


Georgia-Pacific, LLC

OPERABLE UNIT E MITIGATION AND MONITORING PLAN

Fort Bragg Former Wood Products Facility

July 2016

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OPERABLE UNIT E MITIGATION AND MONITORING PLAN

Fort Bragg Former Wood Products
Facility



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ACRONYMS AND ABBREVIATIONS

AJD	Approved Jurisdictional Determination
Arcadis	Arcadis U.S., Inc.
CDFW	California Department of Fish and Wildlife
City	City of Fort Bragg
CRAM	California Rapid Assessment Method
dbh	diameter at breast height
DTSC	Department of Toxic Substances Control
Georgia-Pacific	Georgia-Pacific, LLC
mg/kg	milligrams per kilogram
MMP	Mitigation and Monitoring Plan
NFA	No Further Action
OU-E	Operable Unit E
OU-E Lowlands	portion of OU-E direct north of Pond 8
OU-E Removal Action	OU-E soil and sediment removal action
pg/g	pictograms per gram
RBTLs	risk based tolerance levels
RWQCB	North Coast Regional Water Quality Control Board
Site	Georgia-Pacific former wood products facility
USACE	United States Army Corps of Engineer
WRA	WRA, Inc.

EXECUTIVE SUMMARY

This Mitigation and Monitoring Plan (MMP) details proposed compensatory mitigation activities to address impacts to waters of the United States and waters of the State anticipated to result from the Operable Unit E (OU-E) Soil and Sediment Removal Action (OU-E Removal Action) at the Georgia-Pacific, LLC former Fort Bragg Wood Products Facility located at 90 Redwood Avenue in Fort Bragg, California (the Site). Proposed OU-E Removal Action activities involve excavation and off-site disposal of approximately 2,263 cubic yards of soil and sediment in habitats potentially jurisdictional as waters of the United States or waters of the State. OU-E Removal Action activities are being conducted in accordance with Department of Toxic Substance Control Investigation and Remediation Order Docket No. HAS-RAO-06-07-150. Excavation activities in OU-E are proposed to occur in conjunction with excavation activities proposed in developed upland areas of Operable Units C and D to facilitate construction of the Coastal Trail, as proposed by the City of Fort Bragg (the City).

Proposed OU-E Removal Action activities are anticipated to impact approximately 0.064 acre of waters of the United States (0.055 acre of wetland habitat and 0.009 acre of stream habitat), approximately 0.476 acre of waters of the State (which includes the 0.064 acre of impacts to waters of the United States), and approximately 0.020 acre of upland riparian habitat. Anticipated impacts will be temporary in nature, and restoration activities proposed in this MMP will occur immediately following completion of OU-E Removal Action activities. Impacts to waters of the United States, waters of the State, and upland riparian areas are being authorized under permits from the United States Army Corps of Engineers (Clean Water Act Section 404), North Coast Regional Water Quality Control Board (Clean Water Act Section 401), California Department of Fish and Wildlife (Lake and Streambed Alteration Notification), and the City (Coastal Development Permit).

Compensatory mitigation activities proposed in this MMP include in-kind, in-place restoration of wetland, stream, and upland riparian habitats at a 1:1 ratio and establishment of an additional 0.548 acre of wetlands in the portion of OU-E immediately north of Pond 8 (OU-E Lowlands). The proposed restoration and establishment activities will result in a mitigation ratio of approximately 16:1 for waters of the United States and 2.2:1 for waters of the State¹. This MMP presents the following aspects to detail the compensatory mitigation approach: description of impacted areas, mitigation objectives, mitigation site selection considerations, mitigation activities, mitigation performance standards, mitigation monitoring and reporting activities, adaptive management planning, long-term maintenance, and mitigation site protection instrument.

¹ Total acreage of waters and wetland restoration and establishment is 1.024 acre. The waters of the United States impact is 0.064 acre. The waters of the State impact, inclusive of waters of the United States impact, is 0.476 acre.

1 INTRODUCTION

Arcadis U.S., Inc. (Arcadis) has prepared the following Mitigation and Monitoring Plan (MMP) on behalf of Georgia-Pacific, LLC (Georgia-Pacific) to support permit applications submitted to regulatory agencies to authorize Operable Unit E (OU-E) Soil and Sediment Removal Action (OU-E Removal Action) at the Georgia-Pacific former Fort Bragg Wood Products Facility located at 90 Redwood Avenue in Fort Bragg, California (the Site; Figure 1). Permit applications have been submitted to the following agencies to authorize the OU-E Removal Action: San Francisco District United States Army Corps of Engineers (USACE; Clean Water Act Section 404), North Coast Regional Water Quality Control Board (RWQCB; Clean Water Act Section 401), California Department of Fish and Wildlife (CDFW; Lake and Streambed Alteration Notification), and the City of Fort Bragg (the City; Coastal Development Permit). Proposed OU-E Removal Action activities are anticipated to temporarily impact waters of the United States; waters of the State; and upland riparian areas in the portion of OU-E immediately north of Pond 8 (OU-E Lowlands), South Ponds, and Riparian Area on the Site. Potentially jurisdictional waters and associated wetlands on the Site in and adjacent to the OU-E removal Action project area are presented on Figures 2 and 3. Features that have not yet received a formal jurisdictional determination from the USACE and/or RWQCB (e.g., wetlands in the OU-E Lowlands) are assumed to be jurisdictional waters of the United States/waters of the State.

1.1 Proposed Activities and Regulatory Context

The Proposed OU-E Removal Action activities involve excavation and off-site disposal of approximately 2,263 cubic yards of soil and sediment in habitats potentially jurisdictional as waters of the United States or waters of the State. OU-E Removal Action activities are being conducted in accordance with Department of Toxic Substance Control (DTSC) Investigation and Remediation Order Docket No. HAS-RAO-06-07-150. Excavation activities in OU-E are proposed to occur in conjunction with excavation activities proposed in developed upland areas of Operable Units C and D to facilitate construction of the Coastal Trail, as proposed by the City of Fort Bragg.

Proposed OU-E Removal Action activities will temporarily impact waters of the United States, waters of the State, and upland riparian habitat. Figures 4 and 5 depict the estimated impact areas associated with excavation, staging, and access as they overlap with the delineated waters of the United States, waters of the State, and upland riparian habitat. Access pathways to the work locations will be established to minimize impacts to waters, wetlands, and riparian areas. Staging areas will be located in upland areas, primarily on existing pavement. If necessary, sediment will be dewatered in upland areas and the water will be allowed to drain back to the excavation area by gravity. The equipment work area and dewatering activities adjacent to Pond 7 may overlap with a seasonal wetland area (Wetland E-6) to the north of Pond 7 due to space constraints. Table 1 presents an accounting of estimated maximum extent of impact areas and a summary of the habitats in each impact area. Approximate areas of impacts anticipated are summarized as follows.

- Waters of the United States
 - 0.056 acre (emergent wetlands, Wetland E-1 and Wetland E-6)

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- 0.008 acre (seasonal wetland ditch, Wetland L)
- Total: 0.064 acre
- Waters of the State²
 - 0.412 acre (ponded wetlands, Ponds 2, 3, and 7)
 - 0.056 acre (emergent wetland, Wetland E-1 and Wetland E-6)
 - 0.008 acre (seasonal wetland ditch, Wetland L)
 - Total: 0.476 acre
- Upland Riparian Habitat: 0.020 acre

Impacts anticipated to occur as a result of proposed OU-E Removal Action activities will be temporary. Excavations will be backfilled to approximately original grade and revegetated immediately following completion of excavation activities. If it is necessary to lay down crushed gravel in wetland areas to facilitate equipment access or staging, then the gravel will be removed from the wetland areas immediately following completion of excavation and regrading. Areas impacted by staging or access will be revegetated immediately following completion of excavation, regrading, and removal of crushed gravel pads, if such pads are necessary.

Proposed OU-E Removal Action activities will occur within the Coastal Zone. The City addresses Coastal Zone permitting through the Local Coastal Program. Impacts proposed to waters of the United States on the Site are permitted by the USACE under a Clean Water Act Section 404 permit and by the RWQCB under a Clean Water Act Section 401 Water Quality Certification. Impacts proposed to waters of the State on the Site are permitted by the RWQCB under a Clean Water Act Section 401 Water Quality Certification. Impacts to ponded wetland habitats, habitats with bed and bank (i.e., the seasonal wetland ditch), and upland riparian habitats are permitted by the CDFW through a Lake and Streambed Alteration Notification. Georgia-Pacific submitted permit applications to each of these agencies on June 9, 2016, and this MMP provides details regarding proposed compensatory mitigation activities to support those permit applications.

Georgia-Pacific has designated financial funding to complete the anticipated OU-E Removal Action and associated compensatory mitigation activities in the 2016 budget for the Site.

1.2 Proposed Compensatory Mitigation

Proposed compensatory mitigation activities includes restoration of areas temporarily disturbed by proposed OU-E removal Action activities to pre-remediation conditions at a 1:1 ratio and establishment of 0.548 acre of new wetland areas in the OU-E Lowlands adjacent to Wetland E-6 (Figures 4 and 6). Restoration and establishment activities will occur concurrent with and immediately following OU-E Removal Action activities. Proposed compensatory mitigation activities will result in a mitigation ratio of

² Estimated acreage of impacts to waters of the State include impacts to waters of the United States.

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approximately 16.3:1 for impacts to waters of the United States and 2.1:1 for waters of the State and upland riparian areas³.

Objectives of the compensatory mitigation program are as follow.

- Restore waters of the United States, waters of the State, and upland riparian areas disturbed by OU-E Removal Action activities to pre-remediation conditions.
- Establish approximately 0.548 acre of seasonal wetland/seep wetland habitat in the OU-E Lowlands with function similar to that provided by Wetland E-6.

Restoration activities in each disturbed area will be conducted immediately following backfill of excavation areas to pre-remediation grades, or immediately following removal of gravel access paths/pads, if necessary, in access and staging areas. Restoration activities will primarily consist of returning disturbed areas to pre-remediation grade, seeding with appropriate native seed mixes, and planting replacement trees if trees greater than 4 inches diameter at breast height (dbh) have been removed. Initial grading of establishment wetland areas will occur concurrent with OU-E Removal Action activities in the OU-E Lowlands; final grading and seeding in the establishment area will occur immediately following completion of OU-E Removal Action activities. Specific restoration and establishment activities are detailed in Section 3.

The wetland establishment site was selected based on geographic proximity to the impact areas, ability to create wetland hydrology without using permanent artificial means, and ability of Georgia-Pacific to control final disposition of the property. Since the establishment area is adjacent to Ponds 6 and Wetland E-6, these wetland areas, not proposed to be impacted by OU-E Removal Action activities, will provide the establishment area with a native seed source to aid in natural colonization for revegetation. The geographic proximity of these areas provides opportunity for the establishment area to create a larger interconnected wetland system in the OU-E Lowlands. Groundwater beneath the establishment area is currently near the surface, and wetland hydrology can be easily created by lowering the ground surface elevation of the establishment area approximately 12 to 18 inches to create a ground surface that contacts groundwater or is within 12 inches of groundwater. Since Georgia-Pacific owns the property on which the establishment area is proposed, Georgia-Pacific can establish appropriate site protection instruments.

