DRAFT MITIGATED NEGATIVE DECLARATION

CITY OF FORT BRAGG
Incorporated August 5, 1889
416 N. Franklin Street
Fort Bragg, California 95437
tel. 707.961.2823
fax. 707.961.2802
www.fortbragg.com

PROJECT TITLE: **Grading Permit (GP) 2013-08; SUMMERS LANE RESERVOIR**

APPLICATIONS: CALFIRE Timberland Conversion and Timber Harvest Plan;
SWRCB Petition for Change
NCRWQCB NPDES Permit
Air Quality Grading Permit and Burn Permit

LEAD AGENCY: City of Fort Bragg
416 North Franklin Street
Fort Bragg, CA 95437

CONTACT: Teresa R Spade, AICP
Assistant Planner
Community Development Department
(707) 961-2827

LOCATION: On a City of Fort Bragg owned and incorporated 35.8 acre parcel located approximately 2.5 miles inland at the north end of Summers Lane, at 19701 Summers Lane (APN 019-070-13).

OWNER/APPLICANT: City of Fort Bragg

GENERAL PLAN DESIGNATION: Public Facilities and Services (PF)

ZONING: Public Facilities Zoning District

Summers Lane Reservoir Project

PROJECT LOCATION

The proposed project site is located within the Noyo River Basin in western Mendocino County, 2.5 miles east of the main portion of the Fort Bragg City limits at the northeast terminus of Summers Lane as illustrated in **Figure 1**. The proposed reservoir site is located above Newman Gulch, approximately 200 linear feet above the existing Newman Reservoir on a 35.8-acre parcel owned by the City of Fort Bragg and within City jurisdiction (the property is separated from the main portion of the City however it is an annexed part of the City). The parcel address is 19701 Summers Lane, the Assessor's Parcel Number (APN) is 019-070-13 and the site is located outside of the coastal zone. An associated water pipeline, proposed for replacement, is located within the Summers Lane (private portion) right of way (APN 019-690-RW and 019-070-RW) and within the Brush Creek Road (a private road[1]) right of way on parcels 019-700-25 and 019-700-24).

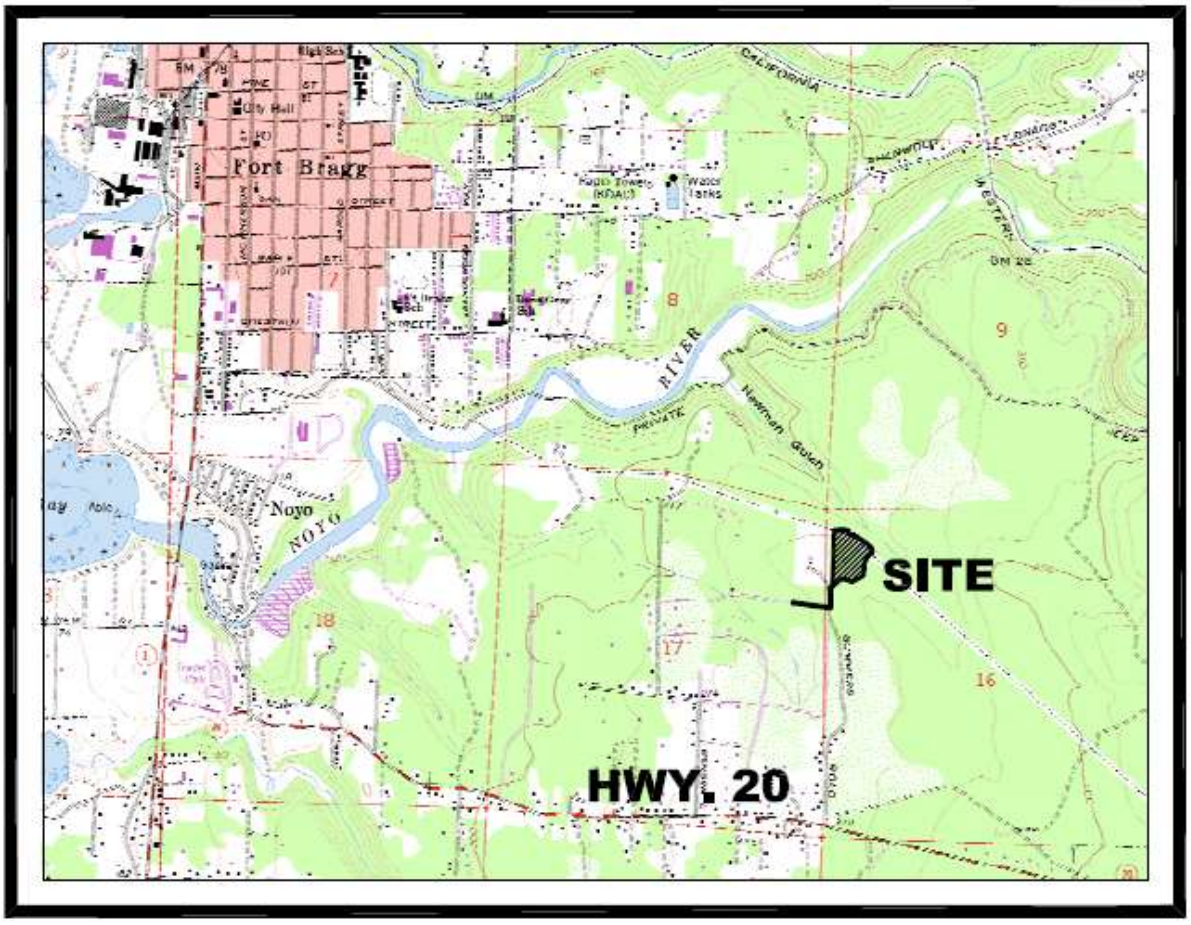


Figure 1. Project site.

According to the U.S. Geological Survey 7.5 minute Fort Bragg Quad topographic map, the project site is located in the NW ¼ of NW ¼ of Section 16, Township 18N, Range 17W and the

[1] There is an existing public utility easement on Brush Creek Road to accommodate the pipe relocation, according to the subdivision map recorded in 1983 in Map Case 2, Drawer 41, Page 68.

project coordinates are approximately 39° 25' 31" N (39.4252°) latitude and 123° 46' 04" W (123.7678°) longitude.

An approximately 600 acre property owned by Mendocino Coast Recreation and Park District surrounds the property to the east and south. A graveled access road and the Mendocino Coast Humane Society and Mendocino County Animal Control facilities are to the south of the proposed development area. The northern edge of the site is bounded by a Pacific Gas and Electric (PG&E) access road and northwest-trending power line corridor. A poorly maintained barbed wire fence extends roughly along the western property margin and defines the approximate western margin of the proposed development area. Property to the west includes rural residential development and a rhododendron nursery. The southern and eastern margins of the development area are currently lined with large concrete rubble to deter unauthorized "off road" vehicular access onto the property.

The overall footprint of the project includes a total of 7.5 acres. Upon development, approximately 6.5 acres of the site would be covered by the reservoir (see site plan **Figure 2)**.

PROJECT PARAMETERS AND PURPOSE

The purpose of the proposed project is to develop a 45 acre-foot raw water reservoir to store raw water from Waterfall Gulch to meet drought-related and regular on-going water storage needs of the Fort Bragg water service area. This water will be transported via gravity fed pipeline to the City of Fort Bragg's water treatment plant for the provision of potable water for the Fort Bragg water service area.

The City currently has the ability to store 6,300,000 gallons of water, including two raw water storage ponds at the Water Treatment Plant, two tanks at the Corporation Yard, and a smaller tank at the Highway 20 Fire Station. Additional water storage is accommodated within the Newman Reservoir, Waterfall Gulch, and water within the distribution system. The proposed reservoir would hold approximately 14,700,000 gallons of raw water. For perspective, Fort Bragg uses roughly 500,000 to a million gallons of water per day in the summer.

The City has a licensed water right to divert water from Waterfall Gulch[2], a tributary to Hare Creek, and that water is piped to the City's Newman Reservoir property and on to the treatment plant. The point of diversion will remain the same, as will the amount of water drawn from Waterfall Gulch. The City has filed a Petition for Change with the State Water Resources Control Board to request that water right License 12171 be changed to allow for water from Waterfall Gulch to be stored in the proposed Summers Lane Reservoir. The reservoir will be constructed down the pipeline, between Waterfall Gulch (point of diversion) and the point at which the pipeline currently ties in to Newman Gulch (current point of re-diversion) and heads to the water treatment plant. Storage of Waterfall Gulch water in a reservoir (proposed new point of re-diversion) will allow the City to use the stored water in the late summer months when demands are high and supply is limited.

Water supply analyses indicate that although the City has a sufficient water right to serve the projected build out of the City of Fort Bragg as currently zoned within the existing City Limits through 2040, it does not have sufficient water storage or a right that allows for storage to

[2] License 12171 for Diversion and Use of Water from the State Water Resources Control Board allows the City of Fort Bragg a maximum of 475 acre feet per year to be diverted from Waterfall Gulch at a rate of diversion not to exceed 0.668 cfs.

provide service in severe drought conditions. A new storage facility will help meet water requirements in extended drought conditions and it will help in the overall management of water quality during typical rainfall summer months. In extreme drought conditions, such as conditions in 1977, the new storage facility would allow the City to effectively serve existing development.

PROJECT CHARACTERISTICS

Project components consist of a timber harvest, reservoir construction (including pipe replacement/ new pipe installation and new fencing), and long-term maintenance of the project.

TIMBER HARVEST

Timber harvest will occur on approximately eight acres to accommodate the project. The selected area has already been impacted by past logging activities. The project site consists of redwood dominated coastal mixed coniferous forest which was most recently logged in 1993. There are no watercourses or wetlands within the timber harvest area.

An estimated 72 pygmy cypress (*Hesperocyparis pygmaea*) trees are currently present in the project area, constituting approximately 1/7th of the canopy cover. Pygmy cypress is considered a rare plant by the California Native Plant Society (CNPS) and it is listed as a 1B2 ranked species. This plant is not included on any Federal or State lists, however. It is also to be noted that the pygmy cypress specimens in the project area are not in their native habitat, which is the Pygmy Cypress Forest.

The project includes measures to ensure that impacts to pygmy cypress are less than significant, including replacement at a ratio of at least 3:1 and invasive plant removal. A pygmy cypress mitigation and monitoring plan has been developed and is included as Attachment 4.

CONSTRUCTION

Grading

Construction of the pond will consist of clearing and grubbing, grading and compaction of soils, creation of a geotextile reinforced berm, installation of safety and access systems, liner placement, erosion control, construction of an overflow spillway, installation of new pipe and connection to existing pipe, and installation of a gravel perimeter road and chain link fence and gate. Preliminary design details are as follows:

CONTROL COORDINATE LIST

PT#	NORTHING	EASTING	ELEVATION	DESCRIPTION
16	7802.5443	3459.8376	264.536	corner
69	7777.6939	4013.2235	291.1084	spike
87	7747.5371	4026.4215	292.45	cl monument
89	7853.3777	3452.9216	267.0655	spike
103	8128.5131	4019.1752	290.2461	spike
125	8099.6189	4036.825	291.6743	corner
143	8233.666	4189.0934	290.9996	spike
144	8208.2775	4404.8681	299.2737	spike
1212	8338.1951	4535.5614	304.2325	spike

LEGEND

- RIGHT OF WAY
- PROPERTY BOUNDARY
- PROPOSED WATER LINE ALIGNMENT
- EXISTING WATER LINE
- EXISTING ELECTRICAL LINE
- EXISTING DRAINAGE SWALE
- EXISTING FENCE LINE
- F — FLOW METER
- VALVE
- THRUST BLOCK
- CONCENTRIC INCREASER
- TRANSITION COUPLER
- (E) — EXISTING

APPROXIMATE PROPERTY LINE
(E) 6" C-900 PVC
18" CMP CULVERT
CREEK
(E) FLOW METER
(E) VAULT
(E) POWER LINE
APPROXIMATE LOCATION NEWMAN RESERVOIR
EXISTING 40' POWERLINE EASEMENT
PROPOSED PIPELINE ALIGNMENT
SUMP
UNDERDRAIN
CONTROL POINT (TYP.)
SUMMERS LANE
BRUSH CREEK ROAD
50' R.O.W. PER MCR, DR 29 PG 74
APPROXIMATE PROPERTY LINE
GRAPHICAL SCALE
0 60 120 180
(FEET)

NO.	DATE	REVISIONS	BY	CHK
1	7/2/09	PRELIMINARY	JS	CC

DRAWN BY: D. ZAITZ
PROJECT NO: 008195.00
ENGINEER: J. SOLORIO
SCALE: 1"=60'
CHECKED BY:
APPROVED BY:
DATE:
DATE:

LAWRENCE & ASSOCIATES
ENGINEERING GEOLOGY
3590 IRON CT. SHASTA LAKE, CA 96019
(530) 275-4800
(530) 275-7970 FAX

NEWMAN RESERVOIR
CITY OF FORT BRAGG
416 NORTH FRANKLIN ST.
FORT BRAGG, CA 95437

SITE PLAN

DRAWING: C1.0
SHEET: OF
REVISION NO: REVISION 0
DATE: 12/1/09

P:\008195.00_Jackson & Hall_Fort Bragg reservoir\surplus.dwg 12/1/2009

Figure 2. Site Plan.

Approximately 43,000 cubic yards (cy) of soil will be graded to provide the 45-acre feet of water storage. Approximately 7,000-cy of topsoil will be temporarily stored at the site and used for mitigation planting around the perimeter of the new reservoir. An additional 34,000-cy will be cut, moved, and then compacted to create the embankment for the reservoir. Any topsoil or other soil materials not used at the project site will be temporarily stored on-site until they can be utilized for other local City projects. The reservoir will cover approximately 6.5-acres. An additional 1.5 acres will be cleared for access, construction staging, the outlet basin, and reservoir piping.

Two-to-one (2 horizontal: 1 vertical) outside (opposite impounded water), and three-to-one (3:1) inside slopes are planned for the reservoir embankment. The berm height will be at grade (southeast corner) to about 13 feet above grade (southwest corner) on the south side, at grade on the east side, about 13 to 22 feet above grade on the north side, and 14 to 18 feet above grade on the west side. The berm will be reinforced with a geotextile material for added stability.

A total of three feet of freeboard is provided for the reservoir. Freeboard is additional embankment height that is provided above a water surface level to assure that failure of the dam will not result from overtopping because of factors that may permanently or temporarily increase the water surface elevation in the reservoir. Freeboard also provides a safety factor to account for uncertainties in operational procedures and the function of the facility in critical situations. The total amount of freeboard may increase or decrease depending on calculations to be performed during the final design phase of the project.

Diversion/Piping

The source piping (from Waterfall Gulch) for the reservoir will tie into the existing pipeline to Newman Gulch Reservoir approximately 280-feet west of the intersection of Brush Creek Road and Summers Lane. The existing pipeline that continues north to Newman Gulch will be disconnected and abandoned in place. All water from Waterfall Gulch, which presently flows either directly to the Water Treatment Plant or to Newman Reservoir, will be diverted to the new Summers Lane Reservoir. Newman Reservoir will be retained to hold water from the City's Newman Gulch water source.

The new piping from Waterfall Gulch will be placed along the north side of Brush Creek Road (a private road) in an existing 60 foot wide utility easement, heading eastward approximately 280 feet from the tie in point to the intersection of Brush Creek Road and Summers Lane. At the intersection of Brush Creek Road and Summers Lane, the new piping will then head north along Summer's Lane (CR 415D) within the privately maintained portion of the road. Beyond Summers Lane, the piping would extend to the City owned property. The new piping will head in a northeasterly direction along the existing access road, around the new reservoir, to the east side, where it will enter the new reservoir. Additional pipe heads northward and then westward around the new reservoir, where it ties in to the outlet pipe to the water treatment plant.

Piping leaving the new reservoir is accommodated by two bottom outlet pipes and one "pond full" pipe, which converge at a three way valve system before tying into the outlet pipe to the Water Treatment Plant. Additionally a reservoir cleanout pipe and reservoir overflow pipes run from the reservoir just west of the three-way valve system to the overflow system in the northwest corner of the new reservoir.

The piping system will use approximately 10,560-feet of existing piping. Of this total, approximately 3,178-feet were replaced in or around the year 1990. **Table 1** below lists the assumed pipeline characteristics based on historical data provided by the City on April 14, 2009. An additional 5400 linear feet of raw water line is expected to be replaced between State Route 20 and Brush Creek Road as part of the Waterfall Gulch Pipeline Replacement Project.

Table 1
Existing Diversion Piping

STATION (STARTING AT WATERFALL INLET)	PIPE MATERIAL	APPROXIMATE YEAR INSTALLED
0 – 0+43	12" C150 PVC	1990
0+43 – 3+40	8" ASBESTOS CEMENT (AC)	UNKNOWN
3+40 – 34+75	10" C150 PVC	1990
34+75 – 105+60	6" AC	UNKNOWN
105+60 – 121+44	6" SPIRAL STEEL/6" AC/6" C300 PVC	UNKNOWN/1990

Notes: PVC: polyvinyl chloride. The 6" spiral steel section will be abandoned in place.

The current outlet from Waterfall Gulch consists of an embankment, less than 10-feet tall, through which a discharge pipe and an overflow culvert pass. The inlet to the discharge pipe is fitted with a stainless-steel debris grate. A gate valve is used to regulate the amount of water entering the pipeline. A vacuum relief valve is located on top of the embankment to prevent a vacuum from forming inside the pipe.

The inlet into the new reservoir will be 62-feet higher than the current discharge location, and the flow is expected to occur via gravity flow at a rate of between 132 gallons per minute (gpm) and 225 gpm. A larger 10-inch diameter C-900 PVC pipe is assumed for the 1,373-feet of pipe from the point of connection on Summers Lane to the new reservoir (the existing pipe is 6-inch diameter steel). Assuming 135-gpm flows, it would take approximately 70 days to fill the reservoir. Assuming 225-gpm flow rates, it would take approximately 40 days.

Overflow (Spillway)

An overflow path, commonly referred to as a spillway, is provided on reservoirs to provide a safe release in the event that inflow exceeds outflow during a condition when the water surface elevation is at full pool. The design of the overflow is driven by factors such as inlet flows, tributary area, rainfall rates, and safety. In the case of the proposed reservoir, surrounding surface drainage will be routed around the reservoir; therefore, the only tributary will be the pond surface. The outlet is designed for the maximum anticipated inflow, which is rainfall from a 100-year storm event, and additional factor of safety (in this case, a factor of safety of 1.5 is recommended). The spillway will provide a controlled overflow for larger storms, and will be designed for the peak design flow of 31 cubic feet per second (cfs).

The "pond overflow" is shown in attached drawing C5.0 (**Attachment 1**, Engineered Plans), and is to be located on the north side of the reservoir in the northwest corner. The overflow heads out of the reservoir through a 36"pipe booted two feet below the top of the berm. A concrete pad with elevated sides accommodates the overflow pipe across the top of the berm and the pipe heads down the berm in a northerly direction to an energy dissipater. The overflow is then piped towards an existing swale in a northeasterly direction. An additional energy dissipater is located at the second outlet. The water then flows through the existing swale downstream. The swale travels northeast to Newman Gulch and subsequently into the Noyo River. The current peak

flow from the reservoir footprint into the existing drainage swale is calculated to be 4.9 cfs. Using the low-flow orifice, the peak flow will be less after the reservoir is constructed.

There are no buildings between the reservoir spillway and the Noyo River. At the design discharge of 1 cfs, the flow into Newman Reservoir and the Noyo River will be less than pre-project flow and will not contribute to flooding. Any discharge from the spillway is likely to last only the duration of the 100-year design storm for peak flow of 5 minutes. It is expected that this short term flow would not result in downstream flooding.

Underdrain and Liner

A liner would be placed along the bottom of the proposed reservoir to retain the water and minimize soil accumulation. The liner would be composed of white 60-mil (about 1/16") thick high-density polyethylene (HDPE). The UV resistant HDPE liner is expected to last longer and have better seam durability than other liner types suitable for drinking water. The lifespan is expected to be greater than 30 years for the proposed liner. The white color is proposed to reduce the potential for water heating.

To prevent groundwater from saturating the soil beneath the embankment, and to prevent groundwater from accumulating beneath the liner, an underdrain such as a 2- to 3-inch perforated schedule 40 PVC pipe bedded in gravel, and filter fabric, will be installed in the native soil beneath the proposed liner. The underdrain would gravity drain downhill to an erosion-protected discharge point.

An anchoring trench will hold the liner in place. Emergency egress ladders or textured HDPE will be placed on each side of the pond to allow for access out of the pond should people or wildlife fall in. A fence will additionally be installed around the pond to prevent access.

Fencing

A six foot tall chain link fence is proposed around the new reservoir just outside of the berm to prevent unauthorized access.

LONG TERM MAINTENANCE

Black plastic food grade vapor containment /pollution control balls, aka “bird balls,” would float on the surface of the reservoir to minimize evaporation and minimize organic growth.

Site maintenance will include: weed removal, upkeep of fencing, and general site maintenance. The site will be regularly inspected for vandalism, signs of leakage, clogging of the low flow spillway, and inspection of the valves to ensure functionality.

The reservoir will be drained once after approximately five years, inspected and cleaned using fire hoses that wash the sediment to the low end. Larger branches will be picked up by hand and smaller sediment will be hosed through the cleanout drain and into the cleanout basin to be collected and transported to a disposal site.

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED

The following environmental factors listed below would be affected by this project, as discussed in the checklist on the following pages:

X Aesthetics	☐ Agricultural Resources	X Air Quality
X Biological Resources	X Cultural Resources	X Geology/Soils
X Hazards & Hazardous Materials	X Hydrology/Water Quality	X Land Use/Planning
☐ Mineral Resources	☐ Noise	☐ Population/Housing
☐ Public Services	☐ Recreation	X Transportation/Traffic
X Utilities/Service Systems	X Mandatory Findings of Significance	X Greenhouse Gas Emissions

DETERMINATION

On the basis of this initial evaluation:

☐ I find that the proposed project COULD NOT have a significant effect on the environment and a NEGATIVE DECLARATION will be prepared.

X I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☐ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect (1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and (2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Teresa R. Spade
Signature

June 12, 2014
Date

Teresa R Spade, AICP
Printed Name

City of Fort Bragg

ENVIRONMENTAL ISSUES

I. Aesthetics

Would the project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Have a substantial adverse effect on a scenic vista?				X
b. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?				X
c. Substantially degrade the existing visual character or quality of the site and its surroundings?		X		
d. Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?				X

DISCUSSION OF IMPACTS

a) *Would the project have a substantial adverse effect on a scenic vista?*

A scenic vista can be defined as the view of an area that is visually or aesthetically pleasing. Aesthetic components of a scenic vista include: 1) scenic quality, 2) sensitivity level, and 3) view access. A scenic vista often includes natural visual elements that can be seen from a distance. A development project can have visual impacts by either directly diminishing the scenic quality of the vista or by blocking the view corridors or "vista" of the scenic resource. The proposed development is not located in a mapped scenic view area, as shown on Map CD-1, "Potential Scenic Views Toward the Ocean or the Noyo River" (**Figure 3**), or on County Maps 13 and 14, included as **Attachment 2**. As the development of a new reservoir, including the reservoir's proposed height, mass, and location relative to surrounding land uses and travel corridors, will not block views of the existing forested tree-line, the project would have **no impact** to scenic vistas.

b) Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

The project is not visible from any State Scenic Highway, as neither Highway 20 or Highway 1 are designated State Scenic Highways.

c) Would the project substantially degrade the existing visual character or quality of the site and its surroundings?

The proposed project site is located in an area that has been previously logged, with second and third growth forest occurring over large portions of the site. A portion of the project footprint area includes a paved access road leading to the Mendocino Coast Humane Society shelter and former Mendocino County Animal Shelter (now abandoned), a denuded swath of vegetation along a northwest-trending power line corridor, a Pacific Gas and Electric (PG&E) access road, and a poorly maintained barbed wire fence along the western border. The southern and eastern margins of the proposed project area are currently lined with large concrete rubble to deter

unauthorized vehicular access onto the property. Illegal dumping and off-road vehicle use have left the site in less-than-pristine condition.

The project will include the removal of trees in a forested area and construction of a berm with a maximum height of 22 feet above grade (on the north side). The west side of the reservoir berm would be visible from the adjacent residential property to the west. The berm height on that side would vary from 14 to 18 feet. Additionally, a six foot tall chain link fence is proposed around the perimeter of the reservoir. A ten foot buffer area exists between the berm and the adjacent property to the west. Existing healthy mature vegetation (except for trees that are damaged or would be prone to windfall after harvest and conversion occur) is to be retained, and additional trees are proposed to be planted within the 10 foot buffer area (one per 100 sq. foot area) which would help to buffer the view of the berm from the adjacent property. The berm will be stabilized with native grass seed mix which will also help with buffering the visual impact.

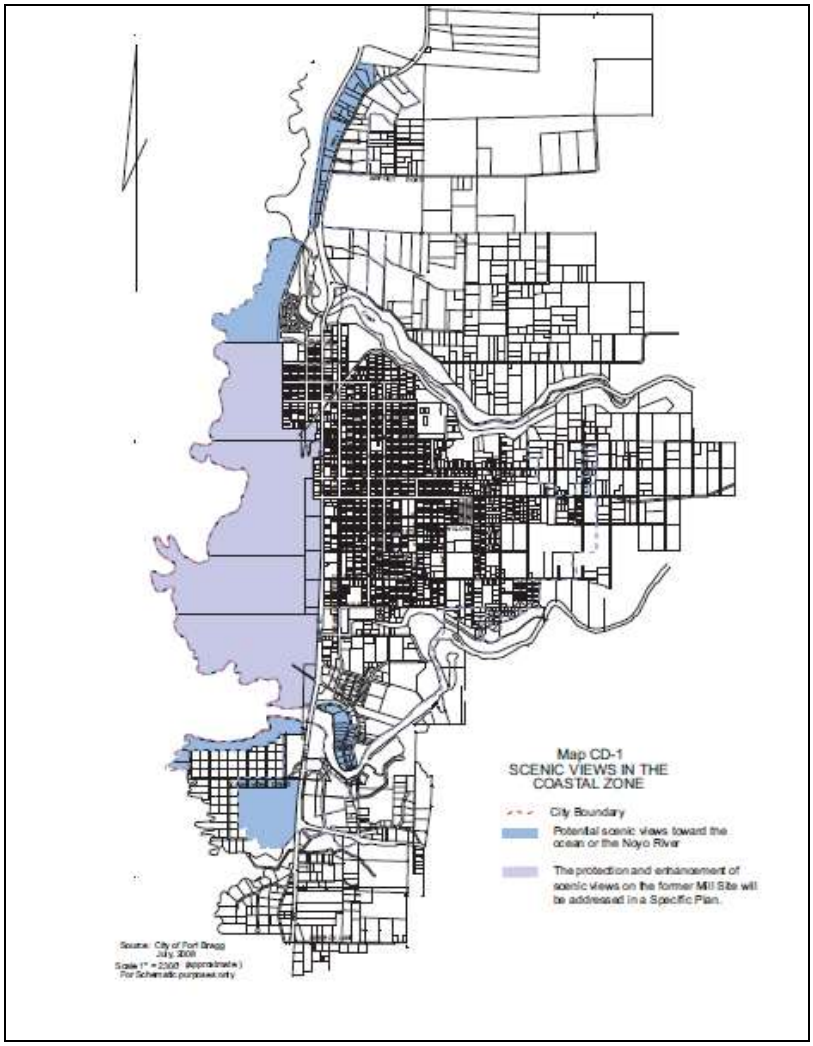


Figure 3. Potential scenic views toward the ocean or Noyo River.

The following mitigation measure is included to ensure the visual impact of the berm will be softened with vegetative planting on the west side, where the berm will be visible from the neighboring property:

Mitigation Measure 1: Native, drought resistant trees and shrubs shall be retained per the recommendation of the Licensed Timber Operator, and/or native pygmy cypress trees shall be established or planted 10 feet apart (an average of at least one every 100 square feet, after the conversion) along the entire west side of the reservoir within the 10 foot wide visual buffer area between the proposed berm and the western property boundary. At least half of the native vegetation shall be of a species which is expected to reach a height of at least 20 feet at maturity.

d) Would the project create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?

The project does not include outdoor lighting or other sources of light or glare that would be visible from neighboring properties. No visual impact is expected as a result of new light or glare sources.

II. Agricultural Resources

Would the project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?				X
b. Conflict with existing zoning for agricultural use, or a Williamson Act contract?				X
c. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use?				X

DISCUSSION OF IMPACTS

a) *Would the project convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?*

According to the California Department of Conservation Important Farmland Map (January 2009), farmland throughout Mendocino County is primarily mapped as grazing land. Prime Farmland, Unique Farmland, and Farmland of Statewide are concentrated around the Eel, Russian, and Navarro Rivers. The proposed project is located predominately within a parcel designated as Public Facilities and Services (PF) in the Fort Bragg General Plan and zoned as Public Facility (PF). The project area has been logged, with second and third growth occurring over large portions of the site. While crop production, horticulture, orchards, and vineyards are permitted uses within the PF zoning district, the parcel has not been used for and is not considered prime farmland, unique farmland, or farmland of statewide importance per the Farmland Mapping and Monitoring Program. As implementation of the project will not result in

the conversion of any farmland to non-agricultural uses, the project is considered to have **no impact** to farmland.

b) *Would the project conflict with existing zoning for agricultural use, or a Williamson Act contract?*

The proposed project is located predominately within a parcel zoned as Public Facility (PF). No agricultural uses currently exist or are planned on the site. The project would not infringe upon any lands with Williamson Act contracts. Therefore, the project is considered to have no impact with agricultural zoning or Williamson Act contracts.

c) *Would the project involve other changes in the existing environment, which, due to their location or nature, could result in conversion of Farmland to non-agricultural use?*

Surrounding land is primarily rural and includes a paved access road leading to the Mendocino County Animal Control and Animal Shelter facilities as well as a PG&E access road and northwest-trending power line corridor. Property to the west includes rural residential development and a rhododendron nursery. Surrounding the property to the east and south is an approximately 600 acre parcel owned by the Mendocino Coast Recreation and Park District. Although the project will create changes to the existing environment, the proposed project will not prevent the neighboring rhododendron nursery or any other parcel from continuing agricultural uses. As such, the proposed project is considered to have no impact to the conversion of farmland to non-agricultural use.

III. Air Quality

Where available, the significance criteria by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Conflict with or obstruct implementation of the applicable air quality plan?				X
b. Violate any air quality standard or contribute substantially to an existing or projected air quality violation?				X
c. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?		X		
d. Expose sensitive receptors to substantial pollutant concentrations?				X
e. Create objectionable odors affecting a substantial number of people?				X

DISCUSSION OF IMPACTS

c) *Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air*

quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?

The City of Fort Bragg is located in the North Coast Air Basin and is within the jurisdiction of the Mendocino County Air Quality Management District. Mendocino County is designated attainment or unclassified for all air quality standards except the state standards for Particulate Matter less than 10 microns in size (PM-10). Development within Mendocino County is required to comply with all applicable provisions of the Particulate Matter Attainment Plan adopted by the Mendocino County Air Quality Management District on March 15, 2005.

Temporary construction impacts are subject to Air Quality Management District Regulation 1 Rule 430 which requires dust control during construction activities.

Section 18.30.080.D of the Land Use and Development Code outlines municipal standards for dust management as follows:

> **Dust**. Activities that may generate dust emissions (e.g., construction, grading, commercial gardening, and similar operations) shall be conducted to limit the emissions beyond the site boundary to the maximum extent feasible. Appropriate methods of dust management shall include the following, subject to approval by the City Engineer.
>
> 1. **Scheduling.** Grading shall be designed and grading activities shall be scheduled to ensure that repeat grading will not be required, and that completion of the dust-generating activity (e.g., construction, paving or planting) will occur as soon as possible.
>
> 2. **Operations during high winds.** Clearing, earth-moving, excavation operations or grading activities shall cease when the wind speed exceeds 25 miles per hour averaged over one hour.
>
> 3. **Limiting the area of disturbance.** The area disturbed by clearing, demolition, earth-moving, excavation operations or grading shall be minimized at all times.
>
> 4. **Dust control.** Dust emissions shall be controlled by watering a minimum of two times each day, paving or other treatment of permanent on-site roads and construction roads, the covering of trucks carrying loads with dust content, and/or other dust-preventive measures (e.g., hydroseeding, etc.).
>
> 5. **Revegetation.** Graded areas shall be revegetated as soon as possible, but within no longer than 30 days, to minimize dust and erosion. Disturbed areas of the construction site that are to remain inactive longer than three months shall be seeded and watered until grass cover is grown and maintained; and
>
> 6. **Containment.** Appropriate facilities shall be constructed to contain dust within the site as required by the City Engineer.

Additionally, Section 18.62.020 of the Land Use and Development Code requires a Dust Prevention and Control Plan to be submitted in conjunction with the grading plan. The required plan content is outlined in Section 18.62.020.B of the Land Use and Development Code as follows:

> **Dust prevention and control plan.** A Dust Prevention and Control Plan shall be submitted in conjunction with a grading plan or other plan involving the movement of dirt. The City Engineer may also require the submittal of a Dust Prevention and Control Plan for other development deemed necessary.

Plan content. The plan shall demonstrate that the discharge of dust from the construction site will not occur, or can be controlled to an acceptable level depending on the particular site conditions and circumstances.

a. The plan shall address site conditions during construction operations, after normal working hours, and during various phases of construction.

b. The plan shall include the name and the 24 hour phone number of a responsible party in case of emergency.

c. If the importing or exporting of dirt is necessary as demonstrated by the cut and fill quantities on the grading plan, the plan shall also include the procedures necessary to keep the public streets and private properties along the haul route free of dirt, dust, and other debris.

d. When an entire project is to be graded and the subsequent construction on the site is to be completed in phases, the portion of the site not under construction shall be treated with dust preventive substance or plant materials and an irrigation system.

e. All phased projects shall submit a plan demonstrating that dust will not be generated from future phase areas.

Mitigation Measure 2 is included to ensure construction activities do not result in significant impacts resulting from a non-attainment pollutant (particulate matter) and includes language to ensure that the requirements of the Land Use and Development Code pertaining to dust control, as outlined above, are addressed:

Mitigation Measure 2: In order to minimize dust and keep dust from leaving the project site, a dust prevention and control plan shall be submitted for approval by the City Engineer in conjunction with the Storm Water Pollution Prevention Plan (SWPPP). The dust prevention and control plan shall demonstrate that the discharge of dust from the construction site will not occur, or can be controlled to an acceptable level depending on the particular site conditions and circumstances. The plan shall include the following information and provisions:

2.A - The plan shall address site conditions during construction operations, after normal working hours, and during various phases of construction.

2.B - The plan shall include the name and the 24 hour phone number of a responsible party in case of emergency.

2.C - If the importing or exporting of dirt is necessary as demonstrated by the cut and fill quantities on the grading plan, the plan shall also include the procedures necessary to keep the public streets and private properties along the haul route free of dirt, dust, and other debris.

2.D - When an entire project is to be graded and the subsequent construction on the site is to be completed in phases, the portion of the site not under construction shall be treated with dust preventive substance or plant materials and an irrigation system.

2.E - Grading shall be designed and grading activities shall be scheduled to ensure that repeat grading will not be required, and that completion of the dust-generating activity (e.g., construction, paving or planting) will occur as soon as possible.

2.F - The area disturbed by clearing, demolition, earth-moving, excavation operations or grading shall be minimized at all times.

2.G - All visibly dry disturbed soil road surfaces shall be watered to minimize fugitive dust emissions. Dust emissions shall be controlled by watering a minimum of two times each day, paving or other treatment of permanent on-site roads and construction roads, the covering of trucks carrying loads with dust content, and/or other dust-preventive measures (e.g., hydroseeding, etc.).

2.H - All unpaved surfaces, unless otherwise treated with suitable chemicals or oils, shall have a posted speed limit of 10 miles per hour.

2.I - Earth or other material that has been transported by trucking or earth moving equipment, erosion by water, or other means onto paved streets shall be promptly removed.

2.J - Asphalt, oil, water or suitable chemicals shall be applied on materials stockpiles, and other surfaces that can give rise to airborne dusts.

2.K - All earthmoving activities shall cease when sustained winds exceed 15 miles per hour. Wind speed shall be measured on-site by the City inspector with a hand-held anemometer.

2.L - The operator shall take reasonable precautions to prevent the entry of unauthorized vehicles onto the site during non-work hours.

2.M - The operator shall keep a daily log of activities to control fugitive dust.

2.N - Graded areas shall be revegetated as soon as possible, but within no longer than 30 days, to minimize dust and erosion. Disturbed areas of the construction site that are to remain inactive longer than three months shall be seeded and watered until grass cover is grown and maintained; and

2.O - Appropriate facilities shall be constructed to contain dust within the site as required by the City Engineer.

An Air Quality Management District grading permit will be needed, since the project area of disturbance is greater than one acre. Additionally, after the timber harvest, some of the vegetation remaining in the project area may be burned. A burn permit will be required from the Air Quality Management District for any burning. Compliance with the permit process will assure impacts to air quality are less than significant. **Mitigation Measure 3** is included to ensure the necessary permits are obtained for the project.

Mitigation Measure 3: The City shall secure all necessary permits for the proposed development from City, County, State and Federal agencies having jurisdiction.

IV. Biological Resources

Would the project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Have a substantial adverse effect, either directly or through habitat modification, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or US Fish and Wildlife Service?		X		
b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or US Fish and Wildlife Service?		X		
c. Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?		X		
d. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?		X		
e. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?				X
f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?				X

DISCUSSION OF IMPACTS

a) *Would the project have a substantial adverse effect, either directly or through habitat modification, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or US Fish and Wildlife Service?*
b) *Would the project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or US Fish and Wildlife Service?*
c) *Would the project have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?*
d) *Would the project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?*

The project area consists of a coastal mixed coniferous forest, approximately 8 acres of which will be logged under a Timber Harvest Plan and converted under a Timber Conversion to accommodate the proposed development. The project site consists of redwood dominated coastal mixed coniferous forest which was most recently logged in 1993.

Botanical, biological and wetland surveys were conducted by Redwood Coast Associates and WRA Environmental Consultants in 2008 and 2009, as documented in two environmental documents: Botanical Survey of the Newman Gulch Timber Harvest Plan, Mendocino County, CA, dated August 13, 2008, and Biological Assessment, Summers Lane Reservoir, Fort Bragg, Mendocino County, California, dated February 2013. Additional surveys occurred in 2013 by Darcy Mahoney to update past work.

A study of potential project impacts and reduction of impacts to a level of less than significant per the California Environmental Quality Act (CEQA) is included in the Biological Assessment, Summers Lane Reservoir, by WRA Environmental Consultants, dated February 2013. This is included as **Attachment 3**. The assessment is briefly summarized as follows:

The reports indicate that the project has the potential to impact special status plants, fish and wildlife as follows:

1. Direct impacts to special status plant species
2. Disturbance to nesting special status birds and other breeding birds
3. Disturbance to special status mammals
4. Disturbance to sensitive herpetofauna (frogs and salamanders)
5. Disturbance to migratory fish

Table two outlines the special status plant species identified within the project area.

Table 2. Special status plant species found in the project area.

Common Name	Latin Name	Special Status	#
Pygmy Cypress	*Callitropsis pygmaea*	CNPS 1B.2	72
Bolander's Reed Grass	*Calamagrostis bolanderi*	CNPS 4.2	30

An estimated 72 pygmy cypress (*Hesperocyparis pygmaea*) trees are present in the project area, constituting approximately 1/7th of the canopy cover. Pygmy cypress is considered a rare plant by the California Native Plant Society (CNPS), and it is listed as a 1B2 ranked species. This plant is not included on any Federal or State lists, however. The pygmy cypress specimens in the project area are also not in their native habitat, which is the Pygmy Cypress Forest.

Approximately 30 individual Bolander's reed grass plants are located in the project area, divided into two populations. Bolander's reed grass is a CNPS 4.3 ranked species, which is essentially a watch list. This species is not considered to be sensitive or regionally significant, and is not included on any Federal or State lists. No mitigation is warranted under CEQA for the loss of these 30 individuals as a result of the project.

The project includes measures to assure the loss of approximately 72 pygmy cypress trees is mitigated to a level of less than significant. A mitigation plan has been developed which features planting of pygmy cypress trees at a ratio of 3:1 around the perimeter of the new reservoir. The Pygmy Cypress Mitigation Planting Area and Monitoring Plan is included as **Attachment 4**. Mitigation measures have been developed in conjunction with the mitigation and monitoring

plan. The measure associated with the removal of pygmy cypress trees in the project area is as follows:

> **Mitigation Measure 4: For Loss of 72 Rare Pygmy Cypress Trees in Project Area**. Topsoil to be disturbed or removed by project construction will be stockpiled temporarily. Once the project has been completed the topsoil will be spread over the 0.54-acre mitigation area. The size of the mitigation area was selected to allow for establishment of over 216 mature trees, with each tree occupying a 100-square foot area (**see Attachment 4, Pygmy Cypress Mitigation Planting Area and Plan**). It is expected that pygmy cypress will germinate naturally from the existing seed bank in the topsoil, due to relatively exposed conditions of bare soil and location next to the newly-constructed reservoir.
>
> In case of inadequate existing seed bank in the topsoil, seedling and cone collection shall occur prior to vegetation removal for the project. 100-200 seed cones shall be collected and 50 or more seedlings shall be salvaged and transplanted to containers and stored at a local nursery.
>
> Three years after construction activities, the mitigation area (**Attachment 4**) will be surveyed for number of trees per acre. If the number of trees per acre is equal to or greater than the 3:1 ratio, then no more visits shall be required.
>
> If after year three the densities are below the designated ratio, then the area shall be replanted back to the mitigated ratio with seedlings, germinated from local seed, then at year five, the area shall be re-surveyed. Seedlings will be planted by hand in native topsoil, in a hole deep enough to allow roots to be positioned downward and not curved over. Seedlings will be planted in the late fall or early winter to increase survival rates. As soon as stocking or replanting goals have been achieved, no more surveys shall be required. If the density is below, then replanting of dead and dying trees back to the mitigated ratio shall occur, and no more monitoring shall be required.
>
> During the initial visit at three years (and at year 5 if required) all competing conifer seedlings and invasive species in the mitigation area shall be removed in an effort to reduce competition and the potential spread of invasive species.
>
> At year three and year five monitoring, a short summary report of conditions will be documented and placed in the project file at City Hall. The summary reports will contain information on the number of cypress trees established, dimensions, and any actions taken including weeding and planting. Photographs will be taken and included with the summary reports.

The project also has the potential for impacts to wetlands and other waters, and impacts from the spread of invasive species resulting from the project. Measures are proposed to reduce any potential impacts to wetlands or other waters, or from invasive species, to a level of less than significant. These measures are included as Mitigation Measures 5 and 6 as outlined below:

> **Mitigation Measure 5: For Potential Impacts to Wetlands and Other Waters.** All work involving or associated with soil movement and or digging should occur during the dry season. A grading permit will be obtained and construction Best Management Practices will be implemented, including silt fencing and straw wattles to control

erosion and sediment transport that may flow into surrounding natural habitats, particularly along the north end of the unit nearest to Newman Gulch. Best Management Practices shall be utilized along existing roads as their location provides an existing buffer to the Newman Gulch stream and associated wetland areas. The natural topography surrounding the proposed reservoir shall be left intact as much as is feasible, such that runoff to the surrounding landscape is minimized.

Mitigation Measure 6: For Potential Impacts from Invasive Species Caused by the Project. Heavy equipment shall be washed prior to initial use on the site in order to remove any potential invasive seed contamination sources. After the completion of the all construction-related activities, all areas of bare soil around the reservoir will be replanted with native vegetation appropriate to the site, and wetland vegetation where appropriate. Vegetation planted around the perimeter of the reservoir shall be locally-native species from local propagule sources if feasible, and should be planted during the wet season or whenever soils are moist, in order to achieve the highest feasible survival rate. Areas of disturbed soil shall be mulched, seeded, or planted and covered with native vegetation as soon as possible after clearing. No exotic plants shall be planted during or following site development. Plant species listed as invasive (High, Moderate, or Limited) on the California Invasive Plant Inventory (Cal-IPC 2006) shall not be installed anywhere in the Project Area as they would pose a risk to the surrounding plant community. All reasonable efforts will be made to control and remove existing or newly established populations of exotic species. Some examples of invasive plants likely to be found that should be monitored and controlled are English ivy (*Hedera helix*), Himalayan blackberry (*Rubus armeniacus*), French broom (*Genista monspessulana*), pampas grass (*Cortaderia* spp.), and forget-me-not (*Myosotis latifolia*).

The wildlife species outlined in **Table 3** have a potential for impacts from the proposed development. Measures are proposed to reduce any potential project impacts to wildlife species of concern to a level of less than significant. These measures are included as **Mitigation Measure 7**[3]:

Mitigation Measure 7: For Potential Disturbance to Wildlife Species

7.A – Potential Disturbance of Special Status Bat Species

7.A.1 WORK WINDOWS. Removal of potential bat roost habitat (large trees or snags) or construction activities near potential bat roost habitat will take place in September and October to avoid impacts to bat maternity or hibernation roosts.

7.A.2 - ROOST SURVEYS. If this work window is not feasible, prior to construction, bat roost surveys will be conducted in the Project Area to determine if bats are occupying roosts. If bats are present, a suitable buffer around the roost site will be installed or bats will be excluded from the roost using methods recommended by a qualified biologist.

7.A.3 - MANAGE LIGHTING. Installation of outdoor artificial lighting in or adjacent to the Project Area will be avoided, unless required for public safety. If outdoor artificial lighting is placed within the Project Area, measures will be incorporated to lessen potential impacts to bats such as: prismatic glass

[3] Measure 7.D was redefined after the publishing of the biological assessment (Attachment 3) through consultation with Department of Fish and Wildlife. The conditions outlined here differ from those in the biological assessment for this reason.

coverings, cutoff shields, embedded road lights, narrow spectrum bulbs, or other appropriate lighting technology.

7.B - Potential Disturbance of Sonoma Tree Vole

7.B.1 - PRECONSTRUCTION SURVEYS. Preconstruction surveys for the Sonoma Tee Vole will be performed prior to construction activities. Tree vole survey methodology will follow the Survey protocol for the Red Tree Vole (*Arborimus longicaudus*) in the Record of Decision of the Northwest Forest Plan), Version 2.1, Revision, October 2002 or any subsequent revision.

7.B.2 - CONSULTATION. Occupied trees will be avoided to the fullest extent possible. If disturbance of occupied trees is unavoidable, consultation with CDFW will be initiated to determine the appropriate mitigation measures. Measures may include the preservation or avoidance of suitable habitat.

7.C - Potential Disturbance of Nesting Special Status Bird Species and Other Breeding Birds

7.C.1 - WORK WINDOWS. Conduct as much ground disturbance and vegetation (tree and shrub) removal as is feasible between September 1 and January 15, outside of the breeding season for most bird species.

7.C.2 - PRECONSTRUCTION SURVEYS. If ground disturbance or removal of vegetation occurs between January 16 and August 31, preconstruction surveys will be performed prior to such disturbance to determine the presence and location of nesting bird species.

7.C.3 - BUFFERS. If nests are present, establishment of temporary protective breeding season buffers will avoid direct mortality of these birds. The appropriate buffer distance is species specific and will be determined by a qualified biologist as appropriate to prevent nest abandonment and direct mortality during construction.

7.C.4 - MANAGE LIGHTING. If outdoor artificial lighting is placed within the Project Area, it will incorporate measures to lessen potential impacts to avian species such as: prismatic glass coverings, cutoff shields, embedded road lights, narrow spectrum bulbs, or other appropriate lighting technology.

7.D - Potential Disturbance to Special Status Herpetofauna

7.D.1 – PRE-HARVEST/PRECONSTRUCTION SURVEY. A biologist or other qualified professional shall conduct a survey for coastal tailed frogs, northern red legged frogs, foothill yellow–legged frogs, and southern torrent salamanders within one week of commencing project activities. The survey may occur during day or night. For night surveys, the surveyor shall use a portable light for use in detecting frog's eye shine. Surveys shall include the project site and an area that extends 30 feet up and downstream of the project site.

7.D.2 – PREHARVEST/PRECONSTRUCTION TRAINING. Before starting project activities, the biologist or qualified professional shall conduct a coastal tailed frog, northern red legged frog, foothill yellow–legged frogs, and southern torrent salamander awareness training for all on-site workers involved in the project. This training will include photos and/or drawings of each species, a discourse on key physical features and general life history of each species and an overview of herpetofauna protection measures to follow to minimize loss of each species during project activities. A copy of the training materials shall be kept at the project site at all times during project activities, and available to all on-site workers for reference.

7.D.3 – HERPETOFAUNA PROTECTION MEASURES. At the beginning of each work day, trained on-site workers shall survey the project area for

coastal tailed frogs, northern red-legged frogs, foothill yellow–legged frogs, and southern torrent salamanders. If at any point during surveys or project activities one of these species is identified within 30 feet of the project area, the individuals shall be carefully removed and placed well outside (at least 300 feet away) the project area.

7.D.4 – HERBICIDE USE AND PILE BURNING RESTRICTION. No herbicide use or pile burning shall occur within 300 feet of the watercourse.

7.D.5 – WATER DRAFTING. If water drafting from the watercourse is to occur for dust abatement purposes, drafting must be done with a hose placed in a bucket in a deep pool. The bucket must be covered by <1 inch mesh, and the mouth of the hose must be covered by ¼ inch mesh.

7.D.6 - STORMWATER TREATMENT. A SWPPP will be implemented to control sediment and pollutants during construction and prevent construction activities from having a negative effect on water quality and quantities in preserved portions of the Study Area. Through implementation of the SWPPP, project stormwater will be treated to meet state and federal stormwater requirements, including treatment of stormwater quality and quantity so that they are not substantially altered from existing conditions.

7.D.7 - MANAGE LIGHTING. Installation of artificial lighting in the Project Area will be avoided, unless required for public safety. If outdoor artificial lighting is placed within the Project Area, it will incorporate measures to lessen potential impacts to frog species such as: prismatic glass coverings, cutoff shields, embedded road lights, narrow spectrum bulbs, or other appropriate lighting technology.

