Appendix O. Wetlands Evaluation and Mitigation Options

Table of Contents

Acronyms and Abbreviations

bgs	below ground surface
CCR	California Code of Regulations
CFR	Code of Federal Regulations
ERA	ecological risk assessment
FS	Feasibility Study
HPS	Hunters Point Shipyard
PSC	Protective Soil Concentration
RI/FS	Remedial Investigation/Feasibility Study
RWQCB	Regional Water Quality Control Board
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency

Section 1. Condition of Existing Wetlands

As discussed in Section 2 of the main report, Parcel E-2 contains intertidal and freshwater wetlands. These wetlands would be impacted during implementation of any containment or removal action that would alter existing site conditions. Compliance with the location-specific applicable or relevant and appropriate requirements (specified in Section 10 of the main report) will require that the site restoration plans address any wetlands impacted during the remedy implementation.

This section summarizes the existing conditions of the wetland areas at Parcel E-2. Section 2 summarizes the regulatory framework for addressing impacts to wetlands at Parcel E-2. Section 3 evaluates the process options for satisfying the regulatory requirements.

1.1. FUNCTIONS AND VALUES ASSESSMENT

A functions and values assessment of the wetlands was conducted in December 2001, in conjunction with the wetlands delineation, and was followed by a confirmatory assessment in April 2002. The wetlands delineation was conducted using technical guidelines and methods described in the U.S. Army Corps of Engineers (USACE) wetland delineation manual (USACE, 1987b). The functions and values assessment followed the methods and guidance in USACE's wetland evaluation technique (USACE, 1987a).

The two wetland areas identified at Parcel E-2 are summarized below.

1. **Intertidal wetlands in the Shoreline Area**: Approximately 2.38 acres of intertidal and saline emergent wetlands along the Parcel E-2 shoreline were identified. The wetlands are bounded by a riprap wall and the Bay. The riprap wall ranges from 10 to 30 feet wide and 3 to 15 feet high. The ground surface in the intertidal wetlands areas slopes gently downward from the base of the riprap wall to the shore of the Bay. Most of the intertidal wetlands are part of the Shoreline Area, although some extend slightly into the Panhandle Area.
2. **An inland seasonal freshwater wetland in the Panhandle Area**: A 1.3-acre seasonally ponded area was identified in the Panhandle Area of Parcel E-2. The wetland consists of a stormwater drainage ditch and a low-lying area where stormwater runoff ponds during the wet season. The wetland is bordered by the Landfill Area to the northeast, the Bayview/Hunters Point district to the west and northwest, and the Shoreline Area to the south. The wetland receives runoff from the north through a drainage ditch. During storm events, there may be some tidal influx through a culvert in the south berm. The Bay side opening of the drainage culvert has a flap to prevent tidal inflow, but the flap has been rusted open for some time.

All wetlands identified at Parcel E-2 (tidal and freshwater) are situated along the Pacific Flyway; therefore, an abundance and diversity of wintering and migrating waterfowl species is a potentially

significant feature; however, only red-winged blackbirds were observed to nest in the seasonal freshwater wetland. The diversity and abundance of aquatic organisms are moderate in the tidal wetlands and low in the seasonal freshwater wetland. This is presumably due to the toxicity of the soil and water in both types of wetlands, and due to the seasonal nature of the freshwater wetland.

The tidal and seasonal freshwater wetlands identified at Parcel E-2 have no recreational value. Access to the wetlands is restricted because the site is located within a naval base. The wetlands are not unique and have no cultural value because they are manmade and situated on artificial fill. In general, the most significant function of these wetlands is seasonal use for wintering and migrating wildlife. Because the wetlands are located on a known hazardous waste disposal site on manmade land, value in terms of social significance, effectiveness, and opportunity is low.