³ Total acreage of waters and wetland restoration and establishment is 1.024 acre. The waters of the United States impact is 0.064 acre. The waters of the State impact, inclusive of waters of the United States impact, is 0.476 acre

2 SITE CONDITIONS

2.1 Site Description

The approximately 415-acre Site is located west of Highway 1 along the Pacific Ocean coastline, and is bounded by the City to the north and east, Noyo Bay to the south, and the Pacific Ocean to the west. Union Lumber Company began sawmill operations at the Site in 1885, and Georgia-Pacific acquired the Site in 1973 and ceased lumber operations on August 8, 2002. Public access to the Site is currently restricted. The Site is largely developed and contains many paved and unpaved roads and former industrial relics, but few buildings. The OU-E Lowlands are currently undeveloped; prior to 2008, when the buildings were demolished, the OU-E Lowlands was completely developed. Shallow groundwater and high organic content substrate resulting from wood mulch materials have allowed wetlands to develop in the OU-E Lowlands (Figure 2) since demolition activities in 2008. Ponds 2 and 3 (Figure 3) and Pond 7 (Figure 2) are historical industrial process ponds that have been abandoned since Site operations ceased in 2002. The Riparian Area and the associated seasonal wetland ditch (Wetland L) depicted on Figure 3 are undeveloped areas of the Site that have been relatively undisturbed throughout the operational history of the Site.

2.2 Mitigation Area Descriptions

Existing condition in the OU-E Lowland wetlands; Ponds 2, 3, and 7; and the Riparian Area are described in more detail below. Wetlands on the Site were delineated by WRA Inc. (WRA) in 2009 (WRA 2009) and by Arcadis in 2010 (Arcadis 2011). On March 15, 2010, the USACE issued an Approved Jurisdictional Determination (AJD) for wetlands delineated on the Site by WRA in 2009 (File # 2009-00372N). Jurisdictional status of those waters and wetlands included in the 2010 AJD are assumed to be the same currently as they were presented in the AJD because conditions and circumstances of these features have not changed since the AJD was issued. On June 21, 2016, the USACE conducted verification of wetlands delineated in the OU-E Lowlands, the shoreline area of Fort Bragg Landing adjacent to the OU-E Lowland, and the Riparian Area. Due to changes in Site conditions since the Arcadis 2010 delineation, some wetland boundaries were revised based on the USACE site visit. Results of the USACE site visit were documented in a July 7, 2016 memorandum (Arcadis 2016a), and wetland boundaries presented in figures contained within this MMP represent modifications made to incorporate USACE input. USACE jurisdictional status of the waters and wetlands delineated by Arcadis in 2010 and verified in 2016 have not been finalized. The RWQCB has not issued a jurisdictional determination for any of the wetlands on the Site.

2.2.1 OU-E Lowlands

The OU-E Lowlands contains seep wetlands, seasonal wetlands, and uplands. Waters and wetlands delineated in the OU-E Lowlands, excluding Pond 7, have been previously determined to be waters of the United States or are assumed to be waters of the United States in the absence of an AJD from the USACE. All waters and wetlands in the OU-E Lowlands are assumed to be waters of the State. Based on the verification survey, a total of 2,455 square feet of emergent wetlands may be impacted by the

excavation, staging, and access routes for the proposed OU-E Removal Action activities (Table 1). Conditional assessments of the OU-E Lowland wetlands, conducted in 2010 to support of the Mill Pond Complex conceptual restoration design using the California Rapid Assessment Method (CRAM), indicated that Wetland E-1 and Wetland E-6 have functional capacities of 57 and 58 percent, respectively. Appendix A presents the CRAM data collected for Wetlands E-1 and E-6. CRAM evaluations demonstrate that functional capacity of these wetlands is limited by a relatively low diversity in the plant community with buffer conditions and physical structure limited by historical and surrounding development. Emergent wetland plant communities present in the OU-E Lowland wetlands are described in Section 2.3 and presented in Table 1.

2.2.2 Pond 7

Pond 7, originally constructed as an ash dewatering pond during mill operations, is located in the southwest corner of OU-E Lowlands (Figure 2). Pond 7 is identified as an isolated wetland not subject to Section 404 of the Clean Water Act in the AJD. Pond 7 is assumed to be a jurisdictional water of the State. Pond 7 is a combination of small areas of open water and ponded water with emergent wetlands dominated by cattails, and is surrounded by a retaining wall with sharp transition from wetland to upland. Conditional assessments of Pond 7 conducted in 2010 using the CRAM (Appendix A) indicated that the Pond 7 functional capacity is 43 percent. CRAM evaluations demonstrate that functional capacity of these wetlands is limited by a relatively low diversity in the plant community, lack of hydrologic connectivity, and buffer conditions and physical structure limited by historical and surrounding development. Ponded wetland plant communities present in Pond 7 are described in Section 2.3 and presented in Table 1.

2.2.3 South Ponds (Ponds 2 and 3)

Ponds 2 and 3, originally constructed as part of the mill's wastewater treatment system, are located in the South Ponds area of OU-E (Figure 3). The South Ponds received process water that was pumped from Pond 7 while the Site was active. Currently Ponds 2 and 3 are identified as isolated wetlands not subject to Section 404 of the Clean Water Act in the AJD. Hydrology in Ponds 2 and 3 is dependent on shallow groundwater, precipitation, and surface water runoff from surrounding areas. Both ponds are approximately 5 to 10 feet below the surrounding flat paved former log deck area. Pond 2 is primarily open water with emergent vegetation dominated by cattail around the edges. Pond 3 contains a mix of ponded wetland and emergent vegetation, dominated by cattails, spread throughout the wetland. Conditional assessments of Ponds 2 and 3 conducted in 2010 using the CRAM (Appendix A) indicated that the Ponds 2 and 3 have functional capacities of 43 and 42 percent, respectively. CRAM evaluations demonstrate that functional capacity of these wetlands is limited by a relatively low diversity in the plant community, lack of hydrologic connectivity, and buffers conditions and physical structure limited by historical and surrounding development. Ponded wetland plant communities present in Pond 7 are described in Section 2.3 and presented in Table 1.

2.2.4 Riparian Area

A small seasonal wetland ditch (Wetland L) flows to the north in the Riparian Area (Figure 3) to a culvert that drains the feature to Maple Creek. Flow in the channel is minimal and is dominated by small amounts of groundwater through most of the year. Flow remains low during the rainy season, when flow in the

channel is supplemented by precipitation and surface water runoff from the surrounding area due to the small catchment size of the channel (i.e. approximately 16.6 acres [Arcadis 2012]). Flow in the channel is approximately 0.55 cubic foot per second after a 1.2-inch 24-hour storm. There is little to no vegetation growing within the bank of the channel of the seasonal wetland ditch, but hydrophytic vegetation does grow adjacent to the channel banks (Section 2.3 and Table 1). No CRAM evaluation has been conducted for the seasonal wetland ditch. The Riparian Area surrounding the ditch is an upland forested canopy composed of mature trees and shrubs and an herbaceous understory. Riparian forest plant communities present in the Riparian Area are described in Section 2.3 and presented in Table 1.

2.3 Wetland Plant Communities

Three wetland communities and one upland plant community found on the Site will be impacted during the OU-E Removal Action activities. These are ponded wetlands, emergent wetlands, seasonal wetland ditch, and riparian forest. The following are the native plant species common in these areas (Table 1).

- Ponded wetlands are dominated by cattails; however, other wetland species, such as marsh pennywort (*Hydrocotyl ranunculoides*) and water parsley (*Oenanthe sarmentosa*), are present depending on the depth of water.
- Emergent wetlands in the areas potentially impacted by OU-E Removal Action activities are largely wet meadows. The wet meadows are heterogeneous with a mosaic of upland areas of non-native grasses and wetlands in the depressions containing meadow barley (*Hordeum brachyantherum*), tall cyperus (*Cyperus eragrostis*), common rush (*Juncus effusus*), and other sedges (Cyperaceae) and rushes (Juncaceae).
- The seasonal wetland ditch contains California blackberry (*Rubus ursinus*), California wax myrtle (*Myrica californica*), red alder (*Alnus rubra*), red elderberry (*Sambucus racemosa*), and willow (*Salix* sp.) on the banks adjacent to the channel.
- Riparian forest has a heterogeneous plant community. At each of the excavation locations, the vegetation differs significantly. At the southernmost excavation is lodgepole pine (*Pinus contorta*) with a largely un-vegetated understory. In the northernmost excavation, red elderberry (*Sambucus racemosa*), California blackberry, and English ivy (*Hedera helix*) dominate. The two middle excavations contain a range of red alder (*Alnus rubra*), willow, lodgepole pine, cypress, and other shrub and tree species.

2.4 Non-native and Weedy Vegetation

Historical development on the Site has resulted in an abundance of non-native weedy plants. Some of the more ubiquitous species are pampas grass (*Cortaderia* sp.), Italian thistle (*Carduus pycnocephalus*), Himalayan blackberry (*Rubus armeniacus*), ripgut brome (*Bromus diandrus*), soft chess (*Bromus Hordeaceus*), wild radish (*Raphanus sativa*), cut-leaf geranium (*Geranium Dissectum*), Italian rye grass (*Festuca perennis*), common velvetgrass (*Holcus lanatus*), sub clover (*Trifolium subterraneum*), iceplant (*Carpobrotus edulis*), and English ivy. In this report, the term “Target Invasive Species” refers to the four following particularly noxious species: pampas grass, Himalayan blackberry, iceplant, and English ivy.

3 MITIGATION ACTIVITIES

Georgia-Pacific is the responsible party for compensatory mitigation activities proposed as part of the OU-E Removal Action activities. Table 2 presents a summary of compensatory mitigation activities proposed for implementation. Details regarding specific activities and methods that will be implemented to accomplish the mitigation objectives (Section 1.2) are presented below.

3.1 Restoration Techniques

3.1.1 Backfill and Grading

Following excavation, impacted areas (i.e., Wetland E-1, Ponds 2, 3 and 7, and Wetland L) will be backfilled with clean fill to pre-excavation grades. Backfilling will occur with low-pressure tracked equipment (e.g., bulldozer or excavator, depending on site conditions). Backfill will be generated from on-site sources to the extent possible. On-site sources proposed consist of soil removed from the wetland establishment area in the OU-E Lowlands (Figure 4).

Fill generated from on-site areas will have concentrations that are below appropriate selected risk-based tolerance levels (RBTLs) or background for Site constituents that were identified as either defining hot spots or posing potential risk to human or ecological receptors on the Site (i.e., benzo[a]pyrene toxic equivalence quotient, dioxin toxic equivalence quotient, lead, and arsenic). No other constituents detected on the Site were identified as potentially posing risk to human or ecological receptors and do not require consideration for fill suitability when evaluating fill generated from on site. Arsenic concentrations in potential fill material will be compared to the Site background value of 10 milligrams per kilogram (mg/kg), as identified in the Baseline Human Health and Ecological Risk Assessment – Operable Unit E (Arcadis 2015). RBTLs identified in the OU-E Remedial Action Workplan (Arcadis 2016b), with DTSC consultation, are as follow: benzo[a]pyrene toxic equivalence quotient – 0.3 mg/kg, dioxin toxic equivalence quotient – 53 picograms per gram (pg/g), lead – 127 mg/kg.

When generated off site, fill used will have constituent concentrations similar to or lower than the unexcavated media in the area where the fill will be used (i.e., baseline conditions in the fill area). Fill will also be identified for use if constituent concentrations are above baseline conditions but below RBTLs values identified in the OUE Remedial Action Workplan (Arcadis 2016b).

The ground surface elevation in the wetland establishment area (Figure 4) will be lowered approximately 12 to 18 inches to create a ground surface that contacts groundwater or is within 12 inches of groundwater. Wetland establishment areas will be regraded with low-pressure tracked equipment (e.g., bulldozer or excavator, depending on site conditions). Figure 6 presents a cross-section depicting the ground surface elevation, estimated groundwater elevation for current conditions, and proposed conditions of the wetland establishment area and adjacent areas. Regraded portions of the wetland establishment area (i.e., 0.548 acres of new wetlands included in the proposed compensatory mitigation) will be connected to Wetland E-6, Pond 6, and Pond 7 to create a large interconnected system of seep wetlands, seasonal wetlands, and ponded wetlands.

