8 Determination showed that the Proposed Action would not block public access to the ocean, nor
9 obstruct views, nor cause any reasonably foreseeable significant direct or indirect effects on coastal uses
10 and resources. No changes to land use would occur as a result of the Proposed Action. The existing
11 military land use in the project area would continue to support naval operations and no land use
12 compatibility issues would occur. The Proposed Action has no potential to cause negative impacts to
13 coastal resources and land use.

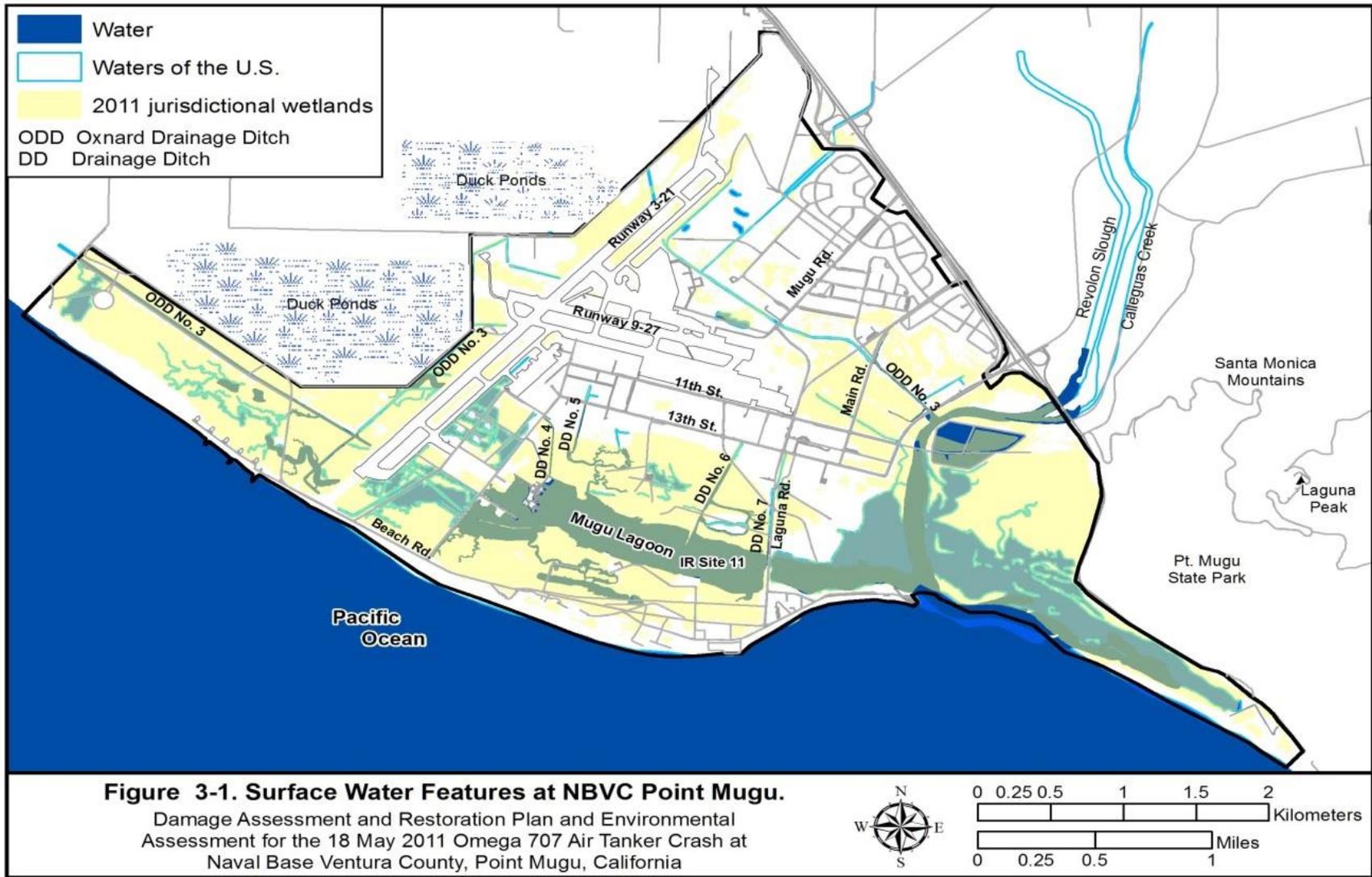
14 **Hazardous and Toxic Materials and Waste/Protection of Children:** There are no aboveground or
15 underground storage tanks, pipelines, emergency generators, or oil/water separators located within the
16 proposed restoration areas and none would be installed as a part of the proposed action. There are no
17 authorized hazardous waste accumulation or storage facilities within the restoration area sites and none
18 would be installed as a part of the project.

19 Construction contractors would be required to prepare and implement hazardous materials/hazardous
20 waste management plans that would include special measures to avoid any identified contamination
21 sites. Proper disposal and handling of any contractor generated hazardous wastes (waste oil, waste fuel,
22 hydraulic fluid, antifreeze, spent absorbent materials, oily wastewater, contaminated soil, empty
23 containers, spill residues, batteries, miscellaneous chemicals, waste paints, solvents, and aerosols)
24 would be the responsibility of the contractor.

25 Sediments or soils within the project area may be contaminated with pesticides and heavy metals.
26 Excavated sediments would be sampled and temporarily stockpiled before leaving the base to be taken
27 to an appropriate upland disposal facility or landfill. The Proposed Action would require limited depth
28 of excavation during construction and maintenance.

29 The contractor would be responsible to clean up any spills that occur during demolition, paving and
30 grading activities associated with the Proposed Action. The construction contractor would be required
31 to submit for Navy approval a Health and Safety Plan and an Accident Prevention Plan prior to the start
32 of construction. Under the above described conditions, and considering the fact that there would be no
33 change in the quantity or types of hazardous materials used in the project area, no significant impacts
34 associated with hazardous materials would result from the Proposed Action. With proper hazardous
35 material use and storage, no increase in human health risk or environmental exposure to hazardous
36 materials would result from implementation of the Proposed Action.

37 The Navy's Installation Restoration (IR) Program, conducted pursuant to CERCLA, identifies and tracks IR
38 sites on NBVC Point Mugu. There are 14 IR sites basewide. One of them, IR Site 11, is in Mugu Lagoon
39 (Figure 3-1), near the Proposed Action site. Historically, various wastes containing oils, fuels, solvents,
40 acid, metals, pesticides, and/or sewage were spilled or directly discharged to the IR Site 11 lagoon, its
41 tributaries, and some of its associated drainage ditches. However, the site of the Proposed Action itself
42 is previously undeveloped and so is likely to be upstream of the potential point source of contamination;
43 and therefore, will not have any elevated risk to construction personnel of encountering wastes during



1

1 project implementation or to natural resources to encounter increased waste levels. Further, negative
2 impacts to natural resources are considered unlikely for the Proposed Action since there will be no
3 change to land use and wetlands habitat is expected to be enhanced along with increased wildlife
4 utilization.

5 Access to areas where construction activities occur would be restricted, which would minimize
6 environmental health risks or safety risks to children. There is no appreciable likelihood of persons living
7 or working on or in proximity to NBVC Point Mugu being exposed to risk from accidental explosions and
8 no adverse effects from groundwater contamination are expected to occur. Therefore, the Proposed
9 Action would have no significant potential to cause significant impacts to public, military health and
10 safety, or children.

11 **Noise:** Construction activities would require the use of heavy equipment for site preparation,
12 excavation, and grading that would result in increased noise levels within the immediate area. However,
13 noise level increases would be temporary, de minimus in volume, and no higher than nearby noise levels
14 generated by air operations at NBVC Point Mugu. According to the 1992 NAWS Point Mugu Air
15 Installation Compatible Use Zone (AICUZ) Update both project alternative sites are within the NBVC
16 Point Mugu Community Noise Equivalent Level zone experiencing an average of from 66 to 75 decibels.
17 By contrast, construction noise would be of short duration and would cease altogether within
18 approximately eight weeks, the estimated duration of construction phase (Appendix F). Equipment used
19 in the construction would generate noise levels in the range of 76 to 98 decibels at a “typical” distance
20 of 50 ft (Federal Highway Administration 2006). Once construction is complete the site will return to its
21 previous use and ambient noise levels generated by road traffic and, more significantly, military airfield
22 operations. Wildlife are generally expected to return to the site post-construction.

23 For noise abatement purposes, human sensitive receptor areas are defined as “lands on which serenity
24 and quiet are of extraordinary significance (and) ...Picnic areas, recreation areas, playgrounds, active
25 sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals” (CFR Title 23
26 Part 722). There are several sensitive noise receptors in the area of the Proposed Action site including
27 the Recreational Vehicle Park (located approximately midway between the Laguna Road and Beach
28 Road sites), and the Morale Welfare and Recreation Beach Motel. Other sensitive noise receptors are
29 the Military Family Housing area on base approximately 1.25 miles from the Proposed Action site, the
30 off-base residential trailer park located approximately 1.5 miles from the Proposed Action site, and
31 three off-base child development centers each approximately 3.0 miles or more away from the
32 Proposed Action site. However, these facilities are already subject to regularly elevated noise levels due
33 to ongoing military aircraft operations at the NBVC Point Mugu airfield and from ongoing jet engine
34 testing conducted in the area.

35 Construction noise from the Proposed Action would last approximately eight weeks and would most
36 likely not be detectable over existing noise sources. The construction/demolition equipment operation
37 hours would be limited to normal working hours: between the hours of 7:00 AM and 5:00 PM weekdays
38 and Saturdays, excluding holidays. No holiday or nighttime operation of construction equipment would
39 be permitted. There would be no permanent adverse indirect effect to the project vicinity, the nearest
40 sensitive receptors, or to the installation over all. Therefore, the Proposed Action has no potential to
41 cause significant impacts due to noise.

42 **Visual Resources:** There would be no significant changes to the existing viewsheds at NBVC Point Mugu
43 as a result of the project. Project construction would last approximately eight weeks (Appendix F) and
44 any disruption (heavy equipment usage and construction material storage and usage) will conclude with
45 construction completion. The brief duration of the construction project as well as project incorporation

1 of biological resource protection measures (such as sediment stabilization and disturbance minimization
2 controls) will not cause negative impacts to visual resources. After construction views in the project
3 area would remain as they are and continue to be consistent with the area's appearance, which is
4 coastal and military in appearance. The project is expected to result in the long-term enhancement of
5 area aesthetics by attracting and supporting wildlife and botanic resources to the project site.
6 Therefore, the Proposed Action has no potential to cause impacts to aesthetic or visual resources.

7 **Utilities and Infrastructure:** The demands on electricity, natural gas, communication, water, sanitary
8 sewer, and solid waste disposal from the Proposed Action would be accommodated by existing supplies
9 and capacities and planned upgrades. The Proposed Action would involve improving tidal flows to the
10 adjacent lands but would not alter the alignment or size of utility services (gas, water & sewer lines)
11 within Laguna Road site and no new public services or utility connections would be constructed as a part
12 of the project. Construction of the Laguna Road Alternative would be conducted in a phased manner
13 with only one half of the road closed to traffic at a time so that the road remains passable throughout
14 construction. Construction of the Beach Road alternative would also not impact existing utilities as the
15 alternative's sewer line removal involves only an abandoned sewer line under an earthen berm.
16 Therefore, the Proposed Action has no potential to cause significant impacts to utilities and
17 infrastructure.

18 **Transportation:** The project alternative sites are on military lands. The Beach Road Alternative does not
19 involve any construction on or near a road. The Laguna Road Culvert Installation Alternative site is an
20 explosive ordnance transportation route and a key transportation route to other mission critical
21 infrastructure. Traffic must continue to flow along Laguna Road during implementation. Therefore, if
22 selected, the Laguna Road Alternative would include the implementation of a traffic control plan to
23 ensure continued traffic flows around the project site. The resulting inconvenience would be considered
24 insignificant because of the short duration of the roadwork. Therefore, the Proposed Action has no
25 potential to cause significant transportation impacts.

26 **Recreation:** NBVC provides several recreational activities for the benefit of military and civilian
27 personnel. Access is restricted to most of the base, even for installation personnel, because of mission
28 activities and sensitive natural resources. Areas near the restoration sites are open to base personnel
29 for outdoor recreation activities include hunting, fishing, wildlife viewing, camping, picnicking, and
30 limited recreational use of beaches. The most heavily used recreation area at NBVC Point Mugu is
31 Family Beach, adjacent to the mouth of Mugu Lagoon. The eight week construction effort at the Laguna
32 Road site would not involve road closure as the constructed would be phased so as to involve only one
33 side of the road at a time. Therefore, no road closure related impacts to recreational access would be
34 caused. Implementation of the Proposed Action would only affect recreation by improving wildlife
35 utilization on site over the long term. Recreational opportunities such as increasing wildlife viewing
36 would improve as, wildlife and wildlife habitat increase. Therefore, the Proposed Action has no
37 potential to cause significant impacts on recreation in the area.

38 **Socioeconomics:** Existing military land use in the project area would continue to support naval
39 operations and there would be no significant changes to the existing socioeconomic environment (e.g.,
40 existing levels of human population or use or economic activity) as a result of the project. Additionally,
41 there are no schools or public housing near the project area that could be affected by the project.
42 Therefore, the Proposed Action has no potential to cause significant socioeconomic impacts.

43 **Environmental Justice:** Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in*
44 *Minority Populations and Low-income Populations* requires that "each Federal Agency shall make
45 achieving environmental justice part of its mission by identifying and addressing, as appropriate,

1 disproportionately high and adverse human health effects on its programs, policies, and activities on
2 minority populations and low income populations” (59 Federal Register 1994). The project would not
3 substantially affect human health or the environment. The project would take place within the NBVC
4 Point Mugu property boundaries. Therefore, the project would not disproportionately increase
5 environmental or health impacts on low-income or minority populations. The Proposed Action has no
6 potential to cause significant EO 12898 impacts.

7 **Air Quality/Climate Change:** The Proposed Action is within the South Central Coast Air Basin, which
8 consists of the San Luis Obispo County, Santa Barbara County, and Ventura County Air Pollution Control
9 Districts. The following list presents the heavy equipment and the total estimated hours that each
10 would be used over the approximately 8-week duration of the project (Appendix F):

11 Front End Loader – to be used for a total of approximately 16 hours

12 Dump Truck – to be used for a total of approximately 104 hours

13 Grader – To be used for a total of approximately 64 hours

14 Backhoe Loader – to be used for a total of approximately 182 hours

15 Hydraulic Crane – to be used for a total of approximately 8 hours

16 Asphalt Paver – to be used for a total of approximately 8 hours

17 Tandem Roller – To be used for a total of approximately 8 hours

18 The short duration and limited scope of this project is such that it has no potential to exceed the air
19 basin’s conformity de minimus levels and so would therefore have no potential to significantly impact
20 air quality (NBVC 2015b). A Record of Non-Applicability was prepared for this project (Appendix C).