7.E - Potential Disturbance to Special Status Migratory Fish

7.E.1 - CONSTRUCTION BMPs. Appropriate BMPs during construction activities, such as the use of a silt fence or other erosion control measures to prevent sediment from entering the water column, will protect in-migrating adults and out-migrating smolts from potential disturbance from increased turbidity. Erosion control devices should not contain monofilament as this may pose a potential entanglement hazard to sensitive amphibian species that may occur in the area. Potential discharge of the reservoir into Newman Gulch should be done with the consultation of the National Marine Fisheries Service (NMFS) to ensure there are no potential impacts to migrating salmonid species.

Table 3. Special status wildlife species with potential to occur in or near the project area.

Common Name	Latin Name	Special Status	Associated Habitat	Potential for Presence
Long-eared Myotis Bat	*Myotis evotis*	WBWG High Priority	Mature Trees/Snags	Moderate to High
Fringed Myotis Bat	*Myotis thysanodes*	WBWG High Priority	Mature Trees/Snags	Moderate to High
Long-legged Myotis Bat	*Myotis volans*	WBWG High Priority	Mature Trees/Snags	Moderate to High
Silver-haired Bat	*Lasionycteris noctivagans*	WBWG Medium Priority	Mature Trees/Snags	Moderate to High
Western Red Bat	*Lasiurus blossevillii*	WBWG High Priority	Mature Trees/Snags	Moderate to High
Hoary Bat	*Lasiurus cinereus*	WBWG Medium Priority	Mature Trees	Moderate to High
Pallid Bat	*Antrozous pallidus*	CDFW Species of Special Concern; WBWG High Priority	Mature Trees/Snags	Moderate to High
Sonoma Tree Vole	*Arborimus pomo*	CDFW Species of Special Concern	Fir and Pine Trees	Moderate
Ring-tailed Cat	*Bassariscus astutus*	CDFW Fully Protected Species	Forest	Moderate
Vaux's Swift	*Chaetura vauxi*	CDFW Species of Special Concern	Mature Trees/Snags	Moderate
Rufous Hummingbird	*Selasphorus rufus*	USFWS Bird of Conservation Concern	Habitats with a varie	Moderate
Olive Sided Flycatcher	*Contopus cooperi*	CDFW Species of Special Concern	Coniferous Trees	Observed
Purple Martin	*Progne subis*	CDFW Species of Special Concern	Mature Trees/Snags	Moderate
Coastal Tailed Frog	*Ascaphus truei*	CDFW Species of Special Concern	Newman Reservoir	Moderate
Northern Red Legged Frog	*Rana aurora*	CDFW Species of Special Concern	Newman Reservoir	Moderate
Southern Torrent Salamander	*Rhyacotriton variegatus*	CDFW Species of Special Concern	Newman Reservoir	Moderate
Coho Salmon	*Oncorhynchus kisutch*	Federal & State Endangered	Noyo River	Observed in Noyo River
Steelhead	*Oncorhynchus mykiss*	Federal Threatened; CDFW Species of Special Concern	Noyo River	Observed in Noyo River
Chinook Salmon	*Oncorhynchus tshawytscha*	Federal Threatened; State Threatened	Noyo River	Observed in Noyo River

V. Cultural Resources

Would the project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5?				X
b. Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?		X		
c. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?				X
d. Disturb any human remains, including those interred outside of formal cemeteries?				X

DISCUSSION OF IMPACTS

Three archaeological studies were performed for the project; two in association with Timber Harvest Plans and a third study specifically for the CEQA analysis. The studies are located in the project file. The first study for the Timber Harvest Plan was undertaken in 2008 by Registered Professional Forester Tom Kisliuk, and is entitled "An Archaeological Survey Report for the Newman Gulch Timber Harvest Plan, Mendocino County, California." The second Timber Harvest Plan study was undertaken by Register Professional Forester Lee Susan and is entitled Section 6 Archaeological Survey Report, City of Fort Bragg 2013. The third study was performed in 2009 by Registered Professional Archaeologist Thad M. Van Bueren, M.A. and is entitled "Historic Properties Survey for the Newman Gulch Reservoir Project near Fort Bragg, CA."[4]

The Kisliuk survey included a records check by the Northwest Information Center on January 22, 2008, which indicated that no previous surveys had been conducted on the property and no resources identified in or adjacent to the project area. Additionally, area specific literature was reviewed, and a neighbor, Jim Celeri, was interviewed. A high intensity six hour survey of the area was conducted.

The Susan survey also included a records check by the Northwest Information Center, which occurred on March 25, 2013. The check indicated there are no recorded sites within the project area. Mr. Susan additionally contacted local tribes by mail. A four hour survey of the entire project area was conducted. No sites were found.

Mr. Van Bueren also reviewed information filed at the Northwest Information Center (all information available through the end of 2009), and examined the California Office of Historic Preservation's historic property directory. Mr. Van Bueren additionally reviewed applicable ethnographic publications, published stories, and historical maps.

[4] The project was initially called the Newman Gulch Reservoir project. The project name was changed to provide clarity between the existing Newman Gulch Reservoir and the subject proposed reservoir, which are both located on the same property.

Mr. Van Bueren also contacted local tribes by mail, inquiring about information pertaining to known resources on this property. Letters were sent to the Noyo Pomo Community, Sherwood Tribe, Coyote Valley Band, and Dina Bowen-Welsh of the She Bel Na Band of Pomo Indians. No responses were received.

Mr. Van Bueren performed an intensive and systematic survey of the entire property. The Kisliuk survey report indicates that no sites were identified. The Van Bueren survey report states that "No archaeological resources or other types of historic properties were identified within this APE (Area of Potential Effect)." The Susan survey report also indicates that no sites were found.

Mr. Van Bueren indicates there is always still a potential to encounter buried archaeological resources, and recommends the following condition to be included in the event that archaeological resources are unearthed as a result of project ground disturbance:

> **Mitigation Measure 8:** If any person excavating or otherwise disturbing the earth discovers any archaeological site during project construction, the following actions shall be taken: 1) cease and desist from all further excavation and disturbances within 25 feet of the discovery; 2) notify the Fort Bragg Public Works Department within 24 hours of discovery; and 3) retain a professional archaeologist to determine appropriate actions in consultation with stakeholders.

VI. Geology and Soils

Would the project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i. Rupture of known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.				X
ii. Strong seismic ground shaking?		X		
iii. Seismic-related ground failure, including liquefaction?		X		
iv. Landslides?		X		
b. Result in substantial soil erosion or the loss of topsoil?		X		
c. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?		X		

d. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?				X
e. Have soils incapable of adequately supporting the use of septic tanks or alternative water disposal systems where sewers are not available for the disposal of waste water?				X

DISCUSSION OF IMPACTS

a) i. Would the project expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault?

The City of Fort Bragg is located along the central Mendocino coast, an area that is known for its seismic activity. Based on published fault maps, there are no active or potentially active faults known to traverse the City. There are four active or potentially active faults that are located within a 60 mile radius of the City. These include: the San Andreas Fault approximately 6 miles offshore of Fort Bragg and the most likely source of earthshaking; the Maacama Fault zone approximately 21 miles to the east of the City which has the potential to generate strong shaking in the City; the Mendocino Fault zone approximately 60 miles to the northwest which is an extremely active structure; and the Pacific Star Fault which is located between the towns of Fort Bragg and Westport and is currently under study. According to the 2007 Geotechnical Report by CGi Technical Services, Inc., located in the project file, there are no faults known to project through the project site (page 6).

a) ii. Would the project expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking?

As the City of Fort Bragg is in an area known for seismic activity, the project could be subject to strong seismic ground shaking. A Geotechnical Engineering Investigation Report was conducted by Holdrege & Kull, Consulting Engineers and Geologists, in October of 2009, and is located in the project file. Holdrege & Kull performed a probabilistic seismicity analysis of the proposed reservoir site using the methodologies presented in the 2007 California Building Code (CBC), Section 1613 (Earthquake Loads) and the American Society of Civil Engineers publication ASCE 7.05 Chapter 11 (Seismic Design Criteria), Chapter 20 (Site Classification Procedures for Seismic Design) and Chapter 21 (Site-Specific Ground Motion Procedures for Seismic Design).

As shown on the Site Plan (**Figure 2**), the exterior (outside) slope of the reservoir is proposed as 2H:1V, and the interior (inside) slope of the reservoir is proposed as 3H:1V. The Holdrege and Kull probabilistic seismicity analysis indicates that given the proposed height, soils, seismic hazard parameters, etc., the interior slopes would be seismically stable, however the proposed exterior slopes would be unstable when subjected to the maximum considered earthquake (MCE) maximum horizontal acceleration (Holdrege & Kull, page 16). Holdrege & Kull recommend geotextile reinforcements be added to the exterior slope to assure the reservoir will be seismically stable. According to Holdrege & Kull, the geotextile reinforcements will need to be placed a maximum 2-foot vertical intervals and will need to extend a minimum of 25 feet into the slope (Holdrege & Kull, page 16).

Earthwork Grading Recommendations are outlined in Section 8 of the Holdrege & Kull report (pages 22-37), and include recommendations Section 8.4, Engineered Fill with Geotextile Reinforcements. **Mitigation Measure 9** requires that site grading conform to the recommendations outlined in Section 8 of the Holdrege and Kull report, to assure the reservoir

will be constructed in a seismically safe manner, and will not result in exposure to people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking. Section 8 of the Holdrege and Kull report is included in this CEQA document as **Attachment 5**.

> **Mitigation Measure 9:** Site grading associated with the construction of the reservoir shall conform to the recommendations outlined in the Holdrege & Kull report, Summer's Lane Reservoir, Fort Bragg, California, Geotechnical Investigation Report, dated October 2, 2009 (Project #70315-01), Section 8, Earthwork Grading Recommendations, which is included as **Attachment 5** of this report.

A Reservoir Breach Inundation Study was conducted by Lawrence and Associates in January of 2014 in response to concerns expressed by the closest residential neighbor at the October 23, 2013 Planning Commission Hearing. The intent of the study was to consider potential risks to the safety of the public and of damage to structures in the unlikely event of a breach in the embankment of the proposed reservoir. The study looked specifically at the worst case scenario of a breach in the direction of the closest neighbor, located immediately to the west. This neighboring property contains a plant nursery and single family residence.

The analysis done for the Breach Inundation Study was a very conservative screening type analysis, a type of study used to determine if further analysis is warranted. The study included a dam breach hydrograph, showing the flow through the dam breach over time, the location of the dam breach on the embankment, and the routing of the inundation over the area of interest. This routing includes peak velocities and maximum flow depths.

The results of the study indicate that the neighboring residence would be in a "low" danger zone in the unlikely event of flooding. This means there would be no "lives in jeopardy" hazard associated with worst case scenario flooding in the vicinity of the residence. The residence would experience approximately 20 minutes of flooding with a peak water depth of 0.98 feet and a flood wave velocity of 2.62 feet per second. An adult should be able to wade in water of this depth and velocity without losing footing.

It is important to note that such a breach is highly unlikely, and also note that the calculations used did not account for the geo-grid enforcement proposed within the embankment or the reservoir lining, which would be expected to reduce the rate of downcutting by providing a physical barrier. These factors were not considered because available breach formation equations and models do not allow for these factors, however an actual breach may have a longer and more staggered breach formation leading to a lower peak discharge, resulting in lower flood depths and velocities.

a) *iii. Would the project expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction?*

Holdrege & Kull performed a liquefaction analysis for the site based in California Division of Mines and Geology Special Publication 117 and the Guidelines for Analyzing and Mitigating Liquefaction in California prepared by the Southern California Earthquake Center. The analysis is included as Section 6 of the Summers Lane Reservoir, Fort Bragg, California Geotechnical Engineering Investigation Report, dated October 2009, located in the project file.

Holdrege and Kull found a relatively high potential for seismically induced liquefaction to occur at the site, because of the loose to medium dense and saturated sandy and silty sand soils that underlie the site (Holdrege & Kull, page 20), however they also found that there is a relatively low potential for damage to on-site structures resulting from seismically induced liquefaction differential settlement and lateral spreading (Holdrege & Kull, page 18). In the low probability event that liquefaction induced settlement and/or lateral spreading occurs, Holdrege and Kull indicate that very limited displacement could occur at the toe of the earthen levee slopes, where the transition from a confined to a free field condition occurs (Holdrege & Kull, page 19). Holdrege and Kull therefore recommend that any rigid structures that are constructed across the toe of the earthen levee slopes should have articulated connections that can accommodate up to at least 25 inches of displacement (Holdrege & Kull, page 19). **Mitigation Measure 10** is included to ensure any potential impacts resulting from liquefaction of soils will be less than significant.

> **Mitigation Measure 10**: Construction of the reservoir shall conform to the recommendations outlined in the Holdrege & Kull report, Summer's Lane Reservoir, Fort Bragg, California, Geotechnical Investigation Report, dated October 2, 2009 (Project #70315-01), including the requirement that any rigid structures that are constructed across the toe of the earthen levee slopes shall have articulated connections that can accommodate up to at least 25 inches of displacement.

a) iv. Would the project expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving landslides?

As shown on the Site Plan (**Figure 2**), the exterior (outside) slope of the reservoir is proposed as 2H:1V, and the interior (inside) slope of the reservoir is proposed as 3H:1V. The Holdrege and Kull probabilistic seismicity analysis indicates that given the proposed height, soils, seismic hazard parameters, etc., the interior slopes would be seismically stable, however the proposed exterior slopes would be unstable when subjected to the maximum considered earthquake (MCE) maximum horizontal acceleration (Holdrege & Kull, page 16). Holdrege & Kull recommend geotextile reinforcements be added to the exterior slope to assure the reservoir will be seismically stable. According to Holdrege & Kull, the geotextile reinforcements will need to be placed a maximum 2-foot vertical intervals and will need to extend a minimum of 25 feet into the slope (Holdrege & Kull, page 16).

Earthwork Grading Recommendations are outlined in Section 8 of the Holdrege & Kull report (pages 22-37), and include recommendations Section 8.4, Engineered Fill with Geotextile Reinforcements. **Mitigation Measure 9** requires that site grading conform to the recommendations outlined in Section 8 of the Holdrege and Kull report, to assure the reservoir will be constructed in a seismically safe manner. Section 8 of the Holdrege and Kull report is included in this CEQA document as **Attachment 5**.

> **Mitigation Measure 9:** Site grading associated with the construction of the reservoir shall conform to the recommendations outlined in the Holdrege & Kull report, Summer's Lane Reservoir, Fort Bragg, California, Geotechnical Investigation Report, dated October 2, 2009 (Project #70315-01), Section 8, Earthwork Grading Recommendations, which is included as **Attachment 5** of this report.

b) Would the project result in substantial soil erosion or the loss of topsoil?

The project requires removal of vegetation over an eight acre area currently forested with mixed coniferous trees and associated understory. After the timber is harvested, smaller trees, stumps and understory plants will be grinded, chipped and burned. The site will be graded, with topsoil removed and stockpiled onsite, and the reservoir will be constructed. During grading and construction, Best Management Practices (BMPs) will be implemented to minimize erosion and prevent sedimentation of Newman Gulch. After construction, additional BMPs will be implemented to stabilize the banks of the reservoir, and all other disturbed areas of soil. Topsoil will be placed around the perimeter of the reservoir, consistent with the pygmy cypress mitigation planting plan, and planted.

Because more than an acre of soil disturbance will occur, a National Pollutant Discharge and Elimination System (NPDES) permit will be required to assure the project is consistent with the Clean Water Act. The North Coast Regional Water Quality Control Board is the permitting agency for the NPDES permit. A Storm Water Pollution Prevention Plan (SWPPP), is a sediment and erosion control plan specific to the project, which describes the pollution prevention activities and practices that will be implemented on the site. The SWPPP includes a description of the site, and of each

major phase of the plan, the roles and responsibilities of contractors and subcontractors, and the inspection schedules and logs. It is also where changes and modifications to the construction plan and the associated pollution prevention activities are documented. A SWPPP is required for the NPDES permit. An NPDES permit will be obtained by the City prior to commencement of the project. **Mitigation Measure 3** requires the City to obtain all necessary permits for the project from all applicable federal, state and local agencies.

Erosion control measures are also included in the Mitigation Measures outlined in Section IV of this report: Biological Resources. Those measures include: 1) **Mitigation Measure 5**, for potential impacts to wetlands and other waters, which outlines seasonal restrictions on ground disturbance, grading permit requirements, and BMP requirements, 2) **Mitigation Measure 7.D.3**, requiring a Regional Water Quality Control Board (RWQCB) Storm Water Pollution Prevention Plan, and 3) **Mitigation Measure 7.E.1**, requiring Best Management Practices to assure impacts to fish will be less than significant. Additionally, erosion control measures are included in the recommendations outlined by Holdrege and Kull in the Geotechnical Engineering Investigation Report dated October 2009. The erosion control recommendations are outlined in Section 8.8: Erosion Controls, on page 31, as shown in **Attachment 5**. The recommendations by Holdrege and Kull are required measures per **Mitigation Measure 9**, which is described under Section VI of this report (Geology and Soils).

The project as conditioned is not expected to result in substantial soil erosion or loss of topsoil.

c) Would the project be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?

According to the geotechnical report by CGi Technical Services, dated January 12, 2007 (located in the project file), the project site is located on the Fern Creek terrace, an emergent marine terrace that is locally covered with older dune sands (CGi, page 5).

According to the slope stability analysis conducted by Holdrege & Kull, as summarized in their October 2009 Geotechnical Engineering Investigation Report (located in the project file), the levee slopes would be statically stable. As discussed under a) ii of VI, Geology and Soils, (this report, above), the exterior slopes of the levee would need to be reinforced with geotextile reinforcements in order for the project to be stable in an earthquake (seismically stable) (Holdrege & Kull, page 16). With the inclusion of **Mitigation Measure 9**, the project levee would not collapse under earthquake conditions.

As discussed under a) iii of VI, Geology and Soils (this report, above), there is potential for liquefaction induced settlement or lateral spreading resulting from an earthquake. **Mitigation Measure 10** is included to assure any liquefaction induced settlement or lateral spreading caused by an earthquake does not result in significant detrimental impacts.

d) Would the project be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?

Expansive soils are those that expand when water is added, and shrink when they dry out. Since the soils at the site are predominantly sandy, expansion is not an issue.

e) Would the project have soils incapable of adequately supporting the use of septic tanks or alternative water disposal systems where sewers are not available for the disposal of waste water?

The project does not require a water disposal system. No septic or sewage system is included or needed for the project.

VII. Greenhouse Gas Emissions

Would the project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?		X		
b. Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?				X

DISCUSSION OF IMPACTS

a) Would the project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

The Global Warming Solutions Act (AB-32), which passed on August 31, 2006, requires that the state's greenhouse gas (GHG) emissions be reduced by 10% below the 1990 GHG level by 2020. The California Environmental Quality Act (CEQA) guidelines were amended in December of 2009 to require GHG impacts to be considered. The Mendocino County Air Quality Management District defers to the Bay Area Air Quality Management District (BAAQMD) CEQA thresholds as an interim measure until the Mendocino County Air Quality Management District (AQMD) develops their own thresholds. A 2010 Air Quality memorandum clarifies how the thresholds differ for our area based on local air quality, and how the thresholds are actually recommended guidance rather than requirements.

The District does not have an adopted Threshold of Significance for construction-related GHG emissions. However, the Lead Agency should quantify and disclose GHG emissions that would occur during construction, and make a determination on the significance of these construction generated GHG emission impacts in relation to meeting AB 32 GHG reduction goals, as required by the Public Resources Code, Section 21082.2. The Lead Agency is encouraged to incorporate best management practices to reduce GHG emissions during construction, as feasible and applicable (BAAQMD).

The aspects of the proposed development that would contribute toward greenhouse gas emissions include conversion of timberland to a non-timber use (including permanent loss of carbon sequestering trees, and burning, grinding and chipping of vegetation associated with conversion), vehicle transportation of materials used in conversion and construction, and heavy equipment used at the site during conversion and construction.

This proposed reservoir project minimizes GHG impact by locating the reservoir on marginal timberland where carbon sequestration occurs at a slower rate and minimizing the overall project foot print to approximately 25% of the property. Carbon from trees harvested will be sequestered for decades or longer in the form of the wood products cut from the logs. Additional carbon will be sequestered in the remaining forested area, and in the proposed pygmy cypress and visual impact planting areas (Susan THP).

Additionally the proposed reservoir project location will minimize GHG emissions from reservoir operation as the water entering the reservoir will flow by gravity feed and the water leaving the reservoir will flow by gravity feed to the City's water treatment plant. As an entirely gravity fed raw water supply system, the reservoir will reduce current GHG associated with raw water supply specifically some water that is currently pumped from the Noyo River to the City's water treatment plant, will instead flow by gravity feed, especially during summer months when electricity demand in the state is high and high carbon sources of electricity would otherwise be used to transmit this water.

The following Best Management Practices (BMPs) will be incorporated into the project to reduce greenhouse gasses:

> **Mitigation Measure 11:** Any topsoil or other soil materials excavated to accommodate the reservoir and not used onsite shall be temporarily stored on the property until such time as the materials can be used locally for City projects.
>
> **Mitigation Measure 12:** To the extent feasible, gasoline and oil conservation measures shall be incorporated into the project. Heavy equipment used at the project site shall be in good working condition and inspected regularly. Equipment shall be turned off immediately when not in use unless warm-up of equipment would use more gas than leaving equipment running.
>
> **Mitigation Measure 13:** Any chipped wood not utilized on site shall be temporarily stored on the property until such time as it can be used locally for other City projects.

b) Would the project conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

The City of Fort Bragg adopted a Climate Action Plan in 2012. The plan sets greenhouse gas reduction goals including a 30% reduction in greenhouse gasses for the municipality by 2020, and a 7% reduction goal for the community by 2020.

Municipal carbon sequestration will be reduced due to the conversion of forest land to a non-sequestering land use. This is minimized by designing the project size to minimize removal and by locating the project on marginally productive soils where carbon sequestering capabilities are less than that of the more fertile forest soils. Additionally, trees are to be planted around the perimeter of the reservoir.

The proposed reservoir would not require any new water pumps or other power operated machinery to operate. With the exception of minimal impacts associated with repairs and maintenance, greenhouse gas impacts will be temporary in nature and limited to timber harvest, timber conversion, and construction activities. Additionally, as previously noted the project would replace some water supply pumped with electricity from the Noyo River in summer months with this gravity source of raw water, thereby reducing GHG emissions.

The project is not expected to result in greenhouse gas impacts that would conflict with the 2012 City of Fort Bragg Climate Action Plan.

VIII. Hazards and Hazardous Materials

Would the project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?		X		
b. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?		X		
c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?				X
d. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?				X
e. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport, would the project result in a safety hazard for people residing or working in the project area.				X
f. For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?				X
g. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?				X
h. Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?				X

DISCUSSION OF IMPACTS

a) Would the project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

The project does not require routine transport, use or disposal of hazardous materials for operations or maintenance.

Hazardous materials such as asbestos pipe may be encountered during construction, and would need to be handled and disposed of properly. Additionally, heavy equipment utilizes fuels, lubricants and oils with the potential for soil contamination during conversion and construction activities. A hazardous materials management plan will be required as a part of the Storm Water Pollution Prevention Plan. This requirement is outlined in Mitigation Measure 14:

> **Mitigation Measure 14:** The Storm Water Pollution Prevention Plan shall include measures for prevention of gasoline, oil and lubricant spills, and an action plan for clean-up of any accidental fluids or other contaminants spilled or encountered during conversion and construction activities.

b) Would the project create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

There are no reasonably foreseeable upset or accident conditions involving release of hazardous materials into the environment in association with this project, with the exception of potential accidental contamination of soils from fuels, oils or lubricants from heavy equipment operation or maintenance in association with conversion of the property or construction of the project. **Mitigation Measure 14** would reduce the potential and effect of such hazards to a level of less than significant.

c) Would the project omit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

The project site is not located within ¼ mile of any existing or proposed school.

d) Would the project be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

According to the Waterboard's GeoTracker system, there are no hazardous materials sites located within 1000 feet of the project area.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport, would the project result in a safety hazard for people residing or working in the project area?

The project is not located within an airport land use plan or within two miles of a public airport.

f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?

There are no private airstrips in the project vicinity. There is a private helipad located on Highway 20 approximately 1.15 miles from the site and a private helipad located approximately 1.5 miles from the site at the local hospital. However the project does not include any new

residential or commercial development and so it would not result in a safety hazard for people residing or working in the project area.

g) Would the project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

The project would not impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. The project would not block any evacuation paths.

h) Would the project expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

After timber harvest occurs, the remaining vegetation will be removed from the reservoir site. The City may consider allowing the public to cut firewood from the downed and stacked wood. The potential exists for a fire to occur from sparks created during firewood cutting. Additionally, the City intends to burn wood and vegetation that cannot be or is not grinded or chipped. The following measures are included to assure that the risk of wildland fire during conversion activities is minimized to a level of less than significant:

Mitigation Measure 15: Should the public be allowed to cut firewood on the property after timber harvest is complete, a full sized shovel shall be visible in each vehicle accessing the property, to be used to cover any accidental fire, associated with firewood collection, with dirt. A fire truck or water truck shall be kept at the site during firewood removal activities, and at least one City staff person shall be assigned at the site to oversee fire cutting efforts and operate water equipment if needed.

Mitigation Measure 16: If vegetation is burned for disposal, permission shall be obtained from the Fort Bragg Fire Department prior to burning, and all safety measures required by the Fort Bragg Fire Department shall be adhered to in order to minimize wildfire risk.

IX. Hydrology and Water Quality

Would the project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Violate any water quality standards or waste discharge requirements?		X		
b. Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?			X	

c.	*Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?*		X		
d.	*Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?*			X	
e.	*Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?*				X
f.	*Otherwise substantially degrade water quality?*				X
g.	*Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?*				X
h.	*Place within a 100-year flood hazard area structures which would impede or redirect flood flows?*				X
i.	*Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?*		X		
j.	*Inundation by seiche, tsunami, or mudflow?*				X

DISCUSSION OF IMPACTS

a) Would the project violate any water quality standards or waste discharge requirements?

The project is subject to permits from the North Coast Regional Water Quality Control Board (NCRWQCB) and State Water Resources Control Board (SWRCB). A National Pollution Discharge Elimination System (NPDES) permit will be needed from the NCRWQCB to ensure the project does not result in pollution to streams, and a Point of Re-Diversion permit will be needed from SWRCB because water from Waterfall Gulch will be re-diverted.

Compliance with permit requirements of the NCRWQCB, SWRCB, and City of Fort Bragg Land Use and Development Code will assure the project does not violate water quality standards or waste discharge requirements. **Mitigation Measure 3** is included to ensure all necessary permits are secured as required for the project. Additionally **Mitigation Measure 5** places seasonal restrictions on grading and requires Best Management Practices (BMPs) to protect water quality, **Mitigation Measure 7.D.3** requires a Storm Water Pollution Prevention Plan (SWPPP), **Mitigation Measure 7.E** requires BMPs to protect fish, **Mitigation Measure 9** includes erosion control measures to protect water quality, and **Mitigation Measure 11** requires the SWPPP to include measures to prevent pollutants from entering the stream. With the included mitigation measures, the project is not expected to result in significant impacts to water quality.

b) Would the project substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells

would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?

An analysis of the subdrain was conducted by Lawrence & Associates to determine if the subdrain of the reservoir has the potential to interfere with groundwater levels. According to the Technical Memo, dated October 5, 2009, (**Attachment 6**), it is unlikely that the reservoir will intercept shallow groundwater under either dry or wet conditions.

c) *Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?*

The project is not expected to result in substantial erosion or siltation on- or off-site as a result of a drainage pattern alteration. The existing stream will not be altered in its course, and the project will be designed and stabilized to prevent erosion and siltation during and following conversion and construction.

d) *Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?*

According to the Preliminary Design Report by Lawrence & Associates, dated July 2, 2009 (located in the project file), the project is designed with safety mechanisms to reduce the potential for flooding. The outer berm is to be engineered with geotextile material to ensure performance of the berm during a severe earthquake. A bypass pipe will be installed to allow water to optionally route around the reservoir.

An overflow path, or spillway, is included in the design to provide a safe release in the event that inflow exceeds outflow during a condition when the water surface elevation is at full pool. An overflow path, commonly referred to as a spillway, is provided on reservoirs to provide a safe release in the event that inflow exceeds outflow during a condition when the water surface elevation is at full pool. The design of the overflow is driven by factors such as inlet flows, tributary area, rainfall rates, and safety. In the case of the proposed reservoir, surrounding surface drainage will be routed around the reservoir; therefore, the only tributary will be the pond surface. The outlet is designed for the maximum anticipated inflow, which is rainfall from a 100-year storm event, and additional factor of safety (in this case, a factor of safety of 1.5 is recommended). The spillway will provide a controlled overflow for larger storms, and will be designed for the peak design flow of 31 cubic feet per second (cfs).

The “pond overflow” is shown in attached drawing C5.0, and is to be located on the north side of the reservoir in the northwest corner. The overflow heads out of the reservoir through a 36”pipe booted two feet below the top of the berm. A concrete pad with elevated sides accommodates the overflow pipe across the top of the berm and the pipe heads down the berm in a northerly direction to an energy dissipater. The overflow is then piped towards an existing swale in a northeasterly direction. An additional energy dissipater is located at the second outlet. The water then flows through the existing swale downstream. The swale travels northeast to Newman Gulch and subsequently in the existing streambed into the Noyo River. The current peak flow from the reservoir footprint into the existing drainage swale is calculated to be 4.9 cfs. Using the low-flow orifice, the peak flow will be less after the reservoir is constructed (pages 7-8).

There are no buildings between the reservoir spillway and the Noyo River. At the design discharge of 1 cfs, the flow into Newman Gulch Reservoir and the Noyo River will be less than pre-project flow and will not contribute to flooding. Any discharge from the spillway is likely to last only the duration of the 100-year design storm for peak flow of 5 minutes. It is anticipated that this short term flow would not result in downstream flooding.

A Reservoir Breach Inundation Study was conducted by Lawrence and Associates in January of 2014 in response to concerns expressed by the closest residential neighbor at the October 23, 2013 Planning Commission Hearing. The intent of the study was to consider potential risks to the safety of the public and of damage to structures in the unlikely event of a breach in the embankment of the proposed reservoir. The study looked specifically at the worst case scenario of a breach in the direction of the closest neighbor, located immediately to the west. This neighboring property contains a plant nursery and single family residence.

The analysis done for the Breach Inundation Study was a very conservative screening type analysis, a type of study used to determine if further analysis is warranted. The study included a dam breach hydrograph, showing the flow through the dam breach over time, the location of the dam breach on the embankment, and the routing of the inundation over the area of interest. This routing includes peak velocities and maximum flow depths.

The results of the study indicate that the neighboring residence would be in a “low” danger zone in the unlikely event of flooding. This means there would be no “lives in jeopardy” hazard associated with worst case scenario flooding in the vicinity of the residence. The residence would experience approximately 20 minutes of flooding with a peak water depth of 0.98 feet and a flood wave velocity of 2.62 feet per second. An adult should be able to wade in water of this depth and velocity without losing footing.

It is important to note that such a breach is highly unlikely, and also note that the calculations used did not account for the geo-grid enforcement proposed within the embankment or the reservoir lining, which would be expected to reduce the rate of downcutting by providing a physical barrier. These factors were not considered because available breach formation equations and models do not allow for these factors, however an actual breach may have a longer and more staggered breach formation leading to a lower peak discharge, resulting in lower flood depths and velocities.

e) Would the project create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?

The project will not result in creation of new impervious surfaces that would create or contribute to runoff water. No stormwater runoff, polluted or otherwise, is expected as a result of the project.

f) Would the project otherwise substantially degrade water quality?

The City has a licensed water right to divert water from Waterfall Gulch[5], and that water is drawn and piped to the City's Newman Reservoir property and on to the treatment plant. The point of diversion will remain the same, as will the amount of water drawn from Waterfall Gulch. The City has filed a Petition for Change with the State Water Resources Control Board to request that water right license 12171 be changed to allow for water from Waterfall Gulch to be stored in the proposed Summers Lane Reservoir. The reservoir will be constructed down the pipeline, between Waterfall Gulch (point of diversion) and the point at which the pipeline currently ties in to Newman Gulch (current point of re-diversion) and heads to the water treatment plant. Storage of Waterfall Gulch water in a reservoir (proposed new point of re-diversion) will allow the City to use the water in drought conditions and for water quality management during normal and high rainfall years. Temporary holding of water in the new reservoir will not result in additional impacts to Waterfall Gulch, the surface water source.

Measures have also been incorporated into the project to ensure that construction of the reservoir does not result in sedimentation or other water quality impacts to Newman Gulch.

g) *Would the project place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?*

The project does not include housing and is not located within a 100 year flood hazard area, per FEMA Flood Insurance Rate Map 06045C1017F, Effective Date June 2, 2011. See discussion under d above.

h) *Would the project place within a 100-year flood hazard area structures which would impede or redirect flood flows?*

The project is not located within a 100 year flood hazard area, per FEMA Flood Insurance Rate Map 06045C1017F, Effective Date June 2, 2011.

i) *Would the project expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?*

According to the Preliminary Design Report by Lawrence & Associates, dated July 2, 2009 (located in the project file), the project is designed with safety mechanisms to prevent flooding. The outer berm is engineered with geotextile material to ensure performance of the berm during earthquakes. A bypass pipe will be installed to allow water to optionally route around the reservoir.

An overflow path is included in the design to provide a safe release in the event that inflow exceeds outflow during a condition when the water surface elevation is at full pool. An overflow path, commonly referred to as a spillway, is provided on reservoirs to provide a safe release in the event that inflow exceeds outflow during a condition when the water surface elevation is at full pool. The design of the overflow is driven by factors such as inlet flows, tributary area, rainfall rates, and safety. In the case of the proposed reservoir, surrounding surface drainage will be routed around the reservoir; therefore, the only tributary will be the pond surface. The outlet is designed for the maximum anticipated inflow, which is rainfall from a 100-year storm

[5] License 12171 for Diversion and Use of Water from the State Water Resources Control Board allows the City of Fort Bragg a maximum of 475 acre feet per year to be diverted from Waterfall Gulch at a rate of diversion not to exceed 0.668 cfs.

event, and additional factor of safety (in this case, a factor of safety of 1.5 is recommended). The spillway will provide a controlled overflow for larger storms, and will be designed for the peak design flow of 31 cubic feet per second (cfs).

The "pond overflow" is shown in attached drawing C5.0 (**Attachment 1**), and is to be located on the north side of the reservoir in the northwest corner. The overflow heads out of the reservoir through a 36"pipe booted two feet below the top of the berm. A concrete pad with elevated sides accommodates the overflow pipe across the top of the berm and the pipe heads down the berm in a northerly direction to an energy dissipater. The overflow is then piped towards an existing swale in a northeasterly direction. An additional energy dissipater is located at the second outlet. The water then flows through the existing swale downstream. The swale travels northeast to Newman Gulch and subsequently into the Noyo River. The current peak flow from the reservoir footprint into the existing drainage swale is calculated to be 4.9 cfs. Using the low-flow orifice, the peak flow will be less after the reservoir is constructed (Lawrence & Associates, pages 7-8).

There are no buildings between the reservoir spillway and the Noyo River. At the design discharge of 1 cfs, the flow into Newman reservoir and the Noyo River will be less than pre-project flow and will not contribute to flooding. Any discharge from the spillway is likely to last only the duration of the 100-year design storm for peak flow of 5 minutes and this short term flow would not result in downstream flooding.

j) Would the project result in inundation by seiche, tsunami, or mudflow?

The project is not located in or near a tsunami zone, and would not result in mudflow. A seiche is a standing wave occurring in a bounded body of water such as a lake or reservoir, generally due to meteorological effects such as wind or earthquakes. A standing wave is the sum of two opposing waves. While seiches are almost always present on larger lakes, they are not likely to occur at an observable size in the proposed reservoir due to the small size of water body proposed. The project would not result in inundation by seiche, tsunami, or mudflow.

k) Would the project substantially alter the existing drainage pattern of the site or area, or add water features that could increase habitat for mosquitos and other vectors as a potential for increased pesticide use?

The project will result in the addition of a water feature, however as proposed with planned maintenance and circulation of water, the project is not expected to increase mosquito habitat or the potential for increased pesticide use.

Site maintenance will include: weed removal, upkeep of fencing, and general site maintenance. The site will be periodically inspected for vandalism, signs of leakage, and clogging of the low flow spillway, and inspection the valves to ensure functionality.

Generally water will be flowing and will not become stagnant. During storm events, the water will be shut off at Waterfall Gulch to keep muddy water from entering the reservoir, which will minimize sediment. Black floating balls will cover the reservoir to prevent organic growth.

The reservoir is expected to be drained after the first five years, inspected and cleaned using fire hoses that wash the sediment to the low end. Larger branches would be picked up by hand and smaller sediment would be hosed through the cleanout drain

and into the cleanout basin where it is collected and transported to a disposal site. Public Works will use this initial cleanout as an evaluation process to determine an appropriate future cleanout regimen.

Mitigation Measure 17 is added to ensure that site maintenance and regular flow of water are required to prevent the creation of mosquito habitat:

> **Mitigation Measure 17:** On a regular basis, the valves will be inspected to ensure functionality and the low flow spillway will be inspected for clogging. As feasible, the water in the reservoir will be constantly flowing to prevent stagnation.

X. Land Use and Planning

Would the project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Physically divide an established community?				X
b. Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?		X		
c. Conflict with any applicable habitat conservation plan or natural community conservation plan?				X

DISCUSSION OF IMPACTS

a) Would the project physically divide an established community?

The proposed reservoir site is located at the top of Newman Gulch, approximately 200 linear feet above the existing Newman Reservoir on a 40.5-acre parcel owned by the City of Fort Bragg and within City Limits and City jurisdiction. The 600 acre property to the east and south is owned by the Mendocino Coast Recreation and Park District and was slated for development of a regional park and golf course in the past. A graveled access road and the Mendocino Coast Humane Society shelter and former Mendocino County Animal Shelter facility are to the south of the proposed development area. The northern edge of the site is bounded by a Pacific Gas and Electric (PG&E) access road and northwest-trending power line corridor. A poorly maintained barbed wire fence extends roughly along the western property margin and defines the approximate western margin of the proposed development area. Property to the west includes rural residential and a rhododendron nursery. The southern and eastern margins of the development area are currently lined with large concrete rubble to deter unauthorized vehicular access onto the property. The project would not divide an established community.

b) Would the project conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?

The project is consistent with the following goals and policies of the Inland General Plan:

Goal PF-1 Ensure that new development is served by adequate public services and infrastructure.

Goal PF-2 Assure that the City's infrastructure is maintained and expanded to meet the needs of the City's residents and growing population.

Policy PF 2.2 Potable Water Capacity: Develop long-term solutions regarding the supply, storage, and distribution of potable water and develop additional supplies.

Policy PF-2.3 Emergency Water Supply: Develop an emergency water supply for disaster preparedness.

Policy PF-2.4 Potable Water Quality: Maintain the safety of the water supply.

Program PF-2.4.2: Provide security and protection for the watersheds and water storage and treatment facilities with monitoring, appropriate notices, physical barriers, and protective devices as well as land use policies and controls.

The proposed project would provide added water storage to meet City needs during drought conditions. The proposed fencing would help to secure the water supply. No goals, policies or programs were identified that would conflict with the proposed project. The project is consistent with General Plan goals, policies and programs.

The project site is located within the Public Facility (PF) zoning district. According to the Land Use and Development Code (LUDC), the project meets the description for a Utility Facility, which is principally permitted in the Public Facility (PF) zoning district. The project is subject to the applicable development standards outlined in Article 3 of the Land Use and Development Code, including parking, fencing, screening, and performance standards. The project is also subject to grading permit requirements and procedures outlined in Chapter 18.60 of the Land Use and Development Code. The project is not subject to Design Review requirements because the project would not be visible from any public view area, and is therefore exempt per Section 18.71.050.B.3.b of the Land Use and Development Code. Applicable development standard requirements are as follows:

Fences – A security fence is proposed around the perimeter of the new reservoir (**Attachment 1**, C7.0). As shown on drawing C7.1 of the Engineered Plans (**Attachment 1**), the proposed height of the fence would be six feet. The fence would not be located in setbacks as none apply to Public Facility zoned property, so the maximum allowable height is eight feet. The fence is proposed to be of chain link construction. Section 18.30.050.E.3 of the Land Use and Development Code prohibits chain link fencing within the front and street side yards in any zoning district. The property does not have a front or street side yard, however, as the property is located at the end of a private road, and does not adjoin any other roads. Additionally, per Section 18.30.050.E, chain link fencing can be approved by the Director for special security needs, and security of the water supply is listed as Program PF-2.4.2 of the Inland General Plan.

Screening – Section 18.30.050.F of the Land Use and Development Code establishes standards for screening between different land uses, indicating that commercial or industrial uses adjacent to a residential use must provide screening at the parcel boundary. Other non-residential uses adjacent to a residential use may also be required by an applicable review authority to comply with these requirements. The proposed reservoir will have banks that rise to a height of 14 to 18 feet above grade on the west side, and would be located approximately 10 feet from the neighboring residential property. For this reason, screening is warranted along the west property line adjacent to the proposed reservoir. Screening requirements outlined in 18.30.050.F.1 are as follows:

> **Screening between different land uses.** A commercial or industrial land use proposed on a site adjacent to a residential zoning district shall provide screening at the parcel boundary as follows.

Other nonresidential uses adjacent to a residential use may also be required by the applicable review authority to comply with these requirements.

a. The screen shall consist of plant materials and a solid, decorative wall of masonry or similar durable material, a minimum of six feet in height.

b. The maximum height of the wall shall comply with the provisions of Subsection B. (Height limits).

c. The decorative wall shall be architecturally treated on both sides, subject to the approval of the review authority.

d. A landscaping strip with a minimum width of five feet shall be installed adjacent to a screening wall, except that 10 feet of landscaping shall be provided between a parking lot and a screening wall, in compliance with Section 18.34.050.C (Landscape Location Requirements - Parking Lots).

e. The review authority may waive or approve a substitute for this requirement if the review authority first determines that:

(1) The relationship of the proposed uses makes the required screening unnecessary;

(2) The intent of this Section can be successfully met by means of alternative screening methods;

(3) Physical constraints on the site make the required screening infeasible; or

(4) The physical characteristics of the site or adjoining parcels make the required screening unnecessary.

Since the structure to be screened will be a vegetated earthen berm, a decorative wall would not be appropriate. A vegetative buffer is to be retained to the extent feasible within the 10 foot area between the property line and the reservoir berm on the west side. All healthy trees and brush that are not damaged or prone to windfall are to remain. Additionally, native pygmy cypress trees are to be planted in any gaps created from clearing. The pygmy cypress trees would be planted at estimated 10 foot intervals where gaps allow, and at maturity would rise above the 14 to 18 foot high berm, effectively screening the berm along the west property line. Mitigation Measure 1 is included to require vegetative buffering as a condition of approval of the project:

> **Mitigation Measure 1:** Native, drought resistant trees and shrubs shall be retained per the discretion of the Licensed Timber Operator, and/or native pygmy cypress trees shall be established or planted 10 feet apart (an average of at least one every 100 square feet, after the conversion) along the entire west side of the reservoir within the 10 foot wide visual buffer area between the proposed berm and the western property boundary. At least half of the native vegetation shall be of a species which is expected to reach a height of at least 20 feet at maturity.

Pygmy cypress are native trees that are currently present in the mixed coniferous forest at the site. Replanting around the perimeter of the berm is proposed as a mitigation measure to reduce the impacts of the initial removal during conversion activities to a level of less than significant. **Mitigation Measure 4** is outlined in the Natural Resources section of this report,

above, to assure the revegetation of the pygmy cypress trees is successful over the long term. The mitigation measure is reiterated as follows:

> **Mitigation Measure 4: For Loss of 72 Rare Pygmy Cypress Trees in Project Area**. Topsoil to be disturbed or removed by project construction will be stockpiled temporarily. Once the project has been completed the topsoil will be spread over the 0.54-acre mitigation area. The size of the mitigation area was selected to allow for establishment of over 216 mature trees, with each tree occupying a 100-square foot area (**see Attachment 4, Pygmy Cypress Mitigation Planting Area and Plan**). It is expected that pygmy cypress will germinate naturally from the existing seed bank in the topsoil, due to relatively exposed conditions of bare soil and location next to the newly-constructed reservoir.
>
> In case of inadequate existing seed bank in the topsoil, seedling and cone collection shall occur prior to vegetation removal for the project. 100-200 seed cones shall be collected and 50 or more seedlings shall be salvaged and transplanted to containers and stored at a local nursery.
>
> Three years after construction activities, the mitigation area (**Attachment 4**) will be surveyed for number of trees per acre. If the number of trees per acre is equal to or greater than the 3:1 ratio, then no more visits shall be required.
>
> If after year three the densities are below the designated ratio, then the area shall be replanted back to the mitigated ratio with seedlings, either germinated from seed or collected from site, then at year five, the area shall be re-surveyed. Seedlings will be planted by hand in native topsoil, in a hole deep enough to allow roots to be positioned downward and not curved over. Seedlings will be planted in the late fall or early winter to increase survival rates. As soon as stocking or replanting goals have been achieved, no more surveys shall be required. If the density is below, then replanting of dead and dying trees back to the mitigated ratio shall occur, and no more monitoring shall be required.
>
> During the initial visit at three years (and at year 5 if required) all competing conifer seedlings and invasive species in the mitigation area shall be removed in an effort to reduce competition and the potential spread of invasive species.
>
> At year three and year five monitoring, a short summary report of conditions will be documented and placed in the project file at City Hall. The summary reports will contain information on the number of cypress trees established, dimensions, and any actions taken including weeding and planting. Photographs will be taken and included with the summary reports.

As proposed, the reservoir berm will be adequately screened with vegetation, consistent with the intent of the screening requirements outlined in the Land Use and Development Code.

Performance Standards – Section 18.30.080 of the Land Use and Development Code outlines performance standards designed to minimize various potential operational impacts of land uses and development, promoting compatibility with adjoining areas and land uses. The section of code discusses standards for combustibles and explosives, dust, ground vibration, hazardous materials, light and glare, liquid waste, noise, odor, radioactivity, electrical disturbance, or

electromagnetic interference. Construction of the project has the potential for impacts associated with dust, ground vibration, and noise.

Dust performance standards are addressed in the Air Quality section of this report, which includes an analysis of the performance standards required by the zoning code. Ground vibration perceivable beyond the property lines has potential to occur during construction activities. Section 18.30.080.E Ground Vibration, allows for vibrations from temporary construction activities and from motor vehicle operations. Noise must comply with the City's noise standards as discussed in the Noise section of this report.

Parking – There is currently no formal parking at the Newman Gulch Reservoir. The existing and proposed reservoir would be accessed City personnel occasionally as needed for repairs and maintenance. There is currently no formalized parking and it is unlikely that a formal parking space would be utilized by City personnel during repair and maintenance activities. Section 18.36.020.A indicates that "Each land use and structure, including a change or expansion of a land use or structure, shall provide suitable off-street parking and loading facilities in compliance with this chapter." No parking spaces or loading spaces are proposed as none are warranted.

Site Development Regulations including grading permit requirements and procedures, grading, erosion, and sediment control standards, and urban runoff pollution control, as outlined in Article 6 of the Land Use and Development Code, are addressed in Section VI, Geology and Soils, and Section IX, Hydrology and Water Quality, of this report.

As conditioned, the project will not conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project.

c) *Would the project conflict with any applicable habitat conservation plan or natural community conservation plan?*

There are no habitat conservation plans or natural community conservation plans associated with this property or habitats or communities located upon this property. The project would not conflict with any habitat conservation plans or natural community conservation plans.

XI. Mineral Resources

Would the project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. *Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?*				X
b. *Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?*				X

DISCUSSION OF IMPACTS

The site does not contain any known mineral resources and construction of the project would not result in the loss of any locally important mineral resources delineated in the Fort Bragg General Plan or any other land use document.

XII. Noise

Would the project result in:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?				X
b. Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?				X
c. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?				X
d. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?			X	
e. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?				X
f. For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?				X

DISCUSSION OF IMPACTS

a) *Would the project result in exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance or of applicable standards of other agencies?*

The proposed reservoir design does not include electric pumps or other equipment with a potential for creating loud noises. Water is to be transported via gravity feed. The local general plan indicates that normally acceptable noise levels in a residential neighborhood are levels at or below 60dB. The reservoir will not produce noise levels above 60dB.

b) *Would the project result in exposure of persons to or generation of excessive ground borne vibration or ground borne noise levels?*

The proposed reservoir design does not include equipment that would cause excessive ground borne vibration or ground borne noise levels. However implementation of the timber harvest plan and construction of the reservoir will result in temporary ground borne vibration and noise of more than 60 dB. In order to minimize impacts to neighbors to a less than significant level, mitigation measure 18 is proposed:

> Mitigation Measure 18: All timber harvest activities and reservoir construction activities shall occur between the hours of 8:00am and 5:00pm during weekdays.

c) *Would the project result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?*

The project is not expected to result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

d) *Would the project result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?*

Temporary noise impacts normally associated with construction projects are expected during project construction. Please see Mitigation Measure 18:

> Mitigation Measure 18: All timber harvest activities and reservoir construction activities shall occur between the hours of 8:00am and 5:00pm during weekdays.

e) *For a project located within an airport land use plan area or, where such a plan has not been adopted, within two miles of a public airport or a public use airport, would the project expose people residing or working in the project area to excessive noise levels?*

The proposed project would not be located in an airport land use plan area or within two miles of a public airport. As noted in Section VII, Hazards and Hazardous Materials, the project site is not located in an area that is influenced by an airport, the project site is not within an overflight zone and is not subject to noise from airport operations.

f) *For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?*

There are no private airstrips within the vicinity of the project area and therefore there would be **no impact**.

XIII. Population and Housing

Would the project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?				X
b. Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?				X
c. Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?				X

DISCUSSION OF IMPACTS

a) *Would the project induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?*

The purpose of the proposed project is to develop a 45 acre-feet raw water reservoir to store raw water from Waterfall Gulch to meet the water storage needs of the Fort Bragg water service area. Water will be transported via gravity fed pipeline to the City of Fort Bragg's water treatment plant for the provision of potable water for the Fort Bragg water service area.