Areas disturbed by access or staging will be restored by removing crushed gravel pads, if used, and regrading the surface.

Impact and wetland establishment areas will be revegetated following completion of backfill/grading materials.

3.1.2 Seed Collection

Seeds will be collected on Site from native wetland species (e.g., cattails, sedges, and rushes) by cutting seed heads of the tops of plants prior to implementation of OU-E Removal Action activities and mitigation monitoring events in subsequent years. Seed harvesting will be limited to 10 to 20 percent of the flowering seed heads of individual plants. Seeds will be stored in paper bags in a cool dry place until used for seeding. The seeds will be stored for days, or at most weeks, until being broadcast into wetlands. Care will be taken to avoid collecting Invasive Target Species seeds by training seed collection personnel in invasive species identification. To enhance local genetic diversity of commercial seed mixes used in the wetland restoration and establishment areas (Section 3.1.3), these seeds will be broadcast into these areas following completion of backfilling and grading activities and mitigation monitoring events.

3.1.3 Seed Mixes

The following seed mixes will be used in their respective habitats in restoration and establishment areas. Seeds will be sourced from commercial vendors and collected on the Site. Commercial seeds will be certified invasive species free and sourced from genetic sources as close to the Site as practicable. Each species will be seeded at a rate of 25 total pounds of seed per acre. For example, seeds needed for 1 acre with a rate of 40% seed A and 60% seed B would have 10 pounds of seed A and 15 pounds of seed B.

- Wet Meadow Mix (Wetland E-1, Wetland E-6, and Wetland Establishment Area): 25% tall cyperus, 50% meadow barley, 25% creeping wild rye. The aforementioned seed mix will be supplemented with seeds from locally collected native sedges, rushes, and/or grasses found on the Site.
- Pondered Wetland Mix (Ponds 2, 3, and 7): 70% cattail and 30% common rush. The aforementioned seed mix will be supplemented with seeds from locally collected native sedges, rushes, and/or grasses found on the Site.
- Riparian Forest Mix (Upland Riparian Area): 30% California brome (*Bromus diandrus*), 30% blue wild rye, 20% creeping wild rye, 10% small fescue (*Festuca microstachya*), and 10% California blackberry.

3.1.4 Seeding

The amount of native seed needed will be measured out for the area to be seeded based on 25 pounds per acre. Seeding will be done either by dry seed broadcast seeding or hydroseeding. Dry seeds will be hand-broadcast evenly across the target area and then coarsely hand-raked to cover seeds with soil and reduce chances of seed predation. Hydroseeding will be accomplished using a truck broadcaster to spray a slurry mixture of seeds and hydromulch. Seeding activities will follow completion of backfilling and grading portions of the OU-E Removal Action activities and, as needed, during the fall mitigation

monitoring activities. Irrigation will not be necessary due to the high groundwater level in restoration and establishment areas and the fall planting schedule.

3.1.5 Container Planting

Contained planting will be done for cattails and riparian trees, if any trees greater than 4 inches dbh are damaged or removed during Riparian Area access.

Cattails will be restored in ponded wetlands using 1-gallon containers, in addition to seeding, to accelerate restoration of impacted ponded wetland areas. Cattail containers will be planted in disturbed ponded areas (Pond 2, 3, and 7) unless water is present that will submerge greater than 75 percent of the height of the leaves or if planting is otherwise unsafe for field crews. In areas that are ponded, and where cattails can be planted without submerging the leaves more than 75 percent of the leaf height, the plastic pots will be removed and the root ball covered with burlap. Planting will be accomplished by placing the burlapped plant into water and wedging it into sediment to keep the plant upright. Irrigation will not be necessary due to the high groundwater level and the fall planting schedule.

One-gallon container trees will be planted in the Riparian Area corridor if trees greater than 4 inches dbh are damaged or removed. Planted species will be selected by the species that is damaged or removed, because species diversity varies along the Riparian Area corridor ranging from cypress, alder, willow, pine, and other species. Two container plants will be planted for every one damaged or removed. This will help increase the probability that the same number of damaged/removed trees are present at the end of the mitigation monitoring period.

A water well will be created around each tree and filled every day for 3 days during the restoration activities. No further watering is proposed unless an unusual dry spell and/or unusually low groundwater conditions exist. Precipitation will be monitored in the weeks after planting to evaluate if additional watering is needed. Additionally, adaptive management activities in the restoration areas (Section 6) will include additional planting and/or irrigation if mitigation monitoring events indicate high mortality of planted trees.

Deer are common on the Site, so trees planted in the riparian corridor will be protected with 5-foot-tall Tubex tree shelters. Each tree will be stabilized with two 2 x 2 inch 5-foot-tall stakes to prevent deer from pushing over the tree shelter. Netting will cover the tops of tree tubes to minimize potential for bird nesting or mortality.

3.1.6 Erosion Control

Erosion control of restoration and establishment areas will be provided according to the Site Stormwater Pollution Prevention Plan. Restoration and establishments areas will be revegetated through seeding of herbaceous species as described in Sections 3.1.3 and 3.1.4. Disturbed upland soil will be seeded with native species to stabilize soil using the following seed mix.

- Upland Mix: 30% California brome, 30% yarrow, 20% California poppy, 10% California meadow barley, and 10% small fescue.

Hydromulch stabilization, straw wattles, and/or erosion control blanket will be used to stabilize slopes as needed based on slope grade.

In locations where hydromulching is necessary to stabilize soil, the native upland seed mix will be included in the mulch materials as they are being wetted in the hydroseeder unit.

3.2 Restoration of Pond 7 in OU-E Lowlands

Pond 7 will be a restored in-kind and in-place. The wooden retaining walls to the north, east, and west will be removed, and a more gradual slope will be created on these sides. The south side butts up against the steep slope of the Pond 8. The elevation of the pond bottom will be approximately the same as the pre-remediation elevation. The restored habitat will be a ponded wetland with cattail emergent habitat and open water, similar to baseline conditions. The new sloped north, east, and west sides will provide new topographic complexity, compared to the current retaining wall edge, that will transition to the wetland establishment area and may support smaller emergent species such as sedges, rushes, and similar. The retaining wall on the west, north, and east sides will be removed, and the banks graded to slope into the ponded wetland, allowing for a transition around the wetland for wetland plants that grow from saturated soil, to shallow water, to deep water. After final grading, Pond 7 will be seeded with Ponded Wetland Seed Mix and planted with 20 cattail container plants.

3.3 Restoration and Establishment of Emergent Wetlands in OU-E Lowlands

The disturbed emergent wetlands in OU-E will be restored in-kind and in-place. Separately, emergent seep/seasonal wetlands will be established in areas adjacent to Wetland E-6 that are currently ruderal uplands. Restoration and establishment will be accomplished by 1) either backfilling to pre-disturbance elevation (restoration) or creating suitable elevation (establishment) and de-compacting soil if it has been compacted (using excavator bucket or a tractor disk), 2) roughening soil surface and creating undulations for water capture, and 3) seeding with the Wet Meadow Seed Mix.

3.4 Restoration of Ponds 2 and 3

Ponds 2 and 3 will be restored to in-kind and in-place. Excavated areas, if excavated to the maximum anticipated extent as shown on current plans, will be backfilled to pre-excavation elevations. As a result of likely scope reductions in this area due to recent data collection, excavation areas less than 1,000 square feet (approximately 30 feet square) will not be backfilled, rather surrounding sediment will be allowed to collapse around the edges and seek a new equilibrium with surrounding conditions. Revegetation will come mainly from adjacent vegetation propagules. Cattails are expected to start spreading immediately by rhizomes. In addition to the natural spread of propagules, the restoration team will conduct broadcast seeding with Ponded Wetland Seed Mix to accelerate restoration. Similar to current baseline conditions, restored Pond 2 habitats are expected to be vegetated emergent wetlands along the pond edges (i.e., approximately 15 to 20 feet from the berm edge), and open water pond in the remaining areas. Pond 3 will be a mix of open water and emergent vegetation.

3.5 Restoration of Stream and Riparian Corridor

Sediment excavation in the four stream locations will be backfilled with soil of grain size comparable to that which was removed. After backfilling, channel material will be lightly compacted to minimize soil movement during rain events. The current channel bottom is relatively flat and un-vegetated. Therefore, the stream channel will not be planted to reflect baseline conditions. During excavation, the banks will be protected to keep them intact. Erosion control blanket will be installed along the banks, if necessary, to stabilize conditions if they are disturbed during excavation and access activities. Disturbed upland riparian areas will be seeded with the Riparian Forest Mix and trees greater than 4 inches dbh removed or injured during OU-E Removal Activities will be replanted at a 2:1 ratio.

4 MITIGATION MONITORING AND REPORTING

Annual monitoring will be conducted based on the following methods to assess whether the mitigation is meeting performance criteria. The outcome of monitoring will be documented in annual reports. Once performance criteria have been met, a wetland delineation will be conducted.

4.1 Performance Standards

Performance criteria (Table 3) are proposed to reflect the expected rate at which the restoration will progress and to achieve a 5-year target of a functional self-sustaining ecosystem. It is expected that, during the years after meeting these criteria, the ecosystem will continue to develop and mature as vegetation ages, fauna use the system with increasing frequency, and soil structure and chemistry develop.

Plant species richness and percent native species cover in restoration and establishment areas are based on data obtained from the CRAM evaluations and the 2010 wetland delineation (Arcadis 2011). Percent native species cover performance standards for the year 5 monitoring event were selected to be 80 percent of the percent native cover observed for adjacent wetland areas the in the 2010 wetland delineation (Arcadis 2011). Percent native cover in the Riparian Area has not been previously quantitated, and the percent native performance standard for this area will be evaluated for suitability prior to implementing OU-E Removal Action activities. Less than 5 percent invasive species cover was selected to reduce probability of invasive species outcompeting native species. Ponded water and wetland hydrology indicators are necessary performance standards to confirm establishment of ponded wetlands and seep/seasonal wetlands, respectively.

4.2 Monitoring Methodology

Mitigation monitoring will occur once a year for 5 years. The annual monitoring event will occur in late early summer to early fall (e.g., August or September). Mitigation performance will be measured for each location as described below. Health and safety of monitoring personnel is of primary importance. Therefore, monitoring protocols may be revised if as-built conditions, vegetation changes, or other mitigation site characteristics make monitoring unsafe.

4.2.1 Ponded Wetland Habitat

Ponds 2, 3, and 7 monitoring will involve the following measurements.

- Native wetland plant species richness: Document vascular plant species in the restored pond.
- Native and invasive vegetation percent cover: Measure cover of submerged, emergent, floating leaf, and free-floating leaf plants. A transect/quadrat method will be used to record percent cover of each plant species. Quadrats, 3 feet by 3 feet in size, will be established approximately every 50 feet along transects spaced approximately 100 feet apart. Transects and quadrats will be established during the first mitigation monitoring event and transect start locations and locations of the quadrats along the

transect will be randomly placed. Data will be collected from the same quadrat during every monitoring event.

- Ponded water indicators present: Record presence of ponded water or moistness of soil if no water is present (saturated, moist, or dry).

4.2.2 Seep/Seasonal Wetland Habitat

Wetland E-1, Wetland E-6, and establishment wetlands will involve the following measurements.