21 The following section presents detailed analysis of those resources considered to have potential for
22 significant impacts under the proposed project: water resources, biological resources, and cultural
23 resources. These resources are analyzed in detail below and summarized in the Table 3-1.

24

Table 3-1. Summary of Potential Impacts and Avoidance Measures

Resource Area	Laguna Road Culvert Installation and Tidal Channel Grading Alternative 1/Preferred Alternative	Beach Road Berm and Sewer Line Removal and Tidal Channel Grading Alternative 2	No Action Alternative
Water Resources	<p>No Significant Impact. The primary impact would be improved tidal flow in 3 acres of salt marsh habitat.</p> <p>Implementation of the Proposed Action would not substantially alter local drainage patterns outside the 3 targeted acres of saltmarsh, existing runoff volumes or velocities, or involve any direct use of groundwater. The Proposed Action would result in installation of two culverts and the grading and contouring of two drainage swales in order to re-establish a tidal connection to wetlands. The Proposed Action would not negatively impact groundwater recharge and filtration and no facilities that would potentially affect groundwater quality would be constructed or used (e.g., underground fuel storage tanks or septic systems). While the Proposed Action is located within a mapped 100-year floodplain, no associated significant impacts would result from implementation of the Proposed Action, because no new or modified conditions that would potentially expose people or structures to flood-related hazards would occur.</p> <p>Compliance with the applicable existing regulatory controls and associated guidelines pursuant to applicable requirements of the Clean Water Act (CWA), National Pollutant Discharge Elimination System (NPDES) and related NBVC planning documents would also ensure that no significant impacts associated with water resources would occur.</p>	<p>No Significant Impact. Impacts under Alternative 2 would be the same as those under Alternative 1. The primary impact would be improved tidal flow in the targeted 4.4 acres of habitat.</p>	<p>No Significant Impact.</p> <p>There would be no change to existing conditions; therefore, no impacts would occur, however, the public would not be compensated for natural resource injuries as required under the Oil Pollution Act and the Lempert-Keene-Seastrand Oil Spill Prevention and Response Act - Govt. Code 8670.1 et seq.</p>
Cultural Resources	<p>No Significant Impact.</p> <p>The proposed undertaking is the type of activity that could affect historic properties, assuming they were present. However, there are no archaeological and historic resources present. Therefore, the project meets the standard for a finding of no historic properties affected, consistent with 36 CFR 800.4(d)(1). Implementation of the Alternative 1/Preferred Alternative would not result in significant</p>	<p>No Significant Impact. Impacts under Alternative 2 would be the same as those under Alternative 1.</p>	<p>No Significant Impact.</p> <p>There would be no change to existing conditions; therefore, no impacts would occur, however, the public would not be compensated for</p>

Table 3-1. Summary of Potential Impacts and Avoidance Measures

Resource Area	Laguna Road Culvert Installation and Tidal Channel Grading Alternative 1/Preferred Alternative	Beach Road Berm and Sewer Line Removal and Tidal Channel Grading Alternative 2	No Action Alternative
	impacts to historic or archaeological resources.		natural resource injuries as required under the Oil Pollution Act and the Lempert-Keene-Seastrand Oil Spill Prevention and Response Act - Govt. Code 8670.1 et seq.
Biological Resources	<p>No Significant Impact. Potential impacts to wildlife from increased noise, dust, and activity could occur in association with the Preferred Alternative Action, but would be temporary and localized. Wildlife species would likely avoid the work area temporarily and return following completion of the work, or would utilize other nearby comparable habitat. The Proposed Action would comply with the Migratory Bird Treaty Act (MBTA), Executive Order (EO) 13186 (Responsibilities of Federal Agencies To Protect Migratory Birds), the U.S. Fish and Wildlife Service/Department of Defense Memorandum of Understanding (MOU) to "Promote the Conservation of Migratory Birds," and the NBVC Point Mugu and Special Areas Integrated Natural Resources Management Plan (INRMP), so there would be no significant effects on MBTA-protected species. With implementation of management strategies outlined in the INRMP, no significant effects from invasive plant species would occur from the Proposed Action. Though there would be short-term impacts within the footprint due to re-contouring within the wetlands, there would be net positive impacts on wetlands from the Proposed Action as the action is anticipated to enhance existing wetlands.</p>	<p>No Significant Impact. Impacts under Alternative 2 would be the same as those under Alternative 1.</p>	<p>No Significant Impact. There would be no change to existing conditions; therefore, no impacts would occur, however, the public would not be compensated for natural resource injuries as required under the Oil Pollution Act and the Lempert-Keene-Seastrand Oil Spill Prevention and Response Act - Govt. Code 8670.1 et seq.</p>

1 3.1 Water Resources

2 3.1.1 Affected Environment

3 Surface Water

4 Surface water includes all lakes, ponds, rivers, streams (perennial, intermittent, and ephemeral), and
5 impoundments within a defined area or watershed.

6 The principal surface waters at NBVC Point Mugu include the Pacific Ocean, Mugu Lagoon, Calleguas
7 Creek, Revolon Slough, and several Oxnard drainage ditches (ODDs) (see Figure 3-1). Mugu Lagoon is a
8 generally shallow (less than 10 ft [3 meters] deep at high tide), linear, and east-west trending feature
9 that receives both freshwater and tidal flows. Freshwater flows are derived from Calleguas
10 Creek/Revolon Slough (both perennial streams) and several ODDs. Circulation patterns and flushing
11 levels within the lagoon are controlled by tidal influence and the amount of freshwater inflow.
12 Additional surface waters at NBVC Point Mugu and in surrounding areas include several smaller
13 perennial streams; off-site extensions of Calleguas Creek, Revolon Slough and local ODDs; and a series of
14 duck ponds to the west. Surface runoff at NBVC Point Mugu is transported to Calleguas Creek, Mugu
15 Lagoon, or the Pacific Ocean via a system of drainage ditches and natural channels. Existing drainage
16 patterns at NBVC Point Mugu are variable, with a number of natural and developed drainage features as
17 described above. Drainage in much of the southernmost (coastal) portion of the base flows directly into
18 Mugu Lagoon or the ocean, while runoff in other areas enters one or more of the noted natural drainage
19 features and/or ODDs. All flows from NBVC Point Mugu ultimately discharge into Mugu Lagoon or the
20 ocean. Surface flows within the NBVC Point Mugu site are characterized by generally low velocities, due
21 to the predominantly low elevation and subdued nature of the local topography.

22 The principal surface waters at NBVC Point Mugu include the Pacific Ocean, Mugu Lagoon, Calleguas
23 Creek, Revolon Slough, and several Oxnard drainage ditches (ODDs, see Figure 3-1). Mugu Lagoon is a
24 generally shallow (less than 10 ft [3 meters] deep at high tide), linear, and east-west trending feature
25 that receives both freshwater and tidal flows (please refer to assessment zone descriptions under
26 Section 1.4.2 above). Freshwater flows are derived from Calleguas Creek/Revolon Slough (both
27 perennial streams) and several ODDs, and a series of duck ponds to the west. Circulation patterns and
28 flushing levels within the lagoon are controlled by tidal influence and the amount of freshwater inflow.
29 The eastern arm of Mugu Lagoon receives limited freshwater input from the adjoining Laguna Peak and
30 Point Mugu State Park to the north. Runoff from those areas flows through a series of culverts south of
31 Highway 1. The eastern arm of the lagoon connects to the central basin via tidal channels and flats that
32 are constantly influenced by tides, storm flows, and location of the inlet. During floods, especially those
33 associated with high tides, the marshes on the eastern side of the lagoon are inundated with fresh
34 water. The ditches that drain nearby agricultural land and portions of the base are subject to tidal
35 influence. Three tide gates prevent high-tide flooding of agricultural lands: (1) a tide gate on Oxnard
36 Drainage Ditch # 2, where it drains into Calleguas Creek near Los Posas Gate; (2) a tide gate on Oxnard
37 Drainage Ditch # 3 near Tide Road; and (3) a tide gate above Oxnard Drainage Ditch # 3 near the
38 intersection with Perimeter Road drainage ditch.

39 The western arm of Mugu Lagoon receives the majority of surface water runoff from storm water at
40 NBVC Point Mugu and an Oxnard drainage ditch. The drainage ditch transports agricultural and storm
41 water runoff from off-base sources. Surface runoff at NBVC Point Mugu is transported to Calleguas
42 Creek, Mugu Lagoon, or the Pacific Ocean via a system of drainage ditches and natural channels.
43 Existing drainage patterns at NBVC Point Mugu are variable, with a number of natural and developed
44 drainage features as described above. Drainage in much of the southernmost (coastal) portion of the

1 base flows directly into Mugu Lagoon or the ocean, while runoff in other areas enters one or more of
2 the noted natural drainage features and/or ODDs. All flows from NBVC Point Mugu ultimately discharge
3 into Mugu Lagoon or the ocean. Surface flows within the NBVC Point Mugu site are characterized by
4 generally low velocities, due to the predominantly low elevation and subdued nature of the local
5 topography."

6 The two main categories of pollutants to surface waters are point and non-point sources. A point source
7 is any discernible, confined, and discrete conveyance (pipe, ditch, channel, and/or tunnel) from which
8 pollutants may be discharged. Non-point-source pollution (also called polluted runoff) is the release of
9 pollutants from everything other than point sources. These include sources such as storm water,
10 agricultural runoff, dust, and air pollution that settle into water bodies.

11 Urban storm water runoff that discharges into streams, bays, and oceans from municipal storm drain
12 systems has been identified under local, regional, and national research programs as one of the principal
13 causes of water quality problems in urbanized areas. Pollutants that accumulate on paved (impervious)
14 surfaces are easily transported by runoff, and flow downstream via the storm water conveyance system
15 (or storm drain system) to downstream creeks, estuaries, and the ocean. As discussed above, surface
16 runoff at NBVC Point Mugu is transported to Calleguas Creek, Mugu Lagoon, or the Pacific Ocean via a
17 system of drainage ditches and natural channels; therefore, urban runoff is not mechanically treated
18 before being discharged off site.

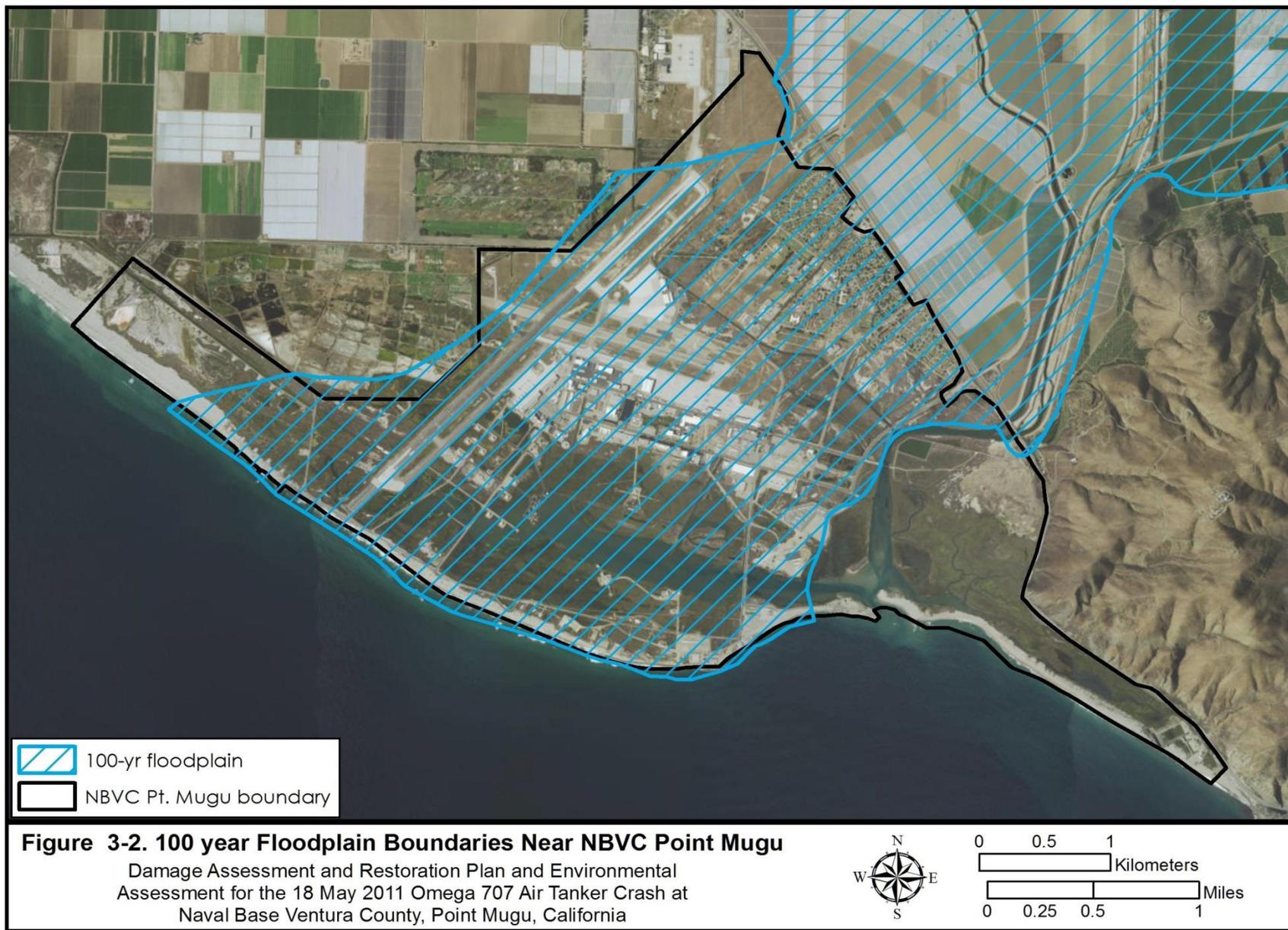
19 **Flood Hazard**

20 Floodplains are generally located in low-lying areas near rivers or other water bodies, and are subject to
21 inundation (flooding) during defined storm events. A 100-year floodplain, for example, is the inundation
22 area associated with a 100-year storm (i.e., a storm event having a one percent chance of occurring in
23 any given year). Due to the potential danger and property damage associated with major flooding,
24 regulatory controls have been developed to generally limit development in 100-year floodplains to uses
25 such as recreational sites and open space/habitat preservation (e.g., EO 11988).