The City currently has the ability to store 6,300,000 gallons of water. The two raw water storage ponds at the Water Treatment Plant hold a total of three million gallons. The two big tanks at the Corporation Yard hold a total of three million gallons, and a smaller tank on Highway 20 holds 300,000 gallons. The proposed reservoir would hold approximately 14,700,000 gallons of water. For perspective, Fort Bragg uses over a million gallons of water a day in the summer.

The City has a licensed water right to divert water from Waterfall Gulch[6], and that water is drawn and piped to Newman Gulch and the treatment plant. The point of diversion will remain the same, as will the amount of water drawn from Waterfall Gulch. The City has filed a Petition for Change with the State Water Resources Control Board to request that water right license 12171 be changed to allow for water from Waterfall Gulch to be stored in the proposed Summers Lane Reservoir. The pond will be constructed down the pipeline, between Waterfall Gulch (point of diversion) and the point at which the pipeline currently ties in to Newman Gulch (current point of re-diversion) and heads to the water treatment plant. Storage of Waterfall Gulch water in a reservoir (proposed new point of re-diversion) will allow the City to use the water when it needs it most, in the late summer months when demands are high and supply is limited.

Water supply analyses indicate that although the City has sufficient water to serve the projected build out of the City of Fort Bragg, as currently zoned within the existing City Limits through 2040 it does not have sufficient water storage or a water right that allows for storage. A new storage facility is necessary to ensure that sufficient water will be available in drought conditions, and to insure that substantial conservation measures will not be needed in severe drought conditions. Creation of the storage facility will allow the City to serve an increase in water demand of up to 12% over existing demand and to serve visitors and new development. In extreme drought conditions, such as conditions in 1977, the new storage facility would alleviate drought conditions for existing development; however some emergency water conservation measures may still be needed when the City is built out should an extreme drought occur.

b) *Would the project displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?*

The project area is undeveloped. No houses will be impacted by the proposed project.

c) *Would the project displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?*

The project area is undeveloped and does not contain people. People will not be displaced.

XIV. Public Services

Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Fire protection?				X
Police protection?				X
Schools?				X
Parks?				X
Other public facilities?				X

DISCUSSION OF IMPACTS

The proposed modifications are not expected to result in a change in need of fire or police protection services, and will not have impacts to schools, parks or other public facilities.

XV. Recreation

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?				X
b. Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?				X

DISCUSSION OF IMPACTS

The project would not be open for public use as a recreational facility. The project would not result in an increase in use of existing parks or other recreational facilities.

XVI. Transportation/Traffic

Would the project result in:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections?		X		
b. Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways?				X
c. Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?				X
d. Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?				X
e. Result in inadequate emergency access?				X
f. Result in inadequate parking capacity?				X
g. Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?				X

DISCUSSION OF IMPACTS

a) *Would the project cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections?*

Temporary increases in traffic are expected during conversion and construction activities. The project was referred to the Mendocino County Department of Transportation, who expressed concerns regarding the temporary increase in traffic attributable to heavy equipment coming to and leaving the site. The County Department of Transportation suggests the road condition be assessed prior to project construction and any damage caused to the road surface caused by the project be repaired by the City at project completion. Mitigation Measure 19 is included to ensure impacts to transportation are minimized to a level of less than significant.

> **Mitigation Measure 19:** Prior to initiation of project construction, the applicant shall meet with a representative of County Department of Transportation, and assess and record the current surface conditions of the County maintained portion of Summers Lane. At the close of the construction period, any damage caused by the project to the County road shall be repaired to a condition equaling or exceeding the condition of the County road prior to the project.

b) Would the project exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways?

The reservoir will not be open to the public and will only be accessed on occasion by city staff for repairs and maintenance. The project will not result in a significant increase in traffic.

c) Would the project result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?

The project does not include any components that would impact air traffic patterns.

d) Would the project substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

The reservoir will be surrounded by a six foot tall chain link fence for safety and security, and will be adequately separated from the public road to prevent the possibility of any design feature interfering with traffic or causing traffic hazards.

e) Would the project result in inadequate emergency access?

The project was referred to the Fort Bragg Fire Department and no emergency access issues were identified.

f) Would the project result in inadequate parking capacity?

There is currently no formal parking at the Newman Reservoir. The existing and proposed reservoir would be accessed by City personnel occasionally as needed for repairs and maintenance. It is unlikely that a formal parking space would be utilized by City personnel during repair and maintenance activities. Section 18.36.020.A indicates that "Each land use and structure, including a change or expansion of a land use or structure, shall provide suitable off-street parking and loading facilities in compliance with this chapter." No parking spaces or loading spaces are proposed as none are warranted.

g) Would the project conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?

The project does not warrant alternative transportation systems consideration because the site will not be open to the public, and will be visited only on occasion by City staff for repairs and maintenance.

XVII. Utilities and Service Systems

Would the project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?				X

b.	*Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?*				X
c.	*Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?*				X
d.	*Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?*		X		
e.	*Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?*				X
f.	*Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?*				X
g.	*Comply with federal, state, and local statutes and regulations related to solid waste?*				X

DISCUSSION OF IMPACTS

a) Would the project exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?

The project is a water storage facility and will have no effect on the City's wastewater treatment facility.

b) Would the project require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

The project is a water storage facility. It will not require construction or expansion of the City's water treatment facilities.

c) Would the project require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

The project will not result in a significant increase of impervious surfaces, and will not necessitate expansion or construction of new stormwater drainage facilities.

d) Would the project have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?

The water source for the reservoir is the City's existing Waterfall Gulch diversion. The licensed water right allows the City of Fort Bragg to divert a maximum of 475 acre feet per year from Waterfall Gulch at a rate of diversion not to exceed 0.668 cubic feet per second. This project will not change the amount or rate of diversion, it will simply allow for additional storage of raw water prior to its treatment and distribution. The City will need to obtain a point of re-diversion permit

from the State Water Resources Control Board to allow for the Waterfall Gulch water to be diverted to the reservoir before heading to or the Water Treatment Plant.

e) Would the project result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

The project will not result in any increase in demand on wastewater treatment facilities.

f) Would the project be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?

The project will not create or contribute to an increase in solid waste.

g) Would the project comply with federal, state, and local statutes and regulations related to solid waste?

The project is in compliance with federal, state and local statutes and regulations related to solid waste.

XVIII. Mandatory Findings of Significance

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. *Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?*		X		
b. *Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?*			X	
c. *Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?*			X	

DISCUSSION OF IMPACTS

With incorporation of the following 19 mitigation measures into the project, all potential impacts would be reduced to a level of less than significant.

Mitigation Measure 1: Native, drought resistant trees and shrubs shall be retained per the recommendations of the Licensed Timber Operator, or planted 10 feet apart (at least one every 100 square feet, after the conversion) along the entire west side of the reservoir within the 10 foot wide visual buffer area between the proposed berm and the western property boundary. At least half of the native vegetation shall be of a species which is expected to reach a height of at least 20 feet at maturity.

Mitigation Measure 2: In order to minimize dust and keep dust from leaving the project site, a dust prevention and control plan shall be submitted for approval by the City Engineer in conjunction with the Storm Water Pollution Prevention Plan (SWPPP). The dust prevention and control plan shall demonstrate that the discharge of dust from the construction site will not occur, or can be controlled to an acceptable level depending on the particular site conditions and circumstances. The plan shall include the following information and provisions:

2.A - The plan shall address site conditions during construction operations, after normal working hours, and during various phases of construction.

2.B - The plan shall include the name and the 24 hour phone number of a responsible party in case of emergency.

2.C - If the importing or exporting of dirt is necessary as demonstrated by the cut and fill quantities on the grading plan, the plan shall also include the procedures necessary to

keep the public streets and private properties along the haul route free of dirt, dust, and other debris.

2.D - When an entire project is to be graded and the subsequent construction on the site is to be completed in phases, the portion of the site not under construction shall be treated with dust preventive substance or plant materials and an irrigation system.

2.E - Grading shall be designed and grading activities shall be scheduled to ensure that repeat grading will not be required, and that completion of the dust-generating activity (e.g., construction, paving or planting) will occur as soon as possible.

2.F - The area disturbed by clearing, demolition, earth-moving, excavation operations or grading shall be minimized at all times.

2.G - All visibly dry disturbed soil road surfaces shall be watered to minimize fugitive dust emissions. Dust emissions shall be controlled by watering a minimum of two times each day, paving or other treatment of permanent on-site roads and construction roads, the covering of trucks carrying loads with dust content, and/or other dust-preventive measures (e.g., hydroseeding, etc.).

2.H - All unpaved surfaces, unless otherwise treated with suitable chemicals or oils, shall have a posted speed limit of 10 miles per hour.

2.I - Earth or other material that has been transported by trucking or earth moving equipment, erosion by water, or other means onto paved streets shall be promptly removed.

2.J - Asphalt, oil, water or suitable chemicals shall be applied on materials stockpiles, and other surfaces that can give rise to airborne dusts.

2.K - All earthmoving activities shall cease when sustained winds exceed 15 miles per hour. Wind speed shall be measured on-site by the City inspector with a hand-held anemometer.

2.L - The operator shall take reasonable precautions to prevent the entry of unauthorized vehicles onto the site during non-work hours.

2.M - The operator shall keep a daily log of activities to control fugitive dust.

2.N - Graded areas shall be revegetated as soon as possible, but within no longer than 30 days, to minimize dust and erosion. Disturbed areas of the construction site that are to remain inactive longer than three months shall be seeded and watered until grass cover is grown and maintained; and

2.O - Appropriate facilities shall be constructed to contain dust within the site as required by the City Engineer.

Mitigation Measure 3: The City shall secure all necessary permits for the proposed development from City, County, State and Federal agencies having jurisdiction. All plans submitted with required permit applications shall be consistent with this analysis.

Mitigation Measure 4: For Loss of 72 Rare Pygmy Cypress Trees in Project Area. Topsoil to be disturbed or removed by project construction will be stockpiled temporarily. Once the project has been completed the topsoil will be spread over the 0.54-acre mitigation area. The size of the mitigation area was selected to allow for establishment of over 216 mature trees, with each tree occupying a 100-square foot area (**see Attachment 4, Pygmy Cypress Mitigation Planting Area and Plan**). It is expected that pygmy cypress will germinate naturally from the

existing seed bank in the topsoil, due to relatively exposed conditions of bare soil and location next to the newly-constructed reservoir.

In case of inadequate existing seed bank in the topsoil, seedling and cone collection shall occur prior to vegetation removal for the project. 100-200 seed cones shall be collected and 50 or more seedlings shall be salvaged and transplanted to containers and stored at a local nursery.

Three years after construction activities, the mitigation area (**Attachment 4**) will be surveyed for number of trees per acre. If the number of trees per acre is equal to or greater than the 3:1 ratio, then no more visits shall be required.

If after year three the densities are below the designated ratio, then the area shall be replanted back to the mitigated ratio with seedlings, either germinated from seed or collected from site, then at year five, the area shall be re-surveyed. Seedlings will be planted by hand in native topsoil, in a hole deep enough to allow roots to be positioned downward and not curved over. Seedlings will be planted in the late fall or early winter to increase survival rates. As soon as stocking or replanting goals have been achieved, no more surveys shall be required. If the density is below, then replanting of dead and dying trees back to the mitigated ratio shall occur, and no more monitoring shall be required.

During the initial visit at three years (and at year 5 if required) all competing conifer seedlings and invasive species in the mitigation area shall be removed in an effort to reduce competition and the potential spread of invasive species.

At year three and year five monitoring, a short summary report of conditions will be documented and placed in the project file at City Hall. The summary reports will contain information on the number of cypress trees established, dimensions, and any actions taken including weeding and planting. Photographs will be taken and included with the summary reports.

Mitigation Measure 5: For Potential Impacts to Wetlands and Other Waters. All work involving or associated with soil movement and or digging should occur during the dry season. A grading permit will be obtained and construction Best Management Practices will be implemented, including silt fencing and straw wattles to control erosion and sediment transport that may flow into surrounding natural habitats, particularly along the north end of the unit nearest to Newman Gulch. Best Management Practices shall be utilized along existing roads as their location provides an existing buffer to the Newman Gulch stream and associated wetland areas. The natural topography surrounding the proposed reservoir shall be left intact as much as is feasible, such that runoff to the surrounding landscape is minimized.

Mitigation Measure 6: For Potential Impacts from Invasive Species Caused by the Project. Heavy equipment shall be washed prior to initial use on the site in order to remove any potential invasive seed contamination sources. After the completion of the all construction-related activities, all areas of bare soil around the reservoir will be replanted with native vegetation appropriate to the site, and wetland vegetation where appropriate. Vegetation planted around the perimeter of the reservoir shall be locally-native species from local propagule sources if feasible, and should be planted during the wet season or whenever soils are moist, in order to achieve the highest feasible survival rate. Areas of disturbed soil shall be mulched, seeded, or planted and covered with native vegetation as soon as possible after clearing. No exotic plants shall be planted during or following site development. Plant species listed as invasive (High, Moderate, or Limited) on the California Invasive Plant Inventory (Cal-IPC 2006) shall not be installed anywhere in the Project Area as they would pose a risk to the surrounding plant

community. All reasonable efforts should be made to control and remove existing or newly established populations of exotic species. Some examples of invasive plants likely to be found that should be monitored and controlled are English ivy (*Hedera helix*), Himalayan blackberry (*Rubus armeniacus*), French broom (*Genista monspessulana*), pampas grass (*Cortaderia* spp.), and forget-me-not (*Myosotis latifolia*).

Mitigation Measure 7: For Potential Disturbance to Wildlife Species

7.A – Potential Disturbance of Special Status Bat Species

7.A.1 WORK WINDOWS. Removal of potential bat roost habitat (large trees or snags) or construction activities near potential bat roost habitat will take place in September and October to avoid impacts to bat maternity or hibernation roosts.

7.A.2 - ROOST SURVEYS. If this work window is not feasible, prior to construction, bat roost surveys will be conducted in the Project Area to determine if bats are occupying roosts. If bats are present, a suitable buffer around the roost site will be instated or bats will be excluded from the roost using methods recommended by a qualified biologist.

7.A.3 - MANAGE LIGHTING. Installation of outdoor artificial lighting in or adjacent to the Project Area will be avoided, unless required for public safety. If outdoor artificial lighting is placed within the Project Area, it will incorporate measures to lessen potential impacts to bats such as: prismatic glass coverings, cutoff shields, embedded road lights, narrow spectrum bulbs, or other appropriate lighting technology.

7.B - Potential Disturbance of Sonoma Tree Vole

7.B.1 - PRECONSTRUCTION SURVEYS. Preconstruction surveys for the Sonoma Tee Vole will be performed prior to construction activities. Tree vole survey methodology should follow the Survey protocol for the Red Tree Vole (*Arborimus longicaudus*) in the Record of Decision of the Northwest Forest Plan), Version 2.1, Revision, October 2002 or any subsequent revision.

7.B.2 - CONSULTATION. Occupied trees will be avoided to the fullest extent possible. If disturbance of occupied trees is unavoidable, consultation with CDFW will be initiated to determine the appropriate mitigation measures. Measures may include the preservation or avoidance of suitable habitat.

7.C - Potential Disturbance of Nesting Special Status Bird Species and Other Breeding Birds

7.C.1 - WORK WINDOWS. Conduct as much ground disturbance and vegetation (tree and shrub) removal as is feasible between September 1 and January 15, outside of the breeding season for most bird species.

7.C.2 - PRECONSTRUCTION SURVEYS. If ground disturbance or removal of vegetation occurs between January 16 and August 31, preconstruction surveys will be performed prior to such disturbance to determine the presence and location of nesting bird species.

7.C.3 - BUFFERS. If nests are present, establishment of temporary protective breeding season buffers will avoid direct mortality of these birds. The appropriate buffer distance is species specific and will be determined by a qualified biologist as appropriate to prevent nest abandonment and direct mortality during construction.

7.C.4 - MANAGE LIGHTING. If outdoor artificial lighting is placed within the Project Area, it will incorporate measures to lessen potential impacts to avian species such as: prismatic glass coverings, cutoff shields, embedded road lights, narrow spectrum bulbs, or other appropriate lighting technology.

7.D - Potential Disturbance to Special Status Herpetofauna

7.D.1 – PRE-HARVEST/PRECONSTRUCTION SURVEY. A biologist or other qualified professional shall conduct a survey for coastal tailed frogs, northern red legged frogs foothill yellow–legged frogs, and southern torrent salamanders within one week of commencing project activities. The survey may occur during day or night. For night

surveys, the surveyor shall use a portable light for use in detecting frog's eye shine. Surveys shall include the project site and an area that extends 30 feet up and downstream of the project site.

7.D.2 – PREHARVEST/PRECONSTRUCTION TRAINING. Before starting project activities, the biologist or qualified professional shall conduct a coastal tailed frog, northern red legged frog, foothill yellow–legged frog, and southern torrent salamander awareness training for all on-site workers involved in the project. This training will include photos and/or drawings of each species, a discourse on key physical features and general life history of each species and an overview of herpetofauna protection measures to follow to minimize loss of each species during project activities. A copy of the training materials shall be kept at the project site at all times during project activities, and available to all on-site workers for reference.

7.D.3 – HERPETOFAUNA PROTECTION MEASURES. At the beginning of each work day, trained on-site workers shall survey the project area for coastal tailed frogs, northern red-legged frogs, foothill yellow–legged frogs, and southern torrent salamanders. If at any point during surveys or project activities one of these species is identified within 30 feet of the project area, the individuals shall be carefully removed and placed well outside (at least 300 feet away) the project area.

7.D.4 – HERBICIDE USE AND PILE BURNING RESTRICTION. No herbicide use or pile burning shall occur within 300 feet of the watercourse.

7.D.5 – WATER DRAFTING. If water drafting from the watercourse is to occur for dust abatement purposes, drafting must be done with a hose placed in a bucket in a deep pool. The bucket must be covered by <1 inch mesh, and the mouth of the hose must be covered by ¼ inch mesh.

7.D.6 - STORMWATER TREATMENT. A SWPPP will be implemented to control sediment and pollutants during construction and prevent construction activities from having a negative effect on water quality and quantities in preserved portions of the Study Area. Through implementation of the SWPPP, project stormwater will be treated to meet state and federal stormwater requirements, including treatment of stormwater quality and quantity so that they are not substantially altered from existing conditions.

7.D.7 - MANAGE LIGHTING. Installation of artificial lighting in the Project Area will be avoided, unless required for public safety. If outdoor artificial lighting is placed within the Project Area, it will incorporate measures to lessen potential impacts to frog species such as: prismatic glass coverings, cutoff shields, embedded road lights, narrow spectrum bulbs, or other appropriate lighting technology.

7.E.1 - CONSTRUCTION BMPs. Appropriate BMPs during construction activities, such as the use of a silt fence or other erosion control measures to prevent sediment from entering the water column, will protect in-migrating adults and out-migrating smolts from potential disturbance from increased turbidity. Erosion control devices should not contain monofilament as this may pose a potential entanglement hazard to sensitive amphibian species that may occur in the area. Potential discharge of the reservoir into Newman Gulch should be done with the consultation of the National Marine Fisheries Service (NMFS) to ensure there are no potential impacts to migrating salmonid species.

Mitigation Measure 8: If any person excavating or otherwise disturbing the earth discovers any archaeological site during project construction, the following actions shall be taken: 1) cease and desist from all further excavation and disturbances within 25 feet of the discovery; 2) notify the Fort Bragg Public Works Department within 24 hours of discovery; and 3) retain a professional archaeologist to determine appropriate actions in consultation with stakeholders.

Mitigation Measure 9: Site grading associated with the construction of the reservoir shall conform to the recommendations outlined in the Holdrege & Kull report, Summer's Lane Reservoir, Fort Bragg, California, Geotechnical Investigation Report, dated October 2, 2009 (Project #70315-01), Section 8, Earthwork Grading Recommendations, which is included as **Attachment 5** of this report.

Mitigation Measure 10: Construction of the reservoir shall conform to the recommendations outlined in the Holdrege & Kull report, Summer's Lane Reservoir, Fort Bragg, California, Geotechnical Investigation Report, dated October 2, 2009 (Project #70315-01), including the requirement that any rigid structures that are constructed across the toe of the earthen levee slopes shall have articulated connections that can accommodate up to at least 25 inches of displacement.

Mitigation Measure 11: Any topsoil or other soil materials excavated to accommodate the reservoir and not used onsite shall be temporarily stored on the property until such time as the materials can be used locally for City projects.

Mitigation Measure 12: To the extent feasible gasoline and oil conservation measures shall be incorporated into the project. Heavy equipment used at the project site shall be in good working condition and inspected regularly. Equipment shall be turned off immediately when not in use unless warm-up of equipment would use more gas than leaving equipment running.

Mitigation Measure 13: Any chipped wood not utilized on site shall be temporarily stored on the property until such time as it can be used locally for other City projects, or used for fuel either locally or at a nearby (Scotia or Eureka) cogeneration plant.

Mitigation Measure 14: The Storm Water Pollution Prevention Plan shall include measures for prevention of gasoline, oil and lubricant spills, and an action plan for clean-up of any accidental fluids or other contaminants spilled or encountered during conversion and construction activities.

Mitigation Measure 15: Should the public be allowed to cut firewood on the property after timber harvest is complete, a full sized shovel shall be visible in each vehicle accessing the property, to be used to cover any fire with dirt. A fire truck or water truck shall be kept at the site during firewood removal activities, and at least one person shall be assigned at the site to oversee firecutting efforts and operate water equipment if needed.

Mitigation Measure 16: If burning of vegetation is required for removal, permission shall be obtained from the Fort Bragg Fire Department prior to burning, and all safety measures required by the Fort Bragg Fire Department shall be adhered to in order to minimize wildfire risk.

Mitigation Measure 17: On a regular basis, the valves will be inspected to ensure functionality and the low flow spillway will be inspected for clogging. As feasible, the reservoir shall be maintained, in fair weather when water quality is clear, such that water is constantly flowing to prevent stagnation.

Mitigation Measure 18: All timber harvest activities and reservoir construction activities shall occur between the hours of 8:00am and 5:00pm during weekdays.

Mitigation Measure 19: Prior to initiation of project construction, the City shall meet with a representative of County Department of Transportation, and assess and record the current

surface conditions of the county maintained portion of Summer's Lane. Prior to completion of the project, any damage caused by the project to the County road shall be repaired to a condition equaling or exceeding the condition of the County road prior to the project.

Mitigation Measure 20: To ensure public safety, the reservoir shall be fully fenced and the gate shall be kept secure to prevent access into the reservoir. Additionally, ropes shall be secured in at least four places around the top of the berm and hung over the inner edge of the reservoir to accommodate exit from the reservoir should someone accidentally fall in.

Tables, Figures and Attachments

ATTACHMENT 1

ENGINEERED PLANS

SUMMERS LANE POND

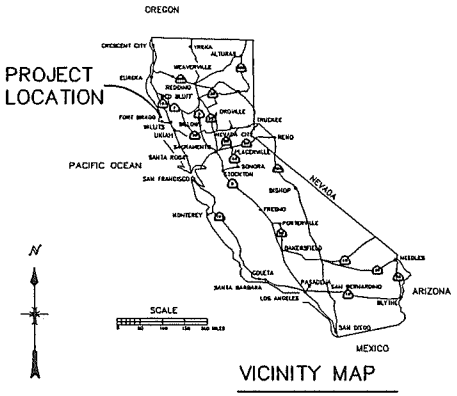
JUNE 2010

FINAL SUBMITTAL

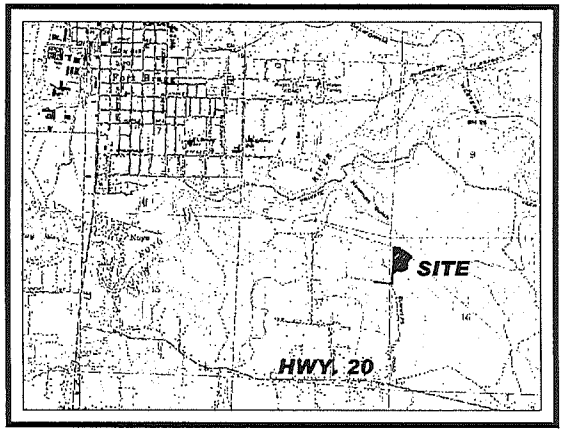
PROJECT DIRECTORY

OWNER: CITY OF FORT BRAGG
416 NORTH FRANKLIN ST.
FORT BRAGG, CA 95437
CONTACT: DAVE GOBLE
1-707-961-2824

CIVIL ENGINEERS: LAWRENCE & ASSOCIATES
3590 IRON COURT
SHASTA LAKE, CA 96019
CONTACT: JESSE SOLORIO
530-275-4800



VICINITY MAP



LOCATION MAP
1"=2000'

INDEX TO DRAWINGS

LEGEND

	RIGHT OF WAY
	PROPERTY BOUNDARY
	PROPOSED WATER LINE ALIGNMENT
	EXISTING WATER LINE
	EXISTING ELECTRICAL LINE
	EXISTING DRAINAGE SWALE
	EXISTING FENCE LINE
2800	CONTOUR LINE (EXISTING)
2800	CONTOUR LINE (NEW)
F	FLOW METER
	GATE VALVE
	THRUST BLOCK
	CONCENTRIC INCREASER
	TRANSITION COUPLER
(E)	EXISTING
A / B	A – DETAIL NUMBER B – SHEET NUMBER
FT.	FEET
MI.	MILE
GAL.	GALLON
ø	DIAMETER
MIN.	MINIMUM
	EXISTING TREE

ABBREVIATIONS

MAX.	MAXIMUM
GSP	GALVANIZED STEEL PIPE
PVC	POLYVINYL CHLORIDE
CMP	CORRUGATED METAL PIPE
AC	ASBESTOS CEMENT
A/C	ASPHALT CONCRETE
GALV.	GALVANIZED
CU. YD.	CUBIC YARD
SCH.	SCHEDULE
O.C.E.W.	ON CENTER EACH WAY
IRRIG.	IRRIGATION
TYP.	TYPICAL
EQ.	EQUAL
W/	WITH
REQ'D.	REQUIRED
NO.	NUMBER
HWY.	HIGHWAY
L.F.	LINEAL FOOT
RSP	ROCK SLOPE PROTECTION
CAV	COMBINATION AIR VALVE

FORT BRAGG DEPARTMENT OF PUBLIC WORKS
Linda Ruffing, City Manager

APPROVAL _____ SIGNED _____ DATE

FORT BRAGG CITY COUNCIL
Doug Hammerstrom, Mayor

APPROVAL _____ SIGNED _____ DATE

PLANS PREPARED BY: LAWRENCE & ASSOCIATES
Jesse Solorio, PE 65305

APPROVAL _____ SIGNED _____ DATE

GEOTECHNICAL REPORT:

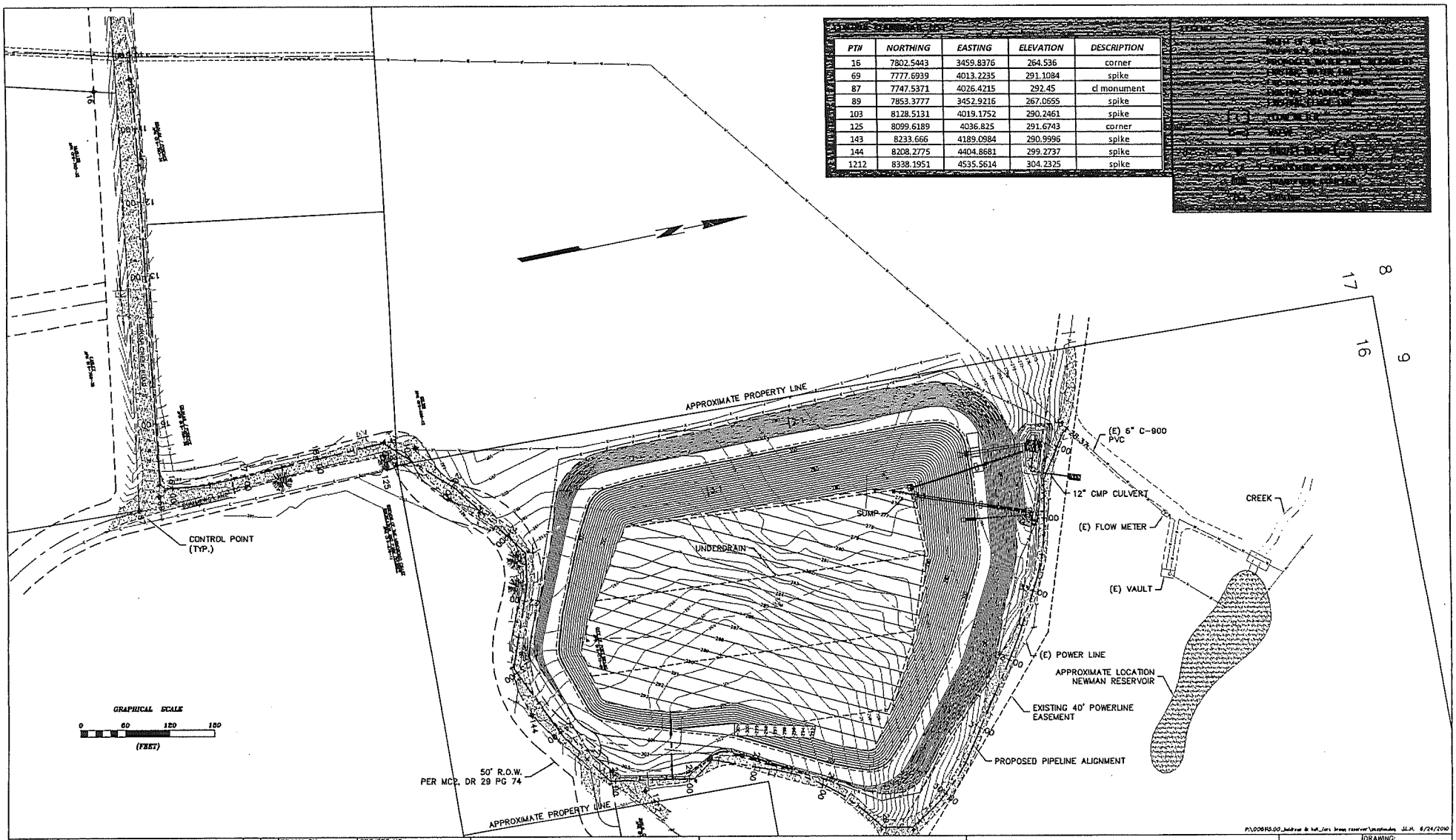
GEOTECHNICAL ENGINEERING INVESTIGATION REPORT FOR SUMMERS LN. RESERVOIR SUMMERS LN, FORT BRAGG, MENDOCINO CO., CA HOLDREGE & KULL FEB 5, 2010

ASSESSOR'S PARCEL NUMBER: 019-070-01

LATITUDE: 39°25'31"N

LONGITUDE: 123°46'04"W

P:\008M9.00_Waldron & Hull_Fort Bragg reservoir\Coversheet.dwg JJ.M. 6/24/2010



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87	7747.5371	4026.4215	292.45	cl monument
89	7853.3777	3452.9216	267.0655	spike
103	8128.5131	4019.1752	290.2461	spike
125	8099.6189	4036.825	291.6743	corner
143	8233.666	4189.0984	290.9996	spike
144	8208.2775	4404.8681	299.2737	spike
1212	8338.1951	4535.5614	304.2325	spike

NO.	DATE	REVISIONS	BY	CHK
1	7/2/09	PRELIMINARY	JS	CC
2	5/22/10	OUTLET REVISION	JS	CC

DRAWN BY: D. ZAITZ
ENGINEER: J. SOLORIO
CHECKED BY:
DATE:
PROJECT NO: 006193.00
SCALE: 1"=60'
APPROVED BY:
DATE:

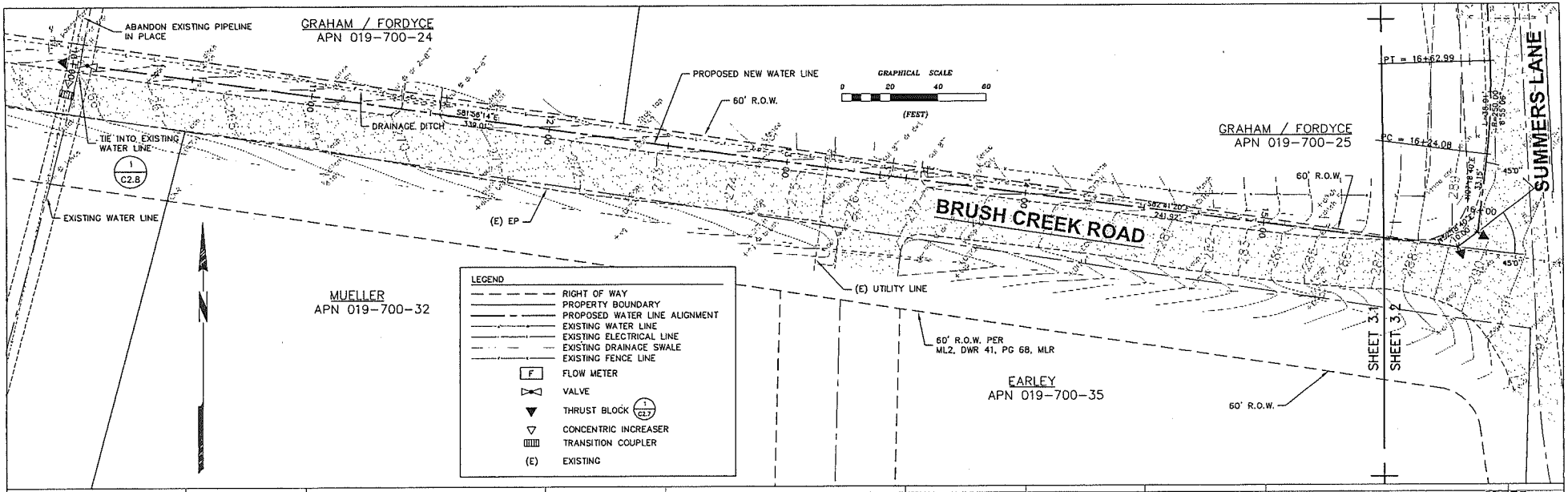
LAWRENCE & ASSOCIATES
ENGINEERING GEOLOGY
3590 IRON CT.
SHASTA LAKE, CA 96019
(530) 275-4600
(530) 275-7970 FAX

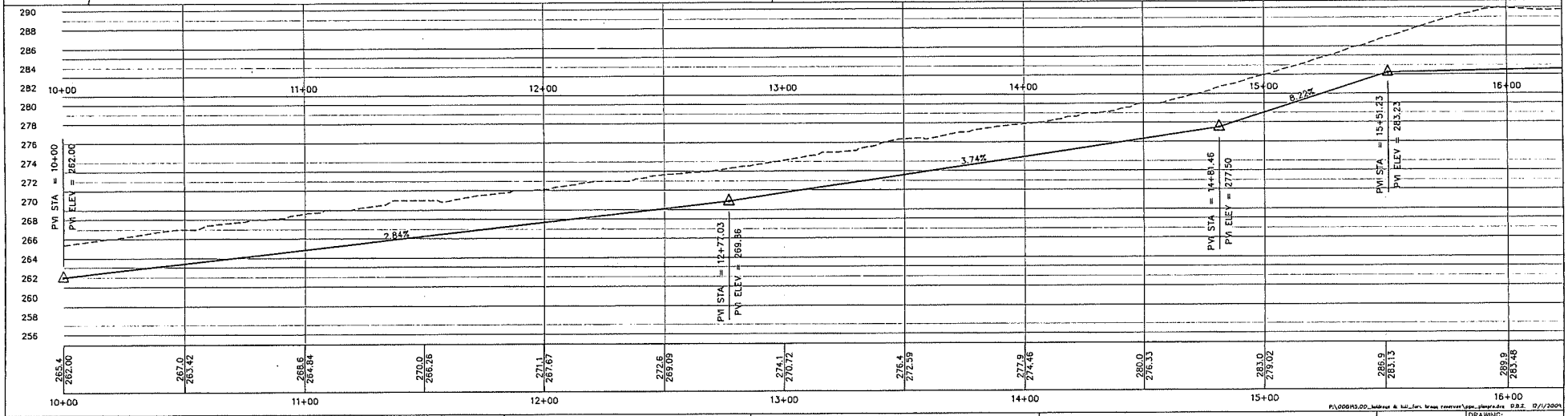
NEWMAN RESERVOIR

CITY OF FORT BRAGG
416 NORTH FRANKLIN ST.
FORT BRAGG, CA 95437

SITE PLAN

DRAWING: C1.0
SHEET: OF
REVISION NO: REVISION 0
DATE: 12/1/09





NO.	DATE	REVISIONS	BY	CHK
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DRAWN BY: D. ZAITZ
ENGINEER: J. SOLORIO
CHECKED BY:
DATE:
PROJECT NO: 008195.00
SCALE: 1"=20'
APPROVED BY:
DATE:

LAWRENCE & ASSOCIATES
ENGINEERING GEOLOGY
3500 IRON CT.
SHASTA LAKE, CA 96019
(530) 275-4800
(530) 275-7970 FAX

NEWMAN RESERVOIR

CITY OF FORT BRAGG
416 NORTH FRANKLIN ST.
FORT BRAGG, CA 95437

WATER PIPE PLAN AND PROFILE STATION 10+00 TO 15+50

DRAWING: C2.1
SHEET: OF
REVISION NO: REVISION 0
DATE: 12/1/09

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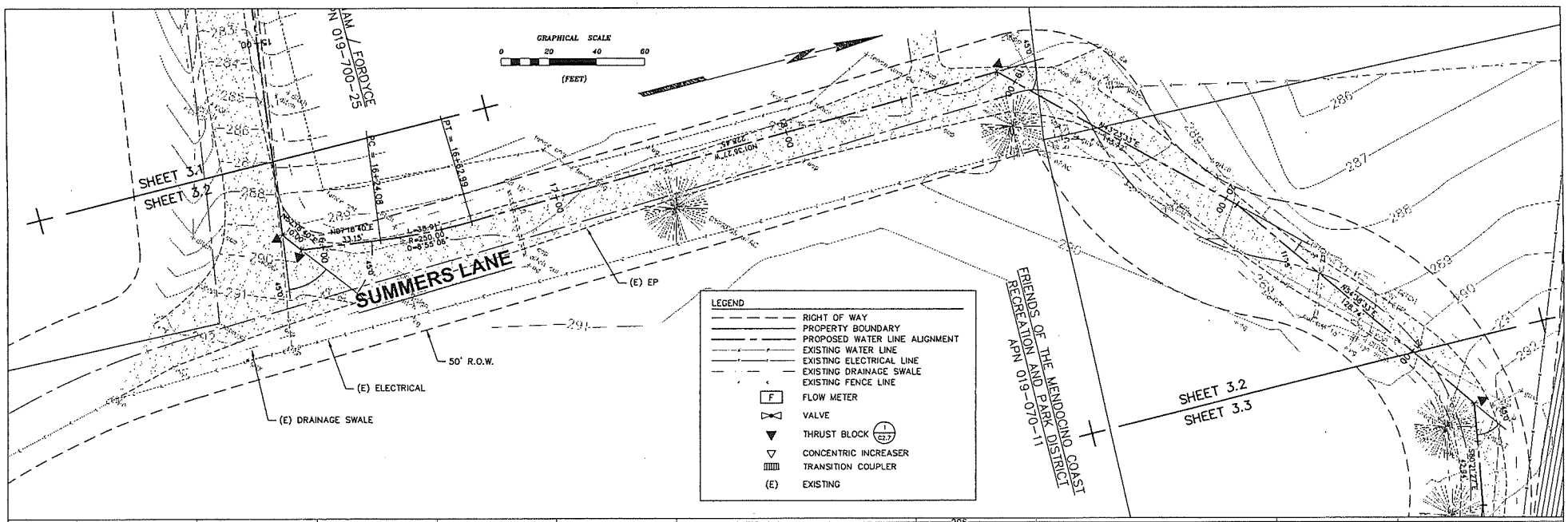

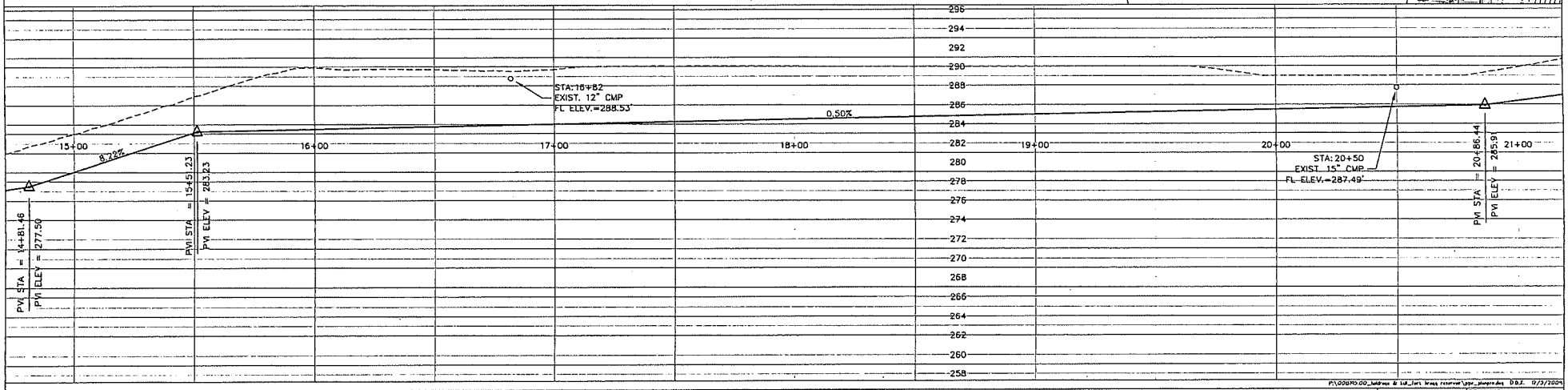

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DRAWN BY: D. ZAITZ
ENGINEER: J. SOLORIO
CHECKED BY:
DATE:

PROJECT NO: 008195.00
SCALE: 1"=20'
APPROVED BY:
DATE:

LAWRENCE & ASSOCIATES
ENGINEERING GEOLOGY
3590 IRON CT.
SHASTA LAKE, CA 96019
(530) 275-4600
(530) 275-7970 FAX

NEWMAN RESERVOIR

CITY OF FORT BRAGG
416 NORTH FRANKLIN ST.
FORT BRAGG, CA 95437

WATER PIPE PLAN AND PROFILE STATION 15+50 TO 21+00

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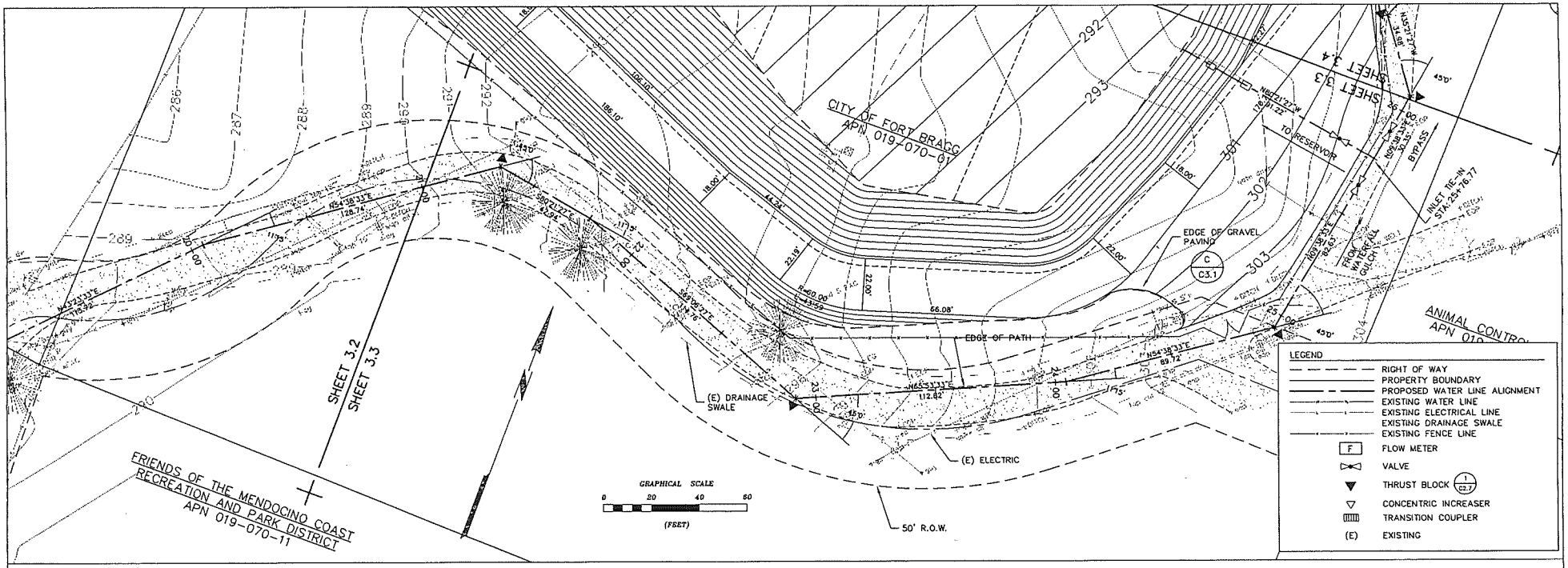
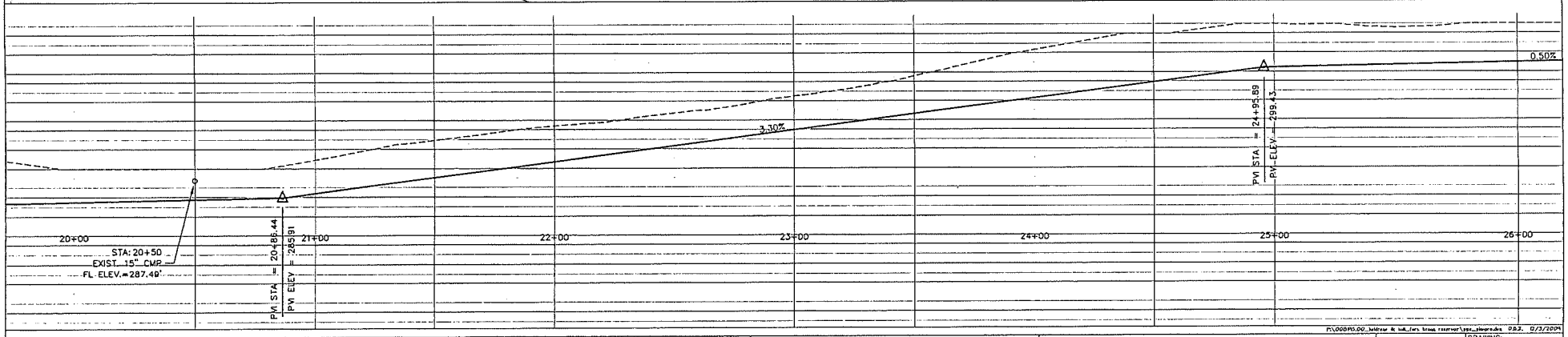




NO.	DATE	REVISIONS	BY	CHK
1	7/2/09	PRELIMINARY	JS	CC

DRAWN BY: B. ZAITZ
ENGINEER: J. SOLORIO
CHECKED BY:
DATE:
PROJECT NO: 008105.00
SCALE: 1"=20'
APPROVED BY:
DATE:

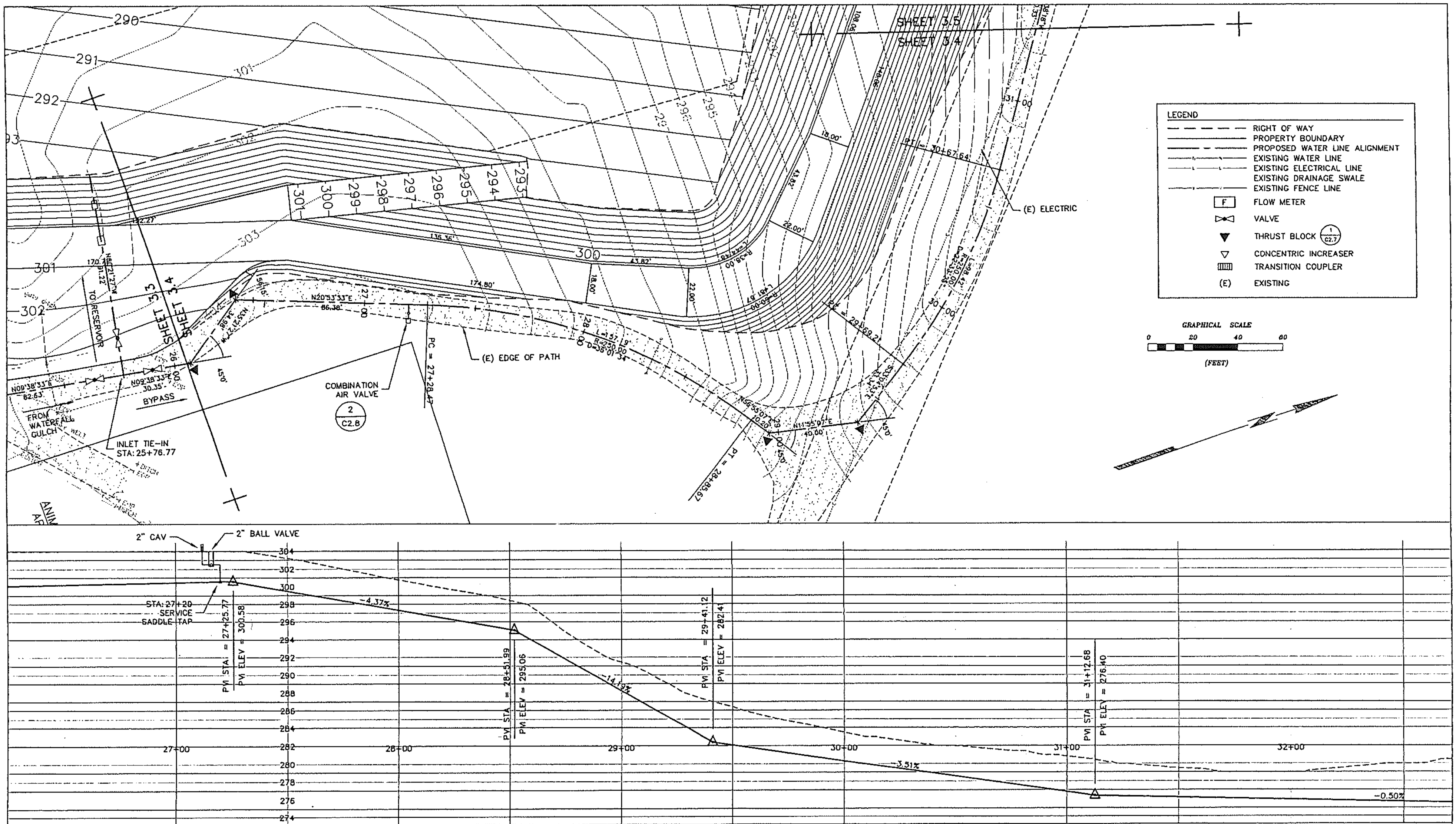
LAWRENCE & ASSOCIATES
ENGINEERING GEOLOGY
3590 IRON CT.
SHASTA LAKE, CA 96019
(530) 275-4800
(530) 275-7970 FAX