- Native wetland plant species richness: Document vascular plant species in the restored and established wetland areas.
- Native and invasive vegetation percent cover: Measure cover of vegetation. A transect/quadrat method will be used to record percent cover of each plant species. Quadrats, 3 feet by 3 feet in size, will be established approximately every 50 feet along transects spaced approximately 100 feet apart. Transects and quadrats will be established during the first mitigation monitoring event, and transect start locations and locations of the quadrats along the transect will be randomly placed. Data will be collected from the same quadrat during every monitoring event.
- Wetland hydrology indicators present: Document presence or absence of primary and secondary wetland hydrology indicators, as provided in the USACE Regional Supplement to the Corps of Engineers Wetland Delineation manual: Western Mountains, Valleys, and Coast Region (Version 2.0) (USACE 2010).
- Delineated acreage of wetland: During the final anticipated year of monitoring (i.e., year 5), delineate the total added acres of wetland adjacent to Wetland E-6, Pond 6, and Pond 7, compared to 2016 documented conditions.

Depth to groundwater in Wetland E-6 and the Wetland Establishment Area will be estimated based on depth to groundwater measurements collected during each monitoring event at the groundwater monitoring wells MW-4.1, MW-4.6, MW-4.2, and MW-4.3R (Figure 4) that are currently established in the OU-E Lowland and at a soil pit that will be dug in the Wetland Establishment Area adjacent to Pond 7.

4.2.3 Seasonal Wetland Ditch Habitat

Wetland L (seasonal wetland ditch) will involve the following measurements.

- Flow unimpeded, channel and banks stable: Record presence and depth of water in the stream. If no water is present, then document soil moisture (e.g., saturated, moist, or dry). Photodocument any instance of substantive stream bed or bank erosion and record measurement (i.e., width, length, and depth) and location of each erosion instance, as necessary.
- Invasive vegetation percent cover: Measure cover of vegetation at each excavation area.

4.2.4 Upland Riparian Habitat

Portions of the Riparian Area impacted by OU-E Removal Action activities will involve the following measurements.

- Native and invasive vegetation percent cover: Measure cover of vegetation. A transect/quadrat method will be used to record percent cover of each plant species. Vegetative cover will be measured in one quadrat, 3 feet by 3 feet in size, in each access path location where riparian habitat was disturbed during OU-E Removal Action activities.
- Planted native tree/shrub percent survival: Record survival and health of all planted trees/shrubs.

4.2.5 Photodocumentation

Photodocumentation monitoring point locations will be established to provide a visual indication of change through time. Prior to beginning OU-E removal Action activities, following completion of final grading, and during each monitoring event, monitoring personnel will collect photographs from established photodocumentation locations indicated on Figures 4 and 5 in the directions indicated by the photodocumentation location arrows.

4.3 Reporting

An annual monitoring and maintenance report will be submitted to USACE, RWQCB, CDFW, DTSC, and the City every year for 5 years or until performance criteria are met. The report will be sent by the first quarter of the following calendar year. The annual report will include results of annual monitoring, progress toward meeting performance criteria, representative photodocumentation, maintenance activities, and any adaptive management actions taken during the year.

In addition to annual monitoring and maintenance reports, following completion of OU-E Removal Action activities, an as-built memo report will be completed and submitted to regulatory agencies within 3 months of completing all grading and reseeding in the restoration and establishment areas. The memo report will document final grades and restoration/establishment actions. Photodocumentation, at the locations indicated on Figure 4 and 5, will be included to show conditions prior and subsequent to OU-E Removal Action activity implementation.

5 ADAPTIVE MANAGEMENT

Adaptive management is the continuous process of monitoring the mitigation project and taking appropriate action when it is not meeting performance criteria or not on a trajectory to meet these criteria.

Monitoring will be conducted annually. Observations from the field and analysis of monitoring data help the team identify whether the restoration is meeting criteria. When it does not meet criteria, the team works to identify the cause. This could be due to a lack of sufficient weeding that allows native species to be outcompeted, it could be plant herbivory resulting in lower vegetative cover than expected, or it could be inappropriate grading that results in water movement conducive to upland conditions when the goal is a wetland.

Every year, an assessment will be made as to whether actions need to be taken to assist nature to restore the mitigation site besides routine maintenance. In addition to observations made during annual monitoring events, the maintenance crews and other field crews will observe conditions and bring concerns to the restoration team. Possible requirements may include additional seeding, replanting trees, additional weeding, installation of irrigation, and/or erosion repair.

6 MAINTENANCE AND SITE PROTECTION

Maintenance of the mitigation areas during the mitigation monitoring period will primarily involve invasive species control, but may involve other tasks as they are identified during the adaptive management process. Pampas grass control is an ongoing task on the Site that pre-dates the proposed mitigation activities. Control of Target Invasive Species in the restoration areas will be conducted twice per year, in April and August. Invasive species control crews will be trained to identify the weeds from the seedling stage so young plants can be controlled before maturation and seed set. Young weeds will be controlled via spot spraying of herbicide approved for use in aquatic habitats (e.g., glyphosate) to avoid overspray of pesticide onto native species.

Long-term maintenance of the mitigation areas will consist of invasive species control. Control of Target Invasive Species will occur once a year in April using the same methods as those described above. Georgia-Pacific will be responsible for long-term maintenance activities while they own the Site. When the Site or portion of the compensatory mitigation area is purchased or deeded to another entity, Georgia-Pacific will include continuation of the long-term invasive species control in the deed transfer.

Georgia-Pacific will implement a deed restriction for the OU-E Lowlands area to provide a site protection instrument for the wetland establishment area. The deed restriction will specify that land use on the OU-E Lowlands is limited to open space use.

7 REFERENCES

- Arcadis U.S., Inc. (Arcadis). 2010. IARAP Cultural Resource Monitoring Report 2009, Former Georgia-Pacific Wood Products Facility, Fort Bragg, California. Prepared for Georgia-Pacific LLC. Arcadis US, Inc. Buffalo, Wyoming office. Submitted to Georgia-Pacific LLC. Copy on file with Georgia-Pacific LLC and with Northwest Information Center at Sonoma State University, Sonoma, California.
- Arcadis. 2011. Environmentally Sensitive Habitat Areas Delineation Report. Former Georgia-Pacific Wood Products Facility, Fort Bragg, California. April.
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- Arcadis 2015. Baseline Human Health and Ecological Risk Assessment – Operable Unit E, Former Georgia-Pacific Wood Products Facility, Fort Bragg, California. Submitted to DTSC, August 2015.
- Arcadis. 2016a. Georgia-Pacific Former Wood Products Facility Wetland Delineation Verification, Fort Bragg, California. July 7, 2016.
- Arcadis. 2016b. Georgia-Pacific LLC, Removal Action Workplan Operable Unit E. May 2016.
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- Jones, Marie. 2014. Fort Bragg Coastal Restoration and Trail project Phase II Subsequent Environmental Impact Report (EIR). Mendocino County, California City of Fort Bragg. November 2014. Copy on file with the City of Fort Bragg Community Development Director.
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TABLES



Location ID	Habitat Type	Cowardin Classification	Vegetation Species Observed	Water of the United States	Water of the State	CRAM Score ¹	Acres Impacted (Temporary)
OU-E Lowlands							
Wetland H (Pond 7)	Ponded Wetland	PEM1H	Cattail (<i>Typha latifolia</i>), marsh pennywort (<i>Hydrocotyl ranunculoides</i>), water parsely (<i>Oenanthe sarmentosa</i>)	N	Y	43%	0.127
Wetland E-6	Seasonal Wetland	PEM2D	Bolander's rush (<i>Juncus bolanderi</i>), cattail, meadow barley (<i>Hordeum brachyantherum</i>), soft rush (<i>Juncus effusus</i>), tall flatsedge (<i>Cyperus eragrositis</i>), tufted hairgrass (<i>Deschampsia cespitosa</i>)	Y	Y	58% ²	0.033
Wetland E-1	Wetland Seep	PEM1E		Y	Y	57%	0.023
South Ponds							
Wetland N (Pond 2)	Ponded Wetland	PUBH	Cattail, soft rush	N	Y	43%	0.138
Wetland O (Pond 3)	Ponded Wetland	PEM1E		N	Y	42%	0.147
Riparian Area							
Wetland L	Seasonal Wetland Ditch	R4SB	California blackberry (<i>Rubus ursinus</i>), California wax myrtle (<i>Myrica californica</i>), red alder (<i>Alnus rubra</i>), red elderberry (<i>Sambucus racemosa</i>), willow (<i>Salix sp.</i>)	Y	Y	--	0.008
Riparian Area	Riparian Upland	NA	California blackberry, California wax myrtle, red alder, red elderberry, willow	N	Y	--	0.020
						Waters of the United States Impact Total	0.064
						Waters of the State Impact Total ³	0.476
						Riparian Area Impact Total	0.020

Notes:

All anticipated impacts will be temporary, and restoration will occur immediately following completion of permitted activities.

NA: not applicable

OU-E: Operable Unit E

--: not available

PEM1H: palustrine emergent, persistent, permanently flooded

PEM2D: palustrine emergent, nonpersistent, continuously saturated

PEM1E: palustrine emergent, persistent, seasonally flooded/saturated

PUBH: palustrine unconsolidated bottom, permanently flooded

R4SB: riverine, intermittent, streambed

CRAM: California Rapid Assessment Methodology

¹CRAM scores based on data collected in 2010.

²CRAM score for wetland E6 is based on data collected for the E5 and E6 wetland complex.

³Waters of the State Impact Total includes Waters of the United States Impact Total.

Table 2
 OU-E Removal Action Proposed Compensatory Mitigation
 Former Wood Products Facility
 Georgia-Pacific, LLC
 Fort Bragg, California

Location ID	Pre-Mitigation Habitat Type	Post-Mitigation Habitat Type	Cowardin Classification	Hydrology	Mitigation Method	Mitigation Acres
Establishment Area	Annual grassland	Seasonal Wetland/ Wetland Seep	PEM2D/PEM1E	continuously saturated to seasonally flooded/saturated	Establishment	0.548
Wetland H (Pond 7)	Ponded Wetland	Ponded Wetland	PEM1H	permanently flooded	Restoration	0.127
Wetland E-6	Seasonal Wetland	Seasonal Wetland	PEM2D	continuously saturated	Restoration	0.033
Wetland E-1	Wetland Seep	Wetland Seep	PEM1E	seasonally flooded/saturated	Restoration	0.023
Wetland N (Pond 2)	Ponded Wetland	Ponded Wetland	PUBH	permanently flooded	Restoration	0.138
Wetland O (Pond 3)	Ponded Wetland	Ponded Wetland	PEM1E	seasonally flooded/saturated	Restoration	0.147
Wetland L	Seasonal Wetland Ditch	Seasonal Wetland Ditch	R4SB	intermittent	Restoration	0.008
Riparian Area	Riparian Upland	Riparian Upland	NA	NA	Restoration	0.020
TOTAL						1.044

Notes:

NA: not applicable

OU-E: Operable Unit E

--: not available

PEM1H: palustrine emergent, persistent, permanently flooded

PEM2D: palustrine emergent, nonpersistent, continuously saturated

PEM1E: palustrine emergent, persistent, seasonally flooded/saturated

PUBH: palustrine unconsolidated bottom, permanently flooded

R4SB: riverine, intermittent, streambed

Table 3
 OU-E Removal Action Mitigation Performance Standards
 Former Wood Products Facility
 Georgia-Pacific, LLC
 Fort Bragg, California

Mitigation Area	Performance Standard	Field Indicator by Monitoring Year				
		Year 1	Year 2	Year 3	Year 4	Year 5
OU-E Lowlands						
Ponded Wetlands (Pond 7)	Native wetland plant species richness	0	1	1	3	3
	Native vegetation percent cover	5	25	50	75	80
	Invasive vegetation percent cover ¹	<5	<5	<5	<5	<5
	Ponded water indicators present	Y	Y	Y	Y	Y
Seep Wetland (Wetland E-1)	Native wet meadow plant species richness	1	2	3	5	6
	Native vegetation percent cover	5	20	40	60	70
	Invasive vegetation percent cover ¹	<5	<5	<5	<5	<5
	Wetland hydrology indicators present	Y	Y	Y	Y	Y
Seasonal/Seep Wetland (Wetland E-6 and Establishment Area)	Native wet meadow plant species richness	1	2	3	4	4
	Native vegetation percent cover	5	15	25	40	50
	Invasive vegetation percent cover ¹	<5	<5	<5	<5	<5
	Depth to groundwater (inches)	<12	<12	<12	<12	<12
	Wetland hydrology indicators present	Y	Y	Y	Y	Y
	Delineated acreage of wetland ²	--	--	--	--	0.54
South Ponds						
Ponded Wetlands (Ponds 2 and 3)	Native wetland plant species richness	1	2	3	4	4
	Emergent native vegetation percent cover ³	5	25	50	75	80
	Invasive vegetation percent cover ¹	<5	<5	<5	<5	<5
	Ponded water indicators present	Y	Y	Y	Y	Y
Riparian Area						
Seasonal Wetland Ditch (Wetlands L)	Flow unimpeded, channel and bank stable	Y	Y	Y	Y	Y
	Invasive vegetation percent cover ¹	<5	<5	<5	<5	<5
Upland Riparian Habitat	Native vegetation percent cover ⁴	5	20	40	60	70
	Planted native tree/shrub percent survival	100	80	70	60	60
	Invasive vegetation percent cover ¹	<5	<5	<5	<5	<5

Notes:

¹Target invasive species are pampas grass (*Cortaderia sp.*), English ivy (*Hedera helix*), ice plant (*Carpobrotus edulis*), and Himalayan blackberry (*Rubus armeniacus*).