26 Based on mapping included in the NBVC Activity Overview Plan (Navy 2006a), most portions of NBVC
27 Point Mugu are within 100-year floodplain boundaries associated with Calleguas Creek and other
28 surface waters (refer to Figure 3-2). Flooding within NBVC Point Mugu is characterized as a "significant
29 problem" in the referenced Activity Overview Plan, with two "major floods" identified at the base since
30 1994 (Navy 2006a). A system of tide gates, storm drains, retaining walls and berms has been
31 constructed around the northern and eastern perimeters of the base to divert floodwaters when
32 needed. Several of the existing flood control structures are identified as providing inadequate
33 protection as evidenced by the noted floods in 1998 and 2006 (Navy 2006a).

34

1



2

1 **Groundwater**

2 Groundwater occurs as subsurface aquifers and is contained in soil pore spaces (i.e., pores, or air space,
3 created by the contacts made between irregular shaped soil particles) and/or bedrock fractures.
4 Groundwater may be withdrawn for uses including agricultural, domestic and industrial applications,
5 and is recharged primarily through the infiltration of rainfall.

6 Six groundwater aquifers are present within the upper approximately 2,000 ft (610 meters) of
7 unconsolidated sediments present in the Ventura Basin. Specifically, these include (in order of
8 increasing depth) the Semi-Perched, Oxnard, Mugu, Hueneme, Grimes Canyon, and Fox Canyon aquifers
9 (Naval Facilities Engineering Command Southwest [NAVFAC SW] 2013). The Semi-Perched and Oxnard
10 are the most important aquifers, as they comprise the upper aquifer system and would be the most
11 susceptible to potential impacts associated with surface development. The Semi-Perched and Oxnard
12 aquifers are separated by an extensive clay layer, which generally precludes mixing. The Oxnard Aquifer
13 is the principal source of local water supplies derived from groundwater; the Semi-Perched Aquifer is
14 not utilized for such purposes due to water quality considerations (as described below). Recharge to all
15 of the described aquifers occurs primarily in the unconfined portion of the Oxnard Plain to the
16 northeast, with groundwater elevations generally above sea level except for the southernmost portions
17 of NBVC Point Mugu. These generally high groundwater elevations (particularly in the recharge areas to
18 the northeast) exert pressure on the confined aquifers, with resulting groundwater movements
19 primarily toward the ocean.

20 **Water Quality and Water Supply**

21 While quantitative water quality data are not known to be available for NBVC Point Mugu and
22 surrounding areas, general qualitative assessments of local surface and groundwater quality conditions
23 are provided in the NBVC Activity Overview Plan (Navy 2006a) and the Final Integrated Natural
24 Resources Management Plan (INRMP, NAVFAC SW 2013). The INRMP identifies a number of issues
25 related to water quality, including sea water intrusion and the discharge of urban and agricultural-
26 related contaminants such as sediment, chemical pesticides/fertilizers, and metals. Past Navy practices
27 are also cited as potential sources of water quality contamination. Based on the described conditions,
28 the referenced plans generally identify existing water quality in the Semi-Perched Groundwater Aquifer
29 as poor, while the underlying Oxnard Aquifer is characterized as containing high quality groundwater
30 (except in areas where seawater intrusion has occurred).

31 While no characterization of surface water quality is provided in the referenced sources, portions of the
32 Calleguas Creek watershed (including segments of Calleguas Creek, Mugu Lagoon and Revolon Slough)
33 are included on the most recent (2010) CWA 303(d) *List of Water Quality Limited Segments Requiring*
34 *TMDLs* (California SWRCB 2014). TMDLs (total maximum daily loads) establish the maximum amount of
35 an impairing substance or stressor that a water body can assimilate and still meet water quality
36 standards. Existing TMDLs identified for various portions of the Calleguas Creek watershed within and
37 upstream of NBVC include toxicity, nutrients, salts, trash, organochlorine pesticides, polychlorinated
38 biphenyls, and metals. Based on the described conditions, local surface water quality is generally
39 considered to be moderate to poor.

40 A number of water resource management guidelines and related efforts are identified in the referenced
41 Activity Overview Plan and INRMP, including a SWPPP and numerous BMPs. These guidelines are
42 described below in Environmental Consequences and Mitigation Measures, as appropriate.

43 Potable water is provided to NBVC Point Mugu by the Port Hueneme Water Agency, which is the

1 wholesale provider for the City of Port Hueneme, the Channel Islands Beach Community Services
2 District, and NBVC Point Mugu and Port Hueneme (NAVFAC SW 2013). The Port Hueneme Water
3 Agency serves a population of approximately 50,000 and has relatively fixed water requirements
4 (NAVFAC SW 2013). The NBVC Point Mugu water distribution system consists of a series of steel,
5 polyvinyl chloride and cement pipes and two 500,000 gallon water storage tanks.

6 **3.1.2 Environmental Consequences and Avoidance Measures**

7 The Proposed Action would re-establish a tidal connection for several acres of salt marsh habitat,
8 thereby improving the habitat for wildlife and other biota, sediment stabilization, and storm buffering.

9 **Laguna Road Culvert Installation and Tidal Channel Grading – Alternative 1/Preferred Alternative**

10 *Surface Water*

11 The Proposed Action if built at the Laguna Road site would not entail large-scale earth movement.
12 While the Proposed Action would involve very limited asphalt paving demolition, culvert installation,
13 repaving, and drainage swale grading, these activities would disturb a total of only approximately 1.82
14 acres. Clean Water Act Section 401 and 404 permits would be obtained from the U.S. Army Corps of
15 Engineers and Regional Water Quality Control Board prior to project implementation. Long-term
16 activities under the Proposed Action would entail continued maintenance of tidal connection drainages
17 and culverts but no new or expanded long-term activities would occur under the Proposed Action;
18 therefore, no associated long-term negative impacts to surface water hydrology would occur.
19 Accordingly, potential impacts to surface water quality from the Proposed Action would be the same as
20 those under existing conditions.

21 The demolition of asphalt pavement, installation of road culverts and drainage swales, and long term
22 maintenance of the area, would be subject to existing regulatory controls, and would be implemented
23 according to associated requirements of the Clean Water Act, National Pollution Discharge Elimination
24 System, and related NBVC planning documents, including the requirement to prepare a project Storm
25 Water Pollution Prevention Plan (Environmental Protection Measure 1, Section 2.2.1.2, Environmental
26 Protection Measures). Specifically, for the Proposed Action this would entail measures such as:
27 (1) proper use, containment, and disposal of potential pollutants related to demolition, construction,
28 and ongoing maintenance activities (e.g., concrete/asphalt wastes, hydrocarbons, etc.); and
29 (2) implementation of the NBVC integrated pest management program for non-native species control,
30 chemical use reduction, proper application rate and methodology assurance. Based on the described
31 operations to be conducted under the Proposed Action and the related conformance requirements, no
32 significant impacts associated with surface water hydrology or water quality would result.

33 *Flood Hazard*

34 The intent of the Proposed Action is to restore tidal flows across existing undeveloped wetlands but not
35 to cause flows to extend beyond those wetland sites. The Laguna Road site is currently surrounded by
36 lands of higher elevations (see Figure 2-1). Specifically, to the west of the site is “Laguna Road” and to
37 the north and northeast of the site is another asphalt paved road. Both of these are elevationally
38 several feet above the wetlands and this will not change as a result of this project. To the south and
39 southeast of the Proposed Action site is the Public Works facility which is a parcel of land that was “built
40 up” with soil, sand and gravel when the facility was established. The elevational superiority of these
41 surrounding lands and road will not change as a result of this project and no change to any land uses in
42 the area is proposed. For these reasons, and since the overall elevation of the whole project site itself

1 will not be altered by the Proposed Action it would not have any significant potential to cause a flooding
2 impact to surrounding lands.

3 *Groundwater and Water Supply*

4 The Proposed Action, if built at the Laguna Road site, would not involve any direct use of groundwater
5 (e.g., through increased withdrawals), and would not entail any modifications of existing facilities or
6 operations that could potentially affect groundwater resources. The Proposed Action has no potential
7 for an increase in impervious areas due to construction. No facilities that would potentially affect
8 groundwater quality would be constructed or used (e.g., underground fuel storage tanks or septic
9 systems). No facilities that would impact water demand would be constructed or used (e.g. housing).
10 Based on these conditions and the conformance requirements described above for surface water
11 quality, the Proposed Action would not result in significant impacts related to groundwater hydrology,
12 groundwater quality, or water supply.

13 **Beach Road Berm and Sewer Line Removal and Tidal Channel Grading– Alternative 2**

14 *Surface Water*

15 The Proposed Action would not entail large-scale earth movement. Only minor excavation would occur
16 to accomplish removal of a soil berm and underlying sewer line. Grading and contouring to create
17 shallow tidal swales would also occur. These activities would only disturb a small area (approximately
18 0.40 acre). Clean Water Act Section 401 and 404 permits would be obtained from the U.S. Army Corps
19 of Engineers and Regional Water Quality Control Board prior to project implementation. Long-term
20 activities under the Proposed Action would entail continued maintenance of tidal connection drainages
21 and culverts but no new or expanded long-term activities would occur under the Proposed Action;
22 therefore, no associated long-term negative impacts to surface water hydrology would occur.
23 Accordingly, potential impacts to surface water quality from the Proposed Action would be the same as
24 those under existing conditions. All grading and soil contouring accomplished under this proposal would
25 be subject to existing regulatory controls, and would be implemented according to associated
26 requirements of the Clean Water Act, National Pollution Discharge Elimination System, and related
27 NBVC planning documents, including the requirement to prepare a project Storm Water Pollution
28 Prevention Plan (Environmental Protection Measure 1, Section 2.2.1.2, Environmental Protection
29 Measures). Specifically, for the Proposed Action this would entail measures such as: (1) proper use,
30 containment, and disposal of fuels and other materials used by grading equipment and any other
31 equipment used for long term maintenance (e.g., concrete/asphalt wastes, hydrocarbons, etc.); and
32 (2) implementation of the NBVC integrated pest management program for non-native species control,
33 chemical use reduction and proper application. Based on the described operations to be conducted
34 under the Proposed Action and the related conformance requirements, no significant impacts
35 associated with surface water hydrology or water quality would result.

36 *Flood Hazard*

37 The intent of the Proposed Action is to restore tidal flows across existing undeveloped wetlands but not
38 to cause flows to extend beyond those wetland sites. The Beach Road site is currently surrounded by
39 lands of higher elevations (see Figure 2-2). Specifically, to the south of the site is Beach Road and to the
40 east of the site is Laguna Road. Both of these are elevationally several feet above the wetlands and this
41 will not change as a result of this project. To the north are lands separated from the Beach Road project
42 site by a minor soil berm that would not be removed as a part of this project and which is believed to be
43 of sufficient elevation to prevent a change in tidal flows to the adjacent lands. To the west of the Beach

1 Road site is a taller berm and buried sewer line, which would be removed as a part of this project but it
2 currently separates the project site from wetlands to the west which are already subject to tidal flows
3 and that would not change as a result of the proposed project. No change in land use is proposed. For
4 these reasons, and since the overall elevation of the whole project site would not be altered by the
5 Proposed Action it would not have any potential to cause a flooding impact to surrounding lands.

6 *Ground Water and Water Supply*

7 The Proposed Action, if constructed at the Beach Road site, would not involve any direct use of
8 groundwater (e.g., through increased withdrawals), and would not entail any modifications of existing
9 facilities or operations that could potentially affect groundwater resources. The Proposed Action has no
10 potential for an increase in impervious areas due to construction. No facilities that would potentially
11 affect groundwater quality would be constructed or used (e.g., underground fuel storage tanks or septic
12 systems). No facilities that would impact water demand would be constructed or used (e.g. housing).
13 Based on these conditions and the conformance requirements described above for surface water
14 quality, the Proposed Action at Beach Road would not result in significant impacts related to
15 groundwater hydrology, groundwater quality, and water supply.

16 **No-Action Alternative**

17 Under the No-Action Alternative, wetlands restoration under the Proposed Action would not occur and
18 the Oil Pollution Act and OSPRA requirements for compensatory restoration would not be met. If the
19 restoration does not occur then the lands on and adjacent to the Laguna Road and Beach Road
20 restoration sites would not benefit from tidal flow re-connection and resultant habitat restoration. It is
21 expected that without re-establishing tidal connection to these lands wetland habitat and wetland
22 species occupation will not improve. Under this scenario no related impacts would occur to water
23 resources.

24 **3.2 Cultural Resources**

25 **3.2.1 Affected Environment**

26 Historic properties are archaeological human-built environment resources that reflect our heritage and are
27 considered important to a culture, a subculture, or a community for scientific, traditional, religious, or other
28 reasons. Historic properties include prehistoric and historic sites, buildings, structures, districts, and objects
29 listed, or eligible for listing, in the National Register of Historic Places. Additionally, cultural resources are
30 addressed under the National Historic Preservation Act, as amended (NHPA; 16 USC 470-470x-6), the
31 Archaeological Resources Protection Act of 1979 (16 USC 470aa-470mm), and subject to protection under the
32 Native American Graves Protection and Repatriation Act (25 USC 3001-3013) and the American Indian
33 Religious Freedom Act (42 USC 1996 and 1996a). Compliance with Section 106 of the NHPA requires that
34 federal agencies take into account the effects of their undertakings on historic properties and provides the
35 opportunity to the Advisory Council on Historic Preservation to comment on those impacts.
36 Requirements are outlined in the Advisory Council on Historic Preservation's regulations, "Protection of
37 Historic Properties" (36 CFR Part 800). The Integrated Cultural Resources Management Plan for NBVC
38 Point Mugu and Port Hueneme (2013) provides readily accessible support for efficient management of
39 cultural resources. It integrates the installation's cultural resources program requirements with
40 established management components of the installation, including the Facilities and Environmental
41 Departments. It is intended to support early identification of potential conflicts between the mission
42 and cultural resources, and to define primary compliance actions if and when certain relevant problems
43 or issues may arise.

1 Definition of the Area of Potential Effects

2 The Area of Potential Effects (APE) of an undertaking is defined at 36 CFR 800.16(d) as “the geographic
3 area or areas within which an undertaking may directly or indirectly cause alterations in the character
4 or use of historic properties, if any such properties exist.” Previously completed professional cultural
5 resources investigations and consensus determinations of eligibility provide a basis for identifying
6 historic properties in the APE for the Preferred Alternative. There has been one systematic inventory
7 of Point Mugu for historic era buildings and structures (JRP Historical Consulting Services 1998:
8 *Inventory and Evaluation of National Register of Historic Places Eligibility for Buildings and Structures*
9 *at Naval Air Weapons Station (NAWS) Point Mugu, Ventura County, California*). This report applied
10 archival research and fieldwork to evaluate buildings and structures utilizing the criteria of eligibility
11 for listing in the National Register of Historic Places. Seven buildings or structures located at Point
12 Mugu (Baker Launch Complex, Building PM-36, Building PM-55, Buildings PM-354 and PM-354A,
13 Building PM-375 and Building PM-390) were found to be eligible for the Register.