NEWMAN RESERVOIR

CITY OF FORT BRAGG
416 NORTH FRANKLIN ST.
FORT BRAGG, CA 95437

WATER PIPE PLAN AND PROFILE STATION 21+00 TO 26+00

DRAWING: C2.3
SHEET: OF
REVISION NO: REVISION 0
DATE: 12/1/09



NO.	DATE	REVISIONS	BY	CHK
1	7/2/09	PRELIMINARY	JS	CC

DRAWN BY: D. ZAITZ
ENGINEER: J. SOLORIO
CHECKED BY:
DATE:

PROJECT NO: 008195.00
SCALE: 1"=20'
APPROVED BY:
DATE:

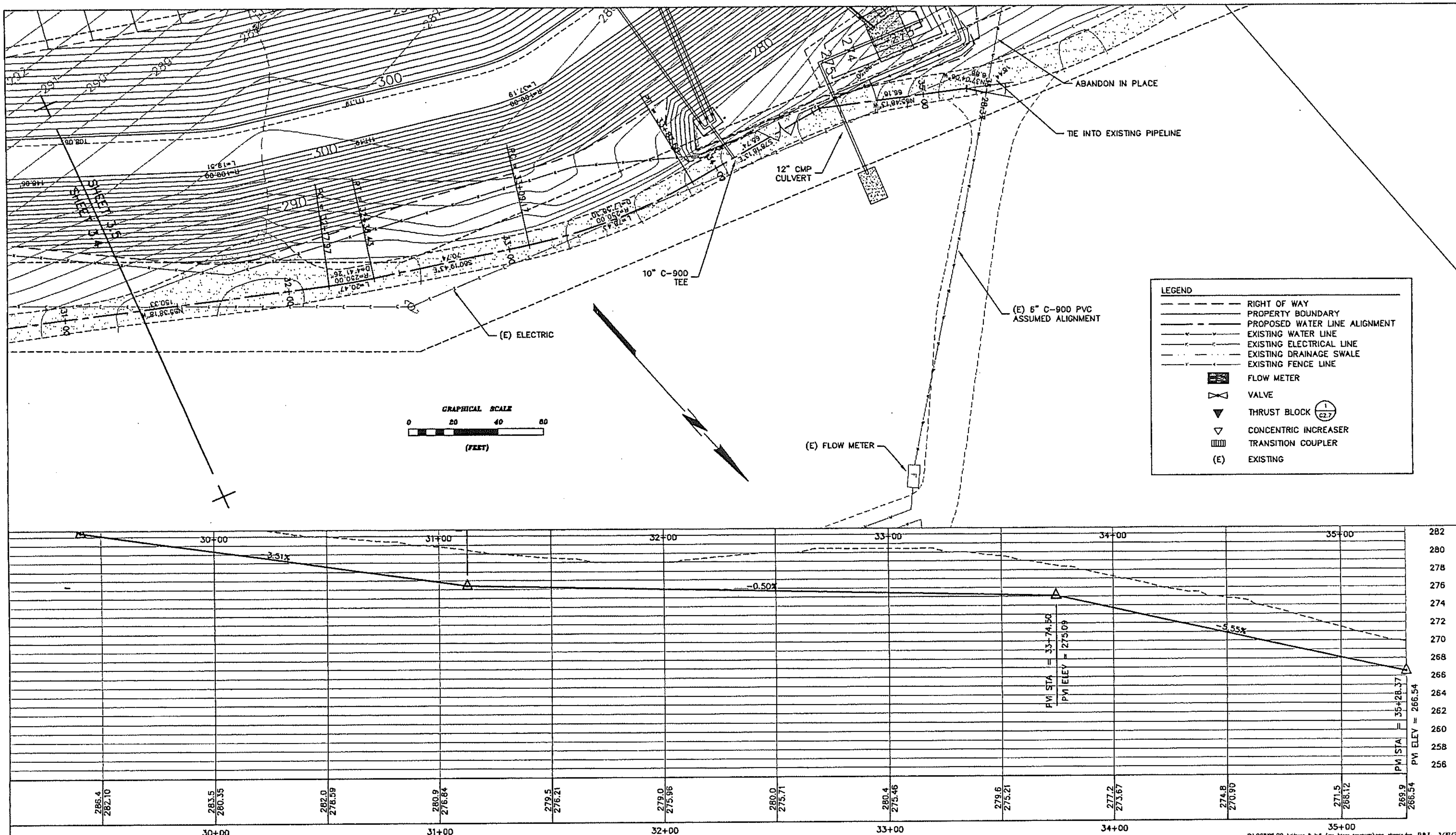
LAWRENCE & ASSOCIATES
ENGINEERING GEOLOGY
3590 IRON CT.
SHASTA LAKE, CA 96019
(530) 275-4800
(530) 275-7970 FAX

NEWMAN RESERVOIR

CITY OF FORT BRAGG
416 NORTH FRANKLIN ST.
FORT BRAGG, CA 95437

WATER PIPE PLAN AND PROFILE STATION 26+00 TO 31+50

DRAWING: C2.4
SHEET: OF
REVISION NO: REVISION 0
DATE: 12/1/09



NO.	DATE	REVISIONS	BY	CHK
1	7/2/09	PRELIMINARY	JS	CC
2	6/22/10	OUTLET REVISION	JS	CC

DRAWN BY: D. ZAITZ
ENGINEER: J. SOLORIO
CHECKED BY:
DATE:

PROJECT NO: 008195.00
SCALE: 1"=20'
APPROVED BY:
DATE:

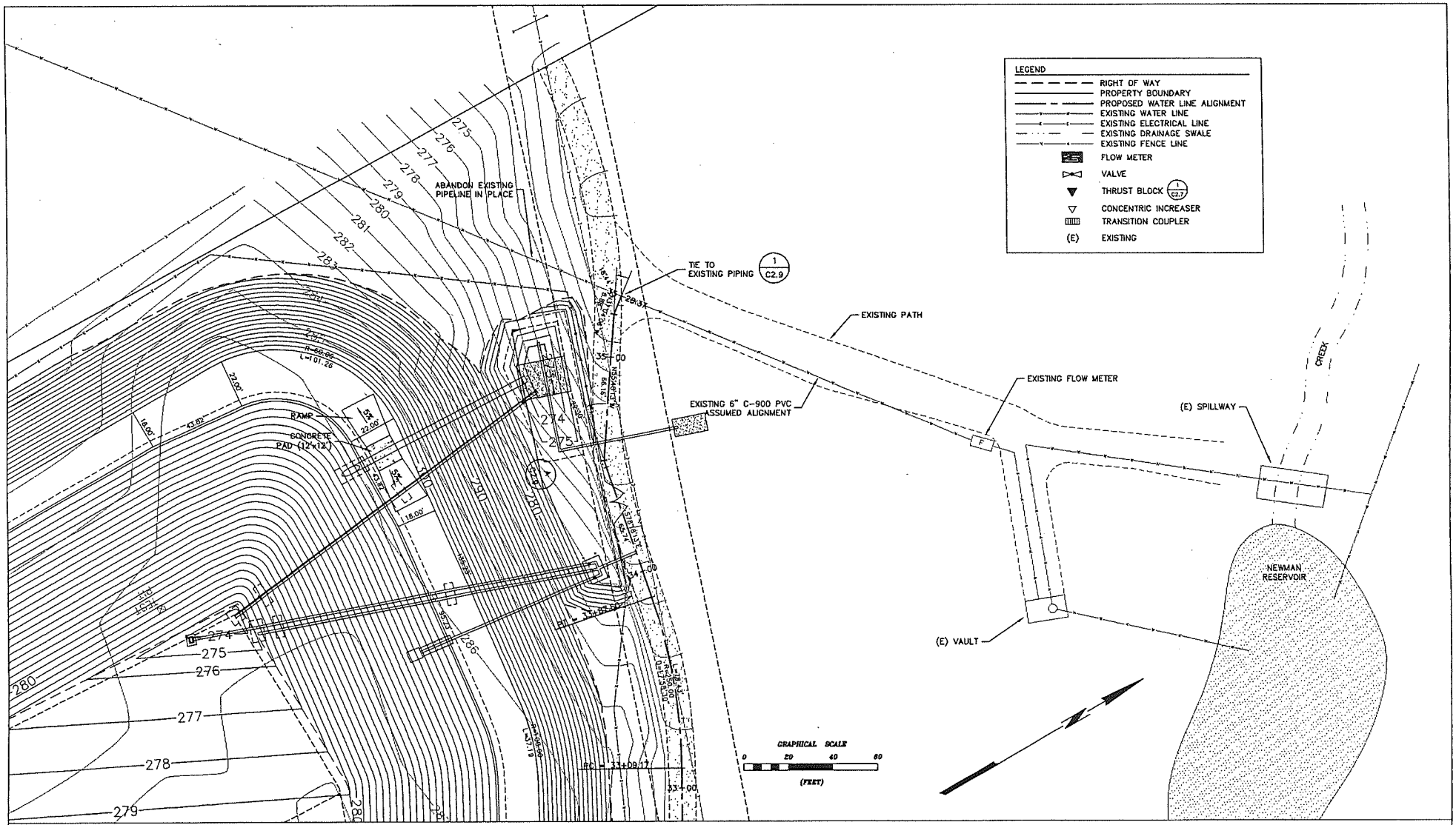
LAWRENCE & ASSOCIATES
ENGINEERING GEOLOGY
3590 IRON CT.
SHASTA LAKE, CA 96019
(530) 275-4800
(530) 275-7970 FAX

NEWMAN RESERVOIR

CITY OF FORT BRAGG
416 NORTH FRANKLIN ST.
FORT BRAGG, CA 95437

WATER PIPE PLAN AND PROFILE
STATION 31+50 TO 35+29.13

DRAWING: C2.5
SHEET: OF
REVISION NO: REVISION 0
DATE: 12/1/09



NO.	DATE	REVISIONS	BY	CHK
1	7/2/09	PRELIMINARY	JS	CC
2	6/22/10	OUTLET REVISION	JS	CC

DRAWN BY: D. ZAITZ
ENGINEER: J. SOLORIO
CHECKED BY:
DATE:

PROJECT NO: 008195.00
SCALE: 1"=20'
APPROVED BY:
DATE:

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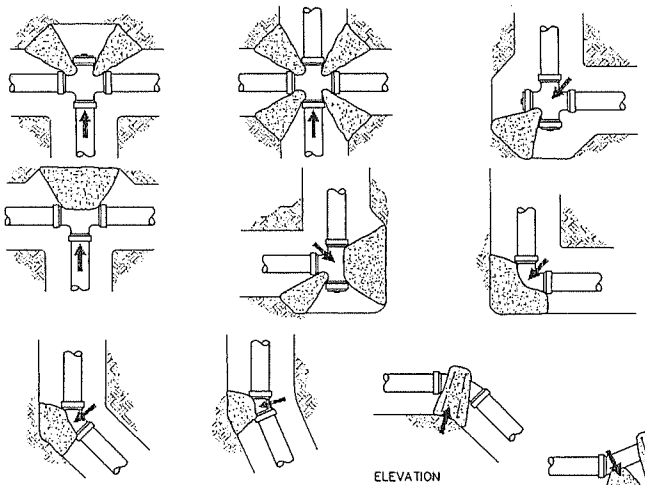
ENGINEERING GEOLOGY
3590 IRON CT.
SHASTA LAKE, CA 96019
(530) 275-4800
(530) 275-7970 FAX

NEWMAN RESERVOIR

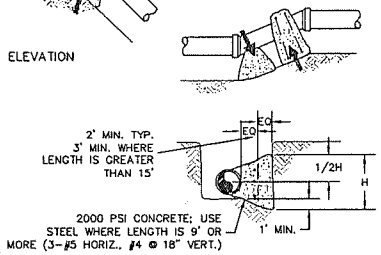
CITY OF FORT BRAGG
416 NORTH FRANKLIN ST.
FORT BRAGG, CA 95437

RESERVOIR EXIT PIPE PLAN

DRAWING: C2.6
SHEET: OF
REVISION NO: REVISION 0
DATE: 12/1/09



ELEVATION



TYPICAL SECTION

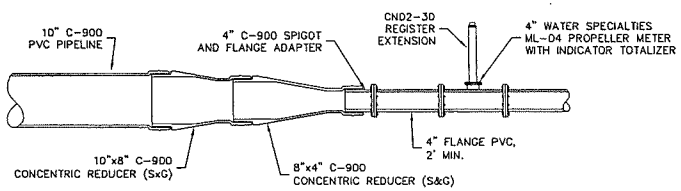
BEARING AREA OF THRUST BLOCKS IN SQ. FT.

PIPE SIZE	TEE, WYE, PLUG OR CAP	90° BEND, PLUGGED CROSS	TEE, PLUGGED		45° BEND	22 1/2° BEND	11 1/4° BEND
4	2	3			2	1	
6	5	6			4	2	
8	8	11			6	3	
10	12	17			10	5	
12	17	24			13	7	

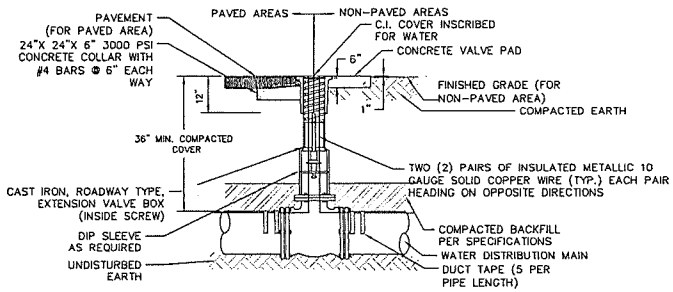
NOTES:

1. CONCRETE THRUST BLOCKS ARE TO BE POURED AGAINST A UNDISTURBED EARTH OR STRUCTURAL BACKFILL.
2. KEEP CONCRETE CLEAR OF JOINTS AND ACCESSORIES.
3. VOLUMES AND SPECIAL BLOCKING DETAILS SHOWN ON THE PLANS TAKE PRECEDENCE OVER VOLUMES AND BLOCKING DETAILS SHOWN ON THIS STANDARD DETAIL.
4. ALL BURIED PIPE EXCEPT FLANGED, SCREWED, SOLVENT WELDED PVC OR WELDED STEEL PIPE SPECIFIED TO BE PRESSURE TESTED SHALL BE PROVIDED WITH CONCRETE THRUST BLOCKS AT ALL DIRECTIONAL CHANGES UNLESS OTHERWISE NOTED.
5. THRUST BLOCKS SHALL NOT BE LOCATED OR SIZED TO ENCASE ADJACENT PIPES OR FITTINGS.
6. THE SIZE AND WEIGHT OF ALL UPLIFE THRUST BLOCKS SHALL BE AS DETERMINED BY ENGINEER.
7. THE BEARING AREAS ARE BASED ON TEST PRESSURE OF 150 PSI AND ALLOWABLE SOIL BEARING STRESS OF 1000 POUNDS PER SQUARE FOOT. TO COMPUTE BEARING AREAS FOR DIFFERENT TEST PRESSURES AND SOIL BEARING STRESSES, USE THE FLLOWING EQUATION:
   BEARING AREA = (TEST PRESSURE/150) X (1000/SOIL BEARING STRESS) X (TABLE VALUE)

1 — STANDARD THRUST BLOCK DETAILS — N.T.S.



2 — POND INLET METER PIPING — N.T.S.



FOR EITHER PAVED OR NON-PAVED AREAS

NOTES:

1. PVC EXTENSIONS SHALL NOT BE USED.
2. EXTENSION ON VALVE BOX SHALL BE SET TO RESERVE 1/2 OF THE ADJUSTMENT LENGTH FOR FUTURE USE.
3. OPERATING NUT SHALL BE WITHIN 12" OF GRADE. EXTENSION TO BE PROVIDED AS REQUIRED.
4. VALVE EXTENSION SHALL BE MECHANICALLY ATTACHED AND SHALL HAVE A STAINLESS STEEL PIN AT THE VALVE AND SHEAR PIN ONLY AT THE OPERATING NUT.
5. ALL PVC PIPE SHALL REQUIRE TWO PAIRS OF INSULATED METALLIC LOCATING WIRES (10 GAUGE SOLID COPPER) TAPED WITH 2" WIDE DUCT TAPE TO TOP CENTERLINE OF THE PIPE AT EVERY JOINT AND AT 4 ADDITIONAL EQUALLY SPACED POINTS PER LENGTH OF PIPE.
6. LOCATING WIRES TO TERMINATE 4" ABOVE VALVE BOX AND FOLDED BACK INSIDE BOX AND PLUGGED PIPE AND PLUGGED.
7. LOCATING WIRES SHALL BE CAPABLE OF DETECTION BY A CABLE LOCATOR AND PASS A FIELD CONDUCTIVITY TEST, OBSERVED BY THE CITY, FROM END TO END OF WIRES.
8. SPLICES SHALL BE CAPABLE OF COMPLETE SUBMERSION, SUCH AS BUTT SPLICE WITH RAYCHEM HEAT SHRINK TUBING.
9. NO MORE THAN ONE SPLICE IN LOCATING WIRES BETWEEN VALVES IS ALLOWED.

3 — RESILIENT SEATED GATE VALVE DETAIL — N.T.S.

P:\000910.00_hddress & hdl_fort bragg reservoir\details.dgn D.B.Z. 12/3/2009

NO.	DATE	REVISIONS	BY	CHK
1	7/2/09	PRELIMINARY	JS	CC

DRAWN BY: D. ZAITZ
ENGINEER: J. SOLORIO
CHECKED BY:
DATE:
PROJECT NO: 000195.00
SCALE: N.T.S.
APPROVED BY:
DATE:

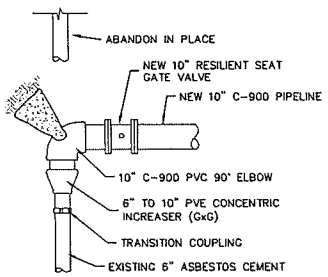
LAWRENCE & ASSOCIATES
ENGINEERING GEOLOGY
3590 IRON CT.
SHASTA LAKE, CA 96019
(530) 275-4800
(530) 275-7970 FAX

NEWMAN RESERVOIR

CITY OF FORT BRAGG
416 NORTH FRANKLIN ST.
FORT BRAGG, CA 95437

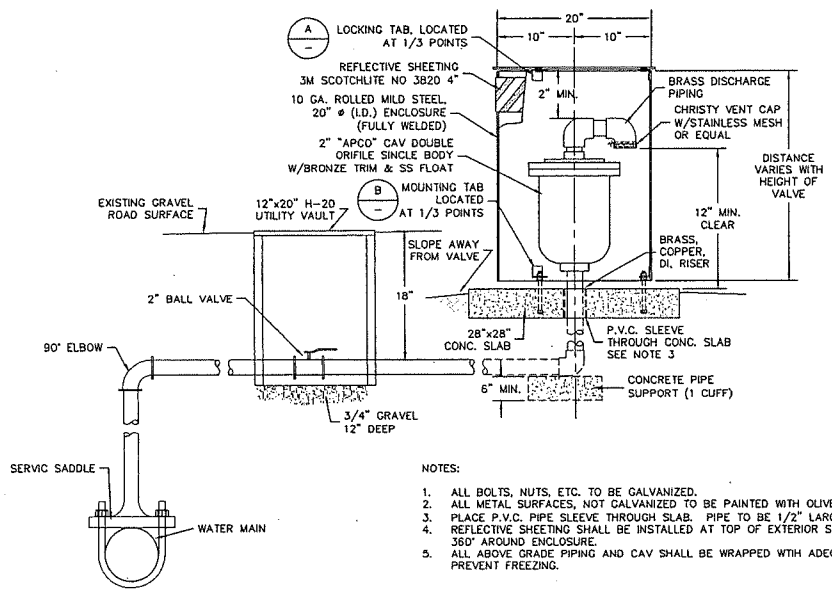
PIPELINE DETAILS

DRAWING: C2.7
SHEET: OF
REVISION NO: REVISION 0
DATE: 12/1/09



1 — NEW PIPEING TIE-IN

N.T.S.

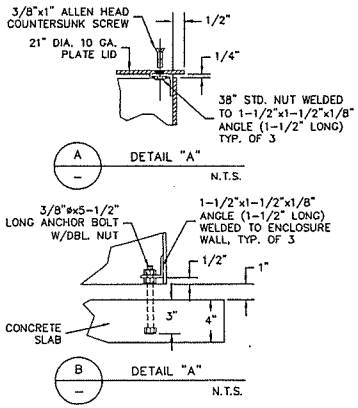


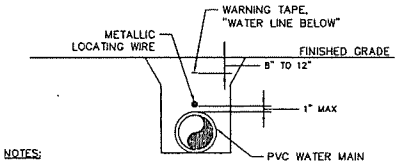
NOTES:

1. ALL BOLTS, NUTS, ETC. TO BE GALVANIZED.
2. ALL METAL SURFACES, NOT GALVANIZED TO BE PAINTED WITH OLIVE GREEN POWDER COAT PAINT.
3. PLACE P.V.C. PIPE SLEEVE THROUGH SLAB. PIPE TO BE 1/2" LARGER THAN RISER.
4. REFLECTIVE SHEETING SHALL BE INSTALLED AT TOP OF EXTERIOR SIDEWALL. WRAP SHEETING 360° AROUND ENCLOSURE.
5. ALL ABOVE GRADE PIPING AND CAV SHALL BE WRAPPED WTIH ADEQUATE PIPE INSULATION TO PREVENT FREEZING.

2 — COMBINATION AIR VALVE & ENCLOSURE

N.T.S.

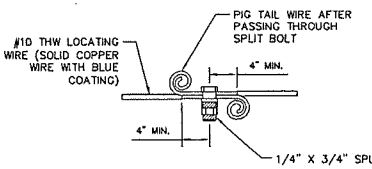




NOTES:

1. ALL PVC PIPE SHALL REQUIRE INSULATED METALLIC LOCATING WIRE (10 GAUGE COPPER/UF INSULATION) CAPABLE OF DETECTION BY A CABLE LOCATOR.
2. WIRE SHALL BE ATTACHED TO THE TOP OF PIPE WITH DUCT TAPE. AT LEAST FIVE TIMES PER JOINT. LOCATING WIRE SHALL TERMINATE AT THE TOP OF EACH VALVE BOX.
3. PROVIDE POTTING COMPOUND AT ALL TRACER WIRE JUNCTIONS AND SPLICES.
4. EXTEND TRACER WIRE INTO METER BOX.

PIPE LOCATING WIRE DETAIL



NOTES:

1. THE ENDS OF ALL LOCATING WIRES, WHETHER THEY ARE SPLICED, CONNECTED, OR TERMINATED, SHALL HAVE THE LAST THREE INCHES PIG TAILED AS DETAILED HEREON.
2. AFTER INSTALLATION OF THE LOCATING WIRE THE SYSTEM SHALL BE SUBJECTED TO TESTING, IN THE PRESENCE OF CITY UTILITIES STAFF PRIOR TO BACKFILL, IN ORDER TO INSURE THAT THE SYSTEM IS FUNCTIONAL.

LOCATING WIRE DETAIL

3 — PVC PIPE LOCATING WIRE DETAILS

N.T.S.

P:\000195.00_Address & Sub_Fort Bragg reservoir\drawings D.D.S. 12/3/2009

NO.	DATE	REVISIONS	BY	CHK
1	7/2/09	PRELIMINARY	JS	CC

DRAWN BY: D. ZAITZ
PROJECT NO: 000195.00
ENGINEER: I. SOLORIO
SCALE: N.T.S.
CHECKED BY:
APPROVED BY:
DATE:
DATE:

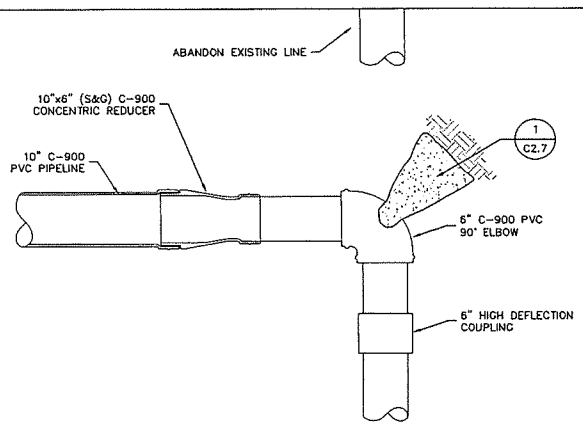
LAWRENCE & ASSOCIATES
ENGINEERING GEOLOGY
3590 IRON CT.
SHASTA LAKE, CA 96019
(530) 275-4900
(530) 275-7970 FAX

NEWMAN RESERVOIR

CITY OF FORT BRAGG
416 NORTH FRANKLIN ST.
FORT BRAGG, CA 95437

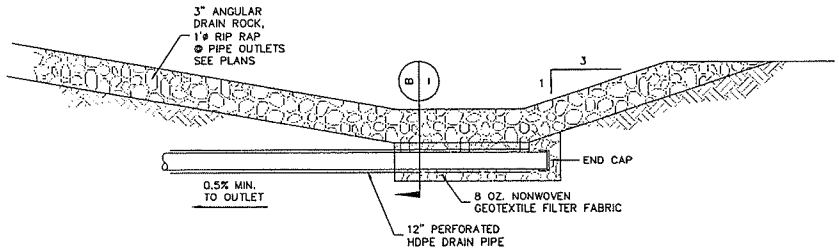
PIPELINE DETAILS

DRAWING: C2.8
SHEET: OF
REVISION NO: REVISION 0
DATE: 11/25/09



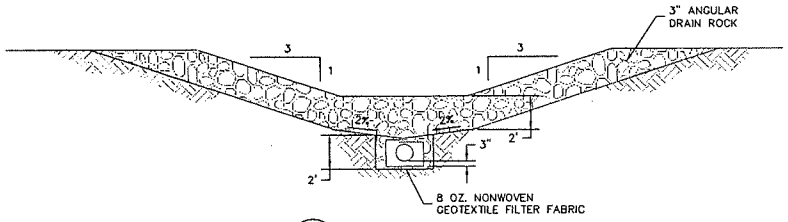
1 / – TIE TO OUTLET

N.T.S.



A / – OUTLET POND DRAIN SECTION

N.T.S.



B / – DRAIN SECTION

N.T.S.

P:\008195.00_ladrow & hat_fort bragg reservoir\details.dwg 12/1/2009

NO.	DATE	REVISIONS	BY	CHK
1	7/2/09	PRELIMINARY	JS	CC

DRAWN BY: D. ZAITZ
ENGINEER: J. SOLORIO
CHECKED BY:
DATE:

PROJECT NO: 008195.00
SCALE: N.T.S.
APPROVED BY:
DATE:

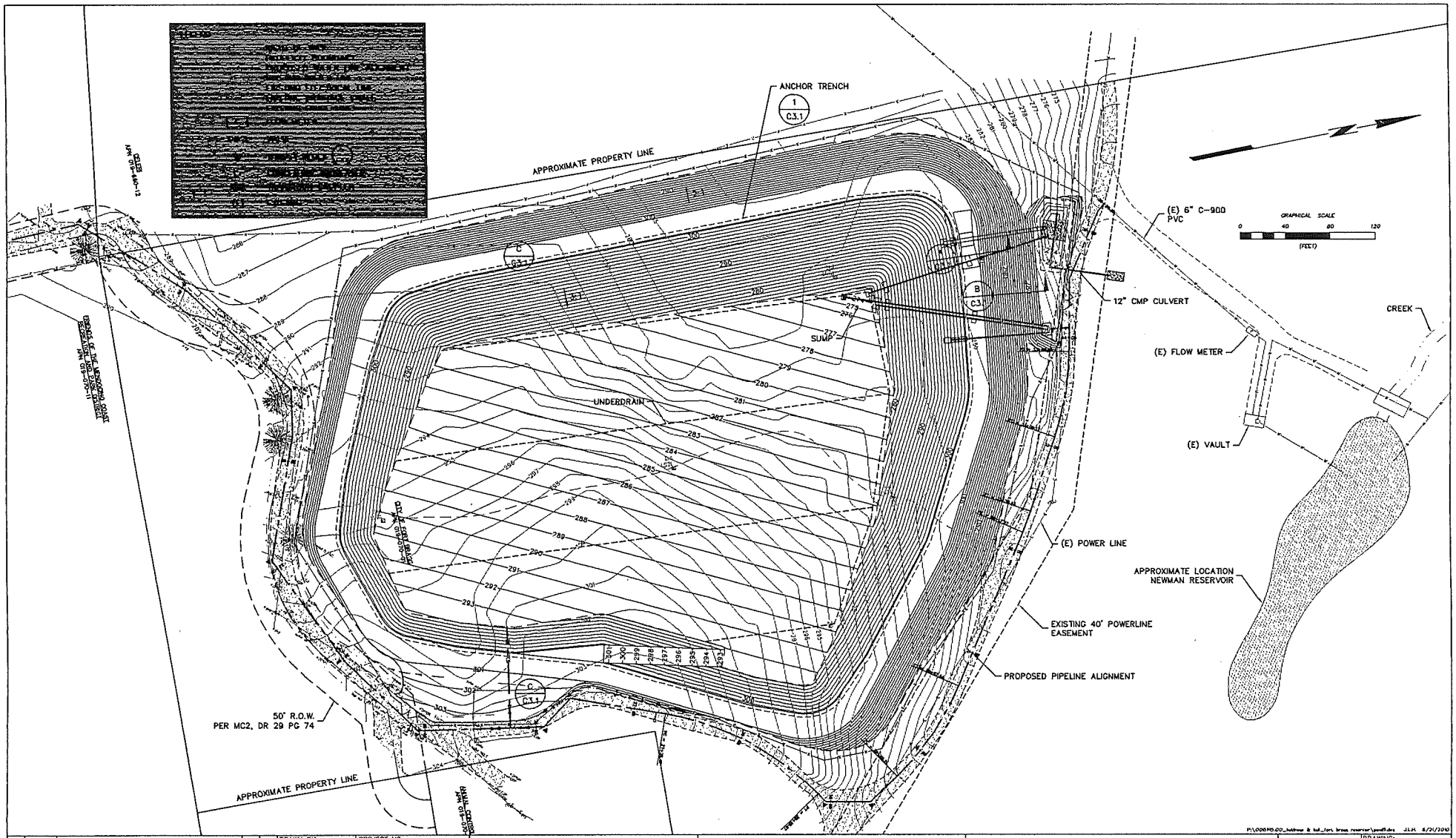
LAWRENCE & ASSOCIATES
ENGINEERING GEOLOGY
3590 IRON CT.
SHASTA LAKE, CA 96019
(530) 275-4800
(530) 275-7070 FAX

NEWMAN RESERVOIR

CITY OF FORT BRAGG
416 NORTH FRANKLIN ST.
FORT BRAGG, CA 95437

PIPELINE DETAILS

DRAWING: C2.9
SHEET: OF
REVISION NO: REVISION 0
DATE: 12/1/09



NO.	DATE	REVISIONS	BY	CHK
1	7/2/09	PRELIMINARY	JS	CC
2	8/22/10	OUTLET REVISION	JS	CC

DRAWN BY: D. ZAITZ
ENGINEER: J. SOLORIO
CHECKED BY:
DATE:
PROJECT NO: 008193.00
SCALE: 1"=40'
APPROVED BY:
DATE:

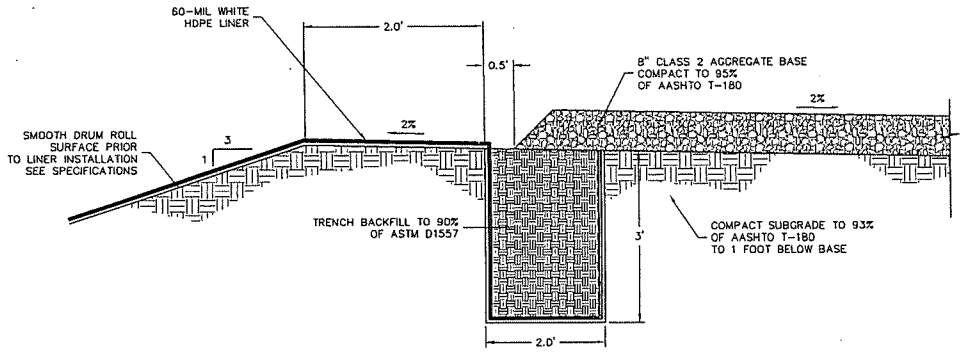
LAWRENCE & ASSOCIATES
ENGINEERING GEOLOGY
3590 IRON CT.
SHASTA LAKE, CA 96019
(530) 275-4800
(530) 275-7970 FAX

NEWMAN RESERVOIR

CITY OF FORT BRAGG
416 NORTH FRANKLIN ST.
FORT BRAGG, CA 95437

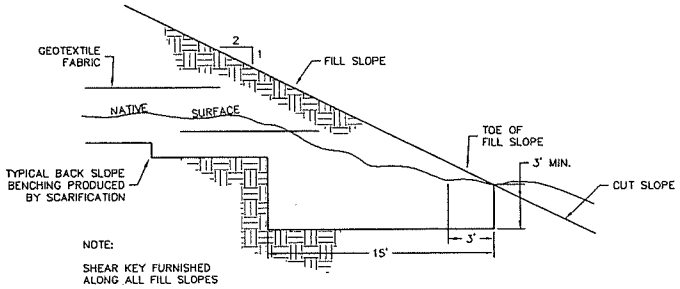
POND PLAN

DRAWING: C3.0
SHEET: OF
REVISION NO: REVISION 0
DATE: 12/1/09



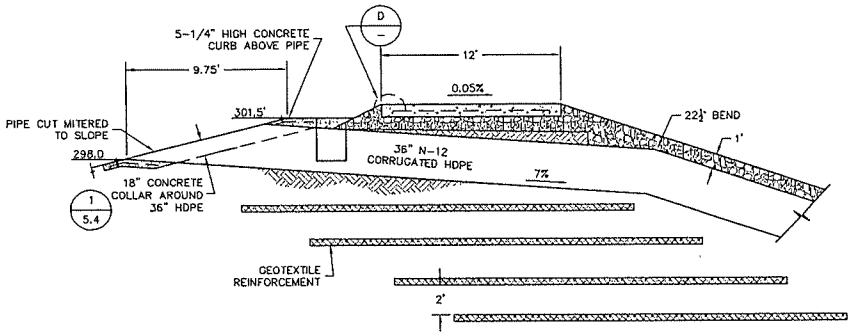
1 — ANCHOR TRENCH FOR HDPE LINER

N.T.S.



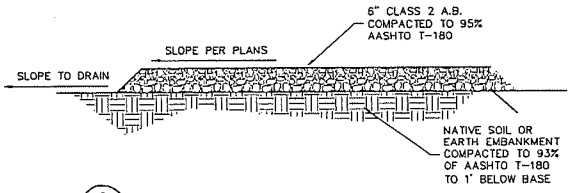
B — SHEAR KEY DETAIL

N.T.S.



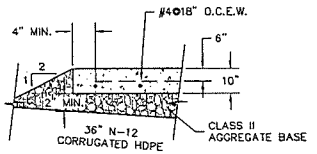
A — OVERFLOW CULVERT OUTLET

N.T.S.



C — GRAVEL PAVING - SECTION

N.T.S.



D — PIPE CROSSING

N.T.S.

P:\000190.00_Widmer & Ind_Fort Bragg reservoir\design\plans 7.2.P. 5/24/2010

NO.	DATE	REVISIONS	BY	CHK
1	7/2/09	PRELIMINARY	JS	CC
2	8/22/10	OUTLET REVISION	JS	CC

DRAWN BY: D. ZAITZ
ENGINEER: J. SOLORIO
CHECKED BY:
DATE:

PROJECT NO: 000190.00
SCALE: N.T.S.
APPROVED BY:
DATE:

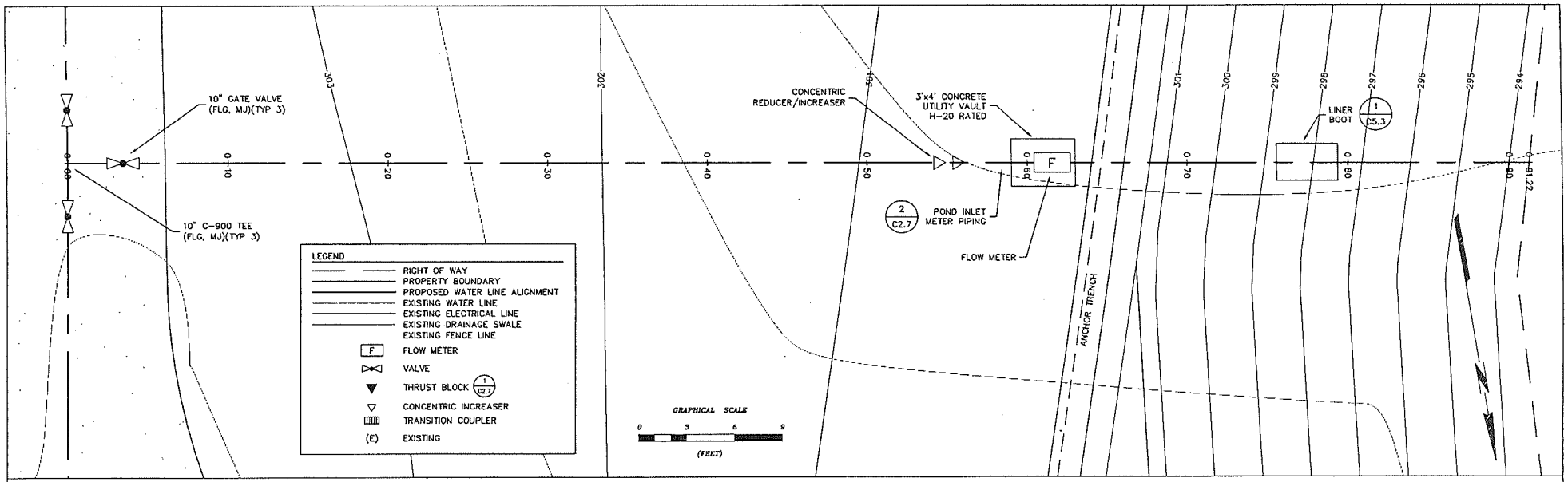
LAWRENCE & ASSOCIATES
ENGINEERING GEOLOGY
3590 IRON CT.
SHASTA LAKE, CA 96019
(530) 275-4600
(530) 275-7970 FAX

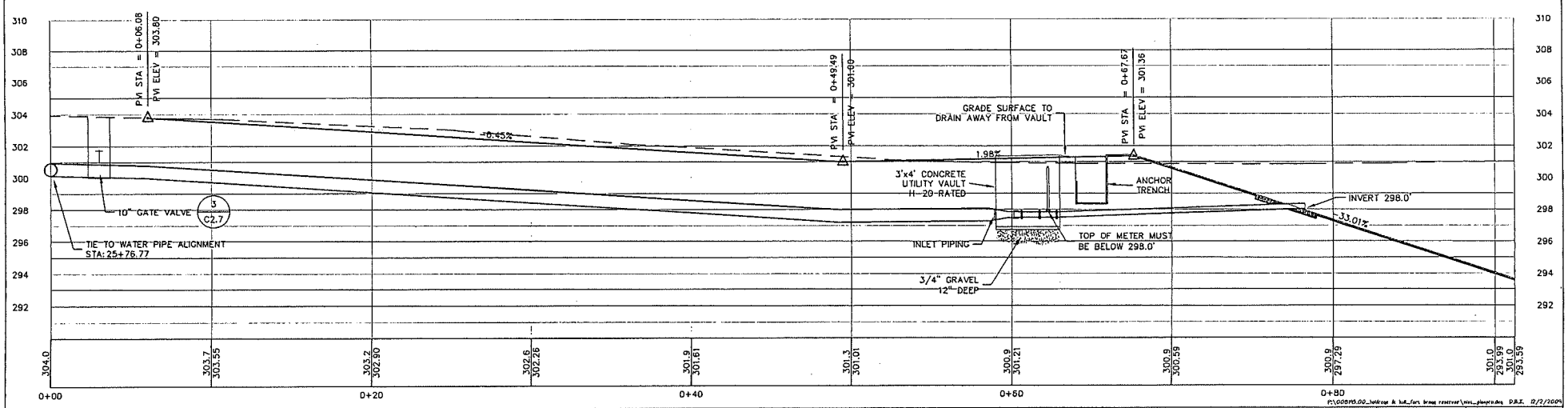
NEWMAN RESERVOIR

CITY OF FORT BRAGG
416 NORTH FRANKLIN ST.
FORT BRAGG, CA 95437

POND GRADING DETAILS

DRAWING: C3.1
SHEET: OF
REVISION NO: REVISION 0
DATE: 12/1/09





NO.	DATE	REVISIONS	BY	CHK

DRAWN BY: D. ZAITZ
ENGINEER: J. SOLORIO
CHECKED BY:
DATE:
PROJECT NO: 008105.00
SCALE: 1"=3' H & V
APPROVED BY:
DATE:

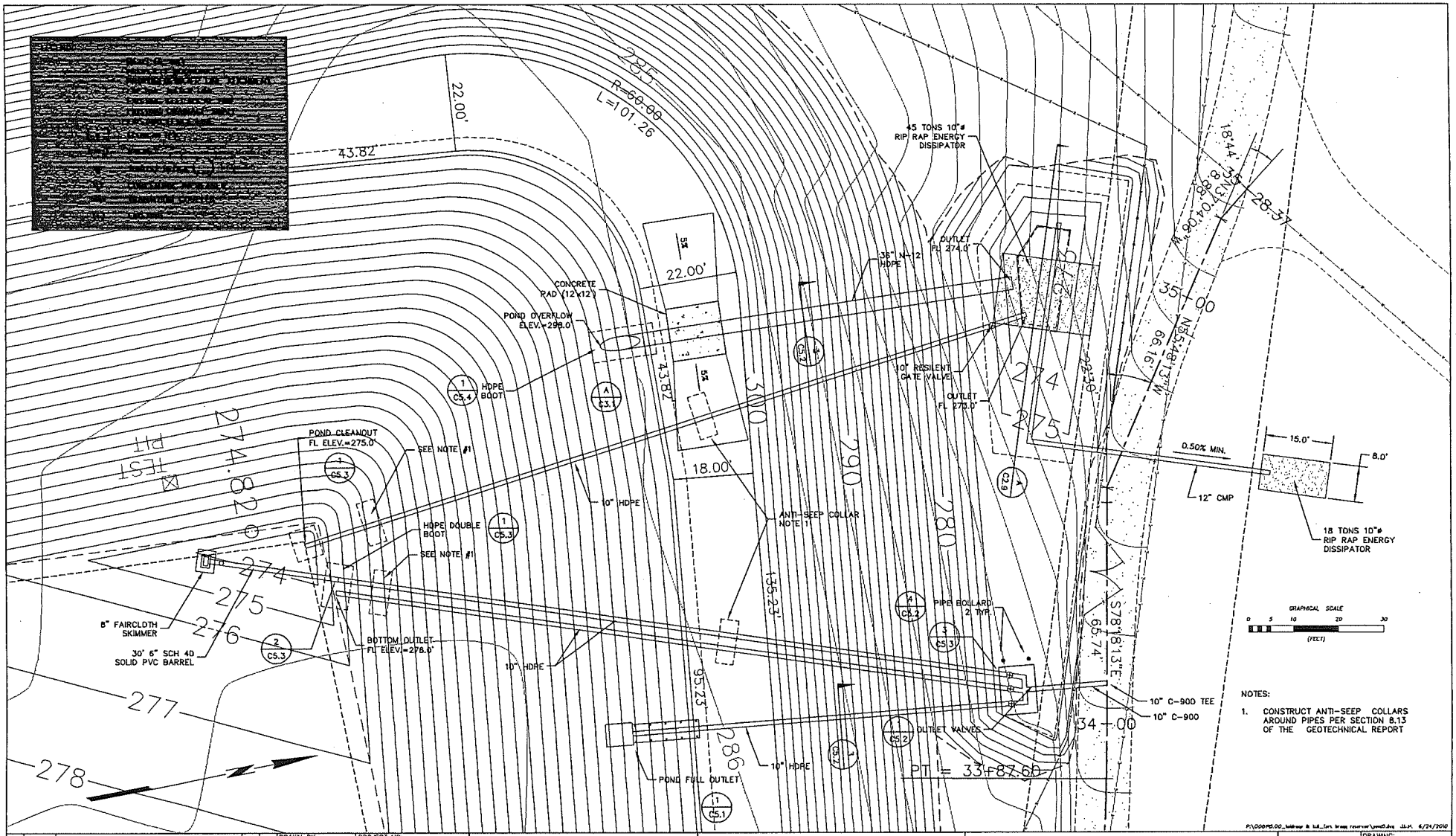
LAWRENCE & ASSOCIATES
ENGINEERING GEOLOGY
3590 IRON CT.
SHASTA LAKE, CA 96019
(530) 275-4800
(530) 275-7970 FAX

NEWMAN RESERVOIR

CITY OF FORT BRAGG
416 NORTH FRANKLIN ST.
FORT BRAGG, CA 95437

ENTRANCE PLAN AND PROFILE

DRAWING: C4.0
SHEET: OF
REVISION NO: REVISION 0
DATE: 12/2/09



NO.	DATE	REVISIONS	BY	CHK
1	7/2/09	PRELIMINARY	JS	CC
2	8/22/10	OUTLET REVISION	JS	CC

DRAWN BY: D. ZAITZ
ENGINEER: J. SOLORIO
CHECKED BY:
DATE:
PROJECT NO: 008195.00
SCALE: 1"=10'
APPROVED BY:
DATE:

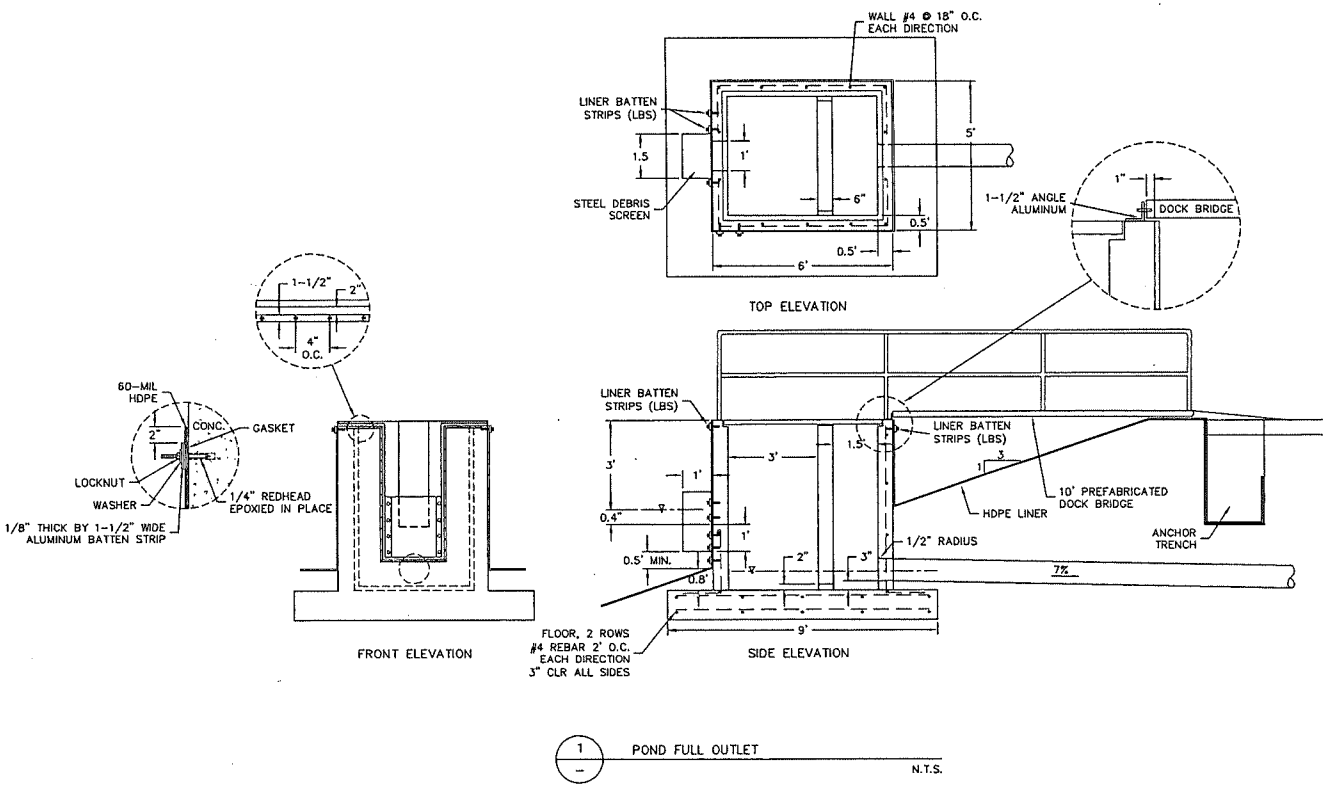
LAWRENCE & ASSOCIATES
ENGINEERING GEOLOGY
3590 IRON CT.
SHASTA LAKE, CA 96019
(530) 275-4800
(530) 275-7970 FAX

NEWMAN RESERVOIR

CITY OF FORT BRAGG
416 NORTH FRANKLIN ST.
FORT BRAGG, CA 95437

OUTLET PLAN

DRAWING: C5.0
SHEET: OF
REVISION NO: REVISION 0
DATE: 11/20/09



1 — POND FULL OUTLET

N.T.S.