²Wetland acreage will only be delineated during the expected final year of mitigation monitoring (i.e. year 5), and the target acreage will be the total added acres of wetland adjacent to Wetland E-6, Pond 6, and Pond 7 compared to 2016 documented conditions.

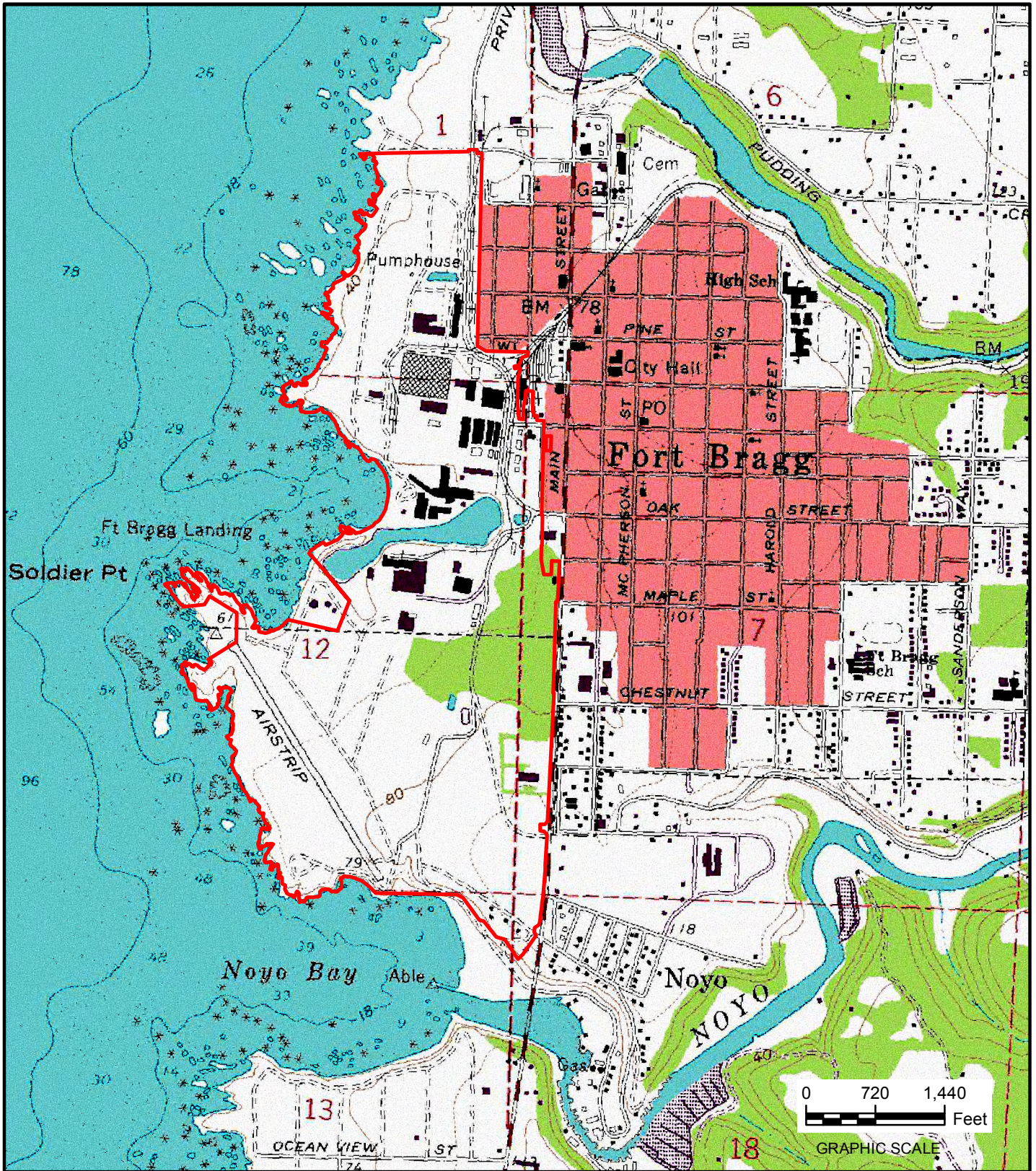
³Percent cover performance standard for Pond 2 is only applicable to vegetated emergent wetland edges that lie approximately 15 to 20 feet from the pond berm edge.

⁴Percent native cover performance standard will be reevaluated during construction to quantitate percent cover by native vegetation prior to construction.

OU-E: Operable Unit E

FIGURES





LEGEND:

 SITE BOUNDARY

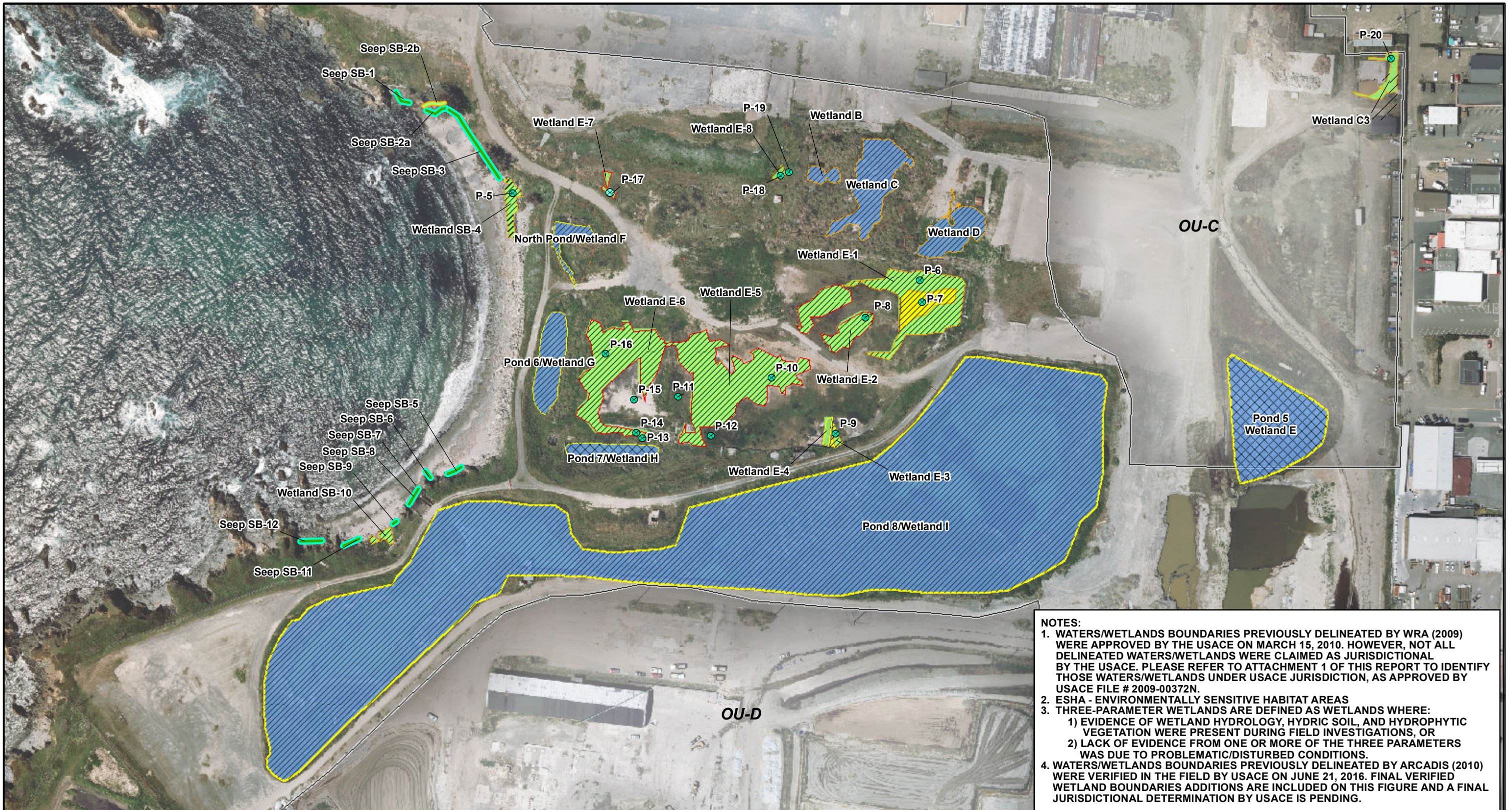
FORMER GEORGIA-PACIFIC WOOD PRODUCTS FACILITY
 FORT BRAGG, CALIFORNIA
 MITIGATION AND MONITORING PLAN

SITE LOCATION MAP

 **ARCADIS** Design & Consultancy
 for natural and built assets

FIGURE
1

DIV/GRP: ENV/MDV DB: sshell LD: PIC: TM: DATE: 7/19/2016 4:53:32 PM
 PROJECT: B0066116.0000.00011 PATH: \\corpstorage\Datat\ArcData\GIS\PROJECTS_ENV\FortBragg\MXD\ESHA Wetland Delineation Report\June 2016\Mitigation and Monitoring Plan\Fig 2 Wetland DelineationMap_Central.mxd



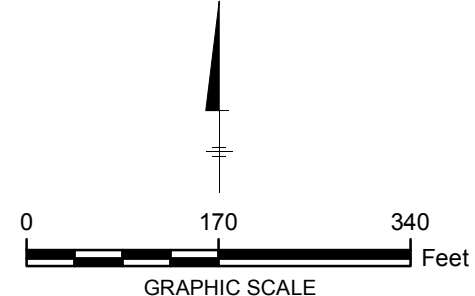
NOTES:

1. WATERS/WETLANDS BOUNDARIES PREVIOUSLY DELINEATED BY WRA (2009) WERE APPROVED BY THE USACE ON MARCH 15, 2010. HOWEVER, NOT ALL DELINEATED WATERS/WETLANDS WERE CLAIMED AS JURISDICTIONAL BY THE USACE. PLEASE REFER TO ATTACHMENT 1 OF THIS REPORT TO IDENTIFY THOSE WATERS/WETLANDS UNDER USACE JURISDICTION, AS APPROVED BY USACE FILE # 2009-00372N.
2. ESHA - ENVIRONMENTALLY SENSITIVE HABITAT AREAS
3. THREE-PARAMETER WETLANDS ARE DEFINED AS WETLANDS WHERE:
 - 1) EVIDENCE OF WETLAND HYDROLOGY, HYDRIC SOIL, AND HYDROPHYTIC VEGETATION WERE PRESENT DURING FIELD INVESTIGATIONS, OR
 - 2) LACK OF EVIDENCE FROM ONE OR MORE OF THE THREE PARAMETERS WAS DUE TO PROBLEMATIC/DISTURBED CONDITIONS.
4. WATERS/WETLANDS BOUNDARIES PREVIOUSLY DELINEATED BY ARCADIS (2010) WERE VERIFIED IN THE FIELD BY USACE ON JUNE 21, 2016. FINAL VERIFIED WETLAND BOUNDARIES ADDITIONS ARE INCLUDED ON THIS FIGURE AND A FINAL JURISDICTIONAL DETERMINATION BY USACE IS PENDING.