14 3.2.2 Environmental Consequences and Avoidance Measures

15 Laguna Road Culvert Installation and Tidal Channel Grading – Alternative 1/Preferred Alternative

16 The proposed undertaking is for the installation of two pre-cast culverts beneath the existing Laguna
17 Road, and limited excavation and channel contouring within the wetlands to the east of Laguna Road
18 within the project Area of Potential Effect (Figure 3-3). Specifically, the APE is each culvert location and
19 channel, with a 50-foot buffer to accommodate associated laydown areas. Laguna Road and North
20 Mugu Road sit on elevated roadbeds consisting of manmade artificial fill. The roadways are 4-5 feet
21 above sea level and consist of sandy soils dredged from the adjacent lagoon. During high tide events the
22 adjacent wetlands are completely inundated. No buildings are within the APE for this undertaking. No
23 known archaeological resources are within the APE for this undertaking.

24 None of the eligible buildings/structures are located within the APE of this undertaking.

25 Ground disturbing activities of Alternative 1/Preferred Alternative include asphalt and roadway fill
26 removal, culvert installation, fine grading and contouring of channels, backfilling and re-compaction of
27 roadway fill. The proposed undertaking is the type of activity that could affect historic properties,
28 assuming they were present. However, as described above there is a lack of archaeological and historic
29 resources present. Therefore, the project meets the standard for a finding of no historic properties
30 affected, consistent with 36 CFR 800.4(d)(1). The National Historic Preservation Act Section 106
31 consultation process, with the California SHPO, was completed upon Navy receipt of the 23 October
32 2015 SHPO “no affect to historic properties” concurrence (Appendix D). All grading activities will be
33 monitored by a qualified archeologist. Alternative 1/Preferred Alternative, Alternative 1 would not result in
34 significant impacts to historic resources.

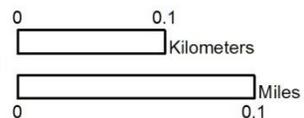
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Figure 3-3. Area of Potential Effects

Damage Assessment and Restoration Plan and Environmental Assessment for the 18 May 2011 Omega 707 Air Tanker Crash at Naval Base Ventura County, Point Mugu, California



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3

1 Beach Road Berm and Sewer Line Removal and Tidal Channel Grading– Alternative 2

2 The proposed undertaking is for excavation and removal of an existing earthen berm and underlying
3 sewer line, and excavation and channel contouring in adjacent wetlands. Specifically, the APE is the
4 berm and sewer line removal location, and the channel contouring area, with a 50-foot buffer to
5 accommodate associated laydown areas (Figure 2-2). Laguna Road and Beach Road sit on elevated
6 roadbeds consisting of manmade artificial fill. The roadways are 4-5 ft above sea level and consist of
7 sandy soils dredged from the adjacent lagoon. During high tide events the adjacent wetlands are
8 completely inundated. No buildings are within the APE for this undertaking. No archaeological
9 resources are within the APE for this undertaking. None of the eligible buildings/structures are located
10 within the APE of this undertaking.

11 Ground disturbing activities include excavation and soil removal, sewer pipe removal, fine grading and
12 contouring of channels and backfilling. The proposed undertaking is the type of activity that could affect
13 historic properties, assuming they were present. However, as described above there is a lack of
14 archaeological and historic resources present. Therefore, the project meets the standard for a finding of
15 no historic properties affected, consistent with 36 CFR 800.4(d)(1). If Alternative 2 was selected, the
16 National Historic Preservation Act Section 106 consultation process, with the California SHPO, would be
17 completed in order to obtain a SHPO “no affect to historic properties” concurrence. Alternative 2 would
18 not result in significant impacts to historic resources.

19 No-Action Alternative

20 Under the No-Action Alternative, no change to the wetlands would occur, the wetlands would not be
21 restored and no associated impacts related to cultural resources would occur.

22 3.3 Biological Resources**23 Resource Setting**

24 NBVC Point Mugu is situated in the Ventura Basin in the southern portion of the Oxnard Plain. The
25 Ventura Basin is a relatively broad and nearly level floodplain and river delta formed by the Santa Clara
26 River and bounded by the Santa Monica and Santa Ynez Mountains to the east and north. Elevations at
27 NBVC Point Mugu range from sea level to about 11 ft above mean sea level. In the early 1900s, Mugu
28 Lagoon and associated wetlands were approximately 3,000 acres (Tetra Tech, Inc. 2013). The topography
29 of Mugu Lagoon was modified with the development of agriculture upstream and the creation of the
30 military base in the 1940s. The Proposed Action site and alternative site are on NBVC Point Mugu
31 property, within the larger wetland complex of the Mugu Lagoon, the largest remaining salt marsh
32 estuary in southern California. The wetlands of NBVC Point Mugu are situated at the mouth of the
33 Calleguas Creek watershed (the Calleguas Creek watershed drains approximately 341 square miles) and,
34 as such, receive inputs from multiple anthropogenic sources upstream, including agricultural and
35 hardscape runoff. The Mugu Lagoon empties into offshore waters designated by the State of California
36 as Areas of Special Biological Significance. Areas of Special Biological Significance are a subset of state
37 water quality protection areas afforded special protections, as determined by the State Water Resources
38 Control Board and are considered key to a sustainable, resilient coastal environment and economy.

39 NBVC Point Mugu acreage includes 2,139 acres of jurisdictional wetlands (Figure 3-1) largely composed of
40 estuarine coastal salt marsh that provides food, nesting, sheltering, breeding, and nursery grounds for
41 numerous species of fish, wildlife, and plants, including several federal and state listed special status
42 species: such as the light-footed Ridgway’s rail (*Rallus obsoletus levipes*); western snowy plover
43 (*Charadrius nivosus nivosus*); Belding’s savannah sparrow (*Passerculus sandwichensis beldingi*); salt

1 marsh bird's-beak (*Chloropyron maritimum* subsp. *maritimum*); California least tern (*Sterna antillarum*
2 browni); and the state-listed critically imperiled wandering skipper (*Panoquina errans*) and sensitive
3 species of tiger beetles (*Cicindela senilis frosti*, *C. hirticollis gravida*, and *C. gabbi*). These wetlands
4 provide a variety of important habitat functions for many marine and terrestrial species including the
5 following: food-chain support for a variety of organisms; nutrient cycling and storage, including carbon
6 sequestration; floodwater storage and groundwater recharge and discharge; erosion protection,
7 shoreline anchoring, dissipation of erosive forces, and as a buffer against sea level rise; water quality
8 improvement from filtering sediments, nesting and forage for birds, runoff, and pollutants; forage,
9 spawning, and nursing grounds for fish and invertebrates; provision of habitat for wildlife and plants; and
10 socioeconomic functions such as fisheries support and passive recreation opportunities, such as, bird
11 watching and environmental education.

12 The Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. §1801-1882, as amended)
13 requires the delineation and description of Essential Fish Habitat by regional fishery management
14 councils, in conjunction with the National Marine Fisheries Service, in fishery management plans for all
15 federally managed fish species. Essential Fish Habitat is defined as "those waters and substrate necessary
16 to fish for spawning, breeding, feeding, or growth to maturity." Actions that occur outside of Essential
17 Fish Habitat and might affect the habitat must also be taken into account. NBVC Point Mugu is within the
18 jurisdiction of the Pacific Fishery Management Council (PFMC). The PFMC has designated Essential Fish
19 Habitat and Habitat Areas of Particular Concern for Pacific Coast Groundfish (PFMC 2011a), Pacific Coast
20 Salmon (PFMC 2012), Coastal Pelagic Species (PFMC 2011b), and Highly Migratory Species (PFMC 2011c).
21 Only Essential Fish Habitat and Habitat Areas of Particular Concern for Pacific Coast Groundfish and
22 Coastal Pelagic Species are located in the nearshore marine and estuarine habitats at NBVC Point Mugu
23 (PFMC 2011a, PFMC 2011b). Groundfish species include rockfish (*Scorpaenidae*), sablefish (*Anoplopoma*
24 *fimbria*), flatfish (*Pleuronectiformes*), and Pacific whiting (*Merluccius productus*) that are often (but not
25 exclusively) found on or near the ocean floor or other structures. The Essential Fish Habitat for Pacific
26 Groundfish species includes all waters and substrates in areas less than or equal to 3,500 meters in depth
27 extending to the mean higher high water level or the upriver extent of saltwater intrusion. Habitat Areas
28 of Particular Concern designated for groundfish include all waters, substrates, and associated biological
29 communities falling within estuaries, canopy kelp, seagrasses, rocky reefs, and other habitat areas of
30 interest (PFMC 2011a). As such, Mugu Lagoon is a designated Habitat Areas of Particular Concern for
31 groundfish.

32 **3.3.1 Affected Environment**

33 **Laguna Road Culvert Installation and Tidal Channel Grading – Alternative 1/Preferred Alternative**

34 The site's former tidal connection was cut off during road construction approximately 50 years ago. The
35 site now functions as a freshwater wetland that holds rainfall and has no surface tidal connection.
36 Project-specific surveys or studies were not conducted. Data are based on annual and/or periodic
37 surveys, monitoring, and wetland delineations conducted to fulfill the requirements of the NBVC INRMP,
38 NBVC Point Mugu Programmatic Biological Opinion, and NBVC Wetland Restoration and Monitoring
39 Program.

1 Vegetation Communities

2 The plant communities on Point Mugu were mapped in 2013 and meet the classification and mapping
3 requirements of the Federal Geographic Data Committee (HDR 2014). The plant communities present at
4 the proposed restoration site are described below and shown in Figure 3-4.

5 Spiny rush *Juncus acutus* Provisional Association (0.14 acre). The dominant species in this Provisional
6 Association is spiny rush which forms a shrub layer canopy not observed in other marsh communities.

7 Salt grass- marsh jaumea (*Distichlis spicata* – *Jaumea carnosa*) Association (0.95 acre). The dominant
8 species in this association is salt grass with the co-dominant species of marsh jaumea.

9 Salt grass (*Distichlis spicata*) Association (1.48 acres). The most dominant species in this association is salt
10 grass.

11 Naturalized Warm-Temperate Riparian and Wetland (0.68 acres). At Point Mugu, this group classification
12 is typically used for ephemeral wetland areas that predominantly freshwater wetland species though
13 there were a few areas with heavy saltwater influence. Common species in this group include yellow
14 nutsedge (*Cyperus esculentus*), dock (*Rumex* sp.), and spiny cocklebur (*Xanthium spinosum*). These are
15 often very small areas where water ponds and then evaporates or drains seasonally.

16 Broadleaf cattail (*Typha latifolia*) Association (0.11 acre). The dominant species in this Association is the
17 broadleaf cattail in a small depression within a disturbed area.

18 *Myoporum* (*Myoporum laetum*) Association (1.10 acres). *Myoporum* is dominant along the roadside.

19 Salt grass – Pacific Swampfire (*Distichlis spicata* – *Salicornia pacifica*) Association (1.79 acres). The
20 dominant species in this association is salt grass with the co-dominant species of Pacific swampfire
21 (pickleweed).

22 Salt grass (*Distichlis spicata* / Annual Grasses [or Grass-Herb] Association) (0.45 acre). Salt grass is
23 dominant in the herbaceous canopy and nonnative annual grasses occur usually as subdominant cover.

24 Developed (0.79 acres). Developed areas include the roads, Public Works storage yard, and disturbed
25 areas.

26 Wildlife

27 The Trustees visited the site in April 2013 and observed killdeer, savannah sparrows, and hummingbirds.
28 Common species of mammals, such as raccoons (*Procyon lotor*) and deer mice likely move through or
29 occur within the site.

30 No fish would be expected to occur at the site because of the lack of tidal flow and existing waters are
31 ephemeral. Essential Fish Habitat within the project boundaries is only present at the existing tidal
32 channel which culverts will be connected to, bringing in tidal waters to the project site; therefore,
33 Essential Fish Habitat would be created, not lost.

34

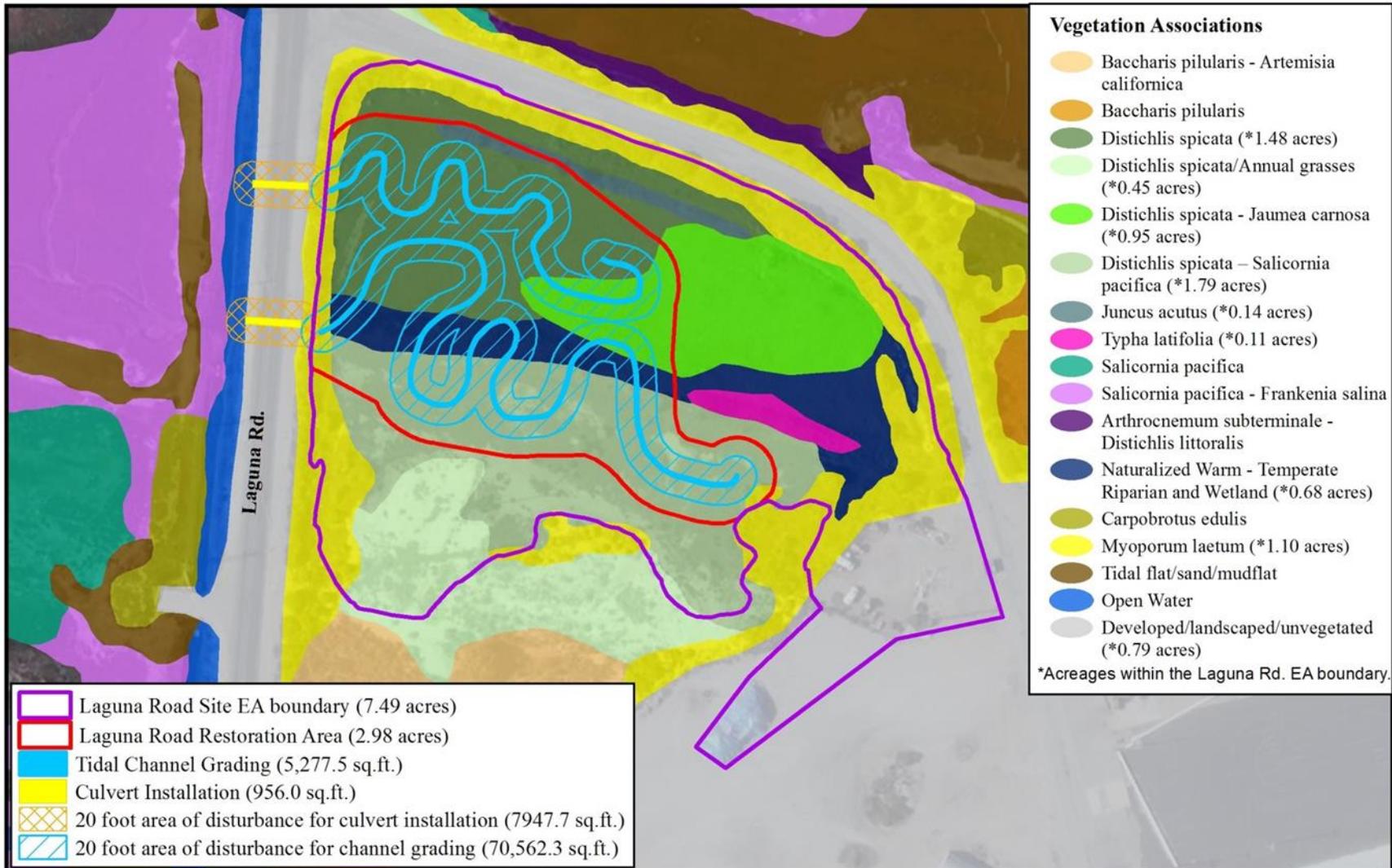
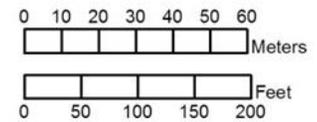