1.2. SOIL SCREENING EVALUATION

Analytical data were collected at Parcel E-2 during the remedial investigation (Tetra Tech EM Inc. [TtEMI], Levine-Fricke-Recon, Inc. [LFR], and Uribe and Associates, Inc. [Uribe], 1997) and the standard data gaps investigation (TtEMI, 2005). These data were used to evaluate the concentrations of hazardous substances in and around the Parcel E-2 wetlands. Because of the sensitive nature of wetlands, the evaluation process used the following criteria considered suitable for wetland environments:

- Wetland cover and foundation criteria for various chemical compounds, including metals, volatile organic compounds, semi-volatile organic compounds, polychlorinated biphenyls, and organochlorine pesticides
- Parcel E terrestrial ecological Protective Soil Concentration (PSCs) for cadmium, copper, lead, nickel, selenium, and zinc

The San Francisco Bay Regional Water Quality Control Board (RWQCB) developed screening criteria for dredged materials that may be used to create wetlands (RWQCB, 1998). Criteria for surface wetlands material were based on ambient levels for the Bay (RWQCB, 1998), and criteria for wetlands foundation material were based on the effects-range median (ER-M) value (Long and Morgan 1991; Long and others, 1995).

PSCs were developed during the ecological risk assessment (ERA) (TtEMI, LFR, and Uribe, 1997; TtEMI and LFR, 2000). PSCs represent the highest concentration for the most sensitive receptor at which no adverse effects are expected to occur as a result of exposure. PSCs were used to screen potential wetland restoration areas based on conversations with RWQCB representatives, who indicated that if dredged materials were not used to create the wetlands, contamination should be assessed using ERA methodology (TtEMI, 2003). PSCs, however, provide only an estimation of probable risk to wetlands because (1) they were developed using data from non-wetland areas and (2) metals availability for ecological receptor uptake may be different in wetland areas (TtEMI and LFR, 2000).

Chemical concentrations in the wetland surface material and wetland foundation material zone in the Panhandle Area were compared with the above criteria to evaluate whether chemical concentrations

posed a potential risk to ecological receptors. Cadmium, copper, lead, and zinc were present at concentrations that exceeded the PSCs in the surface (from 0 to 3 feet below ground surface [bgs]). One sample collected from deeper than 3 feet bgs contained concentrations of cadmium, copper, lead, and zinc that exceeded PSCs. In addition, concentrations of various organic compounds (most notably SVOCs and PCBs) were found in the surface soil in the Panhandle Area and sediment in the Shoreline Area at concentrations above the wetland cover criteria.

These findings confirm that the existing soil fill within and adjacent to the existing Parcel E-2 wetlands is not suitable to support additional wetland construction without some form of remedial action. The remedial alternatives developed and evaluated in Sections 12 and 13 are intended to protect human health and the environment. These remedial alternatives are being evaluated for application throughout Parcel E-2 and, therefore, will address the soil contamination that makes the existing conditions unsuitable for wetlands construction.

Because of the low surface elevation of the Panhandle and Shoreline Areas, relative to the rest of Parcel E-2, these are ideal locations for wetlands construction that may be required to mitigate the remedial action being considered for Parcel E-2.

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Section 2. Regulatory Framework

Implementation of any containment or removal action that would alter existing site conditions will impact Parcel E-2 wetlands. Compliance with regulations for wetlands protection (in accordance with the Clean Water Act [Section 404] and the San Francisco Bay Plan [Title 14 of the California Code of Regulation (CCR), Sections 10110 through 11990]) will require that such impacts be addressed through the USACE wetlands mitigation process, which is discussed in Subsection 2.1.

The Navy will discharge fill material into the wetlands at Parcel E-2 in a manner consistent with the Nationwide General Permit 38 (Cleanup of Hazardous and Toxic Waste) available under the USACE Nationwide Permit program (Title 33 Code of Federal Regulations Section 330). The Navy will comply with the substantive provisions of the Nationwide Permit 38 as a means of compliance with the Clean Water Act. A detailed analysis of regulatory requirements for construction activities that impact existing wetlands at Parcel E-2 is presented in Appendix N. Potential impacts to wetlands and other Waters of the United States are assessed and managed following a tiered process of avoidance, minimization, and compensatory mitigation described in the following subsections.

2.1. OVERVIEW OF WETLAND MITIGATION PROCESS

Under the USACE's regulatory program, wetlands mitigation is defined as a three-step process: 1) avoidance, 2) minimization, and 3) compensatory mitigation. The goal of the mitigation process is to achieve no net loss of aquatic habitat value, which is most often expressed as no net loss of acreage of aquatic habitat, including wetlands. The following sections discuss the regulatory framework of each of these steps.