P:\000195.00_Inderwood & Hwy_Fort Bragg reservoir\drawings P.D.S. 12/2/2009

NO.	DATE	REVISIONS	BY	CHK
1	7/2/09	PRELIMINARY	JG	CC

DRAWN BY: D. ZAITZ
ENGINEER: L. SOLORIO
CHECKED BY:
DATE:

PROJECT NO: 000195.00
SCALE: N.T.S.
APPROVED BY:
DATE:

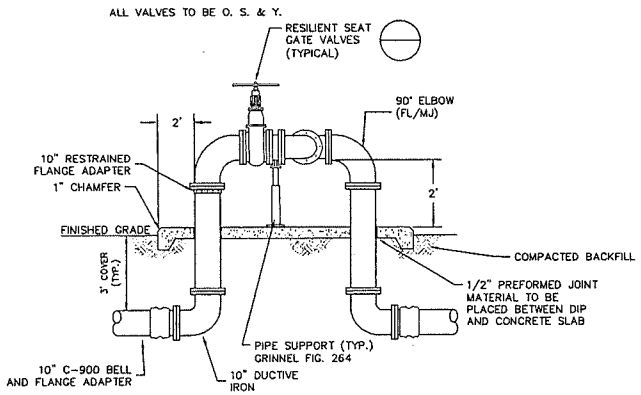
LAWRENCE & ASSOCIATES
ENGINEERING GEOLOGY
3590 IRON CT.
SHASTA LAKE, CA 96019
(530) 275-4800
(530) 275-7970 FAX

NEWMAN RESERVOIR

CITY OF FORT BRAGG
416 NORTH FRANKLIN ST.
FORT BRAGG, CA 95437

OUTLET DETAILS

DRAWING: C5.1
SHEET: OF
REVISION NO: REVISION 0
DATE: 12/2/09

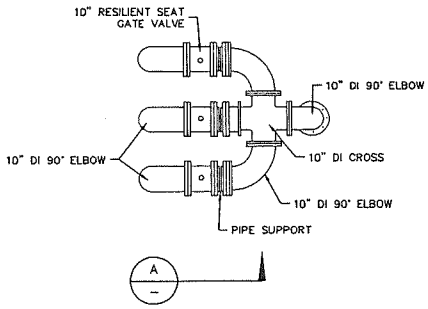


NOTES:

1. ALL PIPE AND FITTINGS SHALL BE DUCTILE IRON, CLASS 54, CEMENT LINED INTERIOR WITH FLANGE FITTINGS FOR ABOVE GROUND USE. MANUFACTURERS RESTRAINED JOINTS SHALL BE USED FOR UNDERGROUND PIPING.

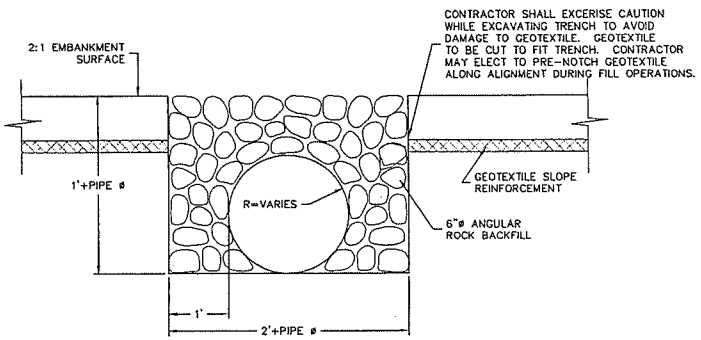
A — OUTLET VALVE – ELEVATION

N.T.S.



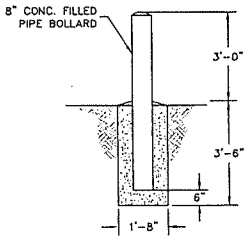
1 — OUTLET VALVE – PLAN

N.T.S.



3 — DOWNDRAIN TRENCH

N.T.S.



4 — SINGLE BOLLARD DETAIL

N.T.S.

P:\00895.00_baldwin & hall_fort bragg reservoir\design.dwg D.B.Z. 12/2/2009

NO.	DATE	REVISIONS	BY	CHK
1	7/2/09	PRELIMINARY	JS	CC

DRAWN BY: D. ZAITZ
ENGINEER: J. SOLORIO
CHECKED BY:
DATE:

PROJECT NO: 00895.00
SCALE: N.T.S.
APPROVED BY:
DATE:

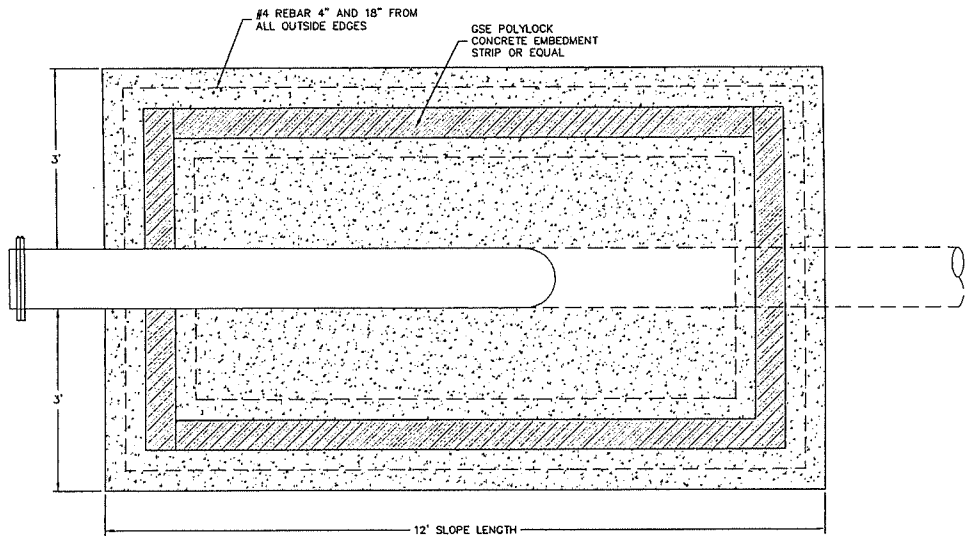
LAWRENCE & ASSOCIATES
ENGINEERING GEOLOGY
3590 IRON CT.
SHASTA LAKE, CA 96019
(530) 275-4600
(530) 275-7970 FAX

NEWMAN RESERVOIR

CITY OF FORT BRAGG
416 NORTH FRANKLIN ST.
FORT BRAGG, CA 95437

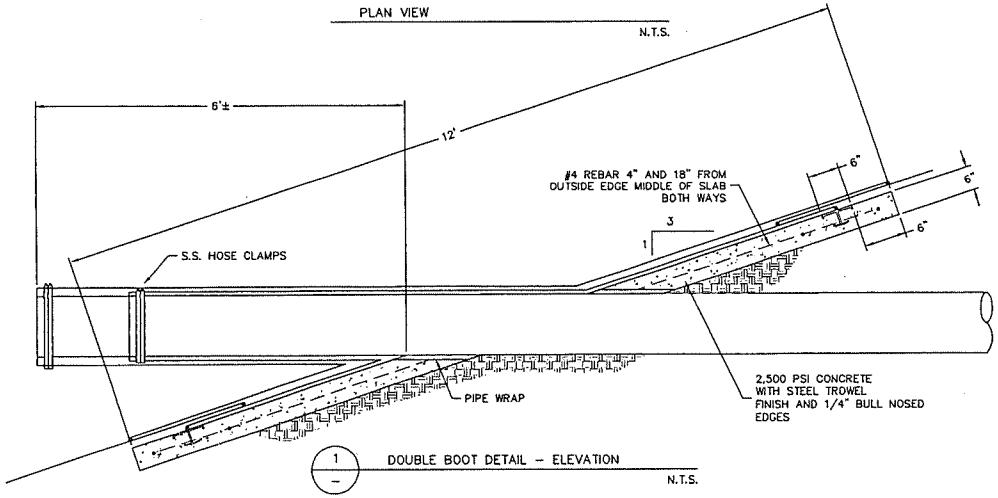
OUTLET DETAILS

DRAWING: C5.2
SHEET: OF
REVISION NO: REVISION 0
DATE: 12/2/09



PLAN VIEW

N.T.S.



1 — DOUBLE BOOT DETAIL – ELEVATION

N.T.S.

P:\008193.00_Address & bdl_fort bragg reservoir\details.dwg P.B.S. 12/2/2009

NO.	DATE	REVISIONS	BY	CHK
1	7/2/09	PRELIMINARY	JG	CC

DRAWN BY: B. ZAITZ
ENGINEER: L. SOLORIO
CHECKED BY:
DATE:

PROJECT NO: 008193.00
SCALE: N.T.S.
APPROVED BY:
DATE:

LAWRENCE & ASSOCIATES
ENGINEERING GEOLOGY
3590 IRON CT.
SHASTA LAKE, CA 96019
(530) 275-4800
(530) 275-7970 FAX

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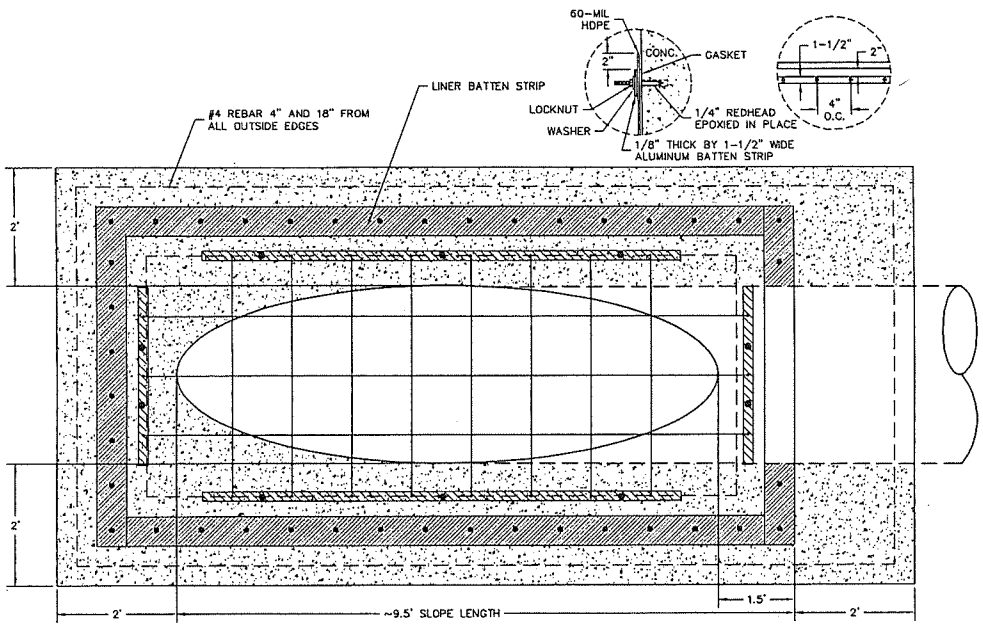
CITY OF FORT BRAGG
416 NORTH FRANKLIN ST.
FORT BRAGG, CA 95437

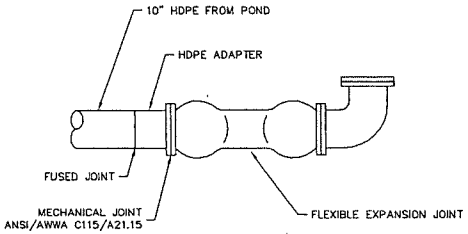
OUTLET DETAILS

DRAWING: C5.3
SHEET: OF
REVISION NO: REVISION 0
DATE: 12/2/09



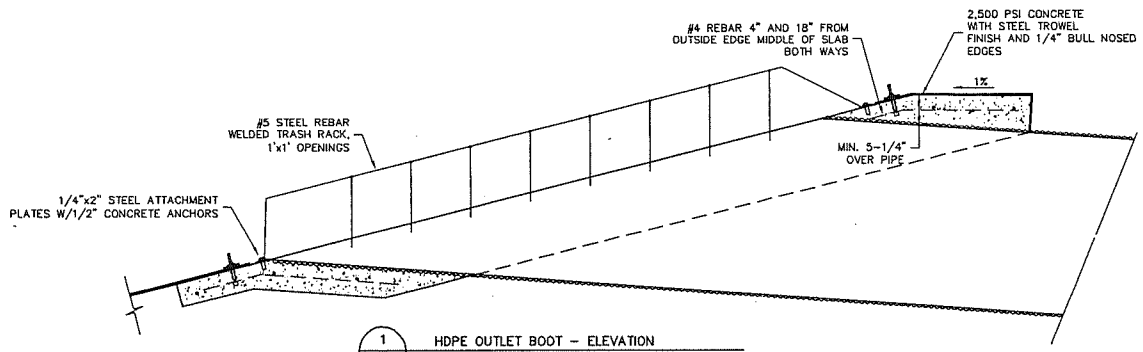
PLAN VIEW

N.T.S.



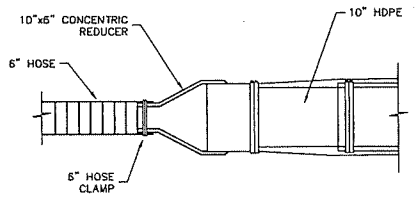
3 / C5.0 BUTT FUSION WELD HDPE

N.T.S.



1 / 5.0 HDPE OUTLET BOOT - ELEVATION

N.T.S.



2 / C5.0 FAIRCLOTH SKIMMER CONNECTION

N.T.S.

P:\00095.00_baldwin & hall_fort bragg reservoir\details\dwg JJH, 6/24/2010

NO.	DATE	REVISIONS	BY	CHK
1	7/2/09	PRELIMINARY	JS	CC
2	8/22/10	OUTLET REVISION	JS	CC

DRAWN BY: D. ZAITZ
ENGINEER: J. SOLORIO
CHECKED BY:
DATE:

PROJECT NO: 00095.00
SCALE: N.T.S.
APPROVED BY:
DATE:

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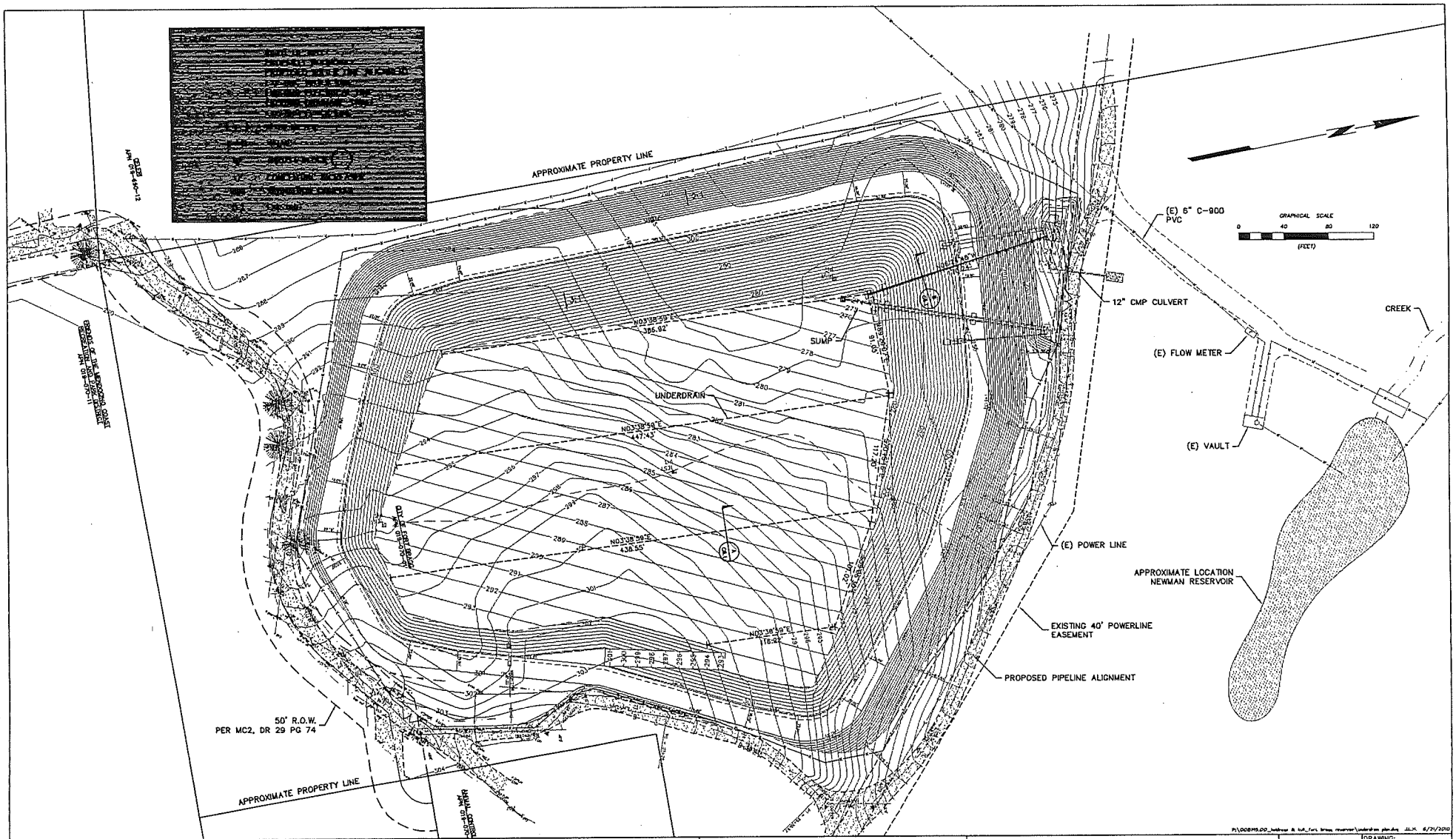
ENGINEERING GEOLOGY
3590 IRON CT.
SHASTA LAKE, CA 96019
(530) 275-4600
(530) 275-7970 FAX

NEWMAN RESERVOIR

CITY OF FORT BRAGG
416 NORTH FRANKLIN ST.
FORT BRAGG, CA 95437

OUTLET DETAILS

DRAWING: C5.4
SHEET: OF
REVISION NO: REVISION 0
DATE: 12/2/09



NO.	DATE	REVISIONS	BY	CHK
1	7/2/09	PRELIMINARY	JS	CC
2	6/22/10	OUTLET REVISION	JS	CC

DRAWN BY: D. ZAITZ
ENGINEER: J. SOLORIO
CHECKED BY:
DATE:

PROJECT NO: 008193.00
SCALE: 1"=40'
APPROVED BY:
DATE:

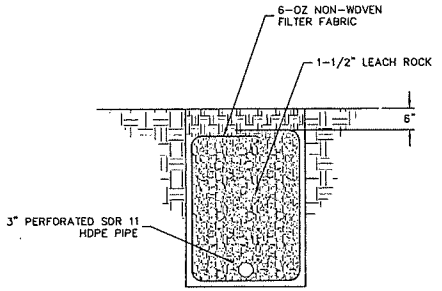
LAWRENCE & ASSOCIATES
ENGINEERING GEOLOGY
3590 IRON CT.
SHASTA LAKE, CA 96019
(530) 275-4800
(530) 275-7970 FAX

NEWMAN RESERVOIR

CITY OF FORT BRAGG
416 NORTH FRANKLIN ST.
FORT BRAGG, CA 95437

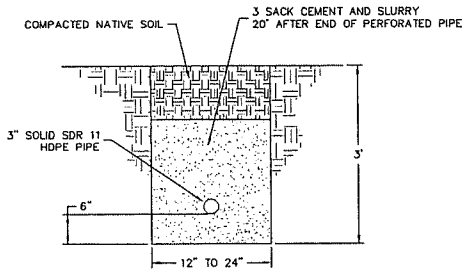
UNDERDRAIN PLAN

DRAWING: C6.0
SHEET: OF
REVISION NO: REVISION 0
DATE: 12/2/09



A — UNDERDRAIN DETAIL – PERFORATED

N.T.S.



B — UNDERDRAIN DETAIL – NONPERFORATED

N.T.S.

P:\008195.00_Waterworks & Sub_Fort Bragg reservoir\details.dwg P.B.S. 12/2/2009

NO.	DATE	REVISIONS	BY	CHK
1	7/2/09	PRELIMINARY	JS	CC

DRAWN BY: D. ZAITZ
ENGINEER: J. SOLORIO
CHECKED BY:
DATE:

PROJECT NO: 008195.00
SCALE: N.T.S.
APPROVED BY:
DATE:

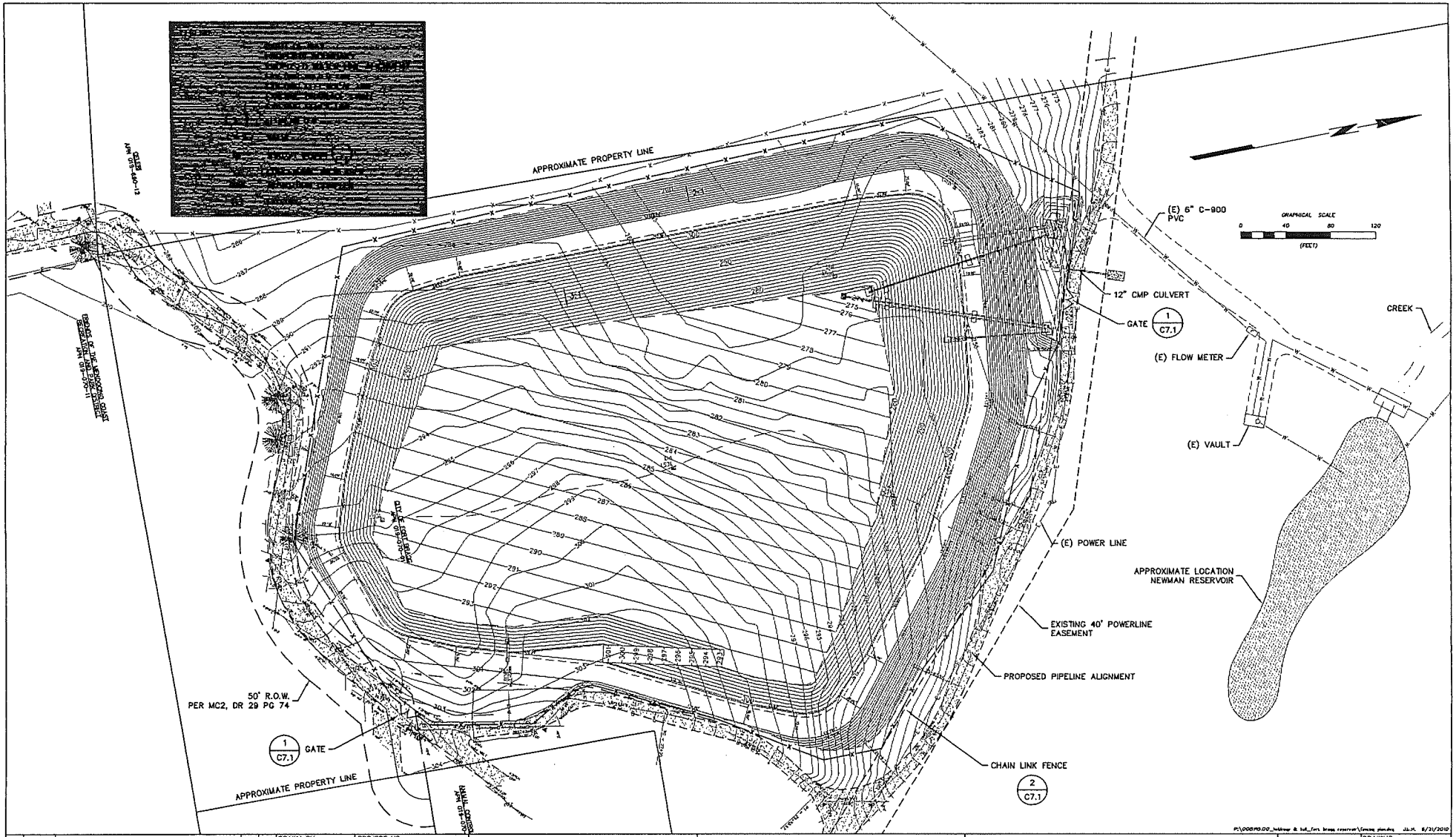
LAWRENCE & ASSOCIATES
ENGINEERING GEOLOGY
3590 IRON CT.
SHASTA LAKE, CA 96019
(530) 275-4800
(530) 275-7970 FAX

NEWMAN RESERVOIR

CITY OF FORT BRAGG
416 NORTH FRANKLIN ST.
FORT BRAGG, CA 95437

UNDERDRAIN DETAILS

DRAWING: C6.1
SHEET: OF
REVISION NO: REVISION 0
DATE: 12/2/09



NO.	DATE	REVISIONS	BY	CHK
1	7/2/09	PRELIMINARY	JS	CC
2	8/22/10	OUTLET REVISION	JS	CC

DRAWN BY: D. ZAITZ
ENGINEER: J. SOLORIO
CHECKED BY:
DATE:

PROJECT NO: 00819S.00
SCALE: 1"=40'
APPROVED BY:
DATE:

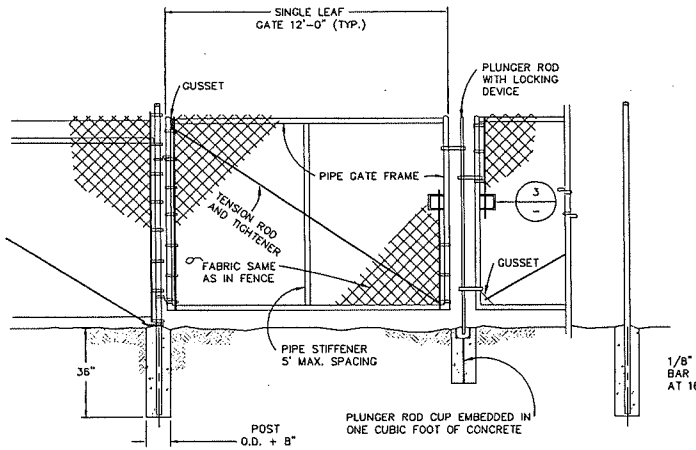
LAWRENCE & ASSOCIATES
ENGINEERING GEOLOGY
3590 IRON CT.
SHASTA LAKE, CA 96019
(530) 275-4800
(530) 275-7970 FAX

NEWMAN RESERVOIR

CITY OF FORT BRAGG
416 NORTH FRANKLIN ST.
FORT BRAGG, CA 95437

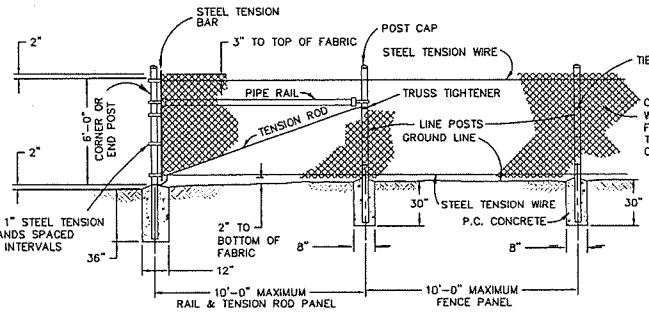
FENCE PLAN

DRAWING: C7.0
SHEET: OF
REVISION NO: REVISION 0
DATE: 12/2/09



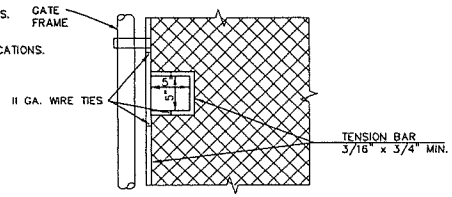
1 — TYPICAL GATE ELEVATION

N.T.S.



3 — TYPICAL FENCE ELEVATION

N.T.S.



3 — CUT-OUT FOR CHAIN & LOCK

N.T.S.

P:\008105.00_lawrence & hall_fort bragg reservoir\details.dwg P.D.T. 12/2/2009

NO.	DATE	REVISIONS	BY	CHK
1	7/2/09	PRELIMINARY	JS	CC

DRAWN BY: D. ZAITZ
ENGINEER: S. SOLORIO
CHECKED BY:
DATE:

PROJECT NO: 008105.00
SCALE: N.T.S.
APPROVED BY:
DATE:

LAWRENCE & ASSOCIATES
ENGINEERING GEOLOGY
3590 IRON CT.
SHASTA LAKE, CA 96019
(530) 275-4800
(530) 275-7970 FAX

NEWMAN RESERVOIR

CITY OF FORT BRAGG
416 NORTH FRANKLIN ST.
FORT BRAGG, CA 95437

FENCE DETAILS

DRAWING: C7.1
SHEET: OF
REVISION NO: REVISION 0
DATE: 12/2/09

GENERAL CONDITIONS

GENERAL NOTES

1. THIS EROSION CONTROL PLAN PERTAINS SOLELY TO THE AREAS SHOWN ON THE ACCOMPANYING PLANS.
2. ALL EROSION AND SEDIMENT CONTROL DEVICES MUST BE IN PLACE BY OCTOBER 31.
3. EROSION AND SEDIMENT CONTROL DEVICES SHALL BE INSTALLED BY A CONTRACTOR LICENSED IN THE STATE OF CALIFORNIA WITH EITHER A CLASS A OR APPROPRIATE SPECIALTY LICENSE.
4. ALL AREAS THAT WILL ACCEPT FILL SHALL BE CLEARED, AND SCARIFIED AND BENCHED TO PROVIDE BONDING FOR THE FILLED SOIL.
5. FILL SLOPES SHALL BE COMPACTED AND GRADED TO A SMOOTH EVEN SURFACE. DO NOT FILL WITH LOOSE SOIL OR LEAVE SIDE CAST SOIL UNCOMPACTED.
6. AVOID ROUTING DRAINAGE ACROSS FILL SLOPES WHERE POSSIBLE.
7. PROVIDE ENERGY DISSIPATION AT THE OUTLETS OF ALL CULVERTS AND PIPES.

PERMANENT SEEDING & MULCHING

PERMANENT SEEDING & MULCH WILL BE REQUIRED ON ALL COMPLETED CUT AND FILL SLOPES.

1. TRACK-WALK UP AND DOWN SOIL SLOPES THAT ARE STEEPER THAN 4 TO 1 AND FLATTER THAN 2 TO 1.
2. APPLY SEED AND MULCH NO LATER THAN OCTOBER 31.
3. APPLY 40 LB/ACRE:

   NATIVE SEED EROSION CONTROL MIX.
4. APPLY 200 LB PER ACRE:

   8-10-10, (N-P-K), 10% SULFUR IS OPTIONAL, OR AS APPROVED BY THE ENGINEER.
5. APPLY 1.5 TONS PER ACRE:

   WHEAT OR RICE STRAW MULCH
6. IMMEDIATELY AFTER STRAW PLACEMENT, APPLY TACKIFIER/MULCH MIX:

   150 LB/ACRE TACKIFIER
   1,200 LB/ACRE CELLULOSE FIBER
   WATER NEEDED FOR OPTIMAL APPLICATION
7. OR EQUAL APPROVED BY CERTIFIED EROSION CONTROL SPECIALIST OR REGISTERED PRACTICING FORESTER.

VTC	VEHICLE TRACKING PAD	A GRAVEL PAD, LOCATED AT THE POINTS OF VEHICULAR INGRESS AND EGRESS ON A CONSTRUCTION SITE, TO REDUCE THE MUD TRANSPORTED ONTO ROADS AND PAVED AREAS.
STB	STRAW BALE BARRIER	A TEMPORARY SEDIMENT BARRIER COMPOSED OF ANCHORED STRAW BALES PLACED ACROSS OR AT THE TOE OF A SLOPE TO INTERCEPT AND DETAIN SEDIMENT AND DECREASE FLOW VELOCITIES FROM SMALL DRAINAGE AREAS; APPLICABLE WHERE SHEET AND RILL EROSION POTENTIAL IS LOW TO MODERATE.
SBB	SANDBAG BARRIER	TEMPORARY STABILIZATION OF DITCHES BY PLACEMENT OF SANDBAGS PERPENDICULAR TO FLOW. ACCOMPANIED BY A DEPRESSION UPSTREAM FOR SEDIMENT RETENTION. GOOD FOR USE WHERE SOILS ARE DIFFICULT TO EXCAVATE, IN AREAS OF SHALLOW BEDROCK, AND IN STEEP DRAINAGES.
SF	SILT FENCE	A TEMPORARY SEDIMENT BARRIER CONSTRUCTED OF POSTS, FILTER FABRIC AND IN SOME CASES, A WIRE SUPPORT FENCE, PLACED ACROSS OR NEAR THE TOE OF A SLOPE OR IN A MINOR DRAINAGEWAY TO INTERCEPT AND DETAIN SEDIMENT AND DECREASE FLOW VELOCITIES FROM DRAINAGE AREAS OF LIMITED SIZE; APPLICABLE WHERE SHEET AND RILL OR SMALL CONCENTRATED FLOWS MAY BE A PROBLEM.
SW	STRAW WATTLE	TEMPORARY STABILIZATION OF SLOPES BY PLACEMENT OF STRAW WATTLES.
SB	SEDIMENT BASIN	A BASIN WITH A CONTROLLED STORMWATER RELEASE STRUCTURE, FORMED BY CONSTRUCTING AN EMBANKMENT OF COMPACTED SOIL ACROSS A DRAINAGEWAY, TO DETAIN SEDIMENT-LADEN RUNOFF FROM DISTURBED AREAS GREATER THAN 5 ACRES FOR ENOUGH TIME TO ALLOW MOST OF THE SEDIMENT TO SETTLE OUT CAN BE CONSTRUCTED ONLY WHERE THERE IS SUFFICIENT SPACE AND APPROPRIATE TOPOGRAPHY. TEMPORARY UNLESS DESIGNED AS A PERMANENT POND.
BB	BRUSH BARRIER	A TEMPORARY SEDIMENT BARRIER COMPOSED OF LIMBS, WEEDS, VINES, ROOT MATTER, SOIL, ROCK AND OTHER CLEARED MATERIALS PUSHED TOGETHER TO FORM A BERM; LOCATED ACROSS OR AT THE TOE OF A SLOPE TO INTERCEPT AND DETAIN SEDIMENT; AND DECREASE FLOW VELOCITIES DURING GRADING OPERATIONS AND REMOVED AT THE TIME OF FINAL GRADING.
CD	CHECK DAM	SMALL, TEMPORARY BERMS CONSTRUCTED ACROSS DRAINAGEWAYS TO REDUCE THE VELOCITY OF CONCENTRATED FLOWS, REDUCING EROSION OF THE SWALE OR DITCH. LIMITED TO USE IN SMALL OPEN CHANNELS WHICH DRAIN SMALL AREAS; SHOULD NOT BE USED IN LIVE STREAMS.
TP	TREE PRESERVATION & PROTECTION	PROTECTING EXISTING TREES FROM MECHANICAL AND OTHER INJURY DURING LAND DISTURBING AND CONSTRUCTION ACTIVITIES TO INSURE THE SURVIVAL OF TREES WHERE THEY ARE EFFECTIVE FOR EROSION AND SEDIMENT CONTROL AND PROVIDE OTHER ENVIRONMENTAL AND AESTHETIC BENEFITS.
GS	GRASS LINED SWALE	THE ESTABLISHMENT OF APPROPRIATE VEGETATION IN CONSTRUCTED CHANNELS TO LIMIT CHANNEL EROSION AND STABILIZE CHANNEL BOTTOMS.
PS	PERMANENT SEEDING	ESTABLISHMENT OF PERENNIAL VEGETATIVE COVER BY PLANTING SEED ON ROUGH-GRADED AREAS THAT WILL NOT BE BROUGHT TO FINAL GRADE FOR AN EXTENDED TIME OR WHERE PERMANENT, LONG-LIVED VEGETATIVE COVER IS NEEDED ON FINE-GRADED AREAS. USED IN CONJUNCTION WITH HEAVY MULCHING.
PP	PERMANENT PLANTING	ESTABLISHMENT OF WOODY VEGETATION ON ROUGH-GRADED AREAS THAT HAVE BEEN PERMANENTLY SEEDED OR SODDED WHERE PERMANENT, LONG-LIVED VEGETATIVE COVER IS DESIRED ON FINE-GRADED AREAS. USED IN CONJUCTION WITH MULCHING.
TM	TEMPORARY MULCHING	USE OF CRIMPED STRAW, WOOD CHIPS, SAWDUST, ETC., TO COVER THE DENUDED SURFACE SHORTLY AFTER CLEARING AND GRUBBING, GRADING, AND CONSTRUCTION ACTIVITIES. MULCHING IS THE MOST EFFECTIVE AND IMPORTANT EROSION CONTROL PRACTICE TO BE USED.
PM	PERMANENT MULCHING	USE OF WOOD CHIPS, STONE, BARK ETC., TO COVER THE FINISHED GRADED SURFACES AFTER CONSTRUCTION ACTIVITIES. MULCHING WITHIN 3 DAYS OF OPERATIONS TO ELIMINATE EROSION AND CONSERVE MOISTURE FOR PLANTINGS TO ENHANCE GROWTH. PART OF THE FINAL LANDSCAPING INCLUDING DRAINAGEWAYS, SWALES, ETC. USED WITH PERMANENT PLANTING.
IP	INLET PROTECTION	THE INSTALLATION OF VARIOUS KINDS OF SEDIMENT TRAPPING MEASURES AROUND INLETS, CULVERTS AND STRUCTURES PRIOR TO PERMANENT STABILIZATION OF THE DISTURBED AREA; LIMITED TO SMALL DRAINAGE AREAS AND NOT INTENDED TO CONTROL LARGE, CONCENTRATED STORMWATER FLOWS.
SS	STREAM SEEDING	ESTABLISHMENT OF VEGETATIVE COVER WITHIN THE STREAM CHANNEL.
WB	WATER BAR	SMALL BERM AND DITCH COMBINATION APPROXIMATELY 18 INCHES IN HEIGHT AND LAID ACROSS A SLOPE AT 45° TO 60° TO REDUCE THE VELOCITY OF CONCENTRATED FLOWS, REDUCING EROSION OF A SLOPE, SWALE OR DITCH. FOR USE AS A SEMI-PERMANENT STRUCTURE ON TRAILS, SKI RUNS, AND SEASONAL ACCESS ROADS.
TS	TEMPORARY SEEDING	ESTABLISHMENT OF SINGLE SEASON VEGETATIVE COVER ON ROUGH-GRADED AREAS. USED IN CONJUNCTION WITH HEAVY MULCHING.

GM	GEOTEXTILE MATTING	STRONG MAN-MADE MATTINGS USED TO STABILIZE THE FLOW ON HIGH VELOCITY CHANNELS AND SWALES AND RECENTLY PLANTED SLOPES. ALSO USED AS A REINFORCEMENT BETWEEN COURSES ON ROAD WORK OVER SOFT AREAS. RECOMMENDED FOR USE IN RETAINING WALL AND FILL SLOPE CONSTRUCTION AS A TIE-BACK INTO NATIVE MATERIALS.
NM	NATURAL MATTING	BIODEGRADEABLE MATERIALS, SUCH AS STRAW AND EXCELSIOR BOUND IN NETTING AND IMPREGNATED WITH SEED, ARE USED ON SLOPES WHERE RILL AND SHEET EROSION MAY BE A PROBLEM AND WHERE SEED AND MULCH WILL NOT BE EFFECTIVE. CAN BE UTILIZED IN TEMPORARY AND PERMANENT SEEDING SOLUTIONS AS NECESSARY.
SC	TEMPORARY STREAM CROSSING	A TEMPORARY STRUCTURAL SPAN ACROSS A STREAM TO PROVIDE VEHICULAR ACCESS TO CONSTRUCTION ACTIVITY ON EITHER SIDE OF STREAM WHILE KEEPING SEDIMENT OUT OF THE STREAM AND PREVENTING DAMAGE TO THE CHANNEL AND BANKS. USED IN CONJUNCTION WITH OTHER MEASURES TO AVOID SEDIMENTATION OF THE RECEIVING WATER.
SR	SURFACE ROUGHENING	GRADING PRACTICES SUCH AS STAIR-STEPPING, GROOVING SLOPES OR LEAVING SLOPES IN A ROUGHENED CONDITION BY NOT FINE-GRADING THEM. REDUCES RUNOFF VELOCITY, PROVIDES SEDIMENT TRAPPING AND INCREASES INFILTRATION; ALL OF WHICH FACILITATE ESTABLISHMENT OF VEGETATION ON EXPOSED SLOPES.
TRR	TEMPORARY ROCKLINED SWALE	A TEMPORARY ROCK LINED SWALE WILL PROVIDE DRAINAGE TO THE TEMPORARY GRADING OPERATIONS. A SECTION OF STRAW WATTLE IS PLACED ACROSS THE SWALE TO SLOW THE VELOCITY OF THE DRAINAGE.
SL	SLOPE DRAIN	A FLEXIBLE CONDUIT, USED BEFORE PERMANENT DRAINAGE STRUCTURES ARE INSTALLED; INTENDED TO CONVEY CONCENTRATED RUNOFF SAFELY FROM THE TOP TO THE BOTTOM OF A DISTURBED SLOPE WITHOUT CAUSING EROSION ON OR BELOW THE SLOPE.
DV	PERMANENT DIVERSION	A PERMANENT CHANNEL WITH A RIDGE ON THE LOWER SIDE CONSTRUCTED ACROSS A SLOPE TO REDUCE SLOPE LENGTH AND INTERCEPT AND DIVERT STORMWATER RUNOFF TO A STABILIZED OUTLET TO PREVENT EROSION ON THE SLOPE.
DP	OUTLET PROTECTION	THE INSTALLATION OF PAVED OR RIP-RAP CHANNEL SECTIONS AND/OR STILLING BASINS BELOW STORM DRAIN OUTLETS TO REDUCE EROSION FROM SCOURING AT OUTLETS AND TO REDUCE FLOW VELOCITIES BEFORE STORMWATER ENTERS RECEIVING CHANNELS BELOW THESE OUTLETS.
RR	RIP-RAP PROTECTION (ROCK LINED SWALE)	A PERMANENT, EROSION-RESISTANT GROUND COVER OF LARGE, LOOSE, ANGULAR STONE INSTALLED WHEREVER SOIL CONDITIONS, WATER TURBULANCE AND VELOCITY EXPECTED VEGETATIVE COVER, ETC., ARE SUCH THAT SOIL MAY ERODE UNDER DESIGN FLOW CONDITIONS.
CRS	CONSTRUCTION ROAD STABILIZATION	TEMPORARY STABILIZATION WITH STONE HIGH TRAFFIC AREAS PRONE TO EROSION IMMEDIATELY AFTER GRADING TO REDUCE EROSION POTENTIAL DAMAGE CAUSED BY VEHICLES DURING WET WEATHER AND TO PREVENT HAVING TO REGRADE PERMANENT ROADBEDS BETWEEN INITIAL GRADING AND FINAL STABILIZATION.
DC	DUST CONTROL	REDUCING SURFACE AND AIR MOVEMENT OF DUST DURING LAND DISTURBANCE, DEMOLITION OR CONSTRUCTION ACTIVITIES IN AREAS SUBJECT TO DUST PROBLEMS IN ORDER TO PREVENT SOIL LOSS AND REDUCE THE PRESENCE OF POTENTIALLY HARMFUL AIRBORNE SUBSTANCES. INCLUDES THE COVERING OF SOIL STOCK PILES AND CONSTRUCTION MATERIALS.
TSP	TOPSOIL PROTECTION	STRIPPING, STOCKPILING AND PROTECTING TOPSOIL FOR LATER USE IN PERMANENT LANDSCAPE ACTIVITIES. STOCKPILES ARE COVERED WITH SHEETING, MULCH AND/OR SEED AND SURROUNDED BY A CONTAINMENT BERM TO PROTECT THEM FROM EROSIVE FORCES. PERIODIC "TURNING" OF THE PILES IS REQUIRED TO MAINTAIN ENDEMIC MICROBIAL SOIL ORGANISMS.
LS	LEVEL SPREADER	AN OUTLET FOR DIKES AND DIVERSIONS CONSISTING OF AN EXCAVATED DEPRESSION CONSTRUCTED AT NEAR ZERO GRADE ACROSS A SLOPE TO CONVERT CONCENTRATED, SEDIMENT-FREE RUNOFF TO SHEET FLOW AND RELEASE IT ONTO AREAS OF UNDISTURBED SOIL STABILIZED BY EXISTING VEGETATION.
CWD	CLEAR WATER DIVERSION	A TEMPORARY RE-ROUTING OF A WATERCOURSE THROUGH A SLUICE OR TUBE TO REDUCE THE AMOUNT OF CLEAN WATER COLLECTING SEDIMENTS FROM ACTIVE CONSTRUCTION OPERATIONS.
INF	INFILTRATION TRENCH	A SEMI-PERMANENT SUB-SURFACE DRAIN THAT ALLOWS FOR STORM WATER TO BE ABSORBED BY THE GROUND IN A PONDED AREA. TYPICALLY A ROCK AND FABRIC LINED TRENCH ON THE DOWN GRADIENT SIDE OF A ROAD FILL OR IN AN OPEN AREA AWAY FROM THE ROADWAY.
SD	SUB-SURFACE DRAINS	A PERFORATED CONDUIT INSTALLED BENEATH THE GROUND TO INTERCEPT AND CONVEY GROUNDWATER PREVENTS SLOPING SOILS FROM BECOMING EXCESSIVELY WET AND SUBJECT TO SLOUGHING.
WDS	WATERWAY DROP STRUCTURE	A PERMANENT STRUCTURE OR SERIES OF STRUCTURES DESIGNED TO "STEP" WATER FLOW DOWN A SLOPE WITHOUT CAUSING CHANNEL EROSION; APPLICABLE IN NATURAL OR MAN-MADE CHANNELS WITH LONG, RELATIVELY STEEP REACHES.

NOTE: ADDITIONAL PRACTICES NOT SHOWN HERE CAN BE IMPLEMENTED BASED ON FIELD OBSERVATIONS AND ADJUSTMENTS FOR WEATHER, SEASON AND UNFORESEEN SITE CONDITIONS. CONTACT YOUR LOCAL PLANNING OFFICE FOR SPECIFIC SITE RECOMMENDATIONS AND FURTHER ASSISTANCE.

USE THESE CONVENIENT SYMBOLS AND DESCRIPTIONS WHEN DEVISING AN EROSION CONTROL PLAN FOR THE INTENDED PROJECT. THE SYMBOLS ARE NATIONALLY ACCEPTED WHILE THE DESCRIPTIONS ARE TAILORED FOR MOUNTAIN DRIVEWAY CONSTRUCTION.

A SMALL PONDING AREA, FORMED BY CONSTRUCTING AN EARTHEN EMBANKMENT WITH A GRAVEL OUTLET ACROSS A DRAINAGE SWALE, TO DETAIN SEDIMENT-LADEN RUNOFF FROM SMALL DISTURBED AREAS FOR ENOUGH TIME TO ALLOW MOST OF THE SEDIMENT TO SETTLE OUT.