Figure 3-4. Vegetation Associations of Laguna Road Restoration Site

Damage Assessment and Restoration Plan and Environmental Assessment for the 18 May 2011 Omega 707 Air Tanker Crash at Naval Base Ventura County, Point Mugu, California



1 Special Status Species

2 No special status species have been recorded at this site; however, light-footed Ridgway's rail, California
3 least terns, western snowy plovers, and Belding's savannah sparrow have been recorded within one mile
4 of the site. It is likely Belding's savannah sparrow occasionally forage on site. Three out of four bird
5 surveys (2009-2012) at the LAG4 restoration site (Navy 2013) across Laguna Road from the Proposed
6 Action observed Belding's savannah sparrow. Least terns may forage on occasion in the existing tidal
7 creek the culverts will be connecting to, as well as may utilize the tidal creeks created for this project.
8 Tiger beetles may have the potential to occur because they have been observed across Laguna Road in
9 the LAG4 restoration and reference sites, but are still very unlikely due to lack of tidal mudflats.

10 Salt marsh bird's-beak is not present at this site, however there is potential for a population to survive
11 post-project. Western snowy plovers have not been observed and are not expected due to lack of
12 appropriate habitat. Tidewater goby would not occur at the site because of the lack of tidal influx.
13 Marine mammals (harbor seals) are found within Mugu Lagoon, but have not and would not be found at
14 the project site pre or post-project due to lack of appropriate habitat.

15 **Beach Road Berm and Sewer Line Removal and Tidal Channel Grading– Alternative 2**

16 The Beach Road site is an existing wetland with limited tidal connection via a restricted flow channel
17 through the berm. Project-specific surveys or studies were not conducted. Data are based on annual
18 and/or periodic surveys, monitoring, and wetland delineations conducted to fulfill the requirements of
19 the NBVC INRMP, NBVC Point Mugu Programmatic Biological Opinion, and NBVC Wetland Restoration
20 and Monitoring Program.

21 Vegetation Communities

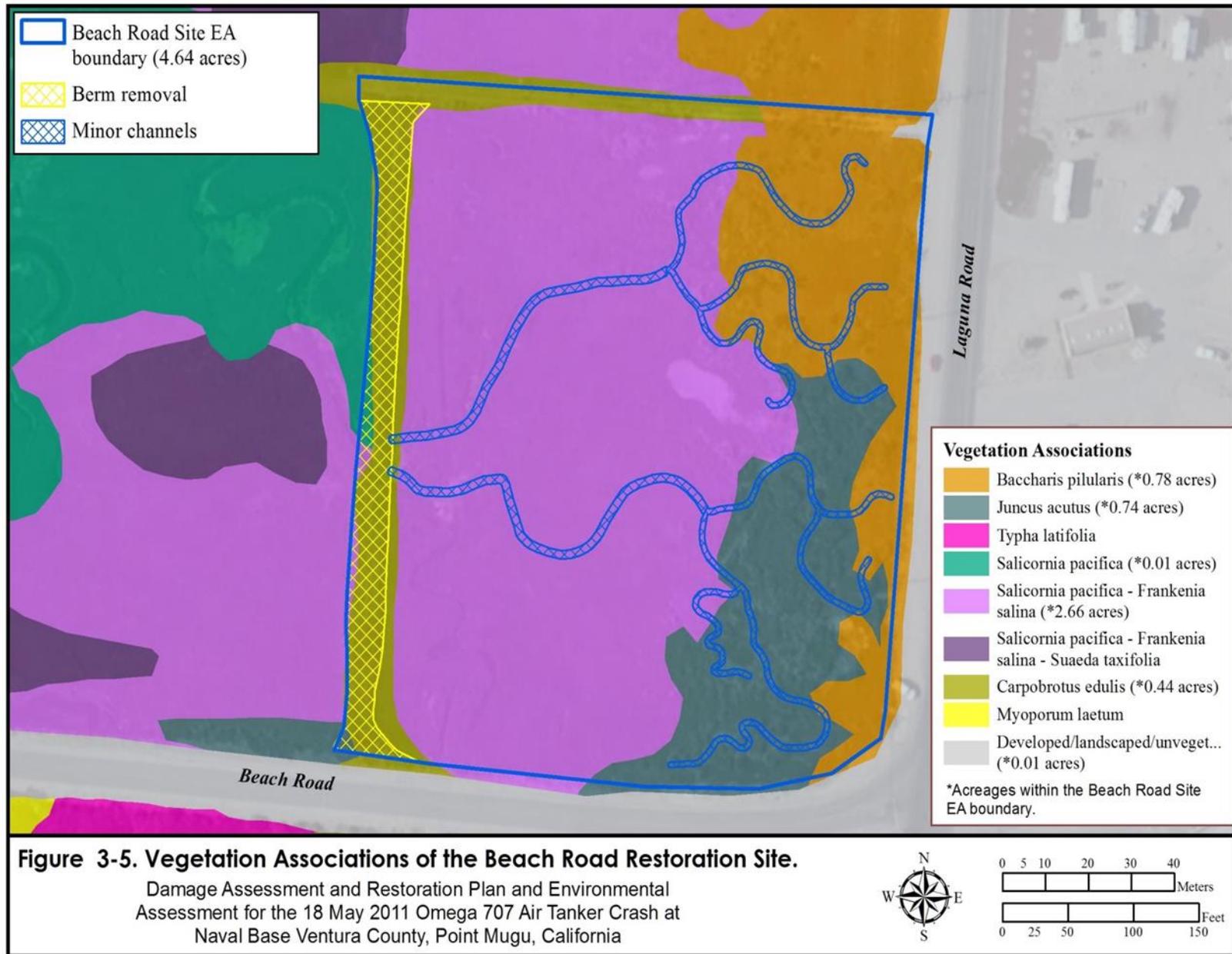
22 South of Beach Road at the intersection with Laguna Road, are jurisdictional wetlands bisected by berms
23 that run north-south and northeast-southwest. The north-south berm continues north of Beach Road,
24 across wetlands. These areas are part of IR Site 5. The plant communities on Point Mugu were mapped
25 in 2013 and meet the classification and mapping requirements of the Federal Geographic Data
26 Committee (Figure 3-5)(HDR 2014).

27 Spiny rush (*Juncus acutus*) Provisional Association (0.74 acre). The dominant species in this Provisional
28 Association is spiny rush which forms a shrub layer canopy not observed in other marsh communities.

29 Coyote brush (*Baccharis pilularis*) Association (0.78 acre). Coyote brush more often occurred on Point
30 Mugu with other species as opposed to finding monotypic stands. This species is the dominant species in
31 this association.

32 Pacific swampfire – alkali heath (*Salicornia pacifica*-*Frankenia salina*) Association (2.66 acres). The
33 dominant species in this association is Pacific swampfire with the co-dominant species alkali heath. This
34 is the most common association at NBVC Point Mugu.

35 Hottentot fig (*Carpobrotus edulis*) Association (0.44 acre). Hottentot fig is dominant in this association
36 and covers the slopes of the berm.



1 **Wildlife**

2 Commons species of shorebirds and wading birds have been observed and are expected to occur on the
3 site. Species such as long-billed curlews (*Numenius americanus*), willet (*Catoptrophorus semipalmatus*),
4 great blue herons (*Ardea herodias*), and snowy egret (*Egretta thula*) are common in the site and adjacent
5 wetlands. Tiger beetles may be found in some of the higher mudflats. Common species of mammals
6 such as raccoons (*Procyon lotor*) and deer mice likely move through the site.

7 Essential Fish Habitat is present on site, as there is currently a tidal connection to the site with
8 appropriate hydrology for fish, such as, California killifish (*Fundulus parvipinnis*) and longjaw mudsucker
9 (*Gillichthys mirabilis*). No surveys were conducted; therefore, species present are unknown.

10 Special Status Species

11 Light Footed Ridgway's rails may at times use the habitat to forage, however rails are not as common in
12 the project area as they were 10 years ago. Belding's savannahs sparrows could be found regularly
13 foraging on site, with a few individuals likely nesting. Snowy plovers are not likely on site due to lack of
14 appropriate habitat. Tiger beetles are less likely to be present given the lack of open areas of the upper
15 marsh, salt pannes, and mudflats, but as noted above, may occur in the higher mudflats. Annual mapping
16 efforts have not recorded salt marsh bird's-beak within the restoration site since the early 1980s.
17 Tidewater goby would not occur at the site due to lack of appropriate habitat. As water salinity increases
18 in relation to proximity of the estuary mouth, it is unlikely gobies would remain due to the lack of
19 freshwater influence throughout the estuary tidal creeks and drainage ditches. Harbor seals can be found
20 in close proximity to the site, but would not be found on site.

21 **3.3.2 Environmental Consequences and Avoidance Measures**

22 **Laguna Road Culvert Installation and Tidal Channel Grading – Alternative 1/Preferred Alternative**

23 **Potential Impacts**

24 Throughout the project implementation period, the Proposed Action would include short-term and long-
25 term minor actions including grading, trenching, culvert installation, asphalt laying, and road
26 maintenance. The proposed undertaking is for the installation of two pre-cast culverts beneath the
27 existing Laguna Road and limited excavation and channel contouring within the wetlands to the east of
28 Laguna Road within the project (Figure 3-3). The Proposed Action area includes each culvert location and
29 channel, with a 20-foot buffer to accommodate maneuvering heavy equipment, and laydown areas along
30 North Mugu Road and the Public Works yard. Laguna Road and North Mugu Road sit on elevated
31 roadbeds consisting of manmade artificial fill.

32 Vegetation

33 Short-term impacts to vegetation due to trampling would be expected from temporary disturbances
34 during tidal channel excavation. Approximately 1.62 acres of salt grass, marsh jaumea, and Pacific
35 swampfire would be trampled by people and equipment and would be expected to regenerate after
36 excavation has ceased. Permanent, long-term impacts to vegetation would include removing vegetation
37 (mostly salt grass) and exposing the area to tidal inundation. Opening the area to tidal inundation will
38 potentially permanently change the vegetation composition to Pacific swampfire and sea blite (*Suaeda*
39 *esteroa*) and mudflats. Exposing soils and sparse vegetation would possibly allow for noxious weeds to
40 become established. However, the five-year maintenance period would promote passive recruitment of
41 desired vegetation by treating noxious weeds and maintaining the tidal flushing which would be a long-
42 term beneficial impact. Degradation of plant communities would also occur if petroleum or other

1 hazardous material are accidentally released during operation or storage of construction or maintenance
2 vehicles. The project would adhere to all regulatory requirements for handling and storage of fuels, oils,
3 and other hazardous materials.

4 A Clean Water Act Section 404 permit and 401 water quality certification would be obtained before
5 disturbance begins. Impact avoidance and minimization measures in these permits would include:
6 preventing unnecessary discharge of sediments into jurisdictional wetlands and waters by place weed-
7 free wattles at the project site perimeter, as close to the work site as possible; use sand bags, tightly
8 butted, in one row; use silt screens as close to the work as possible in the instance that insufficient space
9 exists between the project and jurisdictional wetland, for placement of wattles or sand bags; rubber-
10 wheeled vehicles will be used to work in jurisdictional wetlands (tracked vehicles or other types of
11 vehicles that kick-up sediments are not allowed); equipment would be clean and free of weed species
12 and mud before entering the jurisdictional wetland; and matting, boards, or other plate-like structures
13 placed in the pathway of vehicles to minimize soil damage.

14 Therefore, the Proposed Action, as implemented under Alternative 1, would have no significant impact
15 on vegetation communities in the Project Area.

16 Wildlife

17 Potential impacts to wildlife from increased noise, dust, and activity could occur in association with
18 project implementation and maintenance operations, but will likely be temporary and localized. Wildlife
19 species would likely avoid the work area temporarily and return following completion of the work, or
20 would utilize other nearby comparable habitat Small mammals could and would move outside of the area
21 being actively disturbed in to the area the surrounding habitat. Additional habitat is available north of
22 the site, but would require crossing a small road.

23 Birds

24 Management of migratory birds at NBVC includes the definition that all bird species at NBVC Point Mugu,
25 with the exception of rock pigeon (*Columba livia*), European starling (*Sturnus vulgaris*), and house
26 sparrow (*Passer domesticus*), are protected by federal law under the MBTA (16 USC Section 703 et seq.)
27 and EO 13186 (Responsibilities of Federal Agencies To Protect Migratory Birds, 10 January 2001).
28 Furthermore, in July 2006, the Department of Defense (DoD) and USFWS entered into a MOU to
29 "Promote the Conservation of Migratory Birds." The MOU describes specific actions that should be taken
30 by DoD to advance migratory bird conservation; avoid or minimize the take of migratory birds; and
31 ensure DoD operations other than military readiness activities are consistent with the MBTA. The INRMP
32 Benefits for Migratory Birds (Appendix E of the INRMP) further details NBVC Point Mugu's efforts and
33 strategies for bird conservation to maintain compliance with the MBTA (NAVFAC SW 2013). The
34 Proposed Action would comply with the MBTA, EO 13186, the DoD/USFWS MOU, and INRMP. In
35 accordance with the regulations of the MBTA, the USFWS recommends that impacts to birds protected
36 under the MBTA be avoided by surveying for nesting birds in areas proposed for disturbance, and if
37 protected birds or active nests are present, re-scheduling activities for outside the nesting season, until
38 the young are fledged. Alternatively, the USFWS recommends that activities that have the potential to
39 impact protected birds or their nesting habitat be conducted outside the migratory bird nesting season,
40 to avoid impacts. A majority of migratory birds nest from mid-February and continue until the end of
41 August; however, some species may start earlier or extend their nesting activities through September.