2.1.1. Avoidance

USEPA's regulations at 40 Code of Federal Regulations (CFR), Part 230.10 (a) (USEPA Guidelines), require that a proposed project be the least damaging practicable alternative. In addition, 40 CFR, Part 230.10 (a) (3), sets forth the following presumptions that the applicant must adequately rebut: 1) alternatives for non-water-dependent activities that do not involve special aquatic sites (wetlands, mudflats, pool and riffle areas, and vegetated shallows) are available and 2) alternatives that do not involve special aquatic sites have less adverse impact on the aquatic environment. The first step in the wetlands mitigation process is therefore demonstrating that the preferred alternative is the least environmentally damaging practicable alternative that will allow an applicant to achieve the overall project purpose.

2.1.2. Minimization

USEPA guidelines in 40 CFR, Part 230.10(d), state that appropriate and practicable steps to minimize the adverse impacts of a project will be required through project modifications and permit conditions. Once an applicant has demonstrated that the preferred alternative is the least environmentally damaging practicable alternative, the applicant must then demonstrate that steps have been taken to minimize impacts to jurisdictional areas. These steps could either include modification of the project to reduce the footprint or conditions attached to the approval that define actions to minimize impacts, such as defining a specific construction window to reduce potential impacts to a sensitive resource that seasonally uses the jurisdictional feature (for example, prohibiting construction during the breeding season for endangered or threatened species, if present). Some of these conditions may originate from different agencies, such as the U.S. Fish and Wildlife Service.

2.1.3. Compensatory Mitigation

Once the first two steps have been completed, the applicant is responsible for developing a mitigation plan to compensate for the unavoidable loss of jurisdictional habitat (such as wetlands). USACE and other resource agencies generally prefer compensatory mitigation to be on site or contiguous to the project site. When on-site mitigation is not practicable, then off-site mitigation in the same geographical vicinity may be appropriate. Mitigation banking may be an appropriate form of off-site compensatory mitigation. Additionally, in-kind compensatory mitigation (for example, creating a new tidal marsh to compensate for filling a former tidal marsh) is usually preferable to out-of-kind mitigation (for example, creating a seasonal marsh to compensate for filling a tidal marsh). Only in exceptional cases will USACE and other trustees accept the preservation of off-site aquatic resources as compensatory mitigation for on-site impacts to jurisdictional wetlands. Preservation, as an alternative to replacement, typically requires a greater mitigation ratio (i.e., 3:1 or more), and there must be a demonstrated threat to the aquatic resources included within the proposed preservation area.

USACE requires no net loss of wetland acres or value, with acreage usually being the determining criterion because there are no widely accepted procedures for quantifying wetland functions or values. If functions and values must be considered in the determination of impacts and mitigation, hydrogeomorphic methodology approach is most commonly used and accepted.

2.2. ANTICIPATED WETLANDS IMPACTS

Both containment and removal response actions are being considered for application throughout Parcel E-2. These responses actions would impact the existing tidal and freshwater wetlands at Parcel E-2. In addition, remediation activities in Parcel E-2 could impact adjacent non-wetland mudflat areas in Parcel F. These mudflat areas are considered to be Waters of the United States, and as such are regulated by the USACE. Impacts to mudflat areas could require mitigation in addition to the mitigation required for impacts to jurisdictional wetlands at Parcel E-2.

Also, if shoreline armoring is required, the armoring structure (e.g., rock revetment) will cause hydraulic changes in wave dynamics and near-shore currents which may cause scour and transport of sediments on the mudflats within a zone parallel to the rock revetment. These impacts would also require considerations in the design and/or mitigation. The nature and extent of potential sediment scour resulting from the proposed rock revetment depends on the location of the revetment within the intertidal zone, the orientation and shape of the revetment surface, the near-shore bathymetry of the mudflat, sediment characteristics, and prevailing hydrodynamics within the waterway.