P:\00010.00_laidraw & kuhl_fort bragg reservoir\erosion notes.dwg D.B.Z. 12/2/2009

NO.	DATE	REVISIONS	BY	CHK

DRAWN BY: D. ZAITZ
PROJECT NO: 00B195.00
ENGINEER: J. SOLORIO
SCALE: N.T.S.
CHECKED BY:
APPROVED BY:
DATE:
DATE:

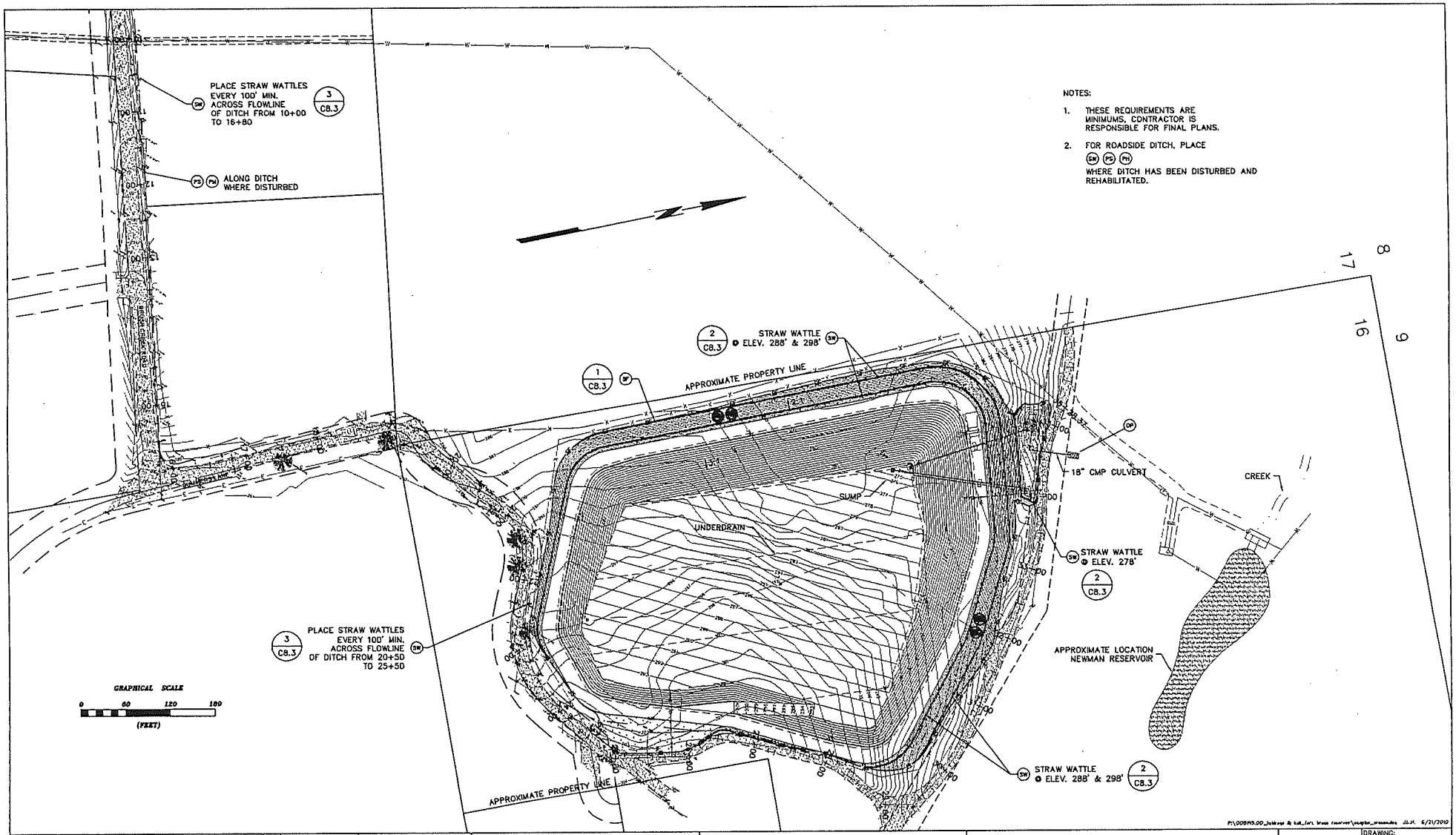
LAWRENCE & ASSOCIATES
ENGINEERING GEOLOGY
3590 IRON CT.
SHASTA LAKE, CA 96019
(530) 275-4800
(530) 275-7970 FAX

NEWMAN RESERVOIR

CITY OF FORT BRAGG
416 NORTH FRANKLIN ST.
FORT BRAGG, CA 95437

EROSION CONTROL GENERAL NOTES

DRAWING: C8.0
SHEET: OF
REVISION NO: REVISION 0
DATE: 12/1/09



NO.	DATE	REVISIONS	BY	CHK
1	7/2/09	PRELIMINARY	JS	CC
2	8/22/10	OUTLET REVISION	JS	CC

DRAWN BY: D. ZAITZ
ENGINEER: J. SOLORIO
CHECKED BY:
DATE:
PROJECT NO: 008193.00
SCALE: 1"=60'
APPROVED BY:
DATE:

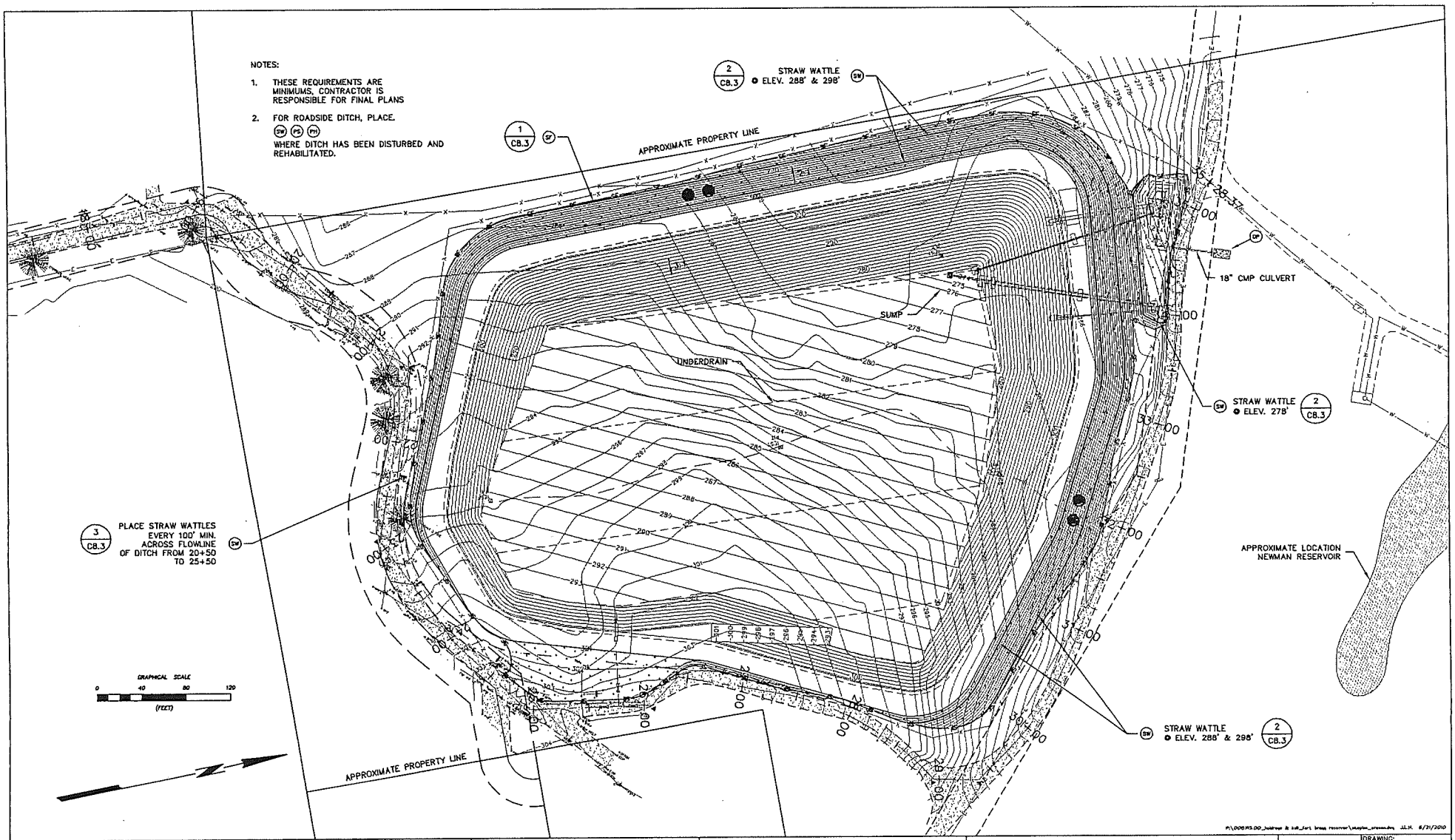
LAWRENCE & ASSOCIATES
ENGINEERING GEOLOGY
3590 IRON CT.
SHASTA LAKE, CA 96019
(530) 275-4800
(530) 275-7970 FAX

NEWMAN RESERVOIR

CITY OF FORT BRAGG
416 NORTH FRANKLIN ST.
FORT BRAGG, CA 95437

EROSION CONTROL SITE PLAN

DRAWING: C8.1
SHEET: OF
REVISION NO: REVISION 0
DATE: 12/1/09



NO.	DATE	REVISIONS	BY	CHK
1	7/2/09	PRELIMINARY	JS	CC
2	6/22/10	OUTLET REVISION	JS	CC

DRAWN BY: D. ZAITZ
ENGINEER: J. SOLORIO
CHECKED BY:
DATE:
PROJECT NO: 008193.00
SCALE: 1"=60'
APPROVED BY:
DATE:

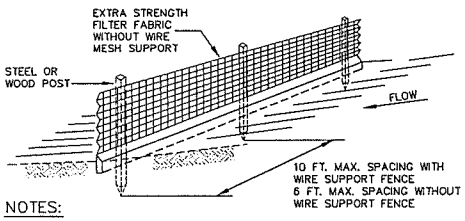
LAWRENCE & ASSOCIATES
ENGINEERING GEOLOGY
3590 IRON CT.
SHASTA LAKE, CA 96019
(530) 275-4800
(530) 275-7970 FAX

NEWMAN RESERVOIR

CITY OF FORT BRAGG
416 NORTH FRANKLIN ST.
FORT BRAGG, CA 95437

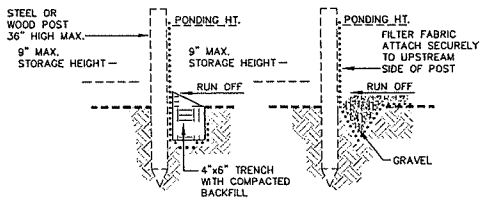
POND EROSION CONTROL SITE PLAN

DRAWING: C8.2
SHEET: OF
REVISION NO: REVISION 0
DATE: 12/1/09



NOTES:

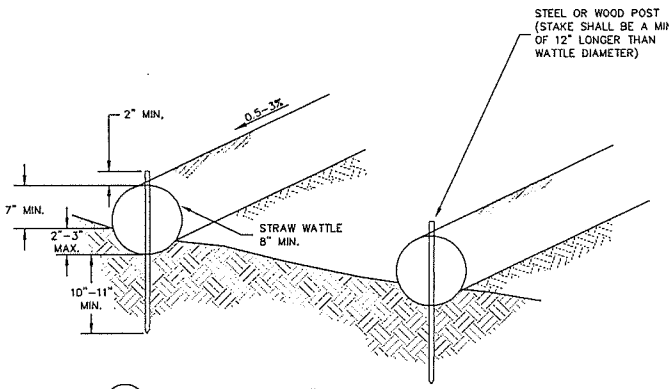
1. THE CONTRACTOR SHALL INSPECT AND REPAIR FENCE AFTER EACH STORM EVENT AND REMOVE SEDIMENT WHEN NECESSARY.
2. REMOVED SEDIMENT SHALL BE DEPOSITED TO AN AREA THAT WILL NOT CONTRIBUTE SEDIMENT OFF-SITE AND CAN BE PERMANENTLY STABILIZED.
3. SILT FENCE SHALL BE PLACED ON SLOPE CONTOURS TO MAXIMUM PONDING EFFICIENCY.



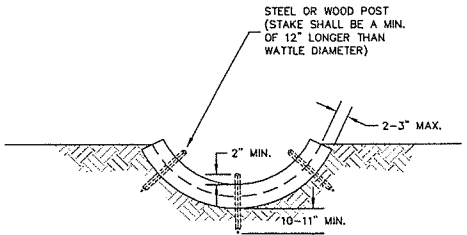
STANDARD DETAIL
TRENCH WITH NATIVE BACKFILL

ALTERNATE DETAIL
TRENCH WITH GRAVEL

1 — SILT FENCE
NOT TO SCALE



2 — STRAW WATTLE DETAIL
NOT TO SCALE



3 — STRAW WATTLE IN DITCH
NOT TO SCALE

P:\008195.00_Noyo & Ind_Ave. Bragg reservoir\DETAILS-EROSION.dgn 12/2/2009

NO.	DATE	REVISIONS	BY	CHK

DRAWN BY: D. ZAITZ
PROJECT NO: 008195.00
ENGINEER: J. SOLORIO
SCALE: 1"=3' H & V
CHECKED BY:
APPROVED BY:
DATE:
DATE:

LAWRENCE & ASSOCIATES
ENGINEERING GEOLOGY
3600 IRON CT.
SHASTA LAKE, CA 96019
(530) 275-4800
(530) 275-7970 FAX

NEWMAN RESERVOIR

CITY OF FORT BRAGG
416 NORTH FRANKLIN ST.
FORT BRAGG, CA 95437

EROSION CONTROL DETAILS

DRAWING: C8.3
SHEET: OF
REVISION NO: REVISION 0
DATE: 12/2/09

ATTACHMENT 2

COUNTY MAPS 13 & 14

COUNTY OF MENDOCINO COASTAL ZONE

ADOPTED BY BOARD OF SUPERVISORS
AUGUST 17, 1983

CHAIRMAN

REVISED
APRIL 9, 1984

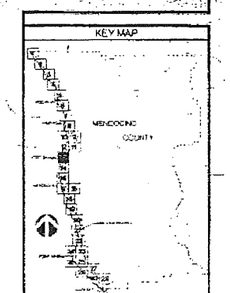
AMENDMENTS
NOVEMBER 15, 1990

CERTIFIED BY THE COASTAL COMMISSION
NOVEMBER 20, 1985

TIMBER AND AGRICULTURE BUFFER POLICIES (3.3-9 & 3.2-13) - Will affect parcels adjacent to Timber Preserve Zones (TPZ) and Agriculture Preserves (WA) and will be considered along with other policies of this plan prior to any further development.

CRITICAL GROUNDWATER AREA - Density may be increased only upon proof of public water service or a positive hydrological study. (See policy 3.8-9 & 3.8-10)

KEY MAP



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0 1/4 1/2 MILES 1
0 1 2 3 4 KILOMETERS 5
25 ACRES

COUNTY OF MENDOCINO — PLANNING & BUILDING DEPARTMENT

MAP 13 OF 31 MAPS

Fort Bragg

COUNTY OF MENDOCINO COASTAL ZONE

ADOPTED BY BOARD OF SUPERVISORS
AUGUST 17, 1983

CHAIRMAN

REVISED
APRIL 9, 1984
JULY 3, 1985

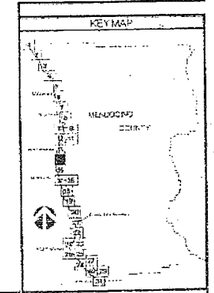
AMENDMENTS
MARCH 28, 1988
NOVEMBER 15, 1990
DECEMBER 13, 1989
JULY 27, 1992
JULY 12, 1993
APRIL 11, 1994
AUGUST 26, 1996

CERTIFIED BY THE COASTAL COMMISSION
NOVEMBER 20, 1985

TIMBER AND AGRICULTURE BUFFER POLICIES (3.3-9 & 3.2-13) - Will affect parcels adjacent to Timber Preserve Zones (TPZ) and Agriculture Preserves (WA) and will be considered along with other policies of this plan prior to any further development.

CRITICAL GROUNDWATER AREA - Density may be increased only upon proof of public water service or results of hydrological study. (See policy 3.8-9 & 3.8-10)

KEY MAP



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0 1 2 3 4 5 KILOMETERS
25 ACRES

COUNTY OF MENDOCINO — PLANNING & BUILDING DEPARTMENT

MAP 14 OF 31 MAPS

Beaver

ATTACHMENT 3

BIOLOGICAL ASSESSMENT, SUMMERS LANE RESERVOIR, WRA CONSULTANTS FEBRUARY 2013

Biological Assessment

SUMMERS LANE RESERVOIR
FORT BRAGG, MENDOCINO COUNTY, CALIFORNIA

Prepared For:

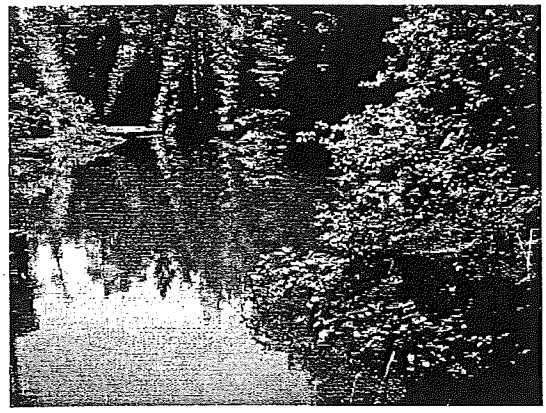
City of Fort Bragg
416 N Franklin Street
Fort Bragg, CA 95437

Contact:

Matt Richmond
richmond@wra-ca.com
WRA
North Coast Office
249 N. Main Street, Suite F
Fort Bragg, CA 95437

Date:

February 2013



wra
ENVIRONMENTAL CONSULTANTS

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APPENDICES

1.0 INTRODUCTION

1.1 Purpose of the Report

Site assessments were conducted on April 2, May 8, June 12 and July 8 2008; May 7,13, 27, July 3, 8, 22, and September 10, 2009 by Redwood Coast Associates (RCA) and WRA, Inc. (WRA) to evaluate potential sensitive species and habitats in the Newman Gulch Study Area, in Fort Bragg, California (Figure 1). This report summarizes the findings of these site assessments and evaluates the potential for impacts to biological resources from the proposed project, according to the California Environmental Quality Act (CEQA).

1.2 Report Organization

This section provides a brief summary of the significant environmental impacts identified, the mitigation measures that would reduce these impacts (if applicable), and the overall impact the project would have on the biological resources within the Study Area and the Project Area and their immediate vicinity.

- Project Description: Provides a brief description of the existing conditions within the **Study Area** and **Project Area** (Figure 2). The 13.6-acre Study Area encompasses the 10.7-acre Project Area in addition to nearby jurisdictional wetlands and other waters. The Project Area encompasses the entire area of potential effect including limits of grading, staging and lay down areas, as well as the water pipeline corridors.

- Approach to Biological Impact Analysis: Provides a brief description of how the biological impact analysis for the 1) Plants and Wetlands and 2) Wildlife sections are organized.

- Plants and Biological Communities: This section describes the existing vegetation communities within the Study Area. Potential impacts to plants, wetlands, and natural communities are described, as well as mitigation measures that would reduce such impacts to a less than significant level.

- Wildlife: This section describes the terrestrial and aquatic wildlife resources in the vicinity of the Study Area. Potential impacts to wildlife are listed, as well as mitigation measures that would reduce such impacts to a less than significant level.

- References: Identifies the authors of the document and supporting studies, the agencies and organizations that were contacted during preparation, and the bibliography of reports or other published materials used in preparing this report.

- Appendices: Include a location map, maps of the Study Area, Project Area and proposed project, jurisdictional wetlands delineation map, special status species records maps, tables evaluating the potential for special-status plant and wildlife species to occur within the Project Area, a list of the plant and animal species observed in the Study Area during surveys, and a special status plant mitigation plan.

2.0 SUMMARY

The project has been designed to avoid impacts to wetlands, riparian zones and other sensitive natural communities. The analysis included in this report indicates that the implementation of the proposed project without mitigation could result in five significant biological impacts under CEQA. These impacts include: 1) Direct impacts to special status plant species, 2) disturbance to nesting special status birds and other breeding birds, 3) disturbance to special status mammals, 4) disturbance to sensitive herpetofauna, and 5) disturbance to migratory fish. No other potentially significant biological impacts are anticipated from this project. The project has been designed to avoid impacts to wetlands, riparian zones and other sensitive natural communities. No impacts to wildlife corridors are anticipated. The project does not conflict with local ordinances protecting biological resources, and the Study Area is not covered by an approved habitat conservation plan. No significant unavoidable impacts to biological resources would result from the proposed project.

Impacts to special status plants will be mitigated through replanting and preservation, as discussed in Section 5.3. Impacts to special-status wildlife will be avoided, minimized or mitigated to a less-than-significant level, using work windows, pre-construction surveys, buffer zones, and other methods, as discussed in Section 6.3.

Implementation of the avoidance and mitigation measures discussed in this report would reduce the five potentially significant potential impacts to a less than significant level.

3.0 PROJECT AREA LOCATION AND DESCRIPTION

3.1 Project Area Location

3.1.1 Regional Setting

The Study Area (Figure 1) is located near the City of Fort Bragg, in Mendocino County, California. According to the U.S. Geological Survey 7½ minute Fort Bragg Quad topographic map, the Study Area is located in the NW ¼ of Section 16, Township 18N, Range 17W and the project coordinates are approximately 39° 25' 31" N (39.4252°) latitude and 123° 46' 04" W (123.7678°) longitude.

3.1.2 Local Setting

The City of Fort Bragg currently has an earthen dam across Newman Gulch, impounding about four acre-feet of water. About 25 percent of Fort Bragg's water supply comes from this small reservoir. The Newman Gulch watershed has an area of 640 acres, with 40 acres in City of Fort Bragg ownership and the remaining 600 acres owned by Campbell-Hawthorne Timberlands. The City of Fort Bragg proposes to create a new reservoir adjacent to Newman Reservoir to serve the projected water needs of the City.

The proposed project site is located within the Noyo River Basin and western Mendocino County, 1.5 miles southeast of the Fort Bragg City limits at the northeast terminus of Summers Lane. The proposed reservoir site is located at the top of Newman Gulch, approximately 200 linear feet above the existing Newman Reservoir on a 40-acre parcel owned by the City of Fort Bragg. The Assessor's Parcel Number (APN) for the proposed project site is 019-070-01-00 and it is located outside of the Coastal Zone.

Surrounding the property to the east and south is the proposed development area for the 600-acre Mendocino Coast Regional Golf Course and Park, which include a proposed sports complex. A paved access road leading to the Mendocino County Animal Control and Animal Shelter facilities defines the approximate southern extent of the Project Area (Figure 2). A Pacific Gas and Electric (PG&E) access road and northwest-trending powerline corridor mark the northern extent of the Project Area. A poorly maintained barbed wire fence extends along the western property margin and defines the approximate western margin of the proposed development area. Property to the west includes rural residential and a rhododendron nursery. The southern and eastern margins of the development area are currently lined with large concrete rubble to deter unauthorized vehicular access onto the property.

3.2 Project Description

The proposed project consists of the construction of a 45-acre-foot reservoir plus associated off-site piping and controls within the 10.7-acre Project Area (Figure 3).

a. **Grading** – The project site will be altered to accommodate the proposed reservoir. A total of approximately 7.5 acres will be cleared and grubbed for the footprint of the reservoir and associated piping. Approximately 7,000 cubic yards (cy) of topsoil will be removed from the site to a location not yet determined. An additional 34,000 cy of subgrade soil will be graded on site to create the embankment of the reservoir.

b. **Liner** – The reservoir will be lined with a 60-mil high-density polyethylene (HDPE) liner. The top of the liner will be white in color.

c. **Security** – The site will be enclosed with a locking gate and 6-foot high chain link fence.

d. **Piping Inlet** – The inlet for the pipe that will deliver water to the reservoir is located at Waterfall Gulch, approximately two miles south of the proposed reservoir. This inlet currently serves as the inlet for the pipe that delivers water to the City of Fort Bragg and the existing Newman Reservoir. The inlet has a mesh sand screen of unknown size. The existing inlet will not be altered for this project. We understand that the inlet basin has recently been cleaned to prevent sand from entering the pipe intake.

e. **Point of Connection to Existing Piping** - The new pipeline for the reservoir will connect to an existing 6-inch diameter asbestos-concrete pipeline approximately 280-feet west of the intersection of Brush Creek Road and Summers Lane. We assume that the metal pipe that currently connects to the asbestos pipe will be cut at its connection with the asbestos pipe, and removed to the adjoining Celeri property and abandoned in place. To reduce friction, a sweeping elbow will be installed. An isolation valve can be specified at the point of connection, if desired.

f. **Route of New Piping** - The new section of 8-inch PVC pipe will be routed from the point of connection east on Brush Creek Road to Summers Lane along the north shoulder of Brush Creek Road within the existing 60-foot Mendocino County right-of way. From the intersection, the pipeline will trend north along the 50-foot Mendocino County right of way easement of Summers Lane into the project property. The pipeline will discharge into the south end of the reservoir. A bypass line will continue around the reservoir and tie to the outlet. The total length of inlet piping will be

approximately 1,550 feet. See Figures 3.1, 3.2, and 3.3 of the engineering report for the approximate pipeline alignment.

g. **Depth of Trench** – Based on head calculations, there is sufficient head to route the pipe in a conventional manner (generally between three and eight feet deep).

h. **Reservoir Inlet** – The force main will enter the reservoir at the south end. It is possible that a small forebay or buried tank could be added to remove sediment before entering the reservoir.

i. **Reservoir Bypass Pipe** – A bypass pipe will tee into the reservoir inlet pipe and can be used to route water around the reservoir. The other end of the pipe will tee into the reservoir outlet pipe. Valves will be used to route water around the reservoir. The bypass pipe would be used during periods when the pond is being maintained or if increased flow was required from Waterfall Gulch.

j. **Reservoir Outlet Pipe** - The pipeline will exit the reservoir at the northeast corner and then tie into the existing Newman Reservoir pipeline near the existing path to Newman Reservoir from the PG&E right of way. The outlet piping will be approximately 100 feet long.

k. **Cleanout Basin** – The pond will have a drain at the bottom that will be used to retain sediment during cleaning. The basin will provide a location where sediment can accumulate and then be removed using equipment. Because the incoming water is relatively sediment free, it is anticipated that the cleanout basin will be used infrequently.

l. **Floating Cover** – While one is not specified at this time, the City may elect to install a floating cover in the future to reduce evaporation and wind-blown debris.

4.0 APPROACH TO BIOLOGICAL IMPACT ANALYSIS

The environmental analysis included within this report is divided into two sections: Section 5.0 evaluates plants and communities and Section 6.0 evaluates wildlife. In each section the report describes the existing environmental setting, presents the thresholds of significance, identifies environmental impacts, and recommends mitigation measures.

4.1 Existing Conditions

Sections 5.1 and 6.1 describe the existing environmental conditions within the Study and Project Area. The discussion of the existing setting focuses on information relevant to the biological issues that are analyzed.

4.2 Thresholds of Significance

Sections 5.2 and 6.2 present thresholds of significance used in the impact analysis. The thresholds of significance focus on the relevant biological issues that are analyzed.

4.3 Potential Project Impacts and Proposed Mitigation Measures

Sections 5.3 and 6.3 describe impacts caused by the proposed project discussed in Section 3.2 and illustrated in Figure 3. Recommended mitigation measures to reduce potential project impacts are included immediately following the identified impact. For example, Proposed Project Impact 5.3.1 would be mitigated by Proposed Project Mitigation Measure 5.3.1. These sections also list the anticipated level of significance of each impact following implementation of the avoidance and mitigation measures.

5.0 PLANTS AND BIOLOGICAL COMMUNITIES

5.1 Existing Conditions

5.1.1 General Environmental Conditions

5.1.1.1 Vegetation

The 13.6-acre Study Area is dominated by coastal mixed conifer forest with a significant redwood component. The Project Area supports two relatively distinct vegetation communities: the forested portion associated with the proposed reservoir site, and the vegetation associated with the existing roads surrounding the reservoir site and the pipeline installation/replacement areas along Summers Lane and Brush Creek Road. The Study Area encompasses additional areas outside the Project Area including wetlands and Newman Gulch stream, which are described in Section 5.2. The greatest canopy cover, tree height, and tree density occur in the Study Area along the stream.

The Study Area is entirely forested, with the exception of openings created by past logging activities and existing roads. The forest stand consists primarily of Redwood-dominated North Coast coniferous forest (Holland 1986). Woody debris and slash are prevalent throughout the forest. Forest canopy cover is, on average, 50 percent throughout the stand. The Project Area has been more recently logged than the rest of the Study Area and supports early to mid-successional mixed forests, with an emergent shrub layer. A majority of the Study Area was logged as recently as1993, with the Project Area more intensely harvested. The Study Area supports more mature forest, with a larger component of the stand dominated by redwood.

Primary canopy species include redwood (*Sequoia sempervirens*) and Douglas fir (*Pseudotsuga menziesii* var. *menziesii*). Associated species include Bishop pine (*Pinus muricata*), grand fir (*Abies grandis*), tan oak (*Lithocarpus densiflorus* var. *densiflorus*), Western hemlock (*Tsuga heterophylla*), and pygmy cypress (*Callitropsis pygmaea*).

Mid-level vegetation is relatively abundant in areas where the canopy cover is less. Characteristic species include; evergreen huckleberry (*Vaccinium ovatum*), salal (*Gaultheria shallon*), tan oak (*Lithocarpus densiflorus* var. *densiflorus*), and hairy manzanita (*Arctostaphylos columbiana*).

The herbaceous understory is dominated by modesty (*Whipplea modesta*), Pacific star flower (*Trientalis latifolia*), and redwood sorrel (*Oxalis oregana*), with a greater diversity of species occurring where sunlight penetrates to the forest floor beneath occasional overstory gaps, along old skid trails/roads/landings, and along the edges of the stand. These species include: evergreen violet (*Viola sempervirens*), bracken fern (*Pteridium aquilinum*), sweet vernal grass

(*Anthoxanthum odoratum*), hairy cat's ear (*Hypochaeris radicata*), and little hop clover (*Trifolium dubium*).

Vegetation along Summers Lane and Brush Creek Road consists primarily of ruderal species including: rattlesnake grass (*Briza maxima)*, bent grass (*Agrostis gigantea*), and sweet vernal grass. Drainage swales vegetated with upland species occur along the sides of the roads.

5.1.1.2 Soils

The Soil Survey of Mendocino County, Western Part (USDA 1988) indicates that the Study Area is underlain primarily by one soil mapping unit: Quinliven-Ferncreek complex (Figure 4).

The Quinliven soil is very deep and is moderately well drained. It formed in marine sediments. Typically, the surface is covered with a mat of litter about 5 inches thick. The surface layer is light gray sandy loam about 4 inches thick. The next layer is white and very pale brown loam about 7 inches thick. The upper 7 inches of the subsoil is light yellowish brown loam. The next 14 inches is brownish yellow clay. Below this is 19 inches of brownish yellow clay that has red mottles. The lower 9 inches of the subsoil is yellowish red clay loam that has strong brown and light gray mottles. The substratum to a depth of 64 inches or more is yellowish red sandy loam that has strong brown mottles. In some areas the surface layer is loamy sand or loam.

Permeability is slow in the Quinliven soil. Available water capacity is high. The effective rooting depth is limited by saturation between the depths of 48 and 72 inches for brief periods following episodes of heavy rain from December through April.

The Ferncreek soil is very deep and is somewhat poorly drained. It formed in marine sediments. Typically, the surface is covered with a mat of litter about 2 inches thick. The surface layer is gray and white sandy loam about 7 inches thick. The upper 17 inches of the subsoil is very pale brown and light yellowish brown clay loam and clay. The next 9 inches is brownish yellow clay that has reddish yellow and red mottles. The lower 10 inches of the subsoil is brownish yellow sandy clay loam that has red and white mottles. The substratum to a depth of 61 inches or more is yellow sandy loam that has red and white mottles.

Permeability is slow in the Ferncreek soil. Available water capacity is high. The effective rooting depth is limited by saturation for brief or long periods following episodes of heavy rain from December through April. The saturated zone starts between the depths of 24 and 48 inches and extends to a depth of more than 60 inches.

5.1.1.3 Hydrology and Topography

Project Area topography is relatively flat, sloping gradually to the northwest, and ranging in elevation from 265 to 305 feet above mean sea level. No wetlands, streams, or other aquatic features occur in the Project Area with the exception of the roadside swales dominated by upland species.

The Study Area encompasses the Project Area plus an additional area to the north of the Project Area, including the Newman Gulch stream, a portion of the existing reservoir southern edge, and associated wetlands, all of which slope to the Northwest. The topography is somewhat steeper in these areas than the Project Area. Newman Gulch drains into the Noyo River approximately 0.75 miles north of the Study Area.

5.1.2 *Regulatory Background*

Sensitive Biological Communities

Sensitive biological communities include habitats that fulfill special functions or have special values, such as wetlands, streams, and riparian habitat. These habitats are protected under federal regulations (such as the Clean Water Act), state regulations (such as the Porter-Cologne Act, the Streambed Alteration Program, and CEQA), or local ordinances or policies (City or County Tree Ordinances, Special Habitat Management Areas, and General Plan Elements).

Waters of the United States

The U.S. Army Corps of Engineers (Corps) regulates "Waters of the United States" under Section 404 of the Clean Water Act. Waters of the U.S. are defined broadly as waters susceptible to use in commerce, including interstate waters and wetlands, all other waters (intrastate waterbodies, including wetlands), and their tributaries (33 CFR 328.3). Potential wetland areas, according to the three criteria used to delineate wetlands stated in the Corps' *Wetlands Delineation Manual* (Environmental Laboratory 1987), are identified by the presence of (1) hydrophytic vegetation, (2) hydric soils, and (3) wetland hydrology. Areas that are inundated for sufficient duration and depth to exclude growth of hydrophytic vegetation are subject to Section 404 jurisdiction as "other waters" and are often characterized by an ordinary high water mark (OHWM). "Other waters" generally include lakes, rivers, and streams. The placement of fill material into Waters of the U.S. (including wetlands) generally requires an individual or nationwide permit from the Corps under Section 404 of the Clean Water Act.

Waters of the State

The term "Waters of the State" is defined by the Porter-Cologne Act as "any surface water or groundwater, including saline waters, within the boundaries of the state." The State Water Resources Control Board (SWRCB) and Regional Water Quality Control Board (RWQCB) protect all waters in their regulatory scope, but have special responsibility for wetlands, riparian areas, and headwaters. These waterbodies have high resource value, are vulnerable to filling, and are not systematically protected by other programs. RWQCB jurisdiction includes "isolated" wetlands and waters that may not be regulated by the Corps under Section 404. Waters of the State are regulated by the RWQCB under the State Water Quality Certification Program which regulates discharges of fill and dredged material under Section 401 of the Clean Water Act and the Porter-Cologne Water Quality Control Act. Projects that require a Corps permit, or fall under other federal jurisdiction, and have the potential to impact Waters of the State, are required to comply with the terms of the Water Quality Certification determination. If a proposed project does not require a federal permit, but does involve dredge or fill activities that may result in a discharge to Waters of the State, the RWQCB has the option to regulate the dredge and fill activities under its state authority in the form of Waste Discharge Requirements.

Streams, Lakes, and Riparian Habitat

Streams and lakes, as habitat for fish and wildlife species, are subject to jurisdiction by the California Department of Fish and Game (CDFG) under Sections 1600-1616 of the State Fish and Game Code. Alterations to or work within or adjacent to streambeds or lakes generally require a 1602 Lake and Streambed Alteration Agreement. The term stream, which includes creeks and rivers, is defined in the California Code of Regulations (CCR) as follows: "a body of water that flows at least periodically or intermittently through a bed or channel having banks and

supports fish or other aquatic life. This includes watercourses having a surface or subsurface flow that supports or has supported riparian vegetation" (14 CCR 1.72). In addition, the term stream can include ephemeral streams, dry washes, watercourses with subsurface flows, canals, aqueducts, irrigation ditches, and other means of water conveyance if they support aquatic life, riparian vegetation, or stream-dependent terrestrial wildlife (CDFG ESD 1994). Riparian is defined as, "on, or pertaining to, the banks of a stream;" therefore, riparian vegetation is defined as, "vegetation which occurs in and/or adjacent to a stream and is dependent on, and occurs because of, the stream itself" (CDFG ESD 1994). Removal of riparian vegetation also requires a Section 1602 Lake and Streambed Alteration Agreement from CDFG.

Other Sensitive Biological Communities

Other sensitive biological communities not discussed above include habitats that fulfill special functions or have special values. Natural communities considered sensitive are those identified in local or regional plans, policies, regulations, or by the CDFG. CDFG ranks sensitive communities as "threatened" or "very threatened" and keeps records of their occurrences in the California Natural Diversity Database (CNDDB). Sensitive plant communities are also identified by CDFG on their *List of California Natural Communities Recognized by the CNDDB*. Impacts to sensitive natural communities identified in local or regional plans, policies, regulations or by CDFG or the U.S. Fish and Wildlife Service (USFWS) must be considered and evaluated under CEQA (California Code of Regulations: Title 14, Div. 6, Chap. 3, Appendix G). Specific habitats may also be identified as sensitive in City or County General Plans or ordinances.

Special Status Species

Special status species include those plant species that have been formally listed, are proposed as endangered or threatened, or are candidates for such listing under the federal Endangered Species Act (ESA) or California Endangered Species Act (CESA). These acts afford protection to both listed and proposed species. Plant species on California Native Plant Society (CNPS) Lists 1 and 2 are also considered special status plant species. Impacts to these species are considered significant according to CEQA. CNPS Lists 3 and 4 plants have little or no protection under CEQA, but are included in this analysis for completeness.

5.1.3 Wetlands and Waters

On July 8, 2009, two wetland scientists from WRA (Tim DeGraff) and RCA (Matt Richmond) conducted a wetland delineation in the Study Area. The purpose of the wetland delineation was to determine the location and extent of sensitive habitats which may be considered jurisdictional by the Corps and RWQCB under Sections 404 and 401 of the Clean Water Act, respectively. On September 30, 2009, Corps staff visited the Study Area and verified the delineation as shown in Figure 5. A final jurisdictional determination by the Corps is pending.

Methods used to delineate jurisdictional wetlands and waters were based on the *U.S. Army Corps of Engineers Wetlands Delineation Manual* ("Corps Manual"; Environmental Laboratory 1987) and the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region ("Western Mountains Supplement"*; Corps 2008). The routine method for wetland delineation described in the Corps Manual was used to identify areas potentially subject to Corps Section 404 jurisdiction within the Study Area.

Prior to conducting field studies, available reference materials were reviewed, including the Soil Survey of Mendocino County, Western Part (U.S. Department of Agriculture [USDA] 2005), the Mendocino USGS 7½ minute quadrangle, and available aerial photographs of the area.

5.1.3.1 Section 404 Jurisdictional Wetlands

Methodology

The Corps has defined the term "wetlands" as follows:

> "Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas." (33 CFR 328.3)

The three parameters listed in the Corps Manual that are used to determine the presence of wetlands are: (1) hydrophytic vegetation, (2) wetland hydrology, and (3) hydric soils. According to the Corps Manual:

> "...[E]vidence of a minimum of one positive wetland indicator from each parameter (hydrology, soil, and vegetation) must be found in order to make a positive wetland delineation."

Data on vegetation, hydrology, and soils collected at sample points during the delineation site visits are reported on standard Corps data forms included in Appendix A. Once an area was determined to be a potential jurisdictional wetland, its boundaries were delineated using flagging. Sample points and potential jurisdictional wetland boundaries were flagged in the field and recorded using submeter-accuracy GPS equipment. Jurisdictional wetland acreage was measured digitally using ArcGIS software. Indicators described in the Corps Manual that were used to make wetland determinations at each sample point in the Study Area are summarized below.

Vegetation

Plant species identified at sample points within the Study Area were assigned a wetland status according to the U.S. Fish and Wildlife Service (USFWS) list of plant species that occur in wetlands (Reed 1988). This wetland classification system is based on the expected frequency of occurrence in wetlands as follows:

OBL	Always found in wetlands, >99% frequency
FACW(±)	Usually found in wetlands, 67-99%
FAC	Equal in wetland or non-wetlands, 34-66%
FACU	Usually found in non-wetlands, 1-33%
NI/NL	No indicator/Not listed (upland), <1%

Plants with OBL, FACW, and FAC classifications are classified as hydrophytic vegetation in the Corps Manual methodology. If more than 50 percent of the dominant plant species (in order for a plant to be considered dominant it must cover at least 20 percent of the total vegetative cover in the sample plot) are classified by the Corps as hydrophytic, the area is considered to have met the wetland vegetation criterion.

Soils

The Natural Resources Conservation Service (NRCS) *Field Indicators of Hydric Soils in the United States* (USDA 2006) was used as a guide for determining hydric soils in the Study Area. The NRCS defines a hydric soil as:

> "A hydric soil is a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part."
>
> Federal Register July 13, 1994, USDA NRCS

Soils formed over long periods of time under wetland (anaerobic) conditions often possess characteristics that indicate they meet the definition of hydric soils. Hydric soils can have a hydrogen sulfide (rotten egg) odor, low chroma matrix color, generally designated 0, 1, or 2, used to identify them as hydric, presence of redox concentrations, gleyed or depleted matrix, or high organic matter content. USDA (2006) contains a list of hydric soil indicators that are known to occur in the United States. Soils samples were collected and described according to the methodology provided in the Western Mountains Supplement (Corps 2008). Soil chroma and values were determined by utilizing a standard Munsell soil color chart (GretagMacbeth 2000). Hydric soils were determined to be present if any of the soils samples met one or more of the hydric soil indicators described in USDA (2006).

Hydrology

The Corps jurisdictional wetland hydrology criterion is satisfied if an area is inundated or saturated for a period sufficient to create anoxic soil conditions during the growing season. Evidence of wetland hydrology can include primary indicators, such as visible inundation or soil saturation, drift deposits, oxidized root channels, and salt crusts, or secondary indicators such as the FAC-neutral test, presence of a shallow aquitard, or water-stained leaves. Only one primary indicator is required to meet the wetland hydrology criterion; if only secondary indicators are used, at least two secondary indicators must be present to conclude that an area has wetland hydrology.

Areas Excluded from Section 404 Jurisdiction

Some areas that meet the technical criteria for wetlands or "other waters" may not be jurisdictional under the Clean Water Act. Included in this category are some man-induced wetlands, which are areas that have developed at least some characteristics of naturally occurring wetlands due to either intentional or incidental human activities. Examples of man-induced wetlands include, but are not limited to, irrigated wetlands, impoundments (such as stock ponds for livestock), or drainage ditches constructed in uplands, wetlands resulting from filling of formerly deep water habitats, dredged material disposal areas, and wetlands resulting from stream channel realignment.

Other areas that may not be jurisdictional are "isolated" wetlands, or non-navigable waters which are not connected or adjacent to a navigable Waters of the U.S. through either a hydrologic or economic connection (per [SWANCC v. United States] Supreme Court decision issued on January 9, 2001). Therefore, wetland areas which do not have a surface or groundwater connection to, and are not adjacent to a navigable Waters of the U.S., may be

considered isolated and not subject to Corps jurisdiction. Final determination of jurisdictional status is the responsibility of the Corps.

Wetlands in the Study Area

Two jurisdictional wetland areas were flagged and mapped by RCA, one associated with the Newman Gulch stream and one associated with the existing reservoir. The total jurisdictional wetland acreage is 0.60 acres. A map of jurisdictional wetlands, "other waters", and sample points is included as Figure 5. Appendix B provides wetland data sheets for all sample points examined.

The wetland associated with Newman Gulch is dominated by red alder (*Alnus rubra*), thimbleberry (*Rubus parviflorus*), salmon berry (*Rubus spectabilis*), deer fern (*Blechnum spicant*), sword fern (*Polystichum munitum*), lady fern (*Athyrium felix-femina*), horsetail (*Equisetum telmateia*), and slough sedge (*Carex obnupta*). Part of this wetland met all three wetland criteria, with hydrophytic vegetation dominant, along with oxidized rhizospheres, and a shallow water table. Portions of the wetland did not meet the vegetation criteria, but were considered to have problematic vegetation, as the soils were mucky and saturated soils and a shallow water table were observed during the July delineation.

The wetland associated with the existing reservoir is indicated by dominance of wax myrtle (*Myrica californica*), deer fern, and corn lily (*Veratrum fimbriatum*), with other dominants and subdominants including Pacific rhododendron (*Rhododendron macrophyllum*), pygmy cypress, redwood, and Western hemlock. This wetland area met both hydric soil and wetland hydrology indicators due to the presence of prominent oxidized rhizospheres.

5.1.3.2 Section 404 Jurisdictional "Other Waters"

Methodology

The Study Area was evaluated for the presence of "other waters". "Other waters" subject to Corps jurisdiction include lakes, rivers, and perennial or intermittent streams. Corps jurisdiction of "other waters" in non-tidal areas extends to the OHWM, defined as:

> "The term "ordinary high water mark" means that line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impresses on the bank, shelving, changes in the characteristics of the soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas."
>
> Federal Register Vol. 51, No. 219, Part 328.3 (d). Nov. 13, 1986.

"Other waters" are identified in the field by the presence of a defined river or streambed, a bank, and evidence of the flow of water, or by the absence of emergent vegetation in ponds or lakes. "Other waters" that were found within the Study Area were mapped were flagged by RCA and recorded using submeter-accuracy GPS equipment. Jurisdictional wetland acreage was measured digitally using ArcGIS software.

Other Waters in the Study Area

A portion of the Newman Gulch stream was mapped as "other waters" in the Study Area. No riparian vegetation was associated with this portion of the stream and wetland vegetation is restricted to scattered plants covering less than five percent of the channel.

5.1.3.3 Waters of the State

Methodology

The RWQCB has not established a formal wetland definition nor has it developed a wetland delineation protocol; however this agency generally adheres to the same delineation protocol set forth by the Corps. Therefore, the methods used to determine potential Waters of the State were the same as those described above for potential Section 404 jurisdiction.

Areas Exempt from State Jurisdiction

Unlike Federal regulations, dredging, filling, or excavation within isolated wetlands and "other waters" constitutes a discharge to Waters of the State, and prospective dischargers are required to submit a report of waste discharge to the RWQCB to comply with requirements of the California Porter-Cologne Water Quality Control Act (SWRCB 2004). Similar to Federal jurisdictional delineations, some areas that meet the technical criteria for wetlands may also be exempt from State jurisdiction due to the lack of normal circumstances (i.e., atypical situations). Included in this category are some man-induced wetlands, such as irrigated wetlands and depressions created in dry land incidental to construction activities.

Waters of the State in the Study Area

All wetlands and "other waters" observed in the Study Area were identified as both Waters of the U.S. and Waters of the State.

5.1.3.4 Riparian Habitat

Methodology

Riparian is defined as, "on, or pertaining to, the banks of a stream"; therefore, riparian vegetation is defined as, "vegetation which occurs in and/or adjacent to a stream and is dependent on, and occurs because of, the stream itself" (CDFG ESD 1994).

Riparian Habitats in the Study Area

Other than the riparian species located within the wetland areas, no distinct riparian vegetation was identified along the Newman Gulch stream or elsewhere in the Study Area. All vegetation associated with watercourses met the technical criteria for Corps jurisdictional wetlands and were therefore mapped as wetlands. Non-wetland riparian habitat was not observed within the Study Area.

5.1.3.5 Other Sensitive Biological Communities

The forested communities present in the Study Area are common throughout northern California and are therefore not considered sensitive. Individual pygmy cypress trees do occur as a minor component of the forest where past disturbance has created gaps in the canopy, and this

special status species is discussed in the following section. The pygmy cypress trees occurring in the Study Area do not constitute a sensitive Mendocino pygmy cypress forest community or a transitional Mendocino pygmy cypress forest. Pygmy cypress trees occur as a minor component of the forest canopy. Appendix D includes a table evaluating presence of sensitive biological communities recorded in coastal Mendocino County (CDFG 2009).

5.1.4 Special Status Plants

Methodology

Potential occurrence of special status plant species in the Project Area was evaluated by first determining which special status species occur in the vicinity of the Project Area through a literature and database search. Database searches were conducted for known occurrences of special status wildlife species within the Fort Bragg, Inglenook, Dutchman's Knoll, Noyo Hill, Mathison Peak and Mendocino 7.5 minute USGS quadrangles. The following sources were reviewed to determine which special status plant species have been documented to occur in the vicinity of the Project Area:

- California Natural Diversity Database records (CNDDB) (CDFG 2009)
- California Native Plant Society (CNPS) On-line Inventory (CNPS 2009)
- USFWS Arcata Field Office species lists for Mendocino County (USFWS 2009)

Additional regionally-significant species were included in the list of potential plants. Appendix D includes a table evaluating the potential for special status plant species to occur in the Project Area, which was used as a scoping list for protocol-level plant surveys. Figure 6 depicts recorded occurrences of special status plants in the vicinity of the Project Area.

The botanical survey was conducted according to the *Guidelines for Assessing the Effects of Proposed Projects on Rare, Threatened, and Endangered Plants and Natural Communities* (Department of Fish and Game 2000). RCA botanists Matt Richmond and Kyle Wear spent a total of 17.5 hours searching for rare plants in the Project Area on April 2, May 8, June 12, July 8 2008, as well as May 7, July 3, and September 10, 2009. Surveys were floristic, seasonally appropriate, and intuitively controlled. Searches were staged and timed to take place when target taxa were evident and identifiable, particularly during periods of active blooming (CNPS 2008, 2009). Local reference populations were used in conjunction with blooming windows presented in the CNPS's Electronic Inventory to confirm the seasonal appropriateness of surveys.

High-intensity (90-100% coverage) surveys were conducted in areas likely to be impacted by proposed developments. All vascular plants encountered in the field were identified to the taxonomic level necessary to determine sensitivity status. Botanical nomenclature follows the *Jepson Manual/Higher Plants of California* (Hickman 1993). Vegetation types were classified to the series level according to *A Manual of California Vegetation* (Sawyer & Keeler-Wolfe 1995) by considering the dominant species in each strata (tree, shrub and herb layers).

Special Status Plants in the Study Area

Appendix C provides a list of all plants observed during assessments and surveys in the Project Area. Two CNPS-listed plants were observed during protocol-level surveys of the Study Area, as described below.

Pygmy cypress trees occur at a density of 9 trees per acre and total an estimated 72 in number within the 8-acre reservoir area. Pygmy cypress is a CNPS List 1B.2 taxon and is threatened by development, logging, and vehicles (CNPS 2009). Within the 40-acre parcel a minimum of 1200 pygmy cypress trees currently exist. The project will impact approximately 72 trees of 1200, or 6% of the total number.

Two populations of Bolander's reed grass (*Calamagrostis bolanderi*) a CNPS List 4.2 species were identified on the Project area, consisting of approximately 30 individuals. CNPS List 4 plants are considered to be on a "watch list". The populations of Bolander's reed grass are located within the Project Area but are not considered to be regionally significant or sensitive.

In addition, fringed cornlily (*Veratrum fimbriatum*), a CNPS List 4.3 species, was observed in the wetlands of the Study Area during delineation studies. This species was not observed within the Project Area, and is not considered a special status species.

5.2 Thresholds of Significance

A threshold of significance is an identifiable, quantitative, qualitative or performance level or set of criteria describing a particular environmental effect. Exceeding the threshold normally indicates a significant environmental effect, while not exceeding indicates a less than significant effect. Significance criteria for impacts to biological resources are based on State CEQA Guidelines Section 15065 and Appendix G, and Public Resources Code Section 21083. Although state guidelines encourage counties and other CEQA Lead Agencies to develop general guidelines for use in the environmental review process, to date neither Mendocino County nor the City of Fort Bragg has not developed such guidelines.

According to state guidelines, a project will have a significant effect on biological resources if it would:

- Have a substantial adverse effect, such as reducing the number or restricting the range of, any sensitive, candidate or special-status species listed in local, state or federal plans, policies or regulations, either directly or through habitat modification;
- Have a substantial adverse effect on any riparian or other sensitive natural community identified in local, regional, state or federal plans;
- Have a substantial adverse effect on any federally protected wetland;
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species, wildlife corridors, or nursery sites;
- Conflict with local policies or ordinances protecting biological resources, such as a tree preservation ordinance; or
- Conflict with an approved local, regional or state habitat conservation plan.

For the purposes of this biological impact analysis, three principal components of the guidelines outlined above were considered:

- Magnitude of the impact (e.g., substantial/not substantial);
- Uniqueness of the affected resource (rarity); and
- Susceptibility of the affected resource to perturbation (sensitivity).