1 As the project will occur outside of the migratory bird nesting season (March 1-Sept 31), significant
2 impacts to nesting migratory birds are unlikely. Effects of the project on birds would include birds leaving
3 or avoiding the project area due to construction activity. The loss of this habitat for foraging is negligible,
4 as there is an abundance of habitat adjacent to the project site that will remain available for foraging;
5 however, areas impacted by equipment during the restoration may limit foraging opportunities for
6 selected species of birds. The effects also are temporary as the birds could forage again in the site after
7 the construction activity has been completed. Post-project the site will provide more foraging
8 opportunities for shorebirds and wading birds, with migratory birds also benefiting from the project.

9 Therefore, the Proposed Action as implemented under Alternative 1, would have no significant negative
10 impact on birds in the Project Area.

11 Fish

12 No fish have been recorded at the current restoration site. Essential Fish Habitat within the project
13 boundaries is only present at the existing tidal channel which the culverts will be connected to, bringing
14 in tidal waters to the project site. There is the potential for fish species across Laguna Road to have
15 short-term impacts from construction activity during culvert installation (e.g. altering hydrology) and
16 beneficial long-term impacts of increasing their range by allowing the tide to inundate the site. Fish
17 species recorded during the LAG4 2009-2011 post-construction monitoring period included California
18 killifish (*Fundulus parvipinnis*) and longjaw mudsuckers (*Gillichthys mirabilis*) in the restoration channels
19 (Tetra Tech 2012). Research from other restoration sites in California reveals that killifish are an
20 opportunistic species and will often colonize new restoration sites, with populations tapering off in
21 subsequent years. The relationship of restoration age and colonization of fish and invertebrate
22 assemblages is not linear and not necessarily additive (Zedler 2001). This is especially relevant in a highly
23 dynamic environment such as the salt marsh ecosystem, which is pulse-driven. Hydrologic processes and
24 sedimentation and erosion affect development of tidal channels in restoration sites and the faunal
25 assemblages that inhabit them. Faunal assemblages in the channels develop in varying rates across
26 taxonomic groups, and vary seasonally depending on the monitoring time period and in response to
27 changes in channel morphology and hydrologic factors. Excess sedimentation can bury the epifaunal
28 community in the natural channel, causing decreased food availability for higher trophic level organisms.
29 This decreased availability of food may have a negative effect on fish populations in the area of the
30 restoration site. As the vegetative cover increases at the restoration site, it will slow and trap suspended
31 sediment during each tidal cycle and create a substrate for passive plant recruitment.

32 The Proposed Action is minimal and temporary. Given the benefit of returning tidal flow to an adjacent
33 wetland and the proposed minimization measures, National Marine Fisheries Service (NMFS) has no
34 conservation recommendations at this time (Personal communication 2015); therefore, the action would
35 have no permanent adverse effect on Essential Fish Habitat and would have beneficial effects on
36 Essential Fish Habitat. The Proposed Action, as implemented under Alternative 1, would have no
37 significant impact on Essential Fish Habitat in the Project Area.

38 Invertebrates

39 Long-term impacts to the site include the movement of striped shore crabs (*Pachygrapsus crassipes*) and
40 other invertebrates to the site. They are found at LAG4, but no yellow shore crabs (*Hemigrapsus*
41 *oregonensis*) were recorded. Studies have shown that interference competition and predation by striped
42 shore crabs may confine yellow shore crabs to lower intertidal zones (Zedler 2001). As the salt marsh
43 vegetative cover and inundation increase, habitat for crab populations will increase.

1 LAG4 restoration site contains California horn snails (*Cerithidea californica*). No coffee bean snails
2 (*Melampus bidentatus*) were recorded during 2012 surveys. Field data from other locations show that
3 horn snails exhibit a preference for un-vegetated areas, except in the winter, whereas coffee bean snails
4 are typically found more frequently in areas with vegetative cover (Zedler 2001). Coffee bean snails could
5 be expected to occur in the future at the Laguna Road restoration site, as vegetation continues to
6 increase, providing food and cover.

7 Therefore, the Proposed Action, as implemented under Alternative 1, would have no significant negative
8 impact on invertebrates in the Project Area.

9 Special Status Species

10 As noted above, no special status species have been recorded at this site; however, light-footed
11 Ridgway's rail, California least terns, western snowy plovers, and Belding's savannah sparrow have been
12 recorded within one mile of the site. It is likely Belding's savannah sparrow occasionally forage on site.
13 Three out of four bird surveys (2009-2012) at the LAG4 restoration site across Laguna Road observed
14 Belding's savannah sparrow. Least terns may forage on occasion in the existing tidal creek the culverts
15 will be connecting to, as well as may utilize the tidal creeks created for this project. Tiger beetles may
16 have the potential to occur because they have been observed across Laguna Road in the LAG4 restoration
17 and reference sites, but are still very unlikely due to lack of tidal mudflats.. Long-term beneficial impacts
18 could include greater numbers of Belding's savannah sparrows with the introduction of tidal waters. As
19 crabs begin to inhabit the area, the site may eventually become occupied by dispersing Ridgeway's rails.
20 Least terns may also forage within the created tidal creeks within the project site. As tidal waters move
21 into the site, it may lead to inundation of some of the surrounding bare soils adjacent to the site, which
22 may lead to occupation by tiger beetles as these mudflats and salt pannes develop.

23 Therefore, the Proposed Action, as implemented under Alternative 1, would have no significant negative
24 impact on special status species in the Project Area.

25 **Beach Road Berm and Sewer Line Removal and Tidal Channel Grading– Alternative 2**

26 **Potential Impacts**

27 The proposed undertaking is for excavation and removal of an existing earthen berm and underlying
28 sewer line and excavation and channel contouring in adjacent wetlands. Associated laydown areas would
29 be along the dirt road at the northern boundary of the site (Figure 3-5). Throughout the project
30 implementation period, the Proposed Action would include short-term and long-term impacts. Minor
31 actions would include grading and limited excavation and channel contouring within the wetlands (Figure
32 3-5).

33 Vegetation

34 Short-term impacts due to vegetation trampling would be expected from temporary disturbances during
35 tidal channel excavation. Permanent, long-term impacts to vegetation include removing approximately
36 4,906 square feet (0.11 acres) of salt marsh vegetation (pickleweed), coyote bush, spiny rush, and alkali
37 heath during channel excavation and exposing the area to increased tidal inundation; spiny rush removal
38 would be minimized to reduce impacts to light-footed Ridgeway's rail. Removing the berm would
39 remove approximately 0.44 acre of hottentot fig. Connecting the area to existing channels would open
40 the area to tidal inundation and permanently change the vegetation composition and potentially increase
41 mudflats. Exposing soils and sparse vegetation would possibly allow for noxious weeds to become
42 established; however, the five-year maintenance period would promote passive recruitment of desired

1 vegetation by treating noxious weeds and maintaining tidal flushing which would be a long-term
2 beneficial impact. Degradation of plant communities would also occur if petroleum projects or other
3 hazardous material are accidentally released during operation or storage of construction or maintenance
4 vehicles. All regulatory requirements for handling and storage of fuels, oils, and other hazardous
5 materials would be implemented.

6 A Clean Water Act Section 404 and 401 permit would be obtained before disturbance begins. Impact
7 avoidance and minimization measures to Waters of the U.S. would include: preventing unnecessary
8 discharge of sediments into jurisdictional wetlands and waters by place weed-free wattles at the project
9 site perimeter, as close to the work site as possible; use sand bags, tightly butted, in one row; use silt
10 screens as close to the work as possible in the instance that insufficient space exists between the project
11 and jurisdictional wetland, for placement of wattles or sand bags; rubber-wheeled vehicles will be used to
12 work in jurisdictional wetlands (tracked vehicles or other types of vehicles that kick-up sediments are not
13 allowed); equipment would be clean and free of weed species and mud before entering the jurisdictional
14 wetland; and matting, boards, or other plate-like structures placed in the pathway of vehicles to minimize
15 soil damage.

16 Therefore, the Proposed Action, as implemented under Alternative 2, would have no significant negative
17 impact on vegetation communities in the Project Area.

18 Wildlife

19 Potential impacts to wildlife from increased noise, dust, and activity could occur in association with
20 project implementation, maintenance operations, but it would be temporary and localized. Wildlife
21 species would likely avoid the work area temporarily and return following completion of the work, or
22 would utilize other nearby comparable habitat. Small mammals could and would move outside of the
23 area being actively disturbed in to the area the surrounding habitat. Additional habitat is available north
24 and west of the site.

25 Therefore, the Proposed Action, as implemented under Alternative 2, would have no significant impact
26 on wildlife in the Project Area.

27 Birds

28 Management of migratory birds at NBVC includes the definition that all bird species at NBVC Point Mugu,
29 with the exception of rock pigeon, European starling, and house sparrow, are protected by federal law
30 under the MBTA (16 USC Section 703 et seq.) and EO 13186 (Responsibilities of Federal Agencies To
31 Protect Migratory Birds, 10 January 2001). Furthermore, in July 2006, the Department of Defense (DoD)
32 and USFWS entered into a Memorandum of Understanding (MOU) to "Promote the Conservation of
33 Migratory Birds." The MOU describes specific actions that should be taken by DoD to advance migratory
34 bird conservation; avoid or minimize the take of migratory birds; and ensure DoD operations other than
35 military readiness activities are consistent with the MBTA. The INRMP Benefits for Migratory Birds
36 (Appendix E of the INRMP) further details NBVC Point Mugu's efforts and strategies for bird conservation
37 to maintain compliance with the MBTA (NAVFAC SW 2013). The Proposed Action would comply with the
38 MBTA, EO 13186, the DoD/USFWS MOU, and INRMP. In accordance with the regulations of the MBTA,
39 the USFWS recommends that impacts to birds protected under the MBTA be avoided by surveying for
40 nesting birds in areas proposed for disturbance, and if protected birds or active nests are present, re-
41 scheduling activities for outside the nesting season, until the young are fledged. Alternatively, the USFWS
42 recommends that activities that have the potential to impact protected birds or their nesting habitat be
43 conducted outside the migratory bird nesting season, to avoid impacts. A majority of migratory birds

1 nest from mid-February and continue until the end of August; however, some species may start earlier or
2 extend their nesting activities through September.

3 As the project will occur outside of the migratory bird nesting season (March 1-Sept 31), there should be
4 no impacts to nesting migratory birds. Effects of the project on birds would include birds leaving or
5 avoiding the project area due to construction activity. The loss of this habitat for foraging is negligible, as
6 there is an abundance of habitat adjacent to the project site that will remain available for foraging;
7 however, areas impacted by equipment during the restoration may limit foraging opportunities for
8 selected species of birds. The effects also are temporary as the birds could forage again in the site after
9 the construction activity has been completed.

10 Therefore, the Proposed Action, as implemented under Alternative 2, would have no significant impact
11 on birds in the Project Area.

12 Fish

13 Essential Fish Habitat is present on site, as there is currently a tidal connection to the site with
14 appropriate hydrology for fish. There may be short-term impacts from berm removal (e.g. altering
15 hydrology) and long-term impacts of increasing their range by connecting to the existing channels. Fish
16 species recorded during the LAG4 2009-2011 post-construction monitoring period included California
17 killifish and longjaw mudsuckers in the restoration channels (Tetra Tech 2012). Research from other
18 restoration sites in California reveals that killifish are an opportunistic species and will often colonize new
19 restoration sites, with populations tapering off in subsequent years. The relationship of restoration age
20 and colonization of fish and invertebrate assemblages is not linear and not necessarily additive (Zedler
21 2001). This is especially relevant in a highly dynamic environment such as the salt marsh ecosystem,
22 which is pulse-driven. Hydrologic processes and sedimentation and erosion affect development of tidal
23 channels in restoration sites and the faunal assemblages that inhabit them. Faunal assemblages in the
24 channels develop in varying rates across taxonomic groups, and vary seasonally depending on the
25 monitoring time period and in response to changes in channel morphology and hydrologic factors. Excess
26 sedimentation can bury the epifaunal community in the natural channel, causing decreased food
27 availability for higher trophic level organisms. This decreased availability of food may have a negative
28 effect on fish populations in the area of the restoration site, however will benefit fish in the long term as
29 tidal creeks and tidal waters increase within the project site. As the vegetative cover increases at the
30 berm site, it will slow and trap suspended sediment during each tidal cycle and provide a substrate for
31 passive plant recruitment (Tetra Tech 2012).

32 The Proposed Action is localized and temporary; therefore, the action would have no adverse effect on
33 Essential Fish Habitat and NMFS would be contacted for concurrence. The Proposed Action, as
34 implemented under Alternative 2, would have no significant negative impact on Essential Fish Habitat in
35 the Project Area.

36 Invertebrates

37 Short-term impacts would be disturbance of shore crabs during excavation and removal of vegetation.
38 Long-term impacts to the site include improving movement of striped shore crabs and other
39 invertebrates to the site. They are found at LAG4, but no yellow shore crabs were recorded. Studies
40 have shown that interference competition and predation by striped shore crabs may confine yellow shore
41 crabs to lower intertidal zones (Zedler 2001). Habitat quality will increase in the long term for crab
42 populations, as the salt marsh vegetative cover and inundation increases.

43 Short-term impacts to California horn snails may be minimal because field data from other locations show

1 that horn snails exhibit a preference for unvegetated areas, except in the winter. Conversely, if coffee
2 bean snails are on the site, Zedler (2001) noted they are typically found more frequently in areas with
3 vegetative cover therefore habitat post-project will provide vegetated and unvegetated areas for coffee
4 bean snails.

5 Therefore, the Proposed Action, as implemented under Alternative 2, would have no significant impact
6 on invertebrates in the Project Area.

7 **Special Status Species**

8 Long-term beneficial effects could be greater numbers of Belding's savannah sparrows will be recorded
9 within the restoration site with the increasing tidal flow and the coverage and health of saltmarsh plants.
10 The site is within light-footed Ridgeway's rail habitat (Tetra Tech 2013); therefore, spiny rush removal
11 would be limited to minimize impacts to their potential nesting habitat. Tidal creeks will also be designed
12 to be adjacent to and within spiny rush patches, which rails prefer for nesting. As rails have not been
13 present in that site in the last 10 years and project is to occur outside of the nesting season, no effects to
14 nesting rails will occur. Disturbance to a foraging rail may occur if one moves into project area, but as
15 there is sufficient habitat adjacent to the site; the temporary loss of this area for foraging would be
16 insignificant. Western snowy plover should not be impacted by berm removal or channel excavation as
17 they are not present on site. Creating open mudflats and the soil substrate of the restoration site may
18 provide suitable habitat for tiger beetles.