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Section 3. Evaluation of Wetlands Mitigation Options

The remedial technologies for wetlands mitigation considered in this FS are: 1) avoidance, 2) minimization, and 3) compensatory mitigation. The following sections discuss the applicability of each of these technologies for the wetland mitigation at Parcel E-2. Viable process options are then evaluated based on three factors: 1) effectiveness; 2) implementability; and 3) cost.

3.1. AVOIDANCE

Due to overlapping distributions of contaminated solid waste, soil, and sediment with wetlands, avoidance is not feasible with either the containment or removal response actions being considered for Parcel E-2. Avoidance of existing wetlands is feasible only if no further remedial action were taken at Parcel E-2; however, avoidance of wetland impacts would not result in effective control of potential human and ecological exposures to contaminated solid waste, soil, or sediment at Parcel E-2. Therefore, avoidance is not considered an applicable technology for wetlands mitigation.

3.2. MINIMIZATION

The RI concluded that, because of the heterogeneous contaminant distribution at Parcel E-2, the uniform implementation of a given remedial alternative across the adjacent areas is the most expeditious and cost-effective means of protecting human health and the environment. As such, minimization of wetland impacts is not considered feasible because the remedial alternatives being considered are to be applied throughout Parcel E-2. Therefore, avoidance is not considered an applicable technology for wetlands mitigation.

3.3. COMPENSATORY MITIGATION

The compensatory mitigation technology has three process options:

- Wetlands mitigation banking
- Wetlands restoration within HPS at areas not impacted by chemical contamination, either in an area outside of Parcel E-2 or within Parcel E-2 following excavation; this option could be assembled into an alternative involving excavation of the Landfill Area and the adjacent areas.
- Wetlands restoration in Parcel E-2 on top of a constructed cap; this option could be assembled into an alternative involving containment of the Landfill Area and the adjacent areas.

Each mitigation approach is discussed and evaluated in detail in the following subsections.

3.3.1. Wetlands Mitigation Banking

Under this process option, the wetlands in Parcel E-2 would not be replaced onsite and the Navy would provide finance resources to a wetlands mitigation bank to support restoration of the wetlands in another point in the San Francisco Bay area. Wetland mitigation banks are common in California, and have been approved as part of a joint State and Federal program for over 15 years. Wetland mitigation banks provide an alternative to off-site compensatory mitigation along with the additional benefit of severance of liability associated with monitoring and maintaining the ecological value of the mitigation over time. For mitigation banks, each transaction requires regulatory approval, and the credits are only applicable within a defined "service area" (i.e., the impacts must be located within the service area to qualify the project proponent to use the mitigation bank). State and Federal agencies favor the use of mitigation banks when the ecological benefits associated with the bank align closely to the ecological benefits lost as a result of the impacts. Because mitigation banks are considered off-site mitigation, regulators tend to require mitigation ratios greater than 1:1. The ratios increase further if the ecological benefits of the bank do not align well with the impacts, and the mitigation is considered "out-of-kind".

Effectiveness

If an appropriately located mitigation bank existed, this option could be effective for Parcel E-2 because it would satisfy State and Federal requirements for wetland impact mitigation. From a standpoint of protecting human health and the environment, this approach is also effective by preventing wetland plants and animals from potentially contacting chemicals and solid wastes by moving these resources away from the area of impacts and, with the proper resources, there would be adequate surface area, sediments, and water resources to compensative for the loss of the wetlands and mudflats in Parcel E-2.

Implementability

As of November 2005, the wetlands banking process option is not implementable. There are no open wetland mitigation banks that include the Hunters Point site within their approved service area, thus there are not the administrative resources required to implement this approach. This alternative may become implementable if a wetland mitigation banker initiates development of a mitigation bank that is appropriately located and provides the necessary ecological functions and values. The timeline for establishing a mitigation bank varies from 2 to 4 years from inception, and the credits are made available for sale in discrete allotments over a 5- to 10-year period based on a negotiated credit release schedule tied to ecological performance measures.