5.3 Potential Project Impacts and Mitigation Measures

The proposed project would impact special status plants (pygmy cypress), as discussed below. Other sensitive biological communities identified in the Study Area, including wetlands and waters, will be avoided by the proposed project, although potential impacts during construction are evaluated below.

Potential Project Impact 5.3.1: Impacts to pygmy cypress (Callitropsis pigmaea) trees

The proposed project will permanently remove approximately 72 pygmy cypress trees with an average DBH of 18 inches from the Project Area.

Proposed Project Mitigation Measure 5.3.1: PLANTING

A Rare Plant Mitigation and Monitoring Plan Outline (Plan) has been developed to mitigate for impacts to pygmy cypress. Refer to this Plan (Appendix E) for an outline on the planting plan, monitoring criteria, and legal protection of mitigation areas. In summary of the Plan, in order to offset the number of pygmy cypress trees being lost, topsoil will be stored or seed cones and/or seedlings of pygmy cypress trees collected from the Project Area prior to impacts and transferred the mitigation area to establish pygmy cypress. Natural germination of pygmy cypress from the existing topsoil seedbank and seed cones will be monitored. The target establishment will be approximately three new seedlings for each impacted tree. If this cannot be achieved through natural recruitment, seedlings will be planted in the mitigation areas to meet the performance criteria established in Appendix E. The planting areas shall be placed under a deed restriction in order to help ensure long-term protection.

Level of Significance with Mitigation 5.3.1: Implementation of the measures listed above would reduce impacts to special status plant species to a less than significant level.

Potential Project Impact 5.3.2: Impacts to wetlands and "other waters"

Based upon the Corps-verified line and limit of disturbance depicted in Figure 5, no direct impacts to wetlands and other waters would occur as a result of the project.

Grading and excavating in the Project Area may cause soil erosion and surface water runoff into surrounding natural habitats, particularly downslope to the wetland vegetation in the Study Area. As a result, erosion of sediments or contaminants could impact the water quality of Newman Gulch stream.

Proposed Project Mitigation Measure 5.3.2: MINIMIZATION OF GRADING and BMPs

All work involving or associated with soil movement and or digging should occur during the dry season. A grading permit will be obtained and construction Best Management Practices will be implemented, including silt fencing and straw wattles to control erosion and sediment transport that may flow into surrounding natural habitats, particularly along the north end of the unit nearest to Newman Gulch. Best Management Practices shall be utilized along existing roads as their location provides an existing buffer to the Newman Gulch stream and associated wetland areas. The natural topography surrounding the proposed reservoir shall be left intact as much as is feasible, such that runoff to the surrounding landscape is minimized.

Level of Significance with Mitigation 5.3.2: Implementation of the measures listed above would reduce impacts to wetlands and waters to a less than significant level.

Potential Project Impact 5.3.3: Impacts from Invasive Plants

Invasive plant species may colonize the disturbed areas created by the proposed project.

Proposed Project Mitigation Measure 5.3.3: LANDSCAPING

After the completion of the all construction-related activities, replant all areas of bare soil around the reservoir with native, wetland vegetation where appropriate. Vegetation planted around the perimeter of the reservoir shall be locally-native species from local propagule sources if feasible, and should be planted during the wet season or whenever soils are moist, in order to achieve the highest feasible survival rate. Planting guidelines for the pygmy cypress mitigation areas are discussed separately in Appendix E.

Areas of disturbed soil shall be mulched, seeded, or planted and covered with native vegetation as soon as possible after clearing. No exotic plants shall be planted during or following site development. Plant species listed as invasive (High, Moderate, or Limited) on the California Invasive Plant Inventory (Cal-IPC 2006) shall not be installed anywhere in the Project Area as they would pose a risk to the surrounding plant community. All reasonable efforts should be made to control and remove existing or newly established populations of exotic species. Some examples of invasive plants likely to be found that should be monitored and controlled are English ivy (*Hedera helix*), Himalayan blackberry (*Rubus discolor*), French broom (*Genista monspessulana*), pampas grass (*Cortaderia* spp.), and forget-me-not (*Myosotis latifolia*).

Level of Significance with Mitigation 5.3.3: Implementation of the measures listed above would reduce impacts from invasive species on biological communities in the Study Area to a less than significant level.

6.0 WILDLIFE

6.1 Existing Conditions

6.1.1 General Wildlife Habitat Conditions

The California Wildlife Habitat Relationships System (CWHR) was reviewed in reference to the habitats observed within the Project Area and Study Area. The CWHR habitat classification scheme has been developed to support the CWHR System, a wildlife information system and predictive model for California's regularly-occurring birds, mammals, reptiles and amphibians. At present, there are 59 wildlife habitats in the CWHR System designed for use with a predictive model for terrestrial vertebrate wildlife species. Of these habitats, three occur in the Project and Study Areas: redwood habitat, closed-cone pine-cypress and fresh emergent wetland. Wildlife considerations for each habitat are detailed below, as described in the CDFG text account for each habitat type.

- *Redwood.* Redwood habitats provide food, cover, or special habitat elements (for at least one season) for 193 wildlife species (Marcot 1979). This total is comprised of 12 reptiles, 18 amphibians, 109 birds, and 54 mammals. Of these species, 18 are

considered harvest species. Moreover, a variety of sensitive species are found in the habitat. Species such as the Red-legged Frog, Ensatina, Osprey, Ringtail, Fisher and Marbled Murrelet show a relatively high preference for various redwood habitat phases and stages. To a minor extent, sensitive species such as the Peregrine Falcon and Spotted Owl can be found, but are usually vagrants in the habitat. The Bald Eagle can also be found in the habitat, but is usually not a common visitor.

- *Closed-cone Pine-cypress.* Numerous game species, including tree squirrels and Band-tailed Pigeons, and nongame species make use of this type for feeding and cover. Few species make substantial use of this type as a breeding habitat, although the Great Horned Owl and Red-tailed Hawk will nest in closed-cone pine forests.

- *Fresh Emergent Wetlands.* Fresh emergent wetlands are among the most productive wildlife habitats in California. They provide food, cover, and water for more than 160 species of birds (U.S. Comptroller General 1979), and numerous mammals, reptiles, and amphibians. Many species rely on Fresh Emergent Wetlands for their entire life cycle. The endangered Santa Cruz Long-toed Salamander and rare Black Toad require pond water for breeding, while the rare Giant Garter Snake use these wetlands as its primary habitat. The Aleutian Canada Goose, Bald Eagle, and Peregrine Falcon use Fresh Emergent Wetlands as feeding areas and roost sites.

The Project Area and the Study Area both support the same types of wildlife habitat discussed above. The Study Area supports a more mature forest type that may be more attractive to species that may nest or roost in tree cavities, such as bats and certain avian species. The Project Area was more intensely harvested than the Study Area and as a result has more open areas and understory. Certain wildlife species, such as bird species, may find this habitat attractive as it has an edge effect.

The reservoir provides important habitat for common and sensitive wildlife species and as such increases the habitat value of the adjacent upland habitat. It may provide breeding habitat for the Sierran Treefrog (*Pseudacris sierra*) and Northern Red-legged Frog (*Rana aurora*) and is most likely used by bat species as a drinking water source (bats typically drink water immediately after exiting their day roost).

In addition, it appears there are no significant barriers to dispersal in the immediate vicinity of the Project and Study Areas and therefore nothing to inhibit movement of wider ranging species such as Mountain Lion (*Felis concolor*) or Coyote (*Canis latrans*). As a result, some species with potential to occur in the Study and Project Areas are not necessarily associated exclusively with the habitats described above.

6.1.2 Regulatory Background

As described in Section 5.1.2, special status species include those wildlife species that have been formally listed, are proposed as endangered or threatened, or are candidates for such listing under the ESA or CESA. These acts afford protection to both listed and proposed species. In addition, CDFG Species of Special Concern, which are species that face extirpation in California if current population and habitat trends continue, USFWS Birds of Conservation Concern, sensitive species included in USFWS Recovery Plans, and CDFG special status invertebrates are all considered special status species. Although CDFG Species of Special

Concern generally have no special legal status, they are given special consideration under CEQA. In addition to regulations for special status species, most birds in the United States, including non-status species, are protected by the Migratory Bird Treaty Act of 1918. Under this legislation, destroying active nests, eggs, and young is illegal.

Critical Habitat

Critical habitat is a term defined and used in the ESA as a specific geographic area that contains features essential for the conservation of a threatened or endangered species and that may require special management and protection. The ESA requires federal agencies to consult with USFWS to conserve listed species on their lands and to ensure that any activities or projects they fund, authorize, or carry out will not jeopardize the survival of a threatened or endangered species. In consultation for those species with critical habitat, federal agencies must also ensure that their activities or projects do not adversely modify critical habitat to the point that it will no longer aid in the species' recovery. In many cases, this level of protection is similar to that already provided to species by the ESA "jeopardy standard". However, areas that are currently unoccupied by the species but which are needed for the species' recovery, are protected by the prohibition against adverse modification of critical habitat.

6.1.3 Literature Review

Potential occurrence of special status wildlife species in the Study Area was evaluated by first determining which special status species occur in the vicinity of the Study Area through a literature and database search. Database searches were conducted for known occurrences of special status wildlife species within the Fort Bragg, Inglenook, Dutchman's Knoll, Noyo Hill, Mathison Peak and Mendocino 7.5 minute USGS quadrangles. The following sources were reviewed to determine which special status wildlife species have been documented to occur in the vicinity of the Study Area:

- California Natural Diversity Database records (CNDDB) (CDFG 2009)
- USFWS Arcata Field Office species lists for Mendocino County (USFWS 2009)
- CDFG publication "California's Wildlife, Volumes I-III" (Zeiner et al. 1990)
- CDFG publication "Amphibians and Reptile Species of Special Concern in California" (Jennings 1994)
- A Field Guide to Western Reptiles and Amphibians (Stebbins, R.C. 2003)

6.1.4 Site Assessment

The Study Area was assessed for suitable habitats for species identified in the literature review as occurring in the vicinity. In addition to visits for wetland delineation and habitat mapping in early 2007, WRA Wildlife Biologist Bill Stagnaro and RCA Biologist Matt Richmond assessed the site for potential special status wildlife habitats on May 13 and July 8, 2009. During the July 8, 2009 visit by Matt Richmond, a protocol level survey (Biswell et al. 2002) for Sonoma Tree Vole (*Arborimus pomo*) was conducted. All wildlife species observed during these site visits are listed in Appendix C.

The potential for each special status wildlife species to occur in the Study Area was evaluated according to the following criteria:

- **No Potential**. Habitat on and adjacent to the site is clearly unsuitable for the species requirements (foraging, breeding, cover, substrate, elevation, hydrology, plant community, site history, disturbance regime).
- **Unlikely**. Few of the habitat components meeting the species requirements are present, and/or the majority of habitat on and adjacent to the site is unsuitable or of very poor quality. The species is not likely to be found on the site.
- **Moderate Potential**. Some of the habitat components meeting the species requirements are present, and/or only some of the habitat on or adjacent to the site is unsuitable. The species has a moderate probability of being found on the site.
- **High Potential**. All of the habitat components meeting the species requirements are present and/or most of the habitat on or adjacent to the site is highly suitable. The species has a high probability of being found on the site.
- **Present**. Species is observed on the site or has been recorded (i.e. CNDDB, other reports) on the site recently.

The site assessment is intended to identify the presence or absence of suitable habitat for each special status species known to occur in the vicinity in order to determine its potential to occur in the Study Area. The site assessment does not constitute a protocol-level survey and is not intended to determine the actual presence or absence of a species; however, if a special status species is observed during the site visit, its presence will be recorded and discussed. As described below, protocol-level surveys were conducted for special status plants following the site assessment.

Appendix D summarizes the potential for special status wildlife species to occur in the Study Area. Figure 7 shows wildlife species occurrence records within five miles of the Study Area. Wildlife species observed during the site visit are listed in Appendix C. Sixteen special status wildlife species have a moderate or higher potential to occur in the Study Area. These species, as well as other sensitive species that may be affected by the proposed project but may not necessarily occur in the Study Area, are discussed below.

Mammals

No special status mammal species were observed during the initial biological site visit conducted on May 13, 2009. Nine species were found to have a moderate or high potential for occurrence. These species are discussed below.

Long-eared Myotis (*Myotis evotis*). Western Bat Working Group (WBWG) High Priority. This bat species is primarily a forest associated species. Day roosts are found in hollow trees, under exfoliating bark, rock outcrop crevices and buildings. Other roosts include caves, mines and under bridges. The mature trees and snags in the Study Area may provide suitable roost habitat for this species.

Fringed Myotis (*Myotis thysanodes*). WBWG High Priority. This bat species is associated with a wide variety of habitats including mixed coniferous-deciduous forest and redwood/sequoia groves. Buildings, mines and large snags are important day and night roosts. The mature trees and snags in the Study Area may provide suitable roost habitat for this species.

Long-legged Myotis (*Myotis volans*). WBWG High Priority. The Long-legged Myotis is a bat generally associated with woodlands and forested habitats. Large hollow trees, rock crevices and buildings are important day roosts. Other roosts include caves, mines and

buildings. The mature trees and snags in the Study Area may provide suitable roost habitat for this species.

Silver-haired Bat (*Lasionycteris noctivagans*). WBWG Medium Priority. Summer habitats include coastal and montane coniferous forests, valley foothill woodlands, pinyon-juniper woodlands, and valley foothill and montane riparian habitats. This species is primarily a forest dweller, feeding over streams, ponds, and open brushy areas. It roosts in hollow trees, snags, buildings, rock crevices, caves, and under bark. The mature trees and snags in the Study Area may provide suitable roost habitat for this species.

Western Red Bat (*Lasiurus blossevillii*). WBWG High Priority. This species is considered highly migratory, and broadly distributed, reaching from southern Canada, through much of the western United States. They are typically solitary, roosting primarily in the foliage of trees or shrubs. Day roosts are commonly in edge habitats adjacent to streams or open fields, in orchards, and sometimes in urban areas possibly an association with riparian habitat (particularly willows, cottonwoods, and sycamores). The mature trees and snags in the Study Area may provide suitable roost habitat for this species.

Hoary Bat (*Lasiurus cinereus*). WBWG Medium Priority. This species is most abundant in the forests and croplands of the plains states and in forests of the Pacific Northwest, and is also found in the forests of the eastern United States and the arid deserts of the Southwest (TPWD 2007). Diverse woodland habitats with a mixture of forest and small open areas that provide edges seem ideal for this species (TPWD 2007). This species has been found in Spanish moss, squirrel nests, woodpecker holes, and out in the open on the trunks of trees. Summer tree roosts are typically located along edge habitats close to feeding grounds. Most females rear young in deciduous trees, while males prefer to roost in conifers. Both sexes appear to prefer older trees as roosts, which they use for up to 5 weeks, and apparently provide greater safety (TPWD 2007).

Pallid Bat (*Antrozous pallidus*). CDFG Species of Special Concern. WBWG High Priority. The Pallid Bat is found in a variety of low elevation habitats throughout California. It selects a variety of day roosts including rock outcrops, mines, caves, hollow trees, buildings, and bridges. Night roosts are usually found under bridges, but also in caves, mines, and buildings. Pallid Bat are sensitive to roost disturbance. Unlike most bat species, Pallid Bat primarily feed on large ground-dwelling arthropods, and many prey are taken on the ground (Zeiner et al. 1990). The mature trees and snags in the Study Area may provide suitable roost habitat for this species.

Sonoma Tree Vole (*Arborimus pomo*). CDFG Species of Special Concern. The Sonoma Tree Vole (STV) is found in California from Sonoma County north to the Oregon border. This species normally occurs in coniferous forests and is most commonly associated with Douglas-fir but is also known to inhabit Bishop pine forest. The nearest occurrence for this species is approximately 1.6 miles southwest of the Study Area (CNDDB 2009). Though no STV nor STV sign were observed during surveys or site visits, this vagile species is given a moderate potential for occurrence because of nearby occurrences and the presence of suitable habitat.

Ringtail (Ring-tailed Cat) (*Bassariscus astutus*). CDFG Fully Protected Species. Ringtail are a widespread resident of California, excluding the Central Valley, south to Mexico. This species is mostly carnivorous and mostly nocturnal. It is typically found in remote areas with trees, brush, and rock crevices for cover. It is often found in riparian forests or steep, rocky canyons. The Study Area and adjacent Newman Gulch provide suitable habitat for this species.

Birds

One special status avian species was observed during the initial site visit: Olive-sided Flycatcher (*Contopus cooperi*). An additional three special status avian species were found to have potential to occur in the Study Area. Each of these species is discussed below.

Vaux's Swift (*Chaetura vauxi*). CDFG Species of Special Concern. Vaux's Swift is a summer resident of northern California that prefers redwood and Douglas-fir habitats with nest-sites in large hollow trees and snags, especially tall, burned-out stubs. The species is a fairly common migrant throughout most of the state in April, May, August, and September. Suitable breeding habitat is available in the mature trees and snags in the Study Area.

Rufous Hummingbird (*Selasphorus rufus*). USFWS Bird of Conservation Concern. The Rufous Hummingbird is a common migrant and uncommon summer resident in California. It occurs in a wide variety of habitats as long as they provide abundant nectar sources. Suitable foraging and breeding habitat are available for this species in the Study Area.

Olive-sided Flycatcher (*Contopus cooperi*). CDFG Species of Special Concern. USFWS Bird of Conservation Concern. Within the coniferous forest biome, this species is most often associated with forest openings, forest edges near natural openings (e.g., meadows, canyons, rivers) or human-made openings (e.g., harvest units), or open to semi-open forest stands (Altman 2000). The coniferous trees in the Study Area may provide suitable breeding habitat for this species.

Purple Martin (*Progne subis*). CDFG Species of Special Concern. An uncommon to rare, local summer resident in a variety of wooded, low-elevation habitats throughout the state; a rare migrant in spring and fall, absent in winter. It usually feeds on insects captured in flight approximately 100 to 200 feet above ground. Purple Martin nest in cavities often located in a tall, old, isolated trees or snags in open forest or woodland. Suitable breeding habitat is available in the mature trees and snags in the Study Area.

Amphibians and Reptiles

No special status amphibian or reptile species were observed during the initial site visit. Three special status species were found to have potential for occurrence in the Study Area. These species include:

Coastal Tailed Frog *(Ascaphus truei*). CDFG Species of Special Concern. Adults forage primarily terrestrially along stream banks but also occasionally feed underwater. Breeding normally occurs in the early fall (late August and September), but pairs may be found clasped together at any time of the year (Nussbaum et al. 1983). The aquatic features at the outlet and inlet to Newman Reservoir may provide habitat for this species.

Northern Red-legged Frog (*Rana aurora).* CDFG Species of Special Concern. The Northern Red-legged Frog inhabits quiet pools of streams, marshes, and occasionally ponds. It occurs along the Coast Ranges from Del Norte County to Mendocino County, usually below 1200 meters (3936 feet). It requires permanent or nearly permanent pools for larval development, which takes 11 to 20 weeks (Storer 1925; Calef 1973). Intermittent streams must retain surface water in pools year-round for frog survival (Jennings et al. 1993). It may require rains for dispersal. Individuals have been found considerable distances from breeding sites on rainy nights.

Shaffer et al. (2004) found only Northern Red-legged Frog north of Big River, Mendocino County, only California Red-legged Frog south of Mills Creek and both species between Big River and Mills Creek (north of Irish Beach), Mendocino County. The nearest occurrence for this species is approximately 3 miles to the northwest of the Study Area (CNDDB 2009). Suitable breeding habitat may exist in Newman Reservoir. In addition, the proposed reservoir location may be used as dispersal and estivation habitat for this species.

Southern Torrent Salamander (*Rhyacotriton variegatus*). CDFG Species of Special Concern. This species occurs in coastal forests of northwestern California south to Point Arena in Mendocino County (Jennings and Hayes 1994) and is common in prime habitat. It is found primarily in cold, well-shaded permanent streams and spring seepages (Behler and King 1979) in redwood, Douglas-fir, mixed conifer, montane riparian and montane hardwood-conifer habitats (Stebbins 1951; Anderson 1968). The nearest occurrence for this species is approximately 1.3 miles to the south of the Study Area (CNDDB 2009). The aquatic features at the outlet and inlet to Newman Reservoir may provide habitat for this species.

Fish

Though no special status fish species have the potential to occur in the Study Area, the Study Area has hydrologic connectivity to the Noyo River. Construction activities have the ability to negatively affect downstream water quality for special status aquatic species know to occur in this feature. Special status fish species that are known to occur in the Noyo River include: Central California Coast Coho Salmon (*Oncorhynchus kisutch*), Northern California Steelhead (*Oncorhynchus mykiss*), and California Coastal Chinook Salmon (*Oncorhynchus tshawytscha*). In addition, the Noyo River is designated as critical habitat for Steelhead and Chinook. These species are discussed in more detail below.

Coho Salmon - Central California Coast ESU (*Oncorhynchus kisutch*). Federal Endangered. State Endangered. The Central California Coast ESU includes all naturally spawned populations of Coho Salmon (and their progeny) in California streams from the Eel River to Aptos Creek, including the Russian River and its tributaries, excluding the Sacramento-San Joaquin River Basin.

Coho Salmon typically migrate in late-fall to early winter to spawn in smaller, coastal streams. Spawning migration known as "runs" occur throughout the year. Spawning occurs mainly between November and January, but can occur as late as March during drought conditions. Juveniles may spend several years in the freshwater habitat before migrating to the ocean. Most adult fish return "home" maintaining fidelity to their natal stream. Preferred spawning habitat for Coho Salmon is small freshwater streams, with cool to cold water temperatures, medium to small gravel substrate, high dissolved oxygen levels, at the head of a riffle where water changes from laminar flow to turbulent flow (provides greater dissolved oxygen). Abundant riffle areas (shallow areas with gravel substrate) for spawning and deeper pools with sufficient riparian cover for rearing are necessary for successful breeding.

Steelhead - Northern California ESU (*Onocorhynchus mykiss*). Federal Threatened. CDFG Species of Special Concern. The federal designation refers populations occurring below impassable barriers in coastal basins from Redwood Creek to, and including, the Gualala River. The state designation refers only to the summer-run. The majority of adult steelhead enter the river in the fall or winter and spawn in early winter or spring, although summer-run steelhead enter much earlier in late spring to early summer and spawn winter or spring. Spawn

in cool, clear streams with high dissolved oxygen and gravel riffle substrate. Deeper pools with sufficient riparian cover for rearing are necessary for successful breeding.

Chinook Salmon - California Coastal ESU (*Oncorhynchus tshawytscha*). Federal Threatened, State Threatened. The ESU includes all naturally spawned populations of Chinook salmon from rivers and streams south of the Klamath River to the Russian River, California, as well as seven artificial propagation programs: the Humboldt Fish Action Council (Freshwater Creek), Yager Creek, Redwood Creek, Hollow Tree, Van Arsdale Fish Station, Mattole Salmon Group, and Mad River Hatchery fall-run Chinook hatchery programs.

Chinook Salmon are anadromous (adults migrate from a marine environment into the fresh water streams and rivers of their birth) and semelparous (spawn only once and then die). They are fairly faithful to the home streams in which they were spawned, using visual and chemical cues to locate these streams. While migrating and holding in the river, Chinook do not feed, relying instead on stored body fat reserves for maintenance and gonadal maturation. Eggs are laid in large depressions (redds) hollowed out in gravel beds.

6.2 Thresholds of Significance

A threshold of significance is an identifiable, quantitative, qualitative or performance level or set of criteria describing a particular environmental effect. Exceeding the threshold normally indicates a significant environmental effect, while not exceeding indicates a less than significant effect. Significance criteria for impacts to biological resources are based on State CEQA Guidelines Section 15065 and Appendix G, and Public Resources Code Section 21083. Although state guidelines encourage counties and other CEQA Lead Agencies to develop general guidelines for use in the environmental review process, to date neither Mendocino County nor the City of Fort Bragg has not developed such guidelines.

According to state guidelines, a project will have a significant effect on biological resources if it would:

- Have a substantial adverse effect, such as reducing the number or restricting the range of, any sensitive, candidate or special-status species listed in local, state or federal plans, policies or regulations, either directly or through habitat modification;
- Have a substantial adverse effect on any riparian or other sensitive natural community identified in local, regional, state or federal plans;
- Have a substantial adverse effect on any federally protected wetland;
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species, wildlife corridors, or nursery sites;
- Conflict with local policies or ordinances protecting biological resources, such as a tree preservation ordinance; or
- Conflict with an approved local, regional, or state habitat conservation plan.

For the purposes of this biological impact analysis, three principal components of the guidelines outlined above were considered:

- Magnitude of the impact (e.g., substantial/not substantial);
- Uniqueness of the affected resource (rarity); and
- Susceptibility of the affected resource to perturbation (sensitivity).

The evaluation of significance must consider the interrelationship of these components. For example, a relatively small magnitude of impact to breeding Burrowing Owl (*Athene cunicularia*) would be considered significant because the species is increasingly rare in portions of California and is believed to be very susceptible to burrow disturbance. A much larger magnitude of impact would be required to result in a significant impact to wildlife species that are not rare or as sensitive to disturbance.

6.3 Potential Project Impacts and Mitigation Measures

Potential Project Impact 6.3.1: Disturbance of Special Status Bat Species

A number of mature trees and snags are capable of supporting bat roosts in the Project Area. If special status bat species roosts are present, project development may impact these species either through direct removal of roosts or nearby disturbance. In addition, an increase in night lighting for the proposed project may result in disturbance to movement and behavior and may be a potential indirect impact. Bat foraging habitat is not expected to be negatively impacted by the project. In fact, bat foraging habitat may be improved by the presence of the proposed reservoir.

> *Proposed Project Mitigation Measure 6.3.1:* Measures that will be implemented to avoid, minimize, and mitigate for potential impacts to special status bat species include:
>
> WORK WINDOWS. Removal of potential bat roost habitat (large trees or snags) or construction activities near potential bat roost habitat will take place in September and October to avoid impacts to bat maternity or hibernation roosts.
>
> ROOST SURVEYS. If this work window is not feasible, prior to construction, bat roost surveys will be conducted in the Project Area to determine if bats are occupying roosts. If bats are present, a suitable buffer around the roost site will be instated or bats will be excluded from the roost using methods recommended by a qualified biologist.
>
> MANAGE LIGHTING. Installation of outdoor artificial lighting in or adjacent to the Project Area will be avoided, unless required for public safety. If outdoor artificial lighting is placed within the Project Area, it will incorporate measures to lessen potential impacts to bats such as: prismatic glass coverings, cutoff shields, embedded road lights, narrow spectrum bulbs, or other appropriate lighting technology.
>
> *Level of Significance with Mitigation 6.3.1:* Implementation of the measures listed above would reduce impacts to special status bat species to a less than significant level.

Potential Project Impact 6.3.2: Disturbance of Sonoma Tree Vole

Potential direct impacts to STV nests could occur during construction as a result of removal of trees that contain nests, equipment movement, or by direct mortality. Indirect impacts to STV may include an increase in nighttime lighting and nest abandonment due to noise or other human disturbances during construction.

> *Proposed Project Mitigation Measure 6.3.2:* Measures that will be implemented to avoid, minimize, and mitigate for potential impacts to special status bat species include:
>
> PRECONSTRUCTION SURVEYS. Preconstruction surveys for the Sonoma Tee Vole will be performed prior to construction activities. Tree vole survey methodology should

follow the *Survey protocol for the Red Tree Vole Arborimus longicaudus (= Phenacomys longicaudus in the Record of Decision of the Northwest Forest Plan), Version 2.1, Revision, October 2002* or any subsequent revision.

CONSULTATION. Occupied trees will be avoided to the fullest extent possible. If disturbance of occupied trees is unavoidable, consultation with CDFG will be initiated to determine the appropriate mitigation measures. Measures may include the preservation or avoidance of suitable habitat.

Level of Significance with Mitigation 6.3.2: Implementation of the measures listed above would reduce impacts to STV to a less than significant level.

Potential Project Impact 6.3.3: Disturbance of Nesting Special Status Bird Species and Other Breeding Birds

Potential direct impacts to nesting special status avian species could occur during construction as a result of the removal of trees and shrubs that contain nests, removal of riparian habitat, ground disturbance, equipment movement, or by direct mortality. Indirect impacts to nesting special status avian species may include increased nighttime lighting and nest abandonment due to noise or other human disturbances during construction. Abandonment of an active nest, eggs, and/or young would represent a potentially significant impact.

Proposed Project Mitigation Measure 6.3.3: Project measures that will be implemented to avoid, minimize, and mitigate for potential impacts to nesting avian species include:

WORK WINDOWS. Conduct as much ground disturbance and vegetation (tree and shrub) removal as is feasible between September 1 and January 15, outside of the breeding season for most bird species.

PRECONSTRUCTION SURVEYS. If ground disturbance or removal of vegetation occurs between January 16 and August 31, preconstruction surveys will be performed prior to such disturbance to determine the presence and location of nesting bird species.

BUFFERS. If nests are present, establishment of temporary protective breeding season buffers will avoid direct mortality of these birds. The appropriate buffer distance is species specific and will be determined by a qualified biologist as appropriate to prevent nest abandonment and direct mortality during construction.

MANAGE LIGHTING. If outdoor artificial lighting is placed within the Project Area, it will incorporate measures to lessen potential impacts to avian species such as: prismatic glass coverings, cutoff shields, embedded road lights, narrow spectrum bulbs, or other appropriate lighting technology.

Level of Significance with Mitigation 6.3.3: Implementation of the measures listed above would reduce impacts to nesting bird species to a less than significant level.

Potential Project Impact 6.3.4: Disturbance to Special Status Herpetofauna

Project development activities may result in permanent onsite impacts to potential herpetofaunal dispersal habitat. Construction activities in the Project Area may also result in direct mortality of individuals. Potential indirect impacts to special status amphibian species include: impediment of dispersal by the proposed project, alteration of hydrology and water quality in neighboring

habitats during project construction and operation, and increased lighting from the proposed project.

The creation of the proposed reservoir and overflow may increase the amount of potential breeding, foraging and dispersal habitat for sensitive herpetofaunal species known to occur in the vicinity of the Project Area.

> *Proposed Project Mitigation Measure 6.3.4:* Project design features that will be implemented to avoid, minimize and mitigate for potential impacts to special status amphibian species include:
>
> EXCLUSION FENCE. Prior to ground disturbance, a temporary exclusion fence containing exit funnels (to enable dispersing sensitive species to exit the impact area) will be established around the Project Area. Exact exclusion fence and exit funnel locations will be determined by a qualified biologist.
>
> PRECONSTRUCTION SURVEY. A preconstruction survey will be performed by a qualified biologist within the confines of the exclusion fence prior to ground disturbance to ensure no special status amphibian species are present.
>
> STORMWATER TREATMENT. A SWPPP will be implemented to control sediment and pollutants during construction and prevent construction activities from having a negative effect on water quality and quantities in preserved portions of the Study Area. Through implementation of the SWPPP, project stormwater will be treated to meet state and federal stormwater requirements, including treatment of stormwater quality and quantity so that they are not substantially altered from existing conditions.
>
> MANAGE LIGHTING. Installation of artificial lighting in the Project Area will be avoided, unless required for public safety. If outdoor artificial lighting is placed within the Project Area, it will incorporate measures to lessen potential impacts to frog species such as: prismatic glass coverings, cutoff shields, embedded road lights, narrow spectrum bulbs, or other appropriate lighting technology.
>
> *Level of Significance with Mitigation 6.3.4:* Implementation of the measures listed above would reduce impacts to special status amphibian species to a less than significant level.

Potential Project Impact 6.3.5: Disturbance to Special Status Migratory Fish

Although no direct impacts to salmonid species are expected to occur in the Study Area, they are addressed here as Newman Gulch has hydrologic connectivity to the Noyo River, a known salmonid-bearing water feature. Listed fish species known to occur in Noyo River include: the federally endangered Central California Coast Coho Salmon (*Oncorhynchus kisutch*), the federally threatened Northern California Steelhead (*Oncorhynchus mykiss*) and the federally threatened California Coastal Chinook (*Oncorhynchus tshawytscha*). In addition, the Noyo River is listed as Critical Habitat for Steelhead and Chinook populations. Listed fish species have the potential to be indirectly impacted by work done in Newman Gulch as a result of runoff and water quality issues. Indirect impacts may include construction-related discharge of sediment or other pollutants into surface waters or aquatic habitats. In addition, potential discharge of the proposed reservoir into Newman Gulch has the potential to alter the hydrology of this feature. Reservoir discharge has the potential to influence downstream water temperature and to attract in-migrating salmonid species into aquatic habitat that may not be suitable for spawning.

Proposed Project Mitigation Measure 6.3.5: CONSTRUCTION BMPs

Appropriate BMPs during construction activities, such as the use of a silt fence or other erosion control measures to prevent sediment from entering the water column, will protect in-migrating adults and out-migrating smolts from potential disturbance from increased turbidity. Erosion control measures should not contain monofilament as this may pose a potential entanglement hazard to sensitive amphibian species that may occur in the area. Potential discharge of the reservoir into Newman Gulch should be done with the consultation of the National Marine Fisheries Service (NMFS) to ensure there are no potential impacts to migrating salmonids species.

Level of Significance with Mitigation 6.3.5: Implementation of the measures listed above would reduce impacts on migratory fish to a less than significant level.

Potential Project Impact 6.3.6: Wildlife Habitat Removal

Wildlife habitat removal includes activities such as ground surface disturbance and vegetation removal. These activities could effectively remove existing habitat, thereby reducing its availability to local wildlife populations. Habitat removal would occur primarily during project construction activities in the upland and wetland habitats. Permanent and temporary loss of habitat with the project vicinity could affect some common small mammal, reptile, and/or amphibian with very limited home range abilities. For these species, the clearing of construction areas could represent a slight reduction in the carrying capacity of a portion of their home range until a productive vegetation cover is reestablished. However, most of these species are common and widely distributed throughout the area and the loss of some individuals as a result of habitat removal would have a negligible impact on the populations of species throughout the region. Extensive amounts of similar habitat is available adjacent to the impact area. In addition, Proposed Project Mitigation Measure 6.3.4 will help prevent potential impacts to these species. Therefore, the potential clearing of the habitat for most of the smaller wildlife species in the construction area is considered adverse but less than significant.

Proposed Project Mitigation Measure 6.3.6: No mitigation is required.

Potential Project Impact 6.3.7: Direct Wildlife Mortality

Direct loss of small mammals, reptiles, amphibians, and other less mobile species could result from clearing, grading, excavating, and/or burying habitats in the construction area. However, most of these species are common and widely distributed throughout the area and the loss of some individuals as a result of habitat removal would have a negligible impact on the populations of species throughout the region. In addition, Proposed Project Mitigation Measure 6.3.4 will help prevent potential impacts to these species. Therefore, the direct mortality of the smaller wildlife species in the small construction area is considered adverse but less than significant.

Proposed Project Mitigation Measure 6.3.7: No mitigation is required.

Potential Project Impact 6.3.8: Impacts to Wildlife Movement Corridors

A wildlife movement corridor is an area which provides a species a single continuous habitat which functions to provide gene flow between sub-populations, as well as potential temporary housing to the sub-population if needed. Potential barriers to wildlife movement currently do not exist within the project vicinity. The proposed project is not expected to affect both larger, wide-

ranging mammals which may move more frequently through the region as well as smaller, narrow-ranging species that may move over generational time periods. The addition of a reservoir in the Project Area has the potential to improve the movement corridors and dispersal capabilities of some species, such as some herpetofauna, by providing essential aquatic breeding and foraging habitat.

Proposed Project Mitigation Measure 6.3.8: No mitigation is required.

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APPENDIX A

REPORT FIGURES

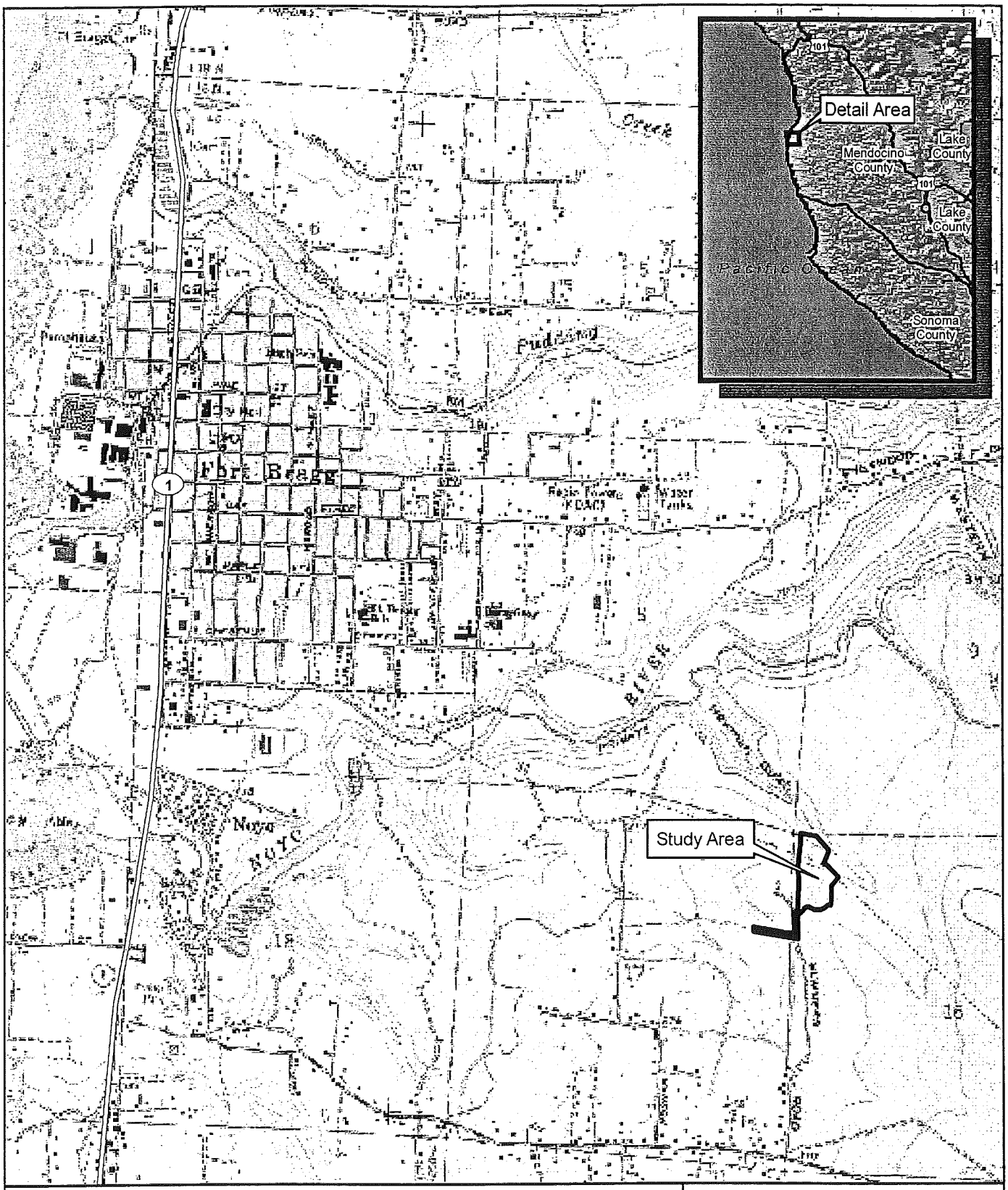

Figure 1. Study Area Location Map

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W E
S

wra ENVIRONMENTAL CONSULTANTS

REDWOOD COAST ASSOCIATES

Summers Lane Reservoir
Mendocino County, California

0 1,000 2,000 4,000 Feet

Map Date: November 2009
Map By: Derek Chan
Base Source: USGS
Filepath: L:\ACAD2000\12132\GIS\ArcMap\Fig1_LocMap.mxd

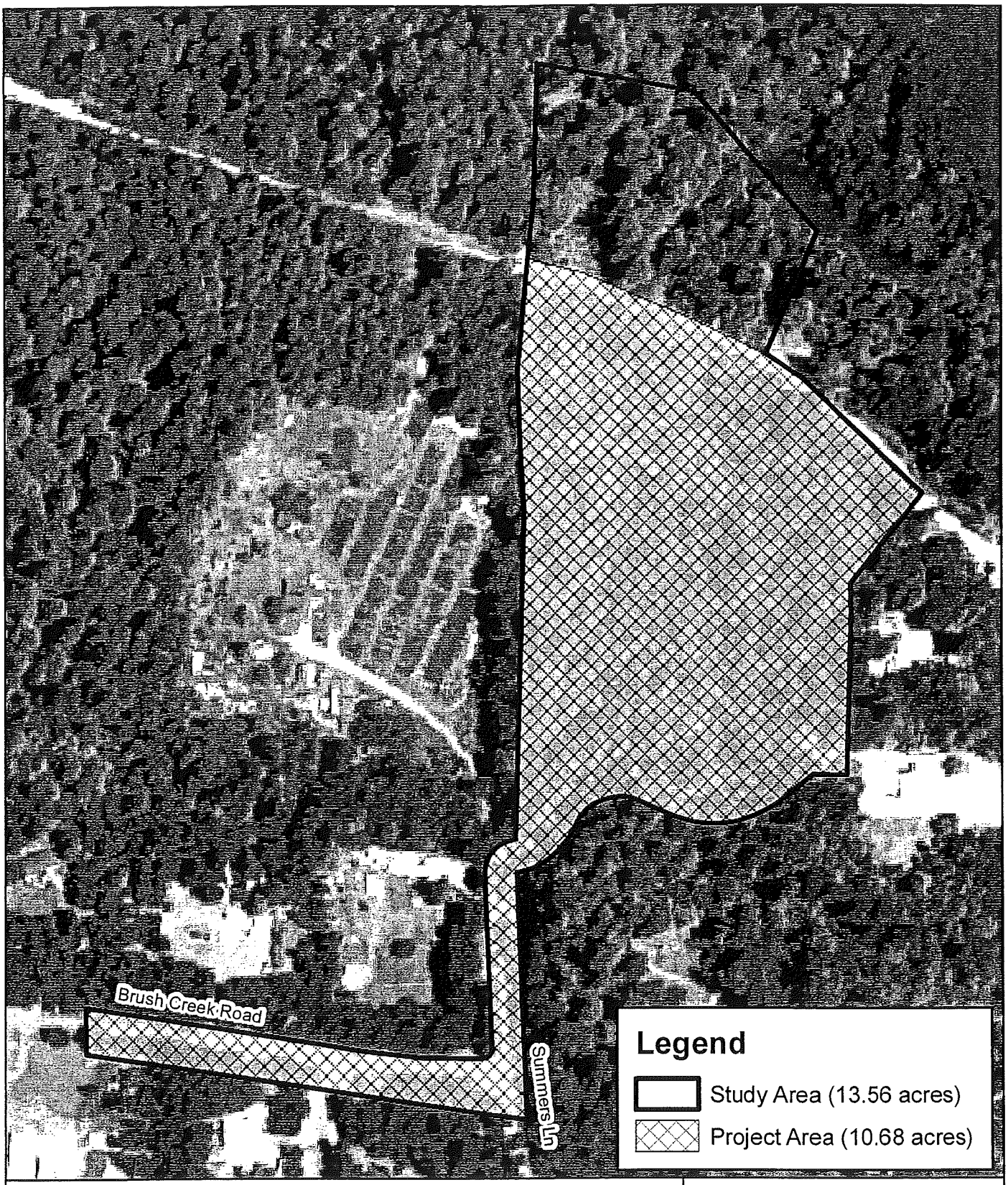

Figure 2. Study Area and Project Area Map

N
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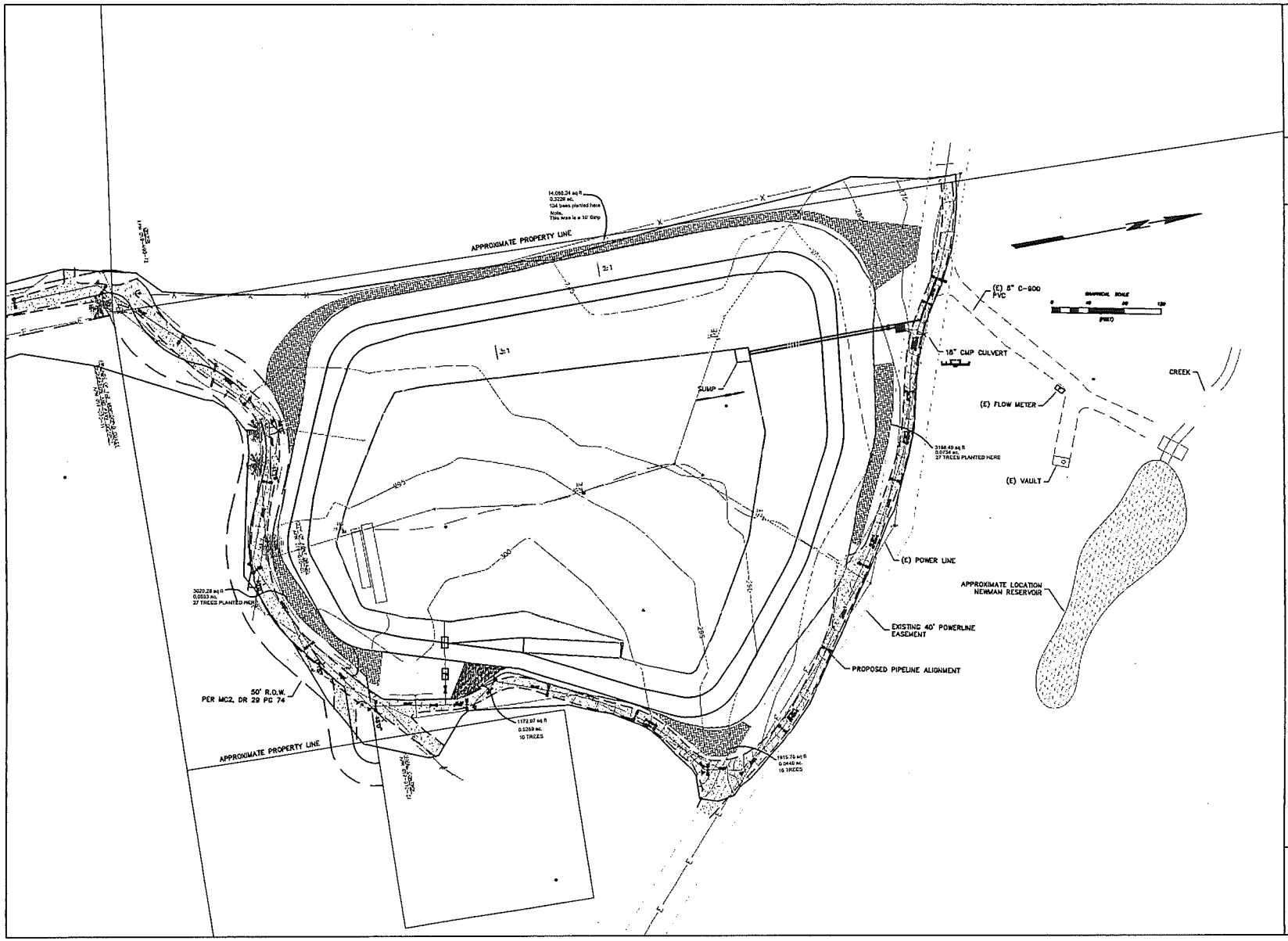
wra ENVIRONMENTAL CONSULTANTS

REDWOOD COAST ASSOCIATES

Summers Lane Reservoir
Mendocino County, California

0 100 200 Feet

Map Date: November 2009
Map By: Derek Chan
Base Source: NAIP, 2005
Filepath:L:\Acad 2000 Files\17000\17017\gis\arcmap\Newman Gulch\Fig2_Aerial_20091116.mxd



wra
ENVIRONMENTAL CONSULTANTS
2169-G East Francisco Blvd.
San Rafael, CA 94901
(415) 454-8868 Phone
(415) 454-0129 Fax

REDWOOD COAST ASSOCIATES

Summers Lane Reservoir

Mendocino County, California

Figure 3

Proposed Project

Date: November 2009
Source: RCA
Map By: Derek Chan
Filepath: L:\Acad 2000 Files\17000\17017\dwg\Fig3_ProposedProject.dwg