LEGEND

- SOIL PIT LOCATION
- OPERATIONAL UNIT
- POTENTIAL ENVIRONMENTALLY SENSITIVE HABITAT AREAS (ESHA)**
- WIDTH OF DELINEATED GROUNDWATER SEEP/WATERS OF THE STATE (ARCADIS 2010; NOT YET APPROVED)
- DELINEATED WET ESHA (ARCADIS 2010; NOT YET APPROVED)
- DELINEATED WATERS/WETLANDS (WRA 2009; APPROVED BY THE USACE 3/15/10)
- WET ESHA DELINEATED DURING JUNE 21, 2016 FIELD VERIFICATION WITH USACE

- SEASONAL WETLAND
- WETLAND SEEP
- INDUSTRIAL POND
- BEDROCK GROUNDWATER SEEP
- THREE-PARAMETER WETLAND
- DELINEATED ISOLATED WETLAND (WRA 2009, APPROVED BY THE USACE 3/15/10)



FORMER GEORGIA-PACIFIC WOOD PRODUCTS FACILITY
 FORT BRAGG, CALIFORNIA
MITIGATION AND MONITORING PLAN
WETLANDS AND OTHER WET ENVIRONMENTALLY SENSITIVE HABITAT AREA - CENTRAL



Design & Consultancy
for natural and
built assets

FIGURE 2

DIV/GRP: ENV/INDV DB: sshell LD: PIC: TM: DATE: 7/19/2016 4:56:47 PM
 PROJECT: B0066116.0000.00011 PATH: \\corpstorage\Data\ArcGisData\GISPROJECTS\ENV\FortBraggMXD\ESHA Wetland Delineation Report\June 2016\Mitigation and Monitoring Plan\Fig 3 Wetland DelineationMap_South.mxd



NOTES:

1. WATERS/WETLANDS BOUNDARIES PREVIOUSLY DELINEATED BY WRA (2009) WERE APPROVED BY THE USACE ON MARCH 15, 2010. HOWEVER, NOT ALL DELINEATED WATERS/WETLANDS WERE CLAIMED AS JURISDICTIONAL BY THE USACE. PLEASE REFER TO ATTACHMENT 1 OF THIS REPORT TO IDENTIFY THOSE WATERS/WETLANDS UNDER USACE JURISDICTION, AS APPROVED BY USACE FILE # 2009-00372N.
2. THREE-PARAMETER WETLANDS ARE DEFINED AS WETLANDS WHERE:
 - 1) EVIDENCE OF WETLAND HYDROLOGY, HYDRIC SOIL, AND HYDROPHYTIC VEGETATION WERE PRESENT DURING FIELD INVESTIGATIONS, OR
 - 2) LACK OF EVIDENCE FROM ONE OR MORE OF THE THREE PARAMETERS WAS DUE TO PROBLEMATIC/DISTURBED CONDITIONS.
3. WATERS/WETLANDS BOUNDARIES PREVIOUSLY DELINEATED BY ARCADIS (2010) WERE VERIFIED IN THE FIELD BY USACE ON JUNE 21, 2016. FINAL VERIFIED WETLAND BOUNDARIES ADDITIONS ARE INCLUDED ON THIS FIGURE AND A FINAL JURISDICTIONAL DETERMINATION BY USACE IS PENDING.

* WETLAND CHARACTERISTICS FOR WETLAND D-2 WERE ASSESSED FROM SOIL BORING P-22. DUE TO THE PRESENCE OF DENSE SHRUB AND BRAMBLE, WETLAND BOUNDARIES FOR WETLAND D-2 WERE DELINEATED FROM SOIL BORINGS P-21 AND P-22 AND VEGETATIVE CHARACTERISTICS IN AERIAL PHOTOGRAPHY. THEREFORE, THE BOUNDARIES OF WETLAND D-2 MAY CONTAIN AN UPLAND AND WETLAND MOSAIC.

LEGEND			
	SOIL PIT LOCATION		DELINEATED WATERS/ WETLANDS (WRA 2009; APPROVED BY THE USACE 3/15/10)
	OPERATIONAL UNIT		WET ESHA DELINEATED DURING JUNE 21, 2016 FIELD VERIFICATION WITH USACE
POTENTIAL ENVIRONMENTALLY SENSITIVE HABITAT AREAS (ESHA)			
	WIDTH OF DELINEATED GROUNDWATER SEEP/WATERS OF THE STATE (ARCADIS 2010; NOT YET APPROVED)		SEASONAL WETLAND
	RIPARIAN AREA		WETLAND SEEP
	DELINEATED WET ESHA (ARCADIS 2010; NOT YET APPROVED)		INDUSTRIAL POND
	SEASONAL WETLAND DITCH		RIPARIAN WETLAND
	BEDROCK GROUNDWATER SEEP		PERENNIAL WATERS
	THREE-PARAMETER WETLAND		AREA NOT EVALUATED BASED ON ONGOING CONSTRUCTION ACTIVITIES
	DELINEATED ISOLATED WETLAND (WRA 2009, APPROVED BY THE USACE 3/15/10)		

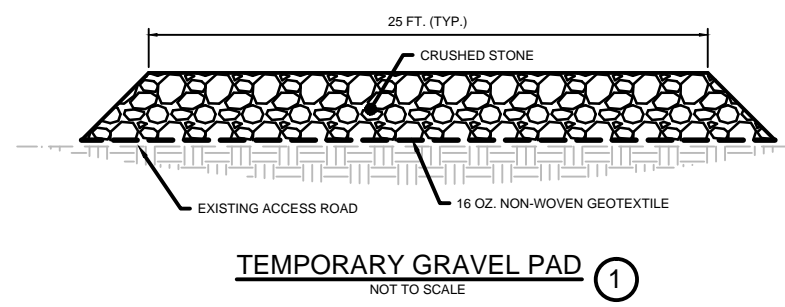
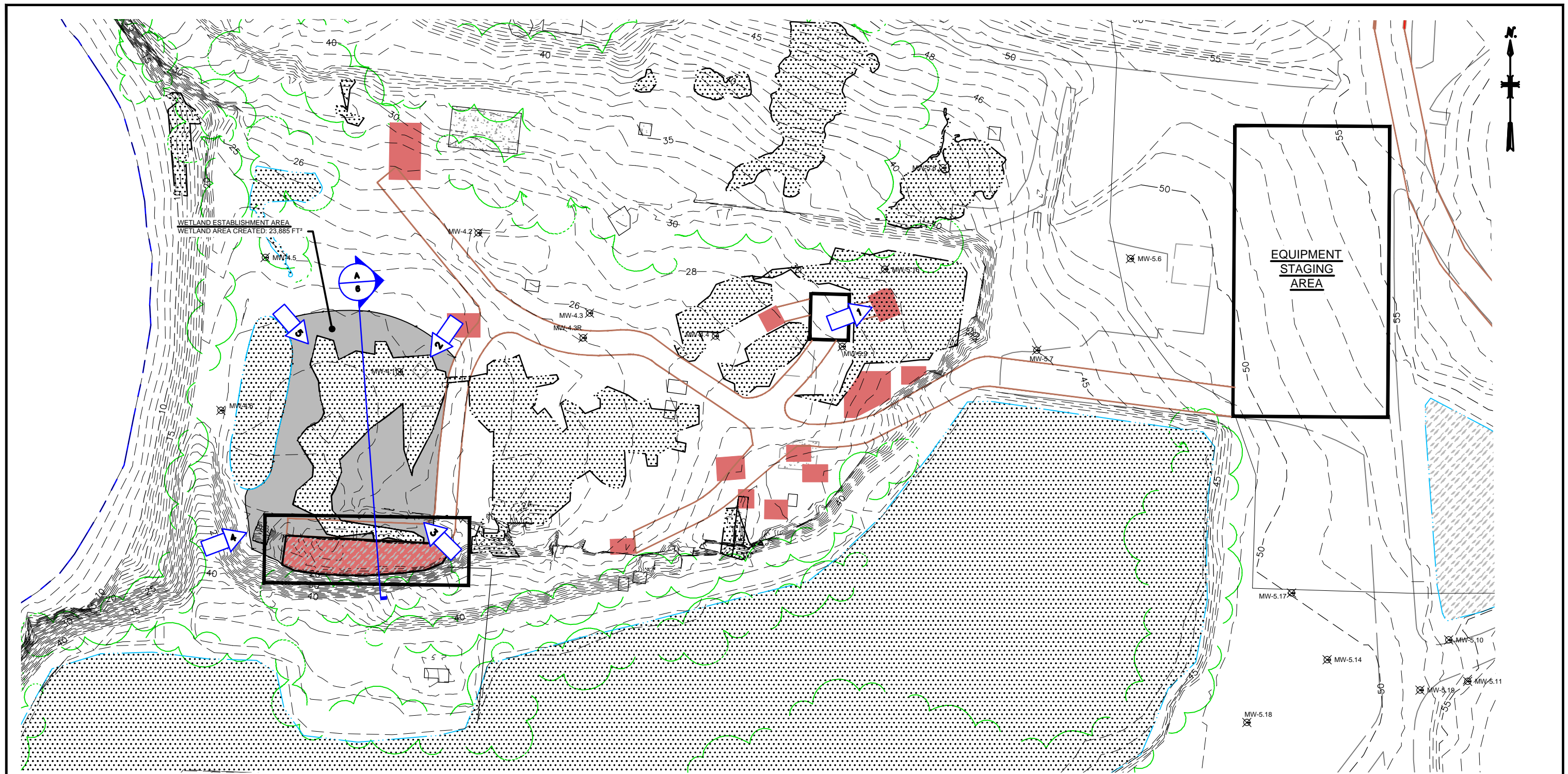
FORMER GEORGIA-PACIFIC WOOD PRODUCTS FACILITY
FORT BRAGG, CALIFORNIA

MITIGATION AND MONITORING PLAN

WETLANDS AND OTHER WET ENVIRONMENTALLY SENSITIVE HABITAT AREA - SOUTHERN

Design & Consultancy for natural and built assets **FIGURE 3**

CITY: DETROIT DIV: GROUP: WR DB: LD: PIC: PM: JG TM: LY: ON: OFF: REF: G: PROJECT: Project Sufi: OTHER OFFICE WORK: B0066125: 0000 (FORT BRAGG) B0066142: 2016 ED: 700: PERMIT SUBMITTALS: SUBMITTAL BIO: FIG: 4: DWG: LAYOUT: 4: SAVER: 7/18/2016 4:23 PM: ACAD: VPR: 19.1S (LMS TECH) PAGES: 4: PLOT: 7/19/2016 10:37 AM

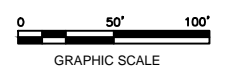


LEGEND

- STAGING/WORK AREA BOUNDARY
- ACCESS ROUTES
- PROPOSED EXCAVATION AREAS
- ISOLATED WETLAND AREA (PER 2010 USACE AUTHORIZED JURISDICTIONAL DETERMINATION)
- MW-3.1 MONITORING WELL
- WETLAND ESTABLISHMENT AREA
- WETLAND AREA
- EXISTING CONCRETE
- PROPOSED PHOTO LOCATION AND PHOTOGRAPH DIRECTION

NOTES:

1. APPARENT HORIZONTAL DATUM IS NAD83 CALIFORNIA STATE PLANES, ZONE II (CA83-IIF).
2. VERTICAL DATUM IS SITE SPECIFIC WITH BASED ON NGS BENCHMARK "SOLDIER" WITH ELEVATION = 64.0' NAVD88.
3. TEMPORARY GRAVEL PAD MAY BE USED IN AREAS WHERE SOFT CONDITIONS IMPEDE MOVEMENT. CRUSHED GRAVEL WILL BE USED TO IMPROVE DRIVING CONDITIONS. GRAVEL PAD WILL BE REMOVED DURING SITE RESTORATION.