19 Therefore, the Proposed Action, as implemented under Alternative 2, would have no significant impact
20 on special status species in the Project Area.

21 **No Action Alternative**

22 Under the No-Action Alternative, wetlands restoration under the Proposed Action would not occur and
23 the Oil Pollution Act and OSPRA requirements for compensatory restoration would not be met. If the
24 restoration does not occur then the lands on and adjacent to the Laguna Road and Beach Road
25 restoration sites would not benefit from tidal flow enhancement and resultant habitat restoration. It is
26 expected that without restoration of these lands, wetland habitat will not improve. Under this scenario,
27 no related impacts would occur to biological resources.

4 Cumulative Impacts

1 4.1 Introduction

2 CEQ regulations implementing the National Environmental Policy Act (NEPA) require that the
3 cumulative impacts of a Proposed Action be assessed (40 Code of Federal Regulations [CFR] Parts
4 1500-1508). A cumulative impact is defined as the following:

5 *“the impact on the environment which results from the incremental impact of the action*
6 *when added to other past, present, and reasonably foreseeable future actions regardless*
7 *of what agency (federal or non-federal) or person undertakes such other actions.*
8 *Cumulative impacts can result from individually minor but collectively significant actions*
9 *taking place over a period of time.” (40 CFR § 1508.7)*

10 Cumulative effects are most likely to arise when a relationship exists between the Proposed Action
11 and other actions expected to occur in a similar location or during a similar time period. Actions
12 overlapping with or in proximity to the Proposed Action would be expected to have more potential
13 for a relationship than those more geographically separated.

14 Under the Proposed Action, the DoN would restore wetland habitat in order to compensate for the
15 period of time during which NBVC Point Mugu wetland habitat values were lost as a result of Omega
16 Air’s 2011 air tanker crash. Alternative 1/Preferred Alternative would re-establish a tidal connection at
17 the NBVC Point Mugu, Laguna Road site by installing two culverts under the road so as to re-establish a
18 tidal connection benefitting 2.98 acres of salt marsh habitat. This would increase and improve bird,
19 Essential Fish Habitat, and other wildlife habitat which in turn generally provide ecological services
20 such as sediment stabilization and storm buffering.

21 The CEQ’s guidance for considering cumulative effects states that NEPA documents “should compare the
22 cumulative effects of multiple actions with appropriate national, regional, state, or community goals
23 to determine whether the total effect is significant” (CEQ 1997). The first step in assessing
24 cumulative effects, therefore, involves identifying and defining the scope of other actions and their
25 interrelationship with the Proposed Action or alternatives. The scope of the cumulative effects
26 analysis involves both the geographic extent of the effects and the timeframe in which the effects could
27 be expected to occur. The scope must consider other projects that coincide with the location and
28 timing of the Proposed Action and other actions, and the duration of potential effects on the
29 environment.

30 Section 4.1.1 identifies the projects considered in the cumulative analysis. Section 4.2 provides an
31 analysis of potential cumulative impacts for each of the environmental resources discussed in this
32 Environmental Assessment (EA).

33 4.1.1 Potentially Cumulative Projects

34 Resource areas were analyzed using a list of past, present and reasonably foreseeable projects (refer
35 to Table 4-1) that have been or will be implemented in the project region.

Table 4-1. List of Potentially Cumulative Projects

#	<i>Project Title</i>	<i>Project Description</i>
1	NBVC Point Mugu Military Family Housing Public Private Ventura	The Navy prepared an EA for the Navy Base Ventura County Point Mugu Military Family Housing Public Private Venture program, located in Ventura County, California. Under the Proposed Action, the Navy would privatize 226 more homes at NBVC Point Mugu. The Navy would grant a ground lease of the proposed premises, excepting range facilities, and transfer the ownership of them to the Public Private Ventura (PPV) entity. The PPV would demolish, renovate, construct, own, operate and maintain the selected housing. The PPV entity may demolish up to 144 homes that are not needed to meet the installation's housing requirements. Minor renovations would be performed by the PPV entity to the remaining homes. Amenities such as recreational fields, tot lots and dog runs may be built in the areas where the existing homes are demolished. A Finding of No Significant Impact (FONSI) was signed in 2015.
	Supplemental EA for NBVC Point Mugu Military Family Housing Public Private Ventura	The Navy prepared a Supplemental EA for the Navy Base Ventura County Point Mugu Military Family Housing Public Private Venture program, located in Ventura County, California. Under the Proposed Action, the Navy would privatize an additional 124 homes at NBVC Point Mugu. The Navy would grant a ground lease of the proposed premises and transfer the ownership of the improvements to the PPV entity. The PPV would demolish, renovate, construct, own, operate and maintain the selected Military Family Housing. A total of up to 150 homes that are not needed to meet the installation's housing requirements may be demolished as part of this Proposed Action. A total of 102 homes not included within the total of 124 homes to be privatized as part of the Proposed Action would be demolished by the Navy, and the remainder of the up to 150 homes would be demolished by the PPV entity. Minor renovations would be performed by the PPV entity to 77 of the privatized homes remaining. Amenities such as recreational fields, tot lots and dog runs may be built in the areas where the existing homes are demolished. Under the Proposed Action, the PPV entity would also build five new Senior Officer Quarters homes. A FONSI is expected to be signed in January 2016.
2	NBVC Point Mugu Sea Range Countermeasures Testing and Training	The Navy (Naval Air Systems Command) prepared an EA for Point Mugu Sea Range Countermeasures (Navy 2012a) for conducting additional types of countermeasures testing on the Sea Range at NBVC Point Mugu and San Nicolas Island. Countermeasures testing addressed in this EA included directed energy (e.g., high-energy lasers and high-power microwave systems), small arms, missiles, flares, and electronic support systems in near shore areas at NBVC Point Mugu and San Nicolas Island. For the purposes of this EA, small arms included bullets fired from close-in weapon systems and projectiles up to 5 inches (13 centimeters) in diameter. Effective countermeasure systems testing requires realistic conditions that (1) exist on the Sea Range over land, (2) are in littoral (i.e., nearshore) environments, and (3) are in the open ocean (Navy 2014b). A FONSI was signed in July 2014.

Table 4-1. List of Potentially Cumulative Projects

#	<i>Project Title</i>	<i>Project Description</i>
3	Point Mugu Sea Range Expansion of Unmanned Systems Operations	The Navy has recently developed an EA/Overseas Environmental Assessment (OEA) for the proposed expansion of unmanned systems testing and training on the Point Mugu Sea Range, which includes land areas at NBVC Point Mugu, NBVC Port Hueneme, and San Nicolas Island (Navy 2014a). As evaluated in the EA/OEA, capabilities of the Sea Range would be expanded to include unmanned aircraft systems (UAS) and unmanned surface vehicle (USV) exercises up to 250 days per year, with duration of each exercise lasting between 1 hour and 7 days. Also as addressed in the EA/OEA, UAS, and USV operations would be initiated from NBVC Point Mugu and San Nicolas Island, with marine vessels launched from NBVC Port Hueneme. An increase of approximately 15 personnel would be required for the launch and recovery of the vehicles, command and control of the vehicles, and maintenance of the systems and associated equipment. No modifications to existing facilities (temporary lodging, meals, recreation, sanitation, etc.) are needed to accommodate the Proposed Action and associated personnel. A FONSI was signed in 2014.
4	EA for the West Coast Home Basing of the MQ-4C Triton UAS at NBVC Point Mugu	In 2013, the Navy prepared an EA that evaluated the potential effects associated with home basing the MC-4C Triton UAS at NBVC Point Mugu (Navy 2013b). Under the Proposed Action, the Navy would home base four Triton UAS; establish a hub for the Triton UAS, supporting up to four additional Triton UAS that would be undergoing maintenance actions at any one time; conduct an average of five Triton UAS flight operations per day (1,825 annually); construct, demolish, and renovate facilities and infrastructure at NBVC Point Mugu; and station up to 700 personnel, plus their family members, while supporting rotational developments to and from outside the continental United States. The FONSI was signed in April 2013, and Triton flight operations will begin in fiscal year (FY 2015). It is assumed that a maximum of eight Triton UAS will be at NBVC Point Mugu at any given time: four that are assigned for operational missions and four that have been transferred to NBVC Point Mugu from another location to receive maintenance. The additional 700 personnel and their families would be gradually relocated to NBVC Point Mugu and the surrounding areas in phases (from 2014 to 2020).

Table 4-1. List of Potentially Cumulative Projects

#	<i>Project Title</i>	<i>Project Description</i>
5	EA/OEA for the Navy MQ-4C Triton (BAMS) UAS Developmental Test Program	<p>In 2012, the Navy prepared an EA/OEA that analyzed the potential effects associated with conducting the Navy's MQ-4C Triton (BAMS) UAS Developmental Test Program at NBVC Point Mugu. On March 13, 2013, a FONSI was signed (Navy 2013c). The Developmental Test Program would be conducted over a three-year period beginning in FY 2013 at a number of contractor and Department of Defense (DoD) facilities and ranges. The Developmental Test Program evaluated the operational capabilities of the Triton UAS in a variety of mission scenarios. The staging of the Developmental Test Program would occur at Naval Air Station (NAS) Patuxent River, Maryland, with secondary locations at the Northrop Grumman Corporation facility in Palmdale, California, and NBVC Point Mugu. In total, approximately 2,270 flight-hours are planned for the entire Developmental Test Program. Initially, 2 flights per week averaging 8 hours per flight would occur. Test flights would progress to 4 flights per week and increase in duration until a 24-hour duration for 7 days can be demonstrated. This program would require approximately 125 personnel. No new infrastructure is expected to be constructed. The Developmental Test Program would include a combination of flight hours between the primary location at NAS Patuxent River in Maryland (1,787 flight hours), and secondary locations at Northrop Grumman Corporation Palmdale in California (363 flight hours), and NBVC Point Mugu (120 flight hours). This program is being implemented through FY 2015.</p>

Table 4-1. List of Potentially Cumulative Projects

#	Project Title	Project Description
6	Homeporting the Littoral Combat Ship	<p>An EA was prepared to identify and evaluate the potential environmental consequences associated with providing facilities and functions to homeport the Littoral Combat Ship on the West Coast of the United States. The homeporting will be conducted in phases over a period of 8 years, beginning in FY 2013. Naval Base San Diego was selected as the homeporting location, so activities associated with homeporting vessels, stationing personnel, and constructing facilities at Naval Base San Diego would have no potential for cumulative impacts at NBVC Point Mugu, and actions at Naval Base San Diego are not discussed in further detail in the EA. The MQ-8B Firescout, a UAS, is one of the supporting aerial systems associated with the Littoral Combat Ships, and the FONSI and <i>Final Environmental Assessment for the Homeporting of the Littoral Combat Ship on the West Coast of the United States</i> support the decision to store, maintain, and conduct test flights of the Firescout at NBVC Point Mugu (Navy 2012c). Up to 40 operational Firescouts would be required to support the mission modules associated with the Littoral Combat Ships homeported on the West Coast of the United States. The procurement of these 40 Firescouts would occur in phases over a 4-year period from FY 2013 to FY 2016, with the first deployment of a Firescout onboard a Littoral Combat Ship anticipated in FY 2013. Firescout test flights would be required to verify that maintenance has been performed properly. Test flights would consist of preprogrammed profiles and would total approximately 5 hours per month of flying time for all Firescouts. Up to 10 test flights could be conducted each month at NBVC Point Mugu. Storage and maintenance facilities would also be required to support the Firescouts. While on shore, up to eight Firescouts could be in a maintenance cycle at any one time and would need access to an airfield flight line for test flights. The Firescouts not in a maintenance cycle would be stored in a preserved state (i.e., defueled with the battery disconnected) to preserve airframe life. To support the storage, maintenance, and test flights of Firescouts at NBVC Point Mugu, 27 on-installation support personnel would be stationed, or based, at NBVC Point Mugu (Navy, 2012c).</p>
7	Transition to E-2D Advanced Hawkeye	<p>In 2009, the Navy prepared the <i>Final Environmental Assessment for the Transition of the E-2D Advanced Hawkeye, Naval Station Norfolk, VA, Naval Base Ventura County Point Mugu, CA</i>; a FONSI was signed February 9, 2009 (Navy 2009a, Navy 2009b). The Navy proposed to provide facilities and functions to support the replacement of 44 E-2C aircraft with 57 E-2D Advanced Hawkeye aircraft at established Airborne Early Warning home bases (i.e., Naval Station Norfolk and NBVC Point Mugu). For purposes of this analysis, only the actions proposed at NBVC Point Mugu are assessed. At the time of development of the E-2D Advanced Hawkeye EA, there were 16 E-2C aircraft and 644 E-2C aircraft personnel at NBVC Point Mugu. The transition to the E-2D Advanced Hawkeye began in FY 2011 and is expected to be completed in FY 2022. It is anticipated that the full transition to the Advanced Hawkeye would take approximately 11 years. Completion of the Advanced Hawkeye transition would result in an increase in the number of squadrons and the number of aircraft per squadron already there (approximately 200 personnel).</p>

Table 4-1. List of Potentially Cumulative Projects

#	<i>Project Title</i>	<i>Project Description</i>
8	Implementing the Bird/Wildlife-Aircraft Strike Hazard Management Plan	The Navy prepared an EA for the implementation of the Bird/Wildlife-Aircraft Strike Hazard (BASH) Management Plan at NBVC Point Mugu in 2008 (NAVFAC 2008). In addition to ongoing BASH management techniques, the Navy proposed various habitat modification projects, including specific grassland and wetland management, and several specific wildlife exclusion projects. The EA identified that 4.9 acres (1.9 hectares [ha]) of wetlands would be filled, 28.3 acres (11 ha) of brackish and freshwater marsh and 360.4 acres (146 ha) of transition disturbed habitat would be subject to mowing and vegetation removal, and wildlife abundance near the runways would be permanently excluded. Wetland losses would be offset by using the installation's existing wetland mitigation bank or by creating new mitigation projects. Operation of equipment and construction would generate minor air emissions. Implementation of BASH management would be expected to reduce hazards that pose a risk to aviation safety.
9	NBVC Point Mugu INRMP	The INRMP for NBVC is the Navy's long-term planning document to guide the installation commander in the management of natural resources to support the installation mission, while protecting and enhancing installation resources for multiple use, sustainable yield, and biological integrity (NAVFAC SW 2013). The INRMP addresses terrestrial and aquatic natural resources at NBVC Point Mugu and Special Areas. The INRMP establishes planning and management strategies; identifies natural resources constraints and opportunities; supports the resolution of land use conflicts, provides baseline descriptions of natural resources necessary for development of conservation strategies and environmental assessments; serves as the principal information source for the preparation of future environmental documents for proposed actions at NBVC Point Mugu and Special Areas; and provides guidance for annual natural resources management reviews, internal compliance audits, and annual budget submittals.
10	Shoreline Protection	The Navy is in the process of preparing an EA for the Shoreline Protection at NBVC. The Proposed Action would provide protection from the immediate threats of coastal flooding and beach erosion through the implementation of two projects, the West Revetment Extension and the Central Revetment Repair. The West Revetment Extension includes extending the existing revetment to protect Building 812 and Beach Road from flooding. The extension would continue to the southeast approximately 125 linear ft (38.1 meters) and crest at approximately 18 ft (5.5 meters) high. The revetment would be constructed of armored stone and the footprint would be approximately 0.18 acre (0.07 ha). The Central Revetment Repair would include increasing the crest elevation up to approximately 27 ft (8.2 meters); armoring the seaward slope; and reinforcing the backside of the structure by adding larger dense stone and increasing its width. Armored stone would be used for the repairs and stabilization of the revetment.