Cost

Costs for wetland mitigation credits from a wetland mitigation bank vary by location, and are typically negotiated based on the current local demand for credits and the size of the transaction (i.e., a larger transaction can command a reduced price per credit). Typically, the cost of mitigation bank credits is set by the local market cost for a project sponsor to create the same mitigation themselves on the scale of 1 or 2 acres. Mitigation bank credits typically cost marginally more than self-performed off-site mitigation to

account for the added value of severance of liability, immediacy of ecological benefits, and reduction in permit review time. Depending on the type and location of wetland impacts, State and Federal regulatory agencies also apply mitigation ratios to mitigation bank credit transactions that increase the amount of mitigation required compared to on-site, in-kind mitigation alternatives.

3.3.2. Restoration on Areas at HPS Not Impacted by Contamination

Under this alternative, disturbances of the wetlands in Parcel E-2 through excavation and/or capping would be allowed to occur but the impacts will be mitigated by enhancement or restoration of the wetland at other areas of Hunters Point or within Parcel E-2 following excavation or capping of solid waste and soil exceeding screening criteria. The restoration would be done at a 1:1 ratio (or possibly at a higher ratio). If the mitigation were performed outside of Parcel E-2, its timing would be independent of the remedial action at Parcel E-2 but would be dependent upon actions and activities at other portions of HPS.

Effectiveness

This process option would be effective. The existing wetlands in Parcel E-2 are low-quality wetlands that are currently impaired and provide very limited ecological functions and values as discussed in Section 1. New wetlands would be of a higher quality, would improve ecological function, and would satisfy the criterion for no net loss of wetland acreage.

Implementability

Wetlands restoration has been successfully implemented throughout the U.S. and there are multiple examples of freshwater and tidal wetlands restoration throughout the San Francisco Bay area.

Wetlands could be established in the same areas of Parcel E-2 where they now exist unless specific areas are unusable for this purpose based on physical limitations associated with ground elevations or the presence of structures (e.g., rock revetment). Following excavation within Parcel E-2, the backfilling and grading can be done to optimize the management of water and sediment deposition for a variety of wetlands.

Wetland restoration on uncontaminated areas outside of Parcel E-2 may have administrative and technical limits to implementation. There are limited areas on the HPS site that are appropriate for wetlands restoration either due to contamination, compatibility with anticipated future uses, and/or inadequate water and sediment resources to create the wetlands.

Cost

For self-performed wetland creation, costs are typically driven by three primary factors: 1) earthwork/grading, 2) plant material, and 3) structures such as dikes, levees, or flow control. Self-performed wetlands restoration would generally cost marginally less than wetlands mitigation banking. The cost of creating wetlands outside of Parcel E-2 may be comparable to or moderately higher than wetlands creation on Parcel E-2, depending on the level of effort to create suitable conditions.

3.3.3. Restoration on Parcel E-2 Following Containment

Under these alternatives, disturbance of the wetlands in Parcel E-2 will be allowed but these impacts will be mitigated by restoration of the wetland within Parcel E-2 on top of the cap in the adjacent areas. As with the other restoration options, the restoration would be done at a 1:1 ratio after implementation of the selected remedial action by in-kind wetland creation in the approximate location of existing wetlands.

Effectiveness

This process option would be effective. The existing wetlands in Parcel E-2 are low-quality wetlands that are currently impaired and provide very limited ecological functions and values as discussed in Section 1. New wetlands would be of a higher quality, would improve ecological function, and would satisfy the criterion for no net loss of wetland acreage.

Implementability

The wetlands proposed for mitigation would be established on top of the cap. This would require that the wetland does not compromise the function of the cap in preventing water from infiltrating into the material left in place under the cap. Similarly, the wetlands must be designed to function even though the cap effectively prevents the wetlands from having a hydrologic connection to shallow groundwater. The soil placed within wetland areas must have appropriate characteristics for wetland development (e.g., elevated organic carbon content, low hydraulic conductivity), while not interfering with the function of the cap below the root zone of the wetland plant community. The composition of the plant community must be carefully selected to avoid plants with deep roots that could impact the cap. Finally, the elevation of the wetland surface must be set appropriately based on the surrounding landscape and the tidal elevation range to ensure adequate wetland hydrology is established by surface water and not dependent on shallow ground water.