GEORGIA-PACIFIC WOOD PRODUCTS FACILITY
FORT BRAGG, CALIFORNIA
 MITIGATION AND MONITORING PLAN

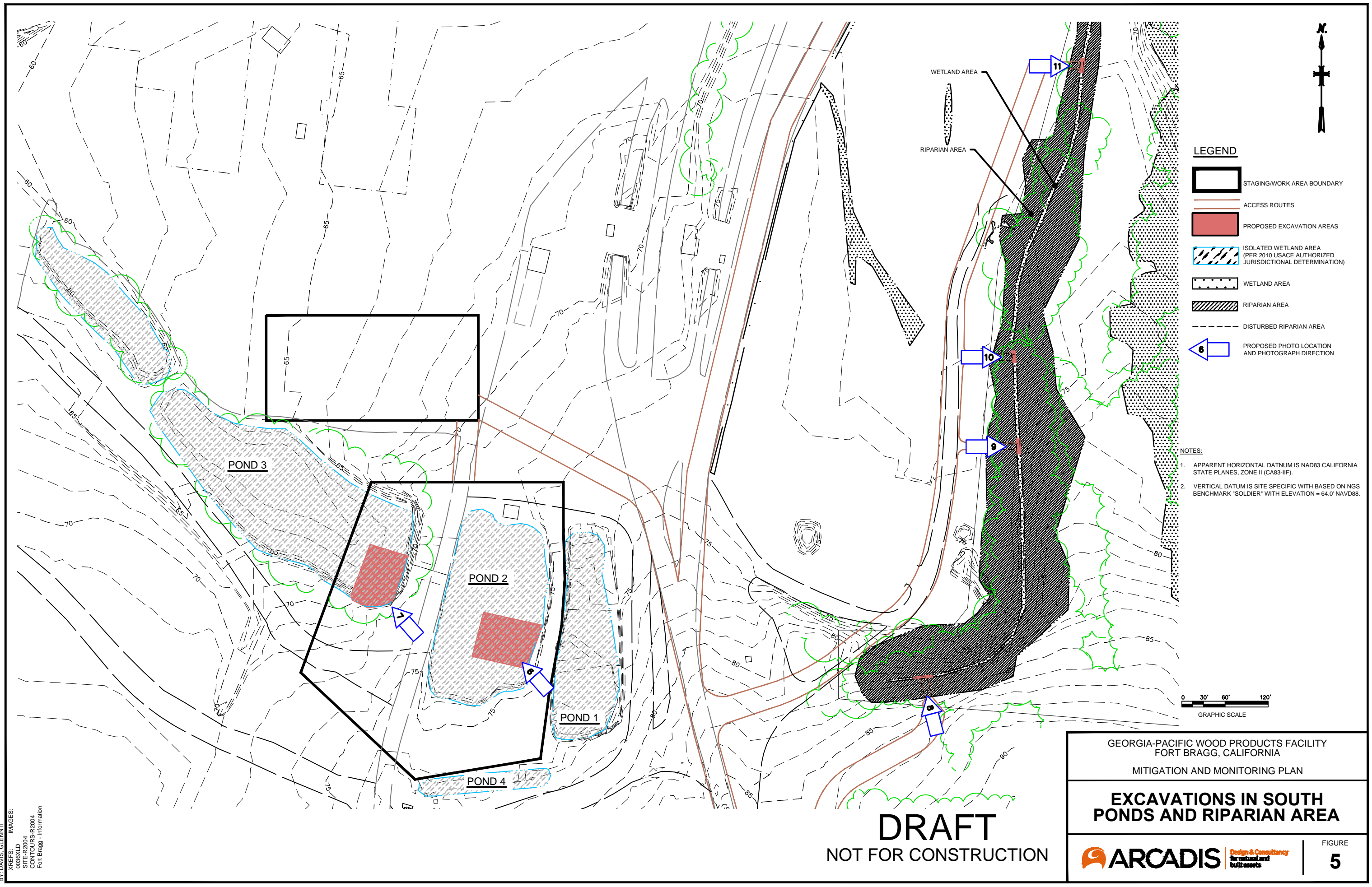
EXCAVATIONS IN OU-E
LOWLANDS

DRAFT
 NOT FOR CONSTRUCTION

FIGURE
4

XREFS: IMAGES:
 03: 6XLD
 SITE: 42004
 CONTOURS: R2004
 Fort Bragg - Information

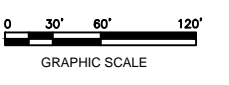
CITY: DETROIT DIV: GROUP: WR DB: LD: PIC: PM: JG TM: LYRON+OFF=REF
 G:\PROJECT\Project Support\OFFICE WORK\B0066125\0000 (FORT BRAGG)\B0066142.2016 ED700\PERMIT SUBMITTALS\SUBMITTAL BIO\FIG-5.dwg LAYOUT: 5 SAVED: 7/18/2016 4:18 PM ACADVER: 19.1S (LMS TECH) PAGES: 5 PLOTTED: 7/19/2016 10:54 AM
 BY: DAVIS, GLENN II



LEGEND

	STAGING/WORK AREA BOUNDARY
	ACCESS ROUTES
	PROPOSED EXCAVATION AREAS
	ISOLATED WETLAND AREA (PER 2010 USACE AUTHORIZED JURISDICTIONAL DETERMINATION)
	WETLAND AREA
	RIPARIAN AREA
	DISTURBED RIPARIAN AREA
	PROPOSED PHOTO LOCATION AND PHOTOGRAPH DIRECTION

- NOTES:**
1. APPARENT HORIZONTAL DATUM IS NAD83 CALIFORNIA STATE PLANES, ZONE II (CA83-IIF).
 2. VERTICAL DATUM IS SITE SPECIFIC WITH BASED ON NGS BENCHMARK "SOLDIER" WITH ELEVATION = 64.0' NAVD88.



GEORGIA-PACIFIC WOOD PRODUCTS FACILITY
 FORT BRAGG, CALIFORNIA

MITIGATION AND MONITORING PLAN

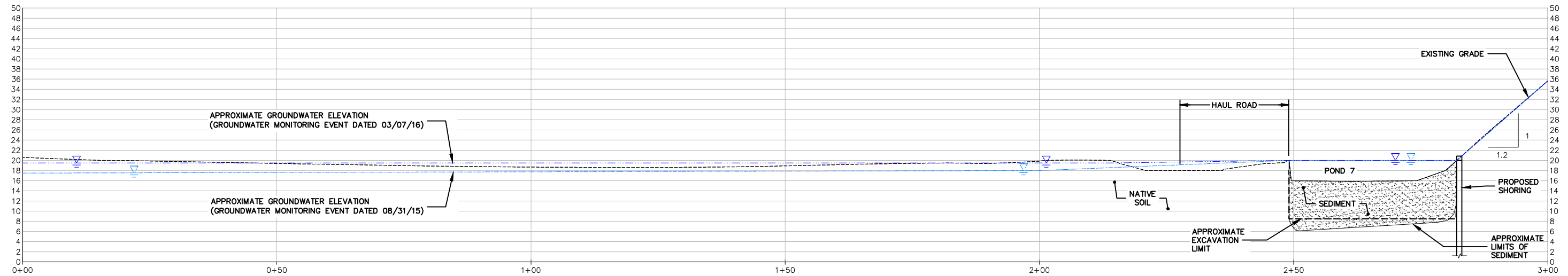
EXCAVATIONS IN SOUTH PONDS AND RIPARIAN AREA

ARCADIS *Design & Consultancy for natural and built assets*

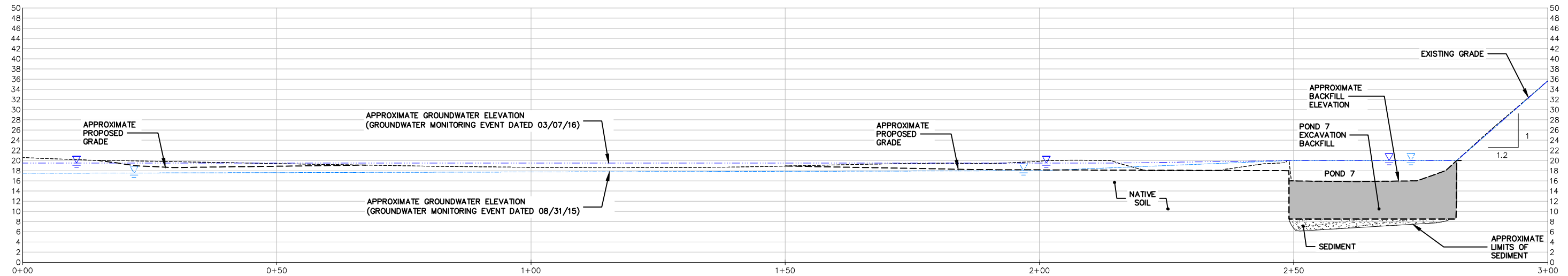
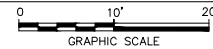
FIGURE **5**

DRAFT
 NOT FOR CONSTRUCTION

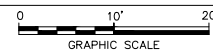
CITY OF FORT BRAGG, CALIFORNIA - PROJECT NAME: GEORGIA-PACIFIC WOOD PRODUCTS FACILITY MITIGATION AND MONITORING PLAN - WETLAND ESTABLISHMENT ELEVATIONS - FIGURE 6
 PROJECT LOCATION: 1500 W. GARDNER AVENUE, FORT BRAGG, CALIFORNIA 95501
 PROJECT NUMBER: 1500 W. GARDNER AVENUE, FORT BRAGG, CALIFORNIA 95501
 PROJECT DATE: 08/2016
 PROJECT STATUS: PRELIMINARY
 PROJECT OWNER: GEORGIA-PACIFIC WOOD PRODUCTS
 PROJECT DESIGNER: ARCADIS U.S. GLENN II
 PROJECT DRAWN BY: JACOB
 PROJECT CHECKED BY: JACOB
 PROJECT DATE: 08/2016



SECTION A - CURRENT ELEVATION AND EXCAVATION LIMITS



SECTION A - WETLAND ESTABLISHMENT ELEVATION



NOTES:

1. EXTENT OF NATIVE SAND INFERRED BASED ON DATA PRESENTED IN THE DATA SUMMARY REPORT OPERABLE UNITE E - POND SEDIMENT, PRODUCED BY ARCADIS IN MAY OF 2009.
2. ELEVATIONS BASED ON NORTH AMERICAN VERTICAL DATUM 1988 (NAVD88).
3. FINAL GRADING FOR MITIGATION AREA WILL HAVE GENTLE UNDULATIONS AND SLIGHT IRREGULARITY TO CAPTURE WATER. GRADING WILL BE BASED ON FIELD CONDITIONS UNDER THE SUPERVISION OF A RESTORATION ECOLOGIST.
4. PROPOSED EXCAVATION LIMITS AND ELEVATIONS ARE APPROXIMATE AND MAY VARY BASED ON FIELD CONDITIONS.
5. POND 7 REMEDIAL AREA SHALL BE EXCAVATED PRIOR TO WETLAND MITIGATION EXCAVATION AREA.