Table 4-1. List of Potentially Cumulative Projects

#	Project Title	Project Description
11	Ventura County General Plan	<p>In 2011, Ventura County updated its General Plan to extend the planning horizon from 2010 to 2020. The updates included updating population, dwelling unit, and employment forecasts; updating transportation and circulation impacts and noise impacts based on updated traffic forecasts; updating appendices based on the updated population, dwelling unit, and employment forecasts; and incorporating specific amendments as directed by the County Board of Supervisors (Ventura County Board of Supervisors 2013). The General Plan identified impacts on air quality, biological resources, agricultural resources, scenic resources, paleontological resources, cultural resources, coastal beaches and sand dunes, fire protection services, hazardous materials and waste and public health, noise and vibration, transportation circulation, airports and airport hazards, water resources and water supply, utilities and energy resources, education facilities, recreational facilities, community character, and housing as a result of direct and induced growth and road projects.</p>
12	Ormond Beach Specific Plan Environmental Impact Report	<p>The <i>Ormond Beach Specific Plan Final Environmental Impact Report (EIR)</i> was developed in 2009 (Oxnard Development Services 2009). This EIR addressed the 916.8-acre (371 ha) Ormond Beach Specific Plan Study Area on the Oxnard Plain in unincorporated Ventura County immediately outside the southeastern city limits of the City of Oxnard. The Study Area is currently almost exclusively used for agricultural activities. The Study Area is adjacent to the perimeter of NBVC Point Mugu and is divided into subareas by Hueneme Road: the 322.9-acre (131-ha) Northern Subarea and the 594.8-acre (241-ha) Southern Subarea. The Northern Subarea is proposed to be annexed as the South Shore Specific Plan project area, while a portion of the Southern Subarea would be annexed as the South Ormond Beach Specific project area. The South Shore Specific Plan calls for a variety of residential uses, a small amount of mixed-use commercial development, an elementary school, a high school, a man-made lake, and supporting park and open spaces. The South Ormond Beach Specific Plan calls for a mixture of light industrial and business park uses, and supporting open space. The South Shore and South Ormond Beach specific annexations would total approximately 700 acres (283 ha) of unincorporated Ventura County. If both plans are approved, approximately 330 acres (134 ha) would either be dedicated (i.e., protected in open space and park uses) or would remain agricultural in use. The Ormond Beach EIR evaluates the environmental effects of these proposed projects.</p>

SECTION 1

1 4.2 Cumulative Impacts Analysis

2 4.2.1 Water Resources

3 The geographic scope of the water resources cumulative analysis includes the waterways (i.e.,
4 Mugu Lagoon) that receive surface water flows from the project site. Cumulative development up
5 gradient of the Mugu Lagoon (i.e., receiving waters for cumulative projects), including Implementing
6 the BASH Management Plan, Shoreline Protection, and Ormond Beach Specific Plan, could result in
7 temporary and localized effects to water quality that could be individually greater than those
8 associated with the Proposed Action. Environmental Protection Measure 1 (Section 2.2.1.1,
9 Environmental Protection Measures) was developed to accompany BMPs and the required permits
10 that ensure that project actions avoid, minimize, and mitigate these potential effects. Therefore,
11 implementation of the Proposed Action would not result in significant impacts to water
12 resources, including surface water and groundwater quality, construction-induced erosion, dispersion
13 of construction-related contaminants or existing groundwater contamination, or increased flooding
14 potential on- or off-site. Although other past, present, and reasonably foreseeable projects on NBVC
15 Point Mugu and in adjacent areas/communities would have similar effects, these projects would
16 also comply with applicable federal, state, and local regulations and/or requirements, and would have
17 to implement similar types of protection measures. This would minimize the majority of potential
18 impacts from Proposed Action and other projects on and in the regional vicinity. Therefore,
19 implementation of the Proposed Action, in addition to the effects from past, present, and reasonably
20 foreseeable projects, would not result in significant cumulative impacts to water resources.

21 4.2.2 Cultural Resources

22 The geographic region of analysis for potential cumulative impacts to cultural resources consists
23 of NBVC Point Mugu and adjacent communities. Regional development and urbanization in California
24 has resulted in extensive impacts to cultural resources, especially the destruction of archaeological
25 sites and historic buildings. These types of cultural resources are limited, which is one of the
26 reasons why strict federal and state regulations have been implemented to provide management and
27 regulatory oversight.

28 Past, present, and reasonably foreseeable projects at NBVC Point Mugu that involve ground
29 disturbing activities within areas not surveyed and/or modification or demolition of historic structures
30 could result in impacts on cultural resources. Federal projects that could potentially affect historic
31 properties (assuming the presence of such properties) would undergo Section 106 review under the
32 NHPA, and any adverse effects on historic properties (under the standards of the NHPA) would be
33 mitigated. The potential significance of any such adverse effects would also be assessed for purposes
34 of NEPA.

35 No cultural resources are known to exist in the relevant APEs, nor is discovery of cultural resources
36 expected in the course of carrying out the proposed action. Therefore, implementation of the
37 Proposed Action, in addition to the effects from past, present, and reasonably foreseeable projects,
38 would not result in significant cumulative impacts to cultural resources.

39 4.2.3 Biological Resources

40 The geographic region of analysis for potential cumulative impacts to biological resources consists of
41 the proposed restoration areas and adjacent wetlands on NBVC Point Mugu. Past, present, and
42 reasonably foreseeable cumulative projects in the region that require ground-disturbance,
43 vegetation clearing, grading, and excavations (e.g., Implementing the BASH Management Plan,

1 Shoreline Protection, and Ormond Beach Specific Plan) could result in temporary and localized
2 effects to biological resources that may be individually comparable to or greater than those
3 associated with the Proposed Action. Potential cumulative impacts associated with the loss of
4 nesting and/or roosting habitat for MBTA-protected species (e.g., raptors and owls) from the
5 Proposed Action would be minimized by compliance with the MBTA, EO 13186, the DoD/USFWS
6 MOU to "Promote the Conservation of Migratory Birds," and the INRMP. As discussed in Section 3.3,
7 Biological Resources, the Proposed Action would not result in significant impacts to biological
8 resources. Although other past, present, and reasonable foreseeable projects on NBVC Point Mugu
9 and in adjacent areas/communities would also have the potential for biological effects, these
10 projects would also have to comply with applicable federal, state, and local regulations and/or
11 requirements, including the MBTA, EO 13186, MOU, and INRMP. The long-term impact of the
12 proposed action on biological resources is expected to be positive. Therefore, implementation of the
13 Proposed Action, in addition to the effects from past, present, and reasonably foreseeable projects,
14 would not result in significant cumulative impacts to biological resources.

15 **Climate Change**

16 Greenhouse Gases

17 The potential effects of proposed greenhouse gas (GHG) emissions are by nature global and cumulative
18 impacts, as individual sources of GHG emissions are typically not large enough to have an appreciable
19 effect on climate change. Therefore, an appreciable impact to global climate change would only occur
20 when proposed GHG emissions combine with GHG emissions from other man-made activities on a
21 global scale.

22 Currently, there are no formally adopted or published NEPA thresholds of significance for GHG
23 emissions. However, a comparison can be made between the Proposed Action and the much larger
24 recently proposed NBVC PPV Military Family Housing project (a demolition and lease action). That much
25 larger proposed project was estimated (NRSW 2014) to have project GHG emissions only about
26 0.00000018 percent of the 2012 U.S. CO₂e emissions inventory. So even the much larger PPV project
27 had only a de minimus potential for contribution to global climate change. No other cumulative project
28 would have the potential to generate more than comparably-negligible GHG emissions. Therefore, GHG
29 emissions from construction of the Proposed Action, in combination with global GHGs, would not
30 produce significant cumulative impacts to global climate change.

31 Although the alternatives would produce de minimus cumulative impacts to global climate change
32 during construction phase, the Navy implements broad-based programs to reduce energy consumption
33 and shift to renewable and alternative fuels, thereby reducing overall emissions of GHGs. Some of these
34 programs are listed below.

35 EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, adopted in October
36 2009, directs federal agencies to increase renewable energy use to achieve general GHG emission
37 reductions. EO 13514 requires federal agencies to develop a 2008 GHG emissions baseline and to
38 develop a percentage reduction target for agency-wide GHG reductions by FY 2020. As part of this
39 effort, federal agencies will evaluate sources of GHG emissions and develop, implement, and annually
40 update an integrated Strategic Sustainability Performance Plan that will prioritize agency actions based
41 on lifecycle analyses. The DoD is currently developing its Strategic Sustainability Performance Plan that
42 will guide Navy initiatives to reduce GHG emissions.

- 43 • On 16 October 2009, the Secretary of the Navy announced five energy targets for the Navy, as

1 summarized below. When awarding contracts, appropriately consider energy efficiency and energy
2 footprints as additional factors in acquisition decisions.

- 3 • By 2012, demonstrate a Green Strike Group composed of nuclear vessels and ships powered by
4 biofuels. By 2016, sail the Strike Group as a Great Green Fleet composed of nuclear ships, surface
5 combatants equipped with hybrid electric alternative power systems running on biofuels, and
6 aircraft running on biofuels.
- 7 • By 2015, cut petroleum use in its 50,000 non-tactical commercial fleet in half, by phasing in hybrid,
8 flex fuel, and electric vehicles. By 2020, produce at least half of the shore-based installations' energy
9 requirements from alternative sources. Also, convert 50 percent of all shore installations to net zero
10 energy consumers.
- 11 • By 2020, half of the Navy's total energy consumption for ships, aircraft, tanks, vehicles and shore
12 installations would come from alternative sources.

13 As part of its efforts to encourage the development of alternative fuels, on 22 January 2010 the Navy
14 and the Department of Agriculture signed an MOU to encourage the development of advanced biofuels
15 and other renewable energy systems.

16 **Climate Change Adaptation**

17 For projects in southern California, the main effect of climate change to consider is increased
18 temperatures and droughts, as documented in *Global Climate Change Impacts in the United States* (U.S.
19 Global Change Research Program 2009). California is currently in a drought, and neither drought nor
20 high temperatures are likely to result in any substantive change in the impacts of the Proposed wetland
21 restoration action. Only a de minimus amount of potable water would be used during the eight week
22 implementation of the Proposed Action so no impact to water supplies in southern California or Ventura
23 County would occur as a result of project implementation. Any future sea level rise that would affect
24 the Proposed Action site would also have substantial effects on the overall operations of NBVC Point
25 Mugu, and measures to address/accommodate sea level rise would need to be implemented on a base-
26 wide basis. Wetlands act as a buffer against storms so improvement of them may help with climate
27 change adaptation. No other substantial effects from future climate change would impact the Proposed
28 Action construction or maintenance activities.

29

5 Other Considerations Required by NEPA

5.1 Possible Conflicts between the Proposed Action and the Objectives of Federal Acts, Executive Orders, Policies, and Plans

Implementation of the Proposed Action would comply with all federal laws and regulations. The federal acts and EOs that specifically apply to this project include: NEPA; CWA; NHPA; and EO 12898, Minority Populations and Low-Income Populations.

5.2 Energy Requirements and Conservation Potential of Alternatives Including the Proposed Action and All Energy Conservation Measures Being Considered

The Proposed Action includes the enhancement of approximately 3 acres of wetland habitat through the installation of a culverts and drainage swales to re-establish a coastal tidal water flows. This action would have no significant impact on energy use on the base.

5.3 Irreversible or Irrecoverable Commitment of Natural or Depletable Resources

NEPA requires an analysis of significant, irreversible effects resulting from implementation of a Proposed Action. Resources that are irreversibly or irretrievably committed to a project are those that are typically used on a long-term or permanent basis; however, those used on a short-term basis that cannot be recovered (e.g., non-renewable resources such as metal, wood, fuel, paper, and other natural or cultural resources) also are irretrievable. Human labor also is considered an irretrievable resource. All such resources are irretrievable in that they are used for one project and thus become unavailable for other purposes. An impact that falls under the category of the irreversible or irretrievable commitment of resources is the destruction of natural resources that could limit the range of potential uses of that resource.

Implementation of the Proposed Action would result in an irreversible commitment of a small amount of materials associated with construction of amenities; fuel for construction equipment and vehicles used during construction activities; and human labor. However, these commitments of resources are neither unusual nor unexpected, given the nature of the action. The Proposed Action would not result in the destruction of other environmental resources such that the range of potential uses of the environment would be limited, or affect the biodiversity of the region.

5.4 Relationship Between Short-Term Uses of the Environment and Long-Term Productivity

NEPA requires consideration of the relationship between short-term use of the environment and the impacts that such use could have to the maintenance and enhancement of the long-term productivity of the affected environment. Of particular concern are impacts that would narrow the range of beneficial uses of the environment. This refers to the possibility that choosing one alternative reduces future flexibility in pursuing other options, or that transforming land or other resources to a certain land use often eliminates the possibility of other uses being performed at that site.

Implementation of the Proposed Action would not result in any such environmental impacts because it would not pose long-term risks to health, safety, or the general welfare of the communities surrounding the project site that would significantly narrow the range of future beneficial uses. In addition, biological productivity would not be negatively affected, as implementation of the Proposed Action would not result in significant direct, indirect, or cumulative impacts to any biological resources. However, the project is intended to restore wetlands and, as such, would cause a net biological benefit.

1 **5.5 Any Probable Adverse Environmental Effects that Cannot be Avoided and are not Amenable**
2 **to Mitigation**

3 This EA has determined that the Proposed Action would not result in any significant unmitigable
4 impacts; therefore, there are no probable adverse environmental effects that cannot be avoided or are
5 not amenable to mitigation.

6 References

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