The restoration of wetlands over a geomembrane and imported clean soil is a fairly common approach for wetlands created for storm-water management and restoration for wetlands impacted by development. These demonstrate that the basic engineering approach can be implemented from a technical standpoint. Wetlands restoration over caps designed to contain solid waste or contamianted soil are not as common; however, one such project was performed at the Shell Refinery in Martinez, California during the late 1980s and early 1990s (Shaw Environmental, Inc., 2005).

Cost

For self-performed wetland creation, costs are typically driven by three primary factors: 1) earthwork/grading, 2) plant material, and 3) structures such as dikes, levees, or flow control. Self-performed wetlands restoration would generally cost marginally less than wetlands mitigation banking. The cost of creating wetlands at Parcel E-2 may be comparable to or moderately lower than wetlands creation outside of Parcel E-2, depending on the level of effort to create suitable conditions.

Section 4. Recommended Mitigation Alternative

Wetlands that are damaged as a result of implementation of the Parcel E-2 remedy would be mitigated at a 1:1 ratio if either a containment or removal response action is implemented. The preferred mitigation option would restore wetlands at Parcel E-2 following implementation of the remedial action, and would create higher quality wetlands (than existing conditions) and satisfy the no net loss of acreage criterion. In general, the wetlands would be created in the same areas where they now exist unless the area becomes unusable for a reason(s) not foreseen at this juncture. If the wetlands cannot be mitigated in Parcel E-2, then in-kind wetlands would be created in other appropriate areas of Hunters Point.

4.1. CONCEPTUAL DESIGNS

Figure 12-1 shows the location of proposed wetland areas for the containment alternative. Figure 12-12 shows the location of proposed wetland areas for the removal alternative. The conceptual designs include both freshwater wetlands and tidal wetlands in the same proportion as the anticipated impacts to those wetland types. Figure 12-11 shows a net expansion of tidal wetlands along the shoreline; however, the intertidal restoration proposed in this area would incorporate shoreline protection measures that would limit the overall area available for wetlands restoration (but would still provide adequate area to mitigate at a 1:1 ratio).

4.2. DESIGN CONSIDERATIONS

The proposed designs are implementable provided the specific design considerations are incorporated, as described below. The discussion of implementability addresses the technical aspects of wetlands regarding quantity and quality of water available to support wetland hydrology and the sources of sediments necessary to maintain the appropriate ground elevation within the intertidal zone. The discussion focuses primarily on how well the restoration of the wetland can be accomplished with a cap since the requirements of the cap impose water and topographic constraints that are not present for wetlands that would be created on uncapped surfaces.

4.2.1. Freshwater Wetlands

The hydrology of existing freshwater wetlands is driven primarily by surface water runoff drained by existing landscape contours into focused low-lying areas that have become wetlands. The proposed grading plans do not significantly increase or decrease the size of the area that will drain to the corresponding low-lying area that will form the proposed wetland for mitigation. The created wetland must be approximately the same size as the existing wetland in this area since the size of the wetland is

determined largely by the surface water runoff available to support wetland hydrology. Any increase in the size of the proposed wetland must be accompanied by a proportionate increase in the supply of surface water runoff to the proposed wetland area. Since hydrology is surface-water driven, the exact elevation of the wetland ground surface is not a fixed specification based on independent factors (e.g., groundwater level or tidal zone). The new ground surface must be set at a lower elevation relative to the surrounding area that drains to it. To support wetland hydrology, the soil must be saturated within 12 inches of the ground surface for no less than approximately 30 days during the growing season. Certainty of success would be increased by configuring the wetland as a low-lying depression lined with poorly drained soil.

4.2.2. Tidal Wetlands

The hydrology of tidal wetlands is dictated by the elevation of the wetland ground surface with respect to the local tidal range. Additional physical effects on hydrology are realized by hydraulic controls (i.e., if the wetland is isolated from open water and tidal flows enter and leave the wetland through a constriction or flow control structure). The composition of plant communities is highly sensitive to elevation within the intertidal zone. Design considerations must ensure that the size of the wetland determines the minimum acceptable size of any flow control structure or channel such that the appropriate volume of water can enter and leave the wetland during the course of normal tidal fluctuations. If the hydraulic control is too small, the wetland will not fill up during normal tidal fluctuations, and that will modify the size of the effective wetland and the composition and distribution of the plant communities.

Section 5. References

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