DRAFT
NOT FOR CONSTRUCTION

GEORGIA-PACIFIC WOOD PRODUCTS FACILITY FORT BRAGG, CALIFORNIA MITIGATION AND MONITORING PLAN	
WETLAND ESTABLISHMENT AREA ELEVATIONS	
Design & Consultancy for natural and built assets	FIGURE 6

APPENDIX A

California Rapid Assessment Method Data



Former Georgia-Pacific Wood Products Facility
Mitigation and Monitoring Plan
Perennial Depressional Wetlands - Buffer and Landscape Connectivity Attribute Calculations
Fort Bragg, California

Pond 7

Attribute	Metric	Value	Rating	Value
Landscape Connectivity	Average Percentage of Transect Length with Wetland Habitat	37%	C	6
	Percent of AA Perimeter with Buffer	100%	A	12
	Average Buffer Width	183.00	B	9
Buffers	Buffer Condition	Highly disturbed	D	3
Raw Attribute Score				11.58363
Final Attribute Score				48%

Wetland N (Pond 2)

Attribute	Metric	Value	Rating	Value
Landscape Connectivity	Average Percentage of Transect Length with Wetland Habitat	5%	D	3
	Percent of AA Perimeter with Buffer	100%	A	12
	Average Buffer Width	83	C	6
Buffers	Buffer Condition	Highly disturbed	D	3
Raw Attribute Score				8.04537849
Final Attribute Score				34%

Wetland E-5 and E-6

Attribute	Metric	Value	Rating	Value
Landscape Connectivity	Average Percentage of Transect Length with Wetland Habitat	34%	C	6
	Percent of AA Perimeter with Buffer	100%	A	12
	Average Buffer Width	175	B	9
Buffers	Buffer Condition	Highly disturbed	D	3
Raw Attribute Score				11.58363
Final Attribute Score				48%

Wetland O (Pond 3 SE)

Attribute	Metric	Value	Rating	Value
Landscape Connectivity	Average Percentage of Transect Length with Wetland Habitat	8%	C	6
	Percent of AA Perimeter with Buffer	54%	B	9
	Average Buffer Width	84	C	6
Buffers	Buffer Condition	Highly disturbed	D	3
Raw Attribute Score				10.6952537
Final Attribute Score				45%

Wetland E-1

Attribute	Metric	Value	Rating	Value
Landscape Connectivity	Average Percentage of Transect Length with Wetland Habitat	22%	D	3
	Percent of AA Perimeter with Buffer	100%	A	12
	Average Buffer Width	140	B	9
Buffers	Buffer Condition	Highly disturbed	D	3
Raw Attribute Score				8.583629
Final Attribute Score				36%

Former Georgia-Pacific Wood Products Facility
Mitigation and Monitoring Plan
Perennial Depressional Wetlands - Biotic Structure Attribute Calculations
Fort Bragg, California

Pond 7

Plant Layer	Co-dominant Species Observed	Native (N) or Invasive (I)
Short	Hydrocotyl ranunculoides	N
Medium	Oenanthe sarmentosa	N
Tall	Typha latifolia	N
3 layers	3 co-dominant species	0% invasive

Wetland N (Pond 2)

Plant Layer	Co-dominant Species Observed	Native (N) or Invasive (I)
Short	Myriophyllum aquaticum	I
Medium	Cakile edula	N
Tall	Typha latifolia	N
3 layers	3 co-dominant species	33% invasive

Wetland E-5 and E-6

Plant Layer	Co-dominant Species Observed	Native (N) or Invasive (I)
Short	Cotula coronopifolia	I
	Grass (unknown)	-
	Plantago coronopus	N
	Lotus corniculatus	N
Medium	Holcus lanatus	I
	Deschampsia cespitosa	N
	Cyperus eragrostis	N
Tall	Cortaderia selloana	I
3 layers	8 co-dominant species	~38% invasive

Wetland O (Pond 3 SE)

Plant Layer	Co-dominant Species Observed	Native (N) or Invasive (I)
Short	Lemna minor	N
Medium	Scirpus microcarpus	N
	Carex obnupta	N
	Juncus effusus	N
Tall	Typha latifolia	N
3 layers	5 co-dominant species	0% invasive

Wetland E-1

Plant Layer	Co-dominant Species Observed	Native (N) or Invasive (I)
Short	Unknown	-
	Juncus bolanderi	N
	Deschampsia cespitosa	N
Medium	Cyperus eragrostis	N
	Deschampsia cespitosa	N
	Polypogon monspeliensis	I
	Juncus effusus	N
Tall	Cortaderia jubata	I
	Typha latifolia	N
3 layers	9 co-dominant species	~ 22% invasive

AA Name: Pond 7		(m/d/y)	6	15	10
Attributes and Metrics		Scores			
Buffer and Landscape Context					
Landscape Connectivity (D)		C			
<i>Buffer submetric A: Percent of AA with Buffer</i>	A				
<i>Buffer submetric B: Average Buffer Width</i>	B				
<i>Buffer submetric C: Buffer Condition</i>	D				
$D + [C \times (A \times B)^{1/2}]^{1/2} = \text{Attribute Score}$		Raw	Final	Final Attribute Score = (Raw Score/24)100	
		11.58	48%		
Hydrology					
Water Source		C			
Hydroperiod or Channel Stability		C			
Hydrologic Connectivity		D			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	
		15	42%		
Physical Structure					
Structural Patch Richness		D			
Topographic Complexity		D			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/24)100	
		6	25%		
Biotic Structure					
<i>Plant Community submetric A: Number of Plant Layers</i>	B				
<i>Plant Community submetric B: Number of Co-dominant species</i>	D				
<i>Plant Community submetric C: Percent Invasion</i>	A				
Plant Community Metric (average of submetrics A-C)		8			
Horizontal Interspersion and Zonation		C			
Vertical Biotic Structure		C			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	
		20	56%		
Overall AA Score		43%		Average of Final Attribute Scores	

AA Name: Wetland E-5 and E-6		(m/d/y)	12	7	10
Attributes and Metrics		Scores			
Buffer and Landscape Context					
Landscape Connectivity (D)		C			
<i>Buffer submetric A: Percent of AA with Buffer</i>	A				
<i>Buffer submetric B: Average Buffer Width</i>	B				
<i>Buffer submetric C: Buffer Condition</i>	D				
D + [C x (A x B)^{1/2}]^{1/2} = Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/24)100	
		11.58	48%		
Hydrology					
Water Source		A			
Hydroperiod or Channel Stability		B			
Hydrologic Connectivity		A			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	
		33	92%		
Physical Structure					
Structural Patch Richness		D			
Topographic Complexity		C			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/24)100	
		9	38%		
Biotic Structure					
<i>Plant Community submetric A: Number of Plant Layers</i>	B				
<i>Plant Community submetric B: Number of Co-dominant species</i>	C				
<i>Plant Community submetric C: Percent Invasion</i>	C				
Plant Community Metric (average of submetrics A-C)		7			
Horizontal Interspersion and Zonation		C			
Vertical Biotic Structure		C			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	
		19	53%		
Overall AA Score		58%		Average of Final Attribute Scores	

AA Name: Wetland E-1		(m/d/y)	12	7	10
Attributes and Metrics		Scores			
Buffer and Landscape Context					
Landscape Connectivity (D)		D			
<i>Buffer submetric A: Percent of AA with Buffer</i>	A				
<i>Buffer submetric B: Average Buffer Width</i>	B				
<i>Buffer submetric C: Buffer Condition</i>	D				
$D + [C \times (A \times B)^{1/2}]^{1/2} = \text{Attribute Score}$		Raw	Final	Final Attribute Score = (Raw Score/24)100	
		8.584	36%		
Hydrology					
Water Source		A			
Hydroperiod or Channel Stability		B			
Hydrologic Connectivity		B			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	
		30	83%		
Physical Structure					
Structural Patch Richness		D			
Topographic Complexity		C			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/24)100	
		9	38%		
Biotic Structure					
<i>Plant Community submetric A: Number of Plant Layers</i>	B				
<i>Plant Community submetric B: Number of Co-dominant species</i>	B				
<i>Plant Community submetric C: Percent Invasion</i>	B				
Plant Community Metric (average of submetrics A-C)		9			
Horizontal Interspersion and Zonation		B			
Vertical Biotic Structure		B			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	
		26	72%		
Overall AA Score		57%		Average of Final Attribute Scores	

AA Name: Wetland N (Pond 2)		(m/d/y)	12	7	10
Attributes and Metrics		Scores			
Buffer and Landscape Context					
Landscape Connectivity (D)		D			
<i>Buffer submetric A: Percent of AA with Buffer</i>	A				
<i>Buffer submetric B: Average Buffer Width</i>	C				
<i>Buffer submetric C: Buffer Condition</i>	D				
D + [C x (A x B)^{1/2}]^{1/2} = Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/24)100	
		8.045	34%		
Hydrology					
Water Source		C			
Hydroperiod or Channel Stability		D			
Hydrologic Connectivity		D			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	
		12	33%		
Physical Structure					
Structural Patch Richness		D			
Topographic Complexity		C			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/24)100	
		9	38%		
Biotic Structure					
<i>Plant Community submetric A: Number of Plant Layers</i>	B				
<i>Plant Community submetric B: Number of Co-dominant species</i>	D				
<i>Plant Community submetric C: Percent Invasion</i>	C				
Plant Community Metric (average of submetrics A-C)		6			
Horizontal Interspersion and Zonation		C			
Vertical Biotic Structure		A			
Attribute Score		Raw	Final	Final Attribute Score = (Raw Score/36)100	
		24	67%		
Overall AA Score		43%		Average of Final Attribute Scores	

AA Name: Wetland O (Pond 3 SE)		(m/d/y)	12	7	10
Attributes and Metrics		Scores			
Buffer and Landscape Context					
Landscape Connectivity (D)		C			
<i>Buffer submetric A: Percent of AA with Buffer</i>	B				
<i>Buffer submetric B: Average Buffer Width</i>	C				
<i>Buffer submetric C: Buffer Condition</i>	D				
D + [C x (A x B)^{1/2}]^{1/2} = Attribute Score		Raw	Final	Final Attribute Score =	
		10.7	45%	(Raw Score/24)100	
Hydrology					
Water Source		D			
Hydroperiod or Channel Stability		D			
Hydrologic Connectivity		D			
Attribute Score		Raw	Final	Final Attribute Score =	
		9	25%	(Raw Score/36)100	
Physical Structure					
Structural Patch Richness		D			
Topographic Complexity		D			
Attribute Score		Raw	Final	Final Attribute Score =	
		6	25%	(Raw Score/24)100	
Biotic Structure					
<i>Plant Community submetric A: Number of Plant Layers</i>	B				
<i>Plant Community submetric B: Number of Co-dominant species</i>	D				
<i>Plant Community submetric C: Percent Invasion</i>	A				
Plant Community Metric (average of submetrics A-C)		8			
Horizontal Interspersion and Zonation		C			
Vertical Biotic Structure		A			
Attribute Score		Raw	Final	Final Attribute Score =	
		26	72%	(Raw Score/36)100	
Overall AA Score		42%		Average of Final Attribute Scores	

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Tel 925 274 1100

Fax 925 274 1103

www.arcadis.com

A decorative graphic consisting of three thin orange lines. One line is horizontal, extending across the width of the page. Two other lines are diagonal, starting from the bottom left and extending towards the top right, intersecting the horizontal line.