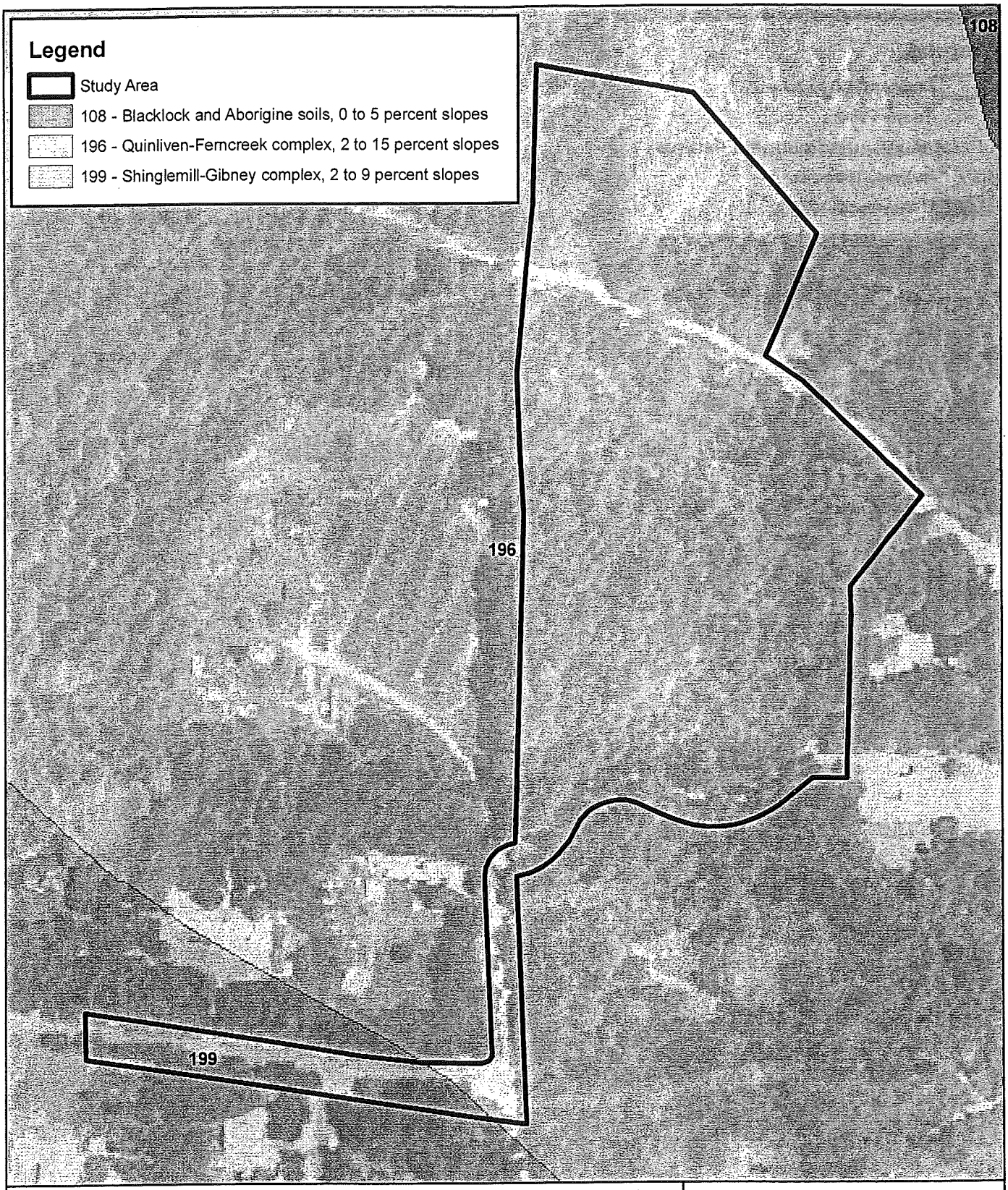


Figure 4. Soils Map

N
W E
S

0 100 200 Feet

wra ENVIRONMENTAL CONSULTANTS

REDWOOD COAST ASSOCIATES

Summers Lane Reservoir
Mendocino County, California

Map Date: November 2009
Map By: Derek Chan
Base Source: NAIP, 2005
Filepath:L:\Acad 2000 Files\17000\17017\gis\arcmap\Newman Gulch\Fig4_Soils_20091116.mxd

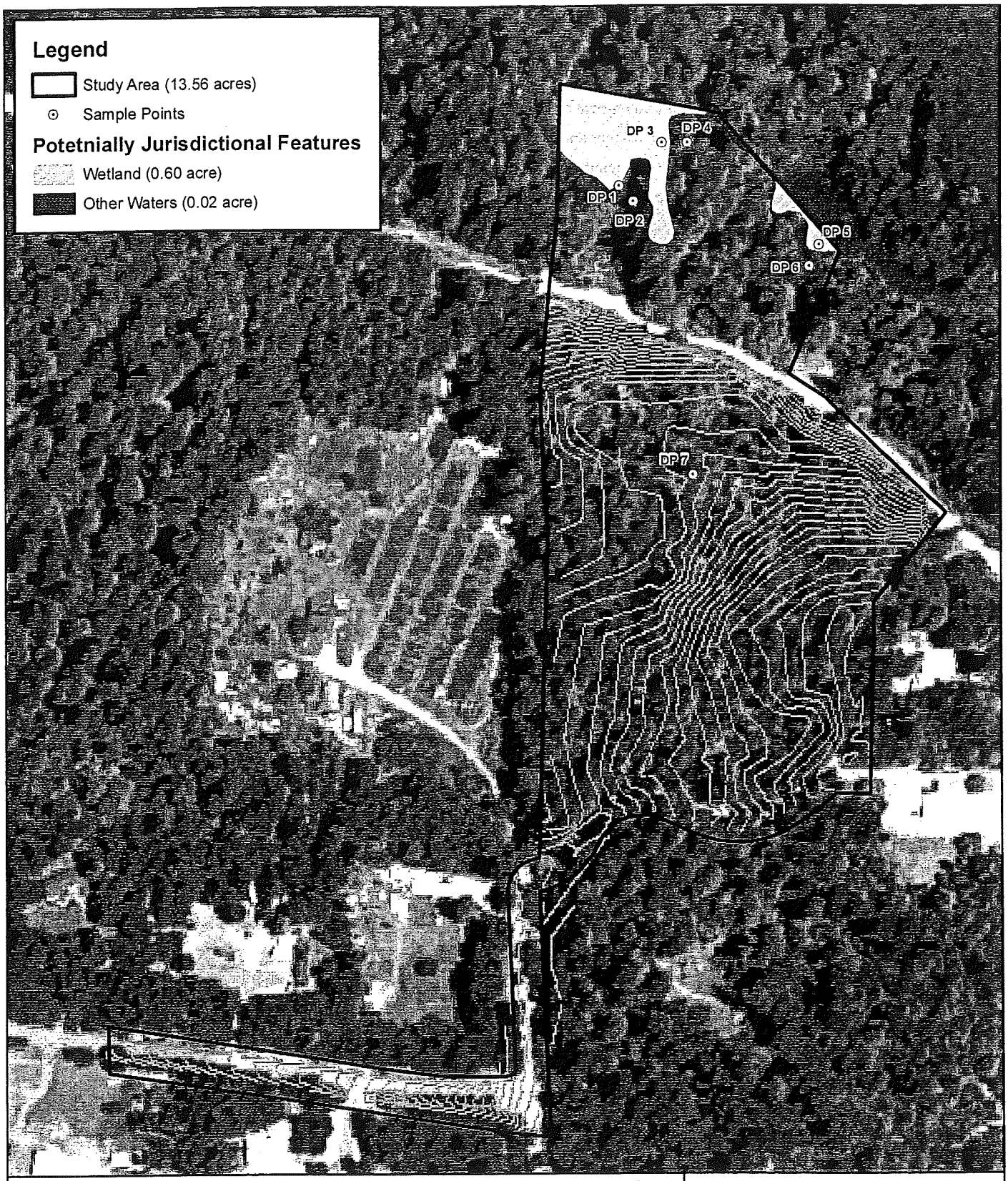


Figure 5. Jurisdictional Wetlands and Waters in the Study Area

N
W E
S

wra ENVIRONMENTAL CONSULTANTS

REDWOOD COAST ASSOCIATES

Summers Lane Reservoir
Mendocino County, California

0 100 200 Feet

Map Date: November 2009
Map By: Derek Chan
Base Source: NAIP, 2005
Filepath: L:\Acad 2000 Files\17000\17017\gis\arcmap\Newman Gulch\Fig5_Delin_20091119.mxd

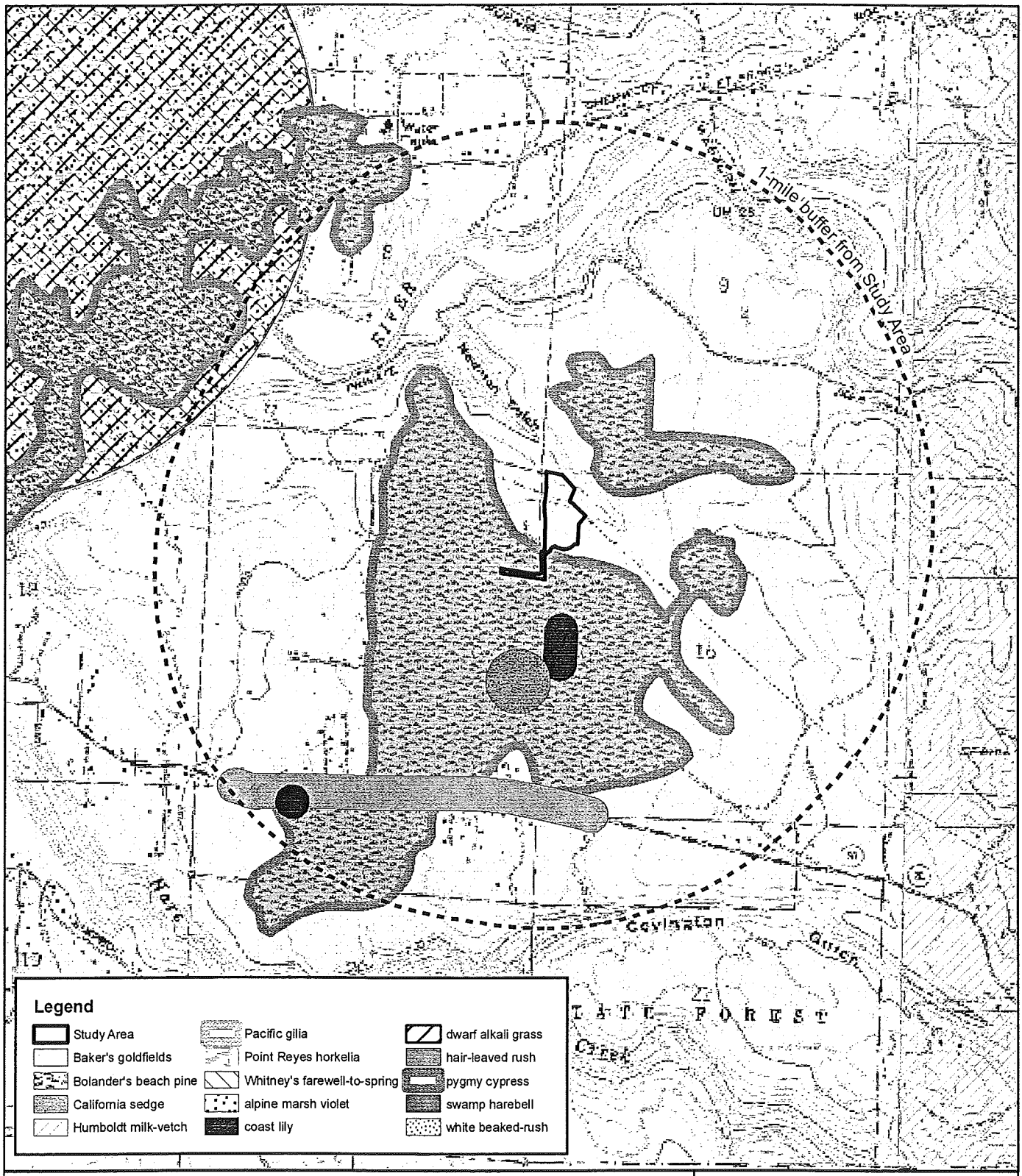


Figure 6. Special Status Plant Species Recorded Within One Mile of the Study Area

Summers Lane Reservoir
Mendocino County, California

wra ENVIRONMENTAL CONSULTANTS
REDWOOD COAST ASSOCIATES

Date: November 2009
Basemap: USGS Topo Quad
Map By: Derek Chan
Filepath: L:\Acad 2000 Files\17000\17017\gis\arcmap\Newman Gulch\Fig6_CNDDBplants_20091116.mxd

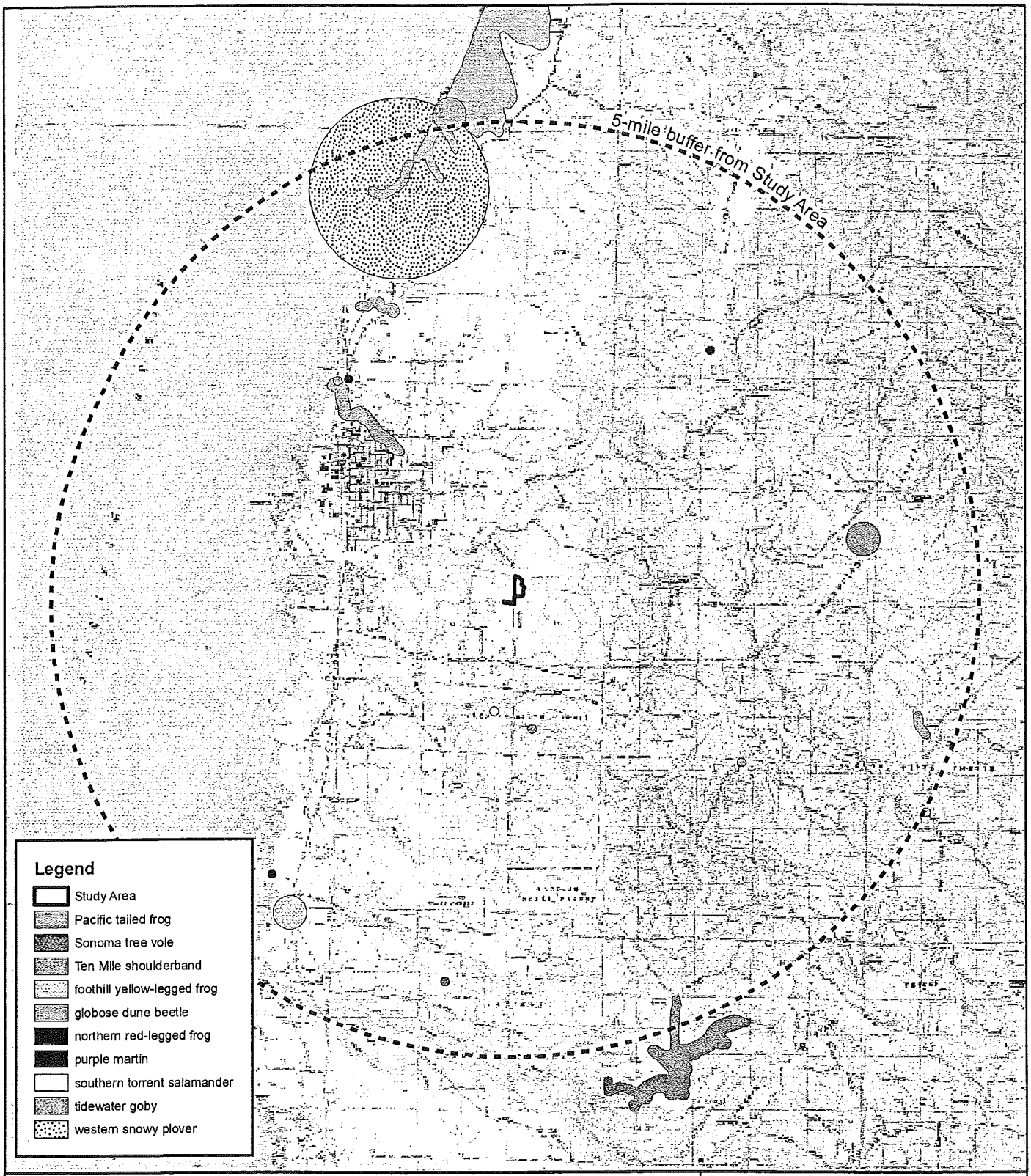


Figure 7. Special Status Wildlife Species Recorded Within Five Miles of the Study Area

N
W E
S

wra ENVIRONMENTAL CONSULTANTS

REDWOOD COAST ASSOCIATES

Summers Lane Reservoir
Mendocino County, California

0 1 2 Miles

Date: November 2009
Basemap: USGS Topo Quad
Map By: Derek Chan
Filepath: L:\Acad 2000 Files\17000\17017\gis\arcmap\Newman Gulch\Fig7_CNDDBanimals_20091116.mxd

APPENDIX B

WETLAND DATA SHEETS

Wetland Determination Data Form - Western Mountains, Valleys and Coast Region

Project/Site Newman Gulch City Fort Bragg County Mendocino Sampling Date 7/8/2009

Applicant/Owner City of Fort Bragg State CA Sampling Point DP1

Investigator(s) Matt Richmond, Tim DeGraff Section,Township,Range sec8, T18N, R17W

Landform (hillslope, terrace, etc.) hillslope Local Relief (concave, convex, none) None Slope(%) 5

Subregion(LRR) LRR A (Northwest Forests and Coast) Lat: 39 25'35.08" N Long: 123 46'11.92" W Datum:

Soil Map Unit Name NWI classification

Are climatic/hydrologic conditions on-site typical for this time of year? ☒ Yes ☐ No (If no, explain in remarks)

Are any of the following significantly disturbed? ☐ Vegetation ☐ Soil ☐ Hydrology Are "Normal Circumstances" present? ☐ Yes ☒ No

Are any of the following naturally problematic? ☐ Vegetation ☐ Soil ☐ Hydrology (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS - Attach site map showing sample point locations, transects, important features, etc.

Hydrophytic Vegetation Present? ☒ Yes ☐ No

Hydric Soil Present? ☒ Yes ☐ No

Wetland Hydrology Present? ☒ Yes ☐ No

Is the Sampled Area within a Wetland? ☒ Yes ☐ No

Remarks: Located near the boundary of a potential Corps jurisdictional seep wetland. Meets all three wetland criteria. Delineation conducted during a dry year.

VEGETATION (use scientific names)

TREE STRATUM Plot Size: 30' radius	Absolute % cover	Dominant Species?	Indicator Status
1. *Alnus rubra*	30	Y	FACW
2. *Sequoia sempervirens*	2		NL
3.			
4.			
Tree Stratum Total Cover:	32		
SAPLING/SHRUB STRATUM Plot Size: 30' radius			
1. *Rubus spectabilis*	5	Y	FAC+
2. *Rubus parviflorus*	4	Y	FAC+
3.			
4.			
Sapling/Shrub Stratum Total Cover:	9		
HERB STRATUM Plot Size: 30' radius			
1. *Athyrium filix-femina*	50	Y	FAC
2. *Rubus ursinus*	20	Y	FACW
3. *Carex obnupta*	10		OBL
4. *Equisetum telmateia*	10		OBL
5. *Blechnum spicant*	5		FAC+
6.			
7.			
8.			
Herb Stratum Total Cover:	95		
WOODY VINES Plot Size:			
1.			
2.			
Woody Vine Stratum Total Cover:			

% Bare ground in herb stratum % cover of biotic crust

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC? 5 (A)

Total number of dominant species across all strata? 5 (B)

% of dominant species that are OBL, FACW, or FAC? 100 (A/B)

Prevalence Index Worksheet

Total % cover of:		Multiply by:	
OBL species		x1	
FACW species		x2	
FAC species		x3	
FACU species		x4	
UPL species		x5	
Column Totals	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators

☒ Dominance Test is >50%

☐ Prevalence Index is </= 3.0[1]

☐ Morphological adaptations[1] (provide supporting data in remarks)

☐ Wetland Non-Vascular Plants [1]

☐ Problematic hydrophytic vegetation[1] (explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present ? ☒ Yes ☐ No

Remarks: Meets hydrophytic vegetation criteria.

SOIL

Sampling Point DP1

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[1]	Texture	Remarks
+1.5-0							duff	
0-1	10YR 2/2	100					Sandy Loam	
1-12 +	10YR 5/2	100	10YR 4/6	3-5	C	PL	Sand	prominent redox

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

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

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☒ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except MLRA1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (explain in remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present ? ☒ Yes ☐ No

Remarks: 3-5% prominent redox concentrations on pore linings in a reduced matrix - meets sandy redox hydric soil indicator.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except NW coast)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1)(LRR AA)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water-Stained Leaves (B9)(NW coast)
- ☐ Drainage Patterns (B10)
- ☒ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☒ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6)(LRR A)
- ☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface water present? ☐ Yes ☒ No Depth (inches): _____

Water table present? ☐ Yes ☒ No Depth (inches): _____

Saturation Present? (includes capillary fringe) ☒ Yes ☐ No Depth (inches): less than 24"

Wetland Hydrology Present ? ☒ Yes ☐ No

Describe recorded data (stream guage, monitoring well, aerial photos, etc.) if available.

Remarks: Meets FAC-neutral test and two other hydrology indicators. Moist soils in upper 12". Saturated within 2 feet. Located adjacent to channel. Oxidized rhizospheres (see above).

Wetland Determination Data Form - Western Mountains, Valleys and Coast Region

Project/Site Newman Gulch City Fort Bragg County Mendocino Sampling Date 7/8/2009

Applicant/Owner City of Fort Bragg State CA Sampling Point DP2

Investigator(s) Matt Richmond, Tim DeGraff Section,Township,Range sec8, T18N, R17W

Landform (hillslope, terrace, etc.) hillslope Local Relief (concave, convex, none) None Slope(%) 12

Subregion(LRR) LRR A (Northwest Forests and Coast) Lat: 39 25'35.08" N Long: 123 46'11.92" W Datum:

Soil Map Unit Name NWI classification

Are climatic/hydrologic conditions on-site typical for this time of year? ☒ Yes ☐ No (If no, explain in remarks)

Are any of the following significantly disturbed? ☐ Vegetation ☐ Soil ☐ Hydrology Are "Normal Circumstances" present? ☐ Yes ☒ No

Are any of the following naturally problematic? ☐ Vegetation ☐ Soil ☐ Hydrology (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS - Attach site map showing sample point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	☐ Yes ☒ No	**Is the Sampled Area within a Wetland?** ☐ Yes ☒ No
Hydric Soil Present?	☐ Yes ☒ No	
Wetland Hydrology Present?	☐ Yes ☒ No	

Remarks: Paired upland point with DP1, located uphill on a steeper slope. No wetland indicators observed. Delineation conducted during a dry year.

VEGETATION (use scientific names)

TREE STRATUM Plot Size: 30' radius	Absolute % cover	Dominant Species?	Indicator Status
1. *Sequoia sempervirens*	80	Y	NL
2. *Lithocarpus densiflorus*	5		NL
3.			
4.			
Tree Stratum Total Cover:	85		
SAPLING/SHRUB STRATUM Plot Size: 30' radius			
1. *Rhododendron macrophyllum*	20	Y	NL
2. *Gaultheria shallon*	15	Y	NL
3. *Lithocarpus densiflorus*	5		NL
4. *Vaccinium ovatum*	5		NL
Sapling/Shrub Stratum Total Cover:	45		
HERB STRATUM Plot Size: 30' radius			
1. *Polystichum munitum*	5	Y	NL
2. *Pteridium aquilinum*	5	Y	FACU
3. *Trillium ovatum*	5	Y	NI
4.			
5.			
6.			
7.			
8.			
Herb Stratum Total Cover:	15		
WOODY VINES Plot Size:			
1.			
2.			
Woody Vine Stratum Total Cover:			

% Bare ground in herb stratum % cover of biotic crust

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC? 0 (A)

Total number of dominant species across all strata? 6 (B)

% of dominant species that are OBL, FACW, or FAC? 0 (A/B)

Prevalence Index Worksheet

Total % cover of:		Multiply by:
OBL species	x1	
FACW species	x2	
FAC species	x3	
FACU species	x4	
UPL species	x5	
Column Totals	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is </= 3.0[1]
- ☐ Morphological adaptations[1] (provide supporting data in remarks)
- ☐ Wetland Non-Vascular Plants [1]
- ☐ Problematic hydrophytic vegetation[1] (explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present ? ☐ Yes ☒ No

Remarks: Most species not listed in 1988 list, but all are upland, FACU, or NL in 1996 list. Does not meet hydrophytic vegetation criteria. 20% cover of duff/leaf litter in herb and S/S strata.

SOIL

Sampling Point DP2

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[1]	Texture	Remarks
+2-0							duff	
0-12	10YR 4/2	100					Sandy Loam	

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

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

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except MLRA1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (explain in remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present ? ☐ Yes ☒ No

Remarks: No hydric soil indicators observed.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except NW coast)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1)(LRR AA)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water-Stained Leaves (B9)(NW coast)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6)(LRR A)
- ☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface water present? ☐ Yes ☒ No Depth (inches): _____

Water table present? ☐ Yes ☒ No Depth (inches): _____

Saturation Present? (includes capillary fringe) ☐ Yes ☒ No Depth (inches): _____

Wetland Hydrology Present ? ☐ Yes ☒ No

Describe recorded data (stream guage, monitoring well, aerial photos, etc.) if available.

Remarks: No wetland hydrology indicators observed

Wetland Determination Data Form - Western Mountains, Valleys and Coast Region

Project/Site: Newman Gulch | City: Fort Bragg | County: Mendocino | Sampling Date: 7/8/2009

Applicant/Owner: City of Fort Bragg | State: CA | Sampling Point: DP3

Investigator(s): Matt Richmond, Tim DeGraff | Section,Township,Range: sec8, T18N, R17W

Landform (hillslope, terrace, etc.): hillslope | Local Relief (concave, convex, none): Concave | Slope(%): 2

Subregion(LRR): LRR A (Northwest Forests and Coast) | Lat: 39 25'35.08" N | Long: 123 46'11.92" W | Datum:

Soil Map Unit Name: | NWI classification:

Are climatic/hydrologic conditions on-site typical for this time of year? ☒ Yes ☐ No (If no, explain in remarks)

Are any of the following significantly disturbed? ☐ Vegetation ☐ Soil ☐ Hydrology | Are "Normal Circumstances" present? ☐ Yes ☒ No

Are any of the following naturally problematic? ☐ Vegetation ☐ Soil ☐ Hydrology | (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS - Attach site map showing sample point locations, transects, important features, etc.

Hydrophytic Vegetation Present? ☐ Yes ☒ No

Hydric Soil Present? ☒ Yes ☐ No

Wetland Hydrology Present? ☒ Yes ☐ No

Is the Sampled Area within a Wetland? ☒ Yes ☐ No

Remarks: This area is believed to be a potential Corps jurisdictional seep wetland despite vegetation results, due to saturation near surface, mucky soils, and a shallow water table. Delineation conducted during a dry year.

VEGETATION (use scientific names)

TREE STRATUM Plot Size: 5' radius	Absolute % cover	Dominant Species?	Indicator Status
1. *Sequoia sempervirens*	5	Y	NL
2.			
3.			
4.			
Tree Stratum Total Cover: 5			
SAPLING/SHRUB STRATUM Plot Size: 5' radius			
1. *Vaccinium parvifolium*	5	Y	NL (NI**)
2. *Gaultheria shallon*	5	Y	NL (FACU**)
3.			
4.			
Sapling/Shrub Stratum Total Cover: 10			
HERB STRATUM Plot Size: 5' radius			
1. *Blechnum spicant*	75	Y	FAC+
2. *Polystichum munitum*	5		NL (FACU**)
3.			
4.			
5.			
6.			
7.			
8.			
Herb Stratum Total Cover: 80			
WOODY VINES Plot Size:			
1.			
2.			
Woody Vine Stratum Total Cover:			

% Bare ground in herb stratum | % cover of biotic crust

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC? 1 (A)

Total number of dominant species across all strata? 4 (B)

% of dominant species that are OBL, FACW, or FAC? 25 (A/B)

Prevalence Index Worksheet

Total % cover of:		Multiply by:	
OBL species	0	x1	
FACW species	0	x2	
FAC species	75	x3	225
FACU species	10	x4	40
UPL species	10	x5	50
Column Totals	95 (A)		315 (B)

Prevalence Index = B/A = 3.32

Hydrophytic Vegetation Indicators

☐ Dominance Test is >50%

☐ Prevalence Index is </= 3.0[1]

☐ Morphological adaptations[1] (provide supporting data in remarks)

☐ Wetland Non-Vascular Plants [1]

☒ Problematic hydrophytic vegetation[1] (explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present ? ☒ Yes ☐ No

Remarks: Picked a representative area of community & examined a 5' radius plot. Large sequoias outside of swale created 80% cover but were not included as part of the swale community. **1996 indicators shown in parentheses to help clarify status of this problematic vegetation community. Prevalence index calculated with 1996 indicators - PI would also be >3 if using 1988 indicators.

SOIL

Sampling Point DP3

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[1]	Texture	Remarks
0-2	organic layer	100						heavy histosols, mucky
2+	10 YR 3/2	100						organic mixed w/ sand

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

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

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☒ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except MLRA1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (explain in remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present ? ☒ Yes ☐ No

Remarks: Mineral sandy soil mixed w/ mucky organic matter. Muck layer on top of of mineral soil with a chroma of 2 meets the Black Histic hydric soil indicator.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except NW coast)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1)(LRR AA)
- ☒ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water-Stained Leaves (B9)(NW coast)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6)(LRR A)
- ☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface water present? ☐ Yes ☒ No Depth (inches): _____

Water table present? ☐ Yes ☒ No Depth (inches): _____

Saturation Present? (includes capillary fringe) ☒ Yes ☐ No Depth (inches): near surface

Wetland Hydrology Present ? ☒ Yes ☐ No

Describe recorded data (stream guage, monitoring well, aerial photos, etc.) if available.

Remarks: Close to saturation near surface. Can hear water trickling in subsurface flow.

Wetland Determination Data Form - Western Mountains, Valleys and Coast Region

Project/Site Newman Gulch City Fort Bragg County Mendocino Sampling Date 7/8/2009

Applicant/Owner City of Fort Bragg State CA Sampling Point DP4

Investigator(s) Matt Richmond, Tim DeGraff Section,Township,Range sec8, T18N, R17W

Landform (hillslope, terrace, etc.) hillslope Local Relief (concave, convex, none) None Slope(%) 4

Subregion(LRR) LRR A (Northwest Forests and Coast) Lat: 39 25'35.08" N Long: 123 46'11.92" W Datum:

Soil Map Unit Name NWI classification

Are climatic/hydrologic conditions on-site typical for this time of year? ☒ Yes ☐ No (If no, explain in remarks)

Are any of the following significantly disturbed? ☐ Vegetation ☐ Soil ☐ Hydrology Are "Normal Circumstances" present? ☐ Yes ☒ No

Are any of the following naturally problematic? ☐ Vegetation ☐ Soil ☐ Hydrology (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS - Attach site map showing sample point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	☐ Yes ☒ No	**Is the Sampled Area within a Wetland?** ☐ Yes ☒ No
Hydric Soil Present?	☐ Yes ☒ No	
Wetland Hydrology Present?	☐ Yes ☒ No	

Remarks: Paired upland point with DP3, located on a steeper slope than adjacent wetland. Delineation conducted during a dry year.

VEGETATION (use scientific names)

TREE STRATUM Plot Size: 30' radius	Absolute % cover	Dominant Species?	Indicator Status
1. *Sequoia sempervirens*	75	Y	NL
2. *Pseudotsuga menziesii*	10		NL
3. *Tsuga heterophylla*	2		FACU
4.			
Tree Stratum Total Cover: 87			
SAPLING/SHRUB STRATUM Plot Size: 30' radius			
1. *Rhododendron macrophyllum*	10	Y	NL
2. *Vaccinium ovatum*	10	Y	NL
3. *Gaultheria shallon*	5	N	NL
4.			
Sapling/Shrub Stratum Total Cover: 28(incl.herbs)			
HERB STRATUM Plot Size: 30' radius			
1. *Polystichum munitum*	2	N	NL
2. *Trillium ovatum*	1	N	NI
3.			
4.			
5.			
6.			
7.			
8.			
Herb Stratum Total Cover: (<5%)			
WOODY VINES Plot Size:			
1.			
2.			
Woody Vine Stratum Total Cover:			

% Bare ground in herb stratum % cover of biotic crust

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC? 0 (A)

Total number of dominant species across all strata? 3 (B)

% of dominant species that are OBL, FACW, or FAC? 0 (A/B)

Prevalence Index Worksheet

Total % cover of:	Multiply by:	
OBL species	x1	
FACW species	x2	
FAC species	x3	
FACU species	x4	
UPL species	x5	
Column Totals (A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is </= 3.0[1]
- ☐ Morphological adaptations[1] (provide supporting data in remarks)
- ☐ Wetland Non-Vascular Plants [1]
- ☐ Problematic hydrophytic vegetation[1] (explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present ? ☐ Yes ☒ No

Remarks: Herb stratum combined with sapling/shrubs because total cover was <5%. No hydrophytic vegetation present.

SOIL

Sampling Point DP4

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[1]	Texture	Remarks
+4-0								duff layer
0-12	10 YR 2/2	100						Sand

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

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

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except MLRA1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (explain in remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present ? ☐ Yes ☒ No

Remarks: No hydric soil indicators observed.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except NW coast)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1)(LRR AA)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water-Stained Leaves (B9)(NW coast)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6)(LRR A)
- ☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface water present? ☐ Yes ☒ No Depth (inches): _____

Water table present? ☐ Yes ☒ No Depth (inches): _____

Saturation Present? (includes capillary fringe) ☐ Yes ☒ No Depth (inches): _____

Wetland Hydrology Present ? ☐ Yes ☒ No

Describe recorded data (stream guage, monitoring well, aerial photos, etc.) if available.

Remarks: No wetland hydrology indicators observed.

Wetland Determination Data Form - Western Mountains, Valleys and Coast Region

Project/Site Newman Gulch City Fort Bragg County Mendocino Sampling Date 7/8/2009

Applicant/Owner City of Fort Bragg State CA Sampling Point DP5

Investigator(s) Matt Richmond, Tim DeGraff Section,Township,Range sec8, T18N, R17W

Landform (hillslope, terrace, etc.) hillslope Local Relief (concave, convex, none) None Slope(%) 5

Subregion(LRR) LRR A (Northwest Forests and Coast) Lat: 39 25'35.08" N Long: 123 46'11.92" W Datum:

Soil Map Unit Name NWI classification

Are climatic/hydrologic conditions on-site typical for this time of year? ☒ Yes ☐ No (If no, explain in remarks)

Are any of the following significantly disturbed? ☐ Vegetation ☐ Soil ☐ Hydrology Are "Normal Circumstances" present? ☐ Yes ☒ No

Are any of the following naturally problematic? ☐ Vegetation ☐ Soil ☐ Hydrology (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS - Attach site map showing sample point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	☒ Yes ☐ No	**Is the Sampled Area within a Wetland?** ☒ Yes ☐ No
Hydric Soil Present?	☒ Yes ☐ No	
Wetland Hydrology Present?	☒ Yes ☐ No	

Remarks: DP5 taken in a representative community of the small wetland fingers extending upslope from the reservoir. Delineation conducted during a dry year.

VEGETATION (use scientific names)

TREE STRATUM Plot Size: 10' radius	Absolute % cover	Dominant Species?	Indicator Status
1. *Myrica californica*	30	Y	FAC+
2. *Callitropsis pygmaea*	5		NL
3. *Sequoia sempervirens*	5		NL
4. *Tsuga heterophylla*	5		FACU
Tree Stratum Total Cover:	45		
SAPLING/SHRUB STRATUM Plot Size: 10' radius			
1. *Rhododendron macrophyllum*	10	Y	NL
2. *Gaultheria shallon*	2		NL
3.			
4.			
Sapling/Shrub Stratum Total Cover:	12		
HERB STRATUM Plot Size: 10' radius			
1. *Blechnum spicant*	35	Y	FAC+
2. *Veratrum fimbriatum*	5		OBL
3.			
4.			
5.			
6.			
7.			
8.			
Herb Stratum Total Cover:	40		
WOODY VINES Plot Size:			
1.			
2.			
Woody Vine Stratum Total Cover:			

% Bare ground in herb stratum % cover of biotic crust

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC?	2	(A)
Total number of dominant species across all strata?	3	(B)
% of dominant species that are OBL, FACW, or FAC?	66	(A/B)

Prevalence Index Worksheet

Total % cover of:		Multiply by:	
OBL species		x1	
FACW species		x2	
FAC species	65	x3	195
FACU species	5	x4	40
UPL species	20	x5	100
Column Totals	90	(A)	315 (B)

Prevalence Index = B/A = 3.5

Hydrophytic Vegetation Indicators

- ☒ Dominance Test is >50%
- ☐ Prevalence Index is </= 3.0[1]
- ☐ Morphological adaptations[1] (provide supporting data in remarks)
- ☐ Wetland Non-Vascular Plants [1]
- ☐ Problematic hydrophytic vegetation[1] (explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present ? ☒ Yes ☐ No

Remarks: Meets hydrophytic vegetation criteria, although with only FAC species typical of riparian habitats.

SOIL

Sampling Point DP5

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[1]	Texture	Remarks
+2-0								Duff
0-12	10YR 4/2	100	10YR 4/6	5	C	RC	Sandy Loam	prominent redox

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

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

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except MLRA1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (explain in remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present ? ☒ Yes ☐ No

Remarks: 5% prominent oxidized rhizospheres in a depleted matrix.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except NW coast)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☒ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1)(LRR AA)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water-Stained Leaves (B9)(NW coast)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6)(LRR A)
- ☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface water present? ☐ Yes ☒ No Depth (inches): _____

Water table present? ☐ Yes ☒ No Depth (inches): _____

Saturation Present? (includes capillary fringe) ☐ Yes ☒ No Depth (inches): _____

Wetland Hydrology Present ? ☒ Yes ☐ No

Describe recorded data (stream guage, monitoring well, aerial photos, etc.) if available.

Remarks: Oxidized rhizospheres are the only hydrology indicator observed. Adjacent to reservoir.

Wetland Determination Data Form - Western Mountains, Valleys and Coast Region

Project/Site Newman Gulch City Fort Bragg County Mendocino Sampling Date 7/8/2009

Applicant/Owner City of Fort Bragg State CA Sampling Point DP6

Investigator(s) Matt Richmond, Tim DeGraff Section,Township,Range sec8, T18N, R17W

Landform (hillslope, terrace, etc.) terrace Local Relief (concave, convex, none) None Slope(%) 2

Subregion(LRR) LRR A (Northwest Forests and Coast) Lat: 39 25'35.08" N Long: 123 46'11.92" W Datum:

Soil Map Unit Name NWI classification

Are climatic/hydrologic conditions on-site typical for this time of year? ☒ Yes ☐ No (If no, explain in remarks)

Are any of the following significantly disturbed? ☐ Vegetation ☐ Soil ☐ Hydrology Are "Normal Circumstances" present? ☐ Yes ☒ No

Are any of the following naturally problematic? ☐ Vegetation ☐ Soil ☐ Hydrology (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS - Attach site map showing sample point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	☐ Yes ☒ No	**Is the Sampled Area within a Wetland?** ☐ Yes ☒ No
Hydric Soil Present?	☐ Yes ☒ No	
Wetland Hydrology Present?	☐ Yes ☒ No	

Remarks: Paired upland point with DP5, lacking the wetland/riparian indicator species Myrica californica and Blechnum spicant. Delineation conducted during a dry year.

VEGETATION (use scientific names)

TREE STRATUM Plot Size: 30' radius	Absolute % cover	Dominant Species?	Indicator Status
1. *Sequoia sempervirens*	70	Y	NL
2. *Tsuga heterophylla*	10		FACU
3.			
4.			
Tree Stratum Total Cover: 80			
SAPLING/SHRUB STRATUM Plot Size: 30' radius			
1. *Rhododendron macrophyllum*	8	Y	NL
2. *Vaccinium ovatum*	2		NL
3.			
4.			
Sapling/Shrub Stratum Total Cover: 12 (incl. herb)			
HERB STRATUM Plot Size: 30' radius			
1. *Polystichum munitum*	1		NL
2. *Pteridium aquilinum*	1		FACU
3.			
4.			
5.			
6.			
7.			
8.			
Herb Stratum Total Cover: (<5%)			
WOODY VINES Plot Size:			
1.			
2.			
Woody Vine Stratum Total Cover:			

% Bare ground in herb stratum 60 % cover of biotic crust

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC? 0 (A)

Total number of dominant species across all strata? 2 (B)

% of dominant species that are OBL, FACW, or FAC? 0 (A/B)

Prevalence Index Worksheet

Total % cover of:		Multiply by:	
OBL species		x1	
FACW species		x2	
FAC species		x3	
FACU species		x4	
UPL species		x5	
Column Totals	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is </= 3.0[1]
- ☐ Morphological adaptations[1] (provide supporting data in remarks)
- ☐ Wetland Non-Vascular Plants [1]
- ☐ Problematic hydrophytic vegetation[1] (explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present ? ☐ Yes ☒ No

Remarks: Herb stratum combined with sapling/shrubs because total cover was <5%.

SOIL

Sampling Point DP6

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[1]	Texture	Remarks
+2-0								duff
0-12	10YR 2/2	100					Loamy sand	

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

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

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except MLRA1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (explain in remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present ? ☐ Yes ☒ No

Remarks: No hydric soil indicators observed.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except NW coast)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1)(LRR AA)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water-Stained Leaves (B9)(NW coast)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6)(LRR A)
- ☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface water present? ☐ Yes ☐ No Depth (inches): _____

Water table present? ☐ Yes ☐ No Depth (inches): _____

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

Wetland Hydrology Present ? ☐ Yes ☒ No

Describe recorded data (stream guage, monitoring well, aerial photos, etc.) if available.

Remarks: No wetland hydrology indicators observed.

Wetland Determination Data Form - Western Mountains, Valleys and Coast Region

Project/Site Newman Gulch City Fort Bragg County Mendocino Sampling Date 7/8/2009

Applicant/Owner City of Fort Bragg State CA Sampling Point DP7

Investigator(s) Matt Richmond, Tim DeGraff Section,Township,Range sec8, T18N, R17W

Landform (hillslope, terrace, etc.) terrace Local Relief (concave, convex, none) None Slope(%) 1

Subregion(LRR) LRR A (Northwest Forests and Coast) Lat: 39 25'35.08" N Long: 123 46'11.92" W Datum:

Soil Map Unit Name NWI classification

Are climatic/hydrologic conditions on-site typical for this time of year? ☒ Yes ☐ No (If no, explain in remarks)

Are any of the following significantly disturbed? ☐ Vegetation ☐ Soil ☐ Hydrology Are "Normal Circumstances" present? ☐ Yes ☒ No

Are any of the following naturally problematic? ☐ Vegetation ☐ Soil ☐ Hydrology (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS - Attach site map showing sample point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	☐ Yes ☒ No	**Is the Sampled Area within a Wetland?** ☐ Yes ☒ No
Hydric Soil Present?	☐ Yes ☒ No	
Wetland Hydrology Present?	☐ Yes ☒ No	

Remarks: Representative plot for upland forest habitat covering entire area south of road. No wetland indicators observed. Delineation conducted during a dry year.

VEGETATION (use scientific names)

TREE STRATUM Plot Size: 30' radius	Absolute % cover	Dominant Species?	Indicator Status
1. *Lithocarpus densiflorus*	25	Y	NL
2. *Callitropsis pygmaea*	25	Y	NL
3. *Sequoia sempervirens*	15	Y	NL
4. *Tsuga heterophylla*	10		FACU
Tree Stratum Total Cover:	60		
SAPLING/SHRUB STRATUM Plot Size: 30' radius			
1. *Lithocarpus densiflorus*	20	Y	NL
2. *Rhododendron macrophyllum*	20	Y	NL
3. *Gaultheria shallon*	10		NL
4. *Vaccinium ovatum*	5		NL
Sapling/Shrub Stratum Total Cover:	55		
HERB STRATUM Plot Size: 30' radius			
1. *Goodyera oblongifolia*	5	Y	NL
2. *Polystichum munitum*	5	Y	NL
3. *Pteridium aquilinum*	5	Y	FACU
4. *Trillium ovatum*	2		NI
5.			
6.			
7.			
8.			
Herb Stratum Total Cover:	17		
WOODY VINES Plot Size:			
1.			
2.			
Woody Vine Stratum Total Cover:			

% Bare ground in herb stratum 60 % cover of biotic crust

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC? 0 (A)

Total number of dominant species across all strata? 8 (B)

% of dominant species that are OBL, FACW, or FAC? 0 (A/B)

Prevalence Index Worksheet

Total % cover of:		Multiply by:	
OBL species		x1	
FACW species		x2	
FAC species		x3	
FACU species		x4	
UPL species		x5	
Column Totals	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is </= 3.0[1]
- ☐ Morphological adaptations[1] (provide supporting data in remarks)
- ☐ Wetland Non-Vascular Plants [1]
- ☐ Problematic hydrophytic vegetation[1] (explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present ? ☐ Yes ☒ No

Remarks: Tree stratum also includes 5% cover of Pseudotsuga menziesii (NL)

SOIL

Sampling Point DP7

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[1]	Texture	Remarks
+6-0								Duff
0-2	10YR 5/2	100						cemented

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

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

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except MLRA1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (explain in remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present ? ☐ Yes ☒ No

Remarks: Cemented layer below 6" of duff. Could not examine profile below 2" of mineral soil

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except NW coast)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1)(LRR AA)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water-Stained Leaves (B9)(NW coast)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6)(LRR A)
- ☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface water present? ☐ Yes ☐ No Depth (inches): _____

Water table present? ☐ Yes ☐ No Depth (inches): _____

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

Wetland Hydrology Present ? ☐ Yes ☒ No

Describe recorded data (stream guage, monitoring well, aerial photos, etc.) if available.

Remarks: No wetland hydrology indicators observed.

APPENDIX C

LIST OF OBSERVED SPECIES

Appendix C. Species observed in the Project Area by RCA and WRA during site assessments and botanical surveys in 2008 and 2009.

SCIENTIFIC NAME	COMMON NAME
WILDLIFE	
BIRDS	
Troglodytes troglodytes	Winter Wren
Zenaida macroura	Mourning Dove
Calypte anna	Anna's Hummingbird
Certhia americana	Brown Creeper
Chamaea fasciata	Wrentit
Contopus cooperi	Olive-sided Flycatcher
Empidonax difficilis	Pacific-slope Flycatcher
Dryocopus pileatus	Pileated Woodpecker
Stelgidopteryx serripennis	Northern Rough-winged Swallow
Sitta carolinensis	White-breasted Nuthatch
Sitta pygmaea	Pygmy Nuthatch
Junco hyemalis	Dark-eyed Junco
Carpodacus purpureus	Purple Finch
AMPHIBIANS	
Ensatina eschscholtzii oregonensis	Oregon Ensatina
Pseudacris regilla	Pacific Treefrog
MAMMALS	
Odocoileus hemionus	Black-tailed Deer
Sorex sp.	Shrew
PLANTS	
TREES	
Abies grandis	grand fir
Arbutus menziesii	Pacific madrone
Callitropsis pygmaea (CNPS List 1B.2)	**pygmy cypress**
Ilex aquifolium	English holly
Lithocarpus densiflorus var. *densiflorus*	tanbark oak
Pinus muricata	Bishop pine
Pseudotsuga menziesii var. *menziesii*	Douglas-fir
Sequoia sempervirens	coast redwood
Tsuga heterophylla	Western hemlock
Umbellularia californica	California-bay

SCIENTIFIC NAME	COMMON NAME
SHRUBS	
Arctostaphylos columbiana	hairy manzanita
Arctostaphylos manzanita	common manzanita
Baccharis pilularis	coyote brush
Berberis aquifolium	tall Oregon-grape
Ceanothus thyrsiflorus	blue blossom
Ceanothus velutinus	snowbrush
Cotoneaster pannosa	cotoneaster
Gaultheria shallon	salal
Genista monspessulana	French broom
Mimulus aurantiacus	orange bush monkey-flower
Myrica californica	wax myrtle
Rhododendron macrophyllum	California rose-bay
Rosa gymnocarpa	wood rose
Rubus discolor	Himalayan blackberry
Rubus leucodermis	white-stemmed raspberry
Rubus parviflorus	thimbleberry
Sambucus racemosa var. *racemosa*	red elderberry
Toxicodendron diversilobum	poison-oak
Vaccinium ovatum	Vine maple
Vaccinium parvifolium	red huckleberry
HERBS	
Achillea millefolium	common yarrow
Achlys californica	California deer foot, vanilla leaf
Adenocaulon bicolor	trail plant
Agrostis hallii	Hall's bent-grass
Agrostis pallens	Bent grass
Agrostis stolonifera	creeping bent-grass
Aira caryophyllea	silver European hairgrass
Aria praecox	hairgrass
Allium sp.	onion
Anagallis arvensis	scarlet pimpernel
Anaphalis margaritacea	pearly everlasting
Anthoxanthum odoratum	sweet vernal grass
Asarum caudatum	wild ginger
Avena barbata	slender wild oat

SCIENTIFIC NAME	COMMON NAME
Avena fatua	wild oat grass
Bellis perennis	English daisy
Blechnum spicant	deer fern
Boykinia occidentalis	coast boykinia
Brassica rapa	field mustard
Briza maxima	large quaking or rattlesnake grass
Briza minor	small quaking or rattlesnake grass
Bromus diandrus	ripgut grass
Bromus hordeaceus	soft chess
Bromus vulgaris	narrow-flowered brome
Calamagrostis bolanderi (CNPS List 4.2)	**Bolander's reed grass**
Calypso bulbosa	calypso orchid or fairy slipper orchid
Campanula prenanthoides	California harebell
Cardamine californica	California toothwort or milk maids
Cardamine oligosperma	western bittercress
Carduus pycnocephalus	Italian thistle
Carex gynodynama	Olney's hairy sedge
Carex rossii	Ross' sedge
Cerastium arvense	field chickweed
Cerastium glomeratum	mouse ear chickweed
Cirsium arvense	Canada thistle
Cirsium vulgare	bull thistle
Claytonia perfoliata	miner's lettuce
Convolvulus arvensis	field bindweed
Conyza canadensis	horseweed
Cortaderia jubata	weedy pampas grass
Cynodan dactylon	bermuda grass
Cynoglossum grande	hound's-tongue
Cynosurus cristatus	crested dogtail
Cynosurus echinatus	hedgehog dogtail grass
Dactylis glomerata	orchard grass
Danthonia pilosa	hairy oatgrass
Deschampsia elongata	slender hairgrass
Dipsacus sativus	Fuller's teasel
Elymus glaucus ssp. *glaucus*	blue wildrye
Equisetum telmateia ssp. *braunii*	giant horsetail

SCIENTIFIC NAME	COMMON NAME
Erechtites minima	toothed coast fireweed
Eriophyllum lanatum var. *arachnoideum*	woolly sunflower
Erodium botrys	long-beaked storksbill
Erodium moschatum	musk or white-stemmed filaree
Festuca arundinacea	tall fescue
Festuca rubra	red fescue
Foeniculum vulgare	fennel
Fragaria vesca	wood strawberry
Galium aparine	goose grass
Galium muricatum	Humboldt bedstraw
Gastridium ventricosum	nit grass
Geranium dissectum	cut-leaved geranium
Geranium molle	dovefoot geranium
Gnaphalium japonicum	Japanese cudweed
Gnaphalium luteo-album	weedy cudweed
Goodyera oblongifolia	rattlesnake plantain
Hedera helix	English ivy
Hieracium albiflorum	white hawkweed
Hierochloe occidentalis	vanilla grass
Holcus lanatus	common velvet grass
Hordeum jubatum	foxtail barley
Hypochaeris glabra	smooth cat's-ear
Hypochaeris radicata	hairy cat's-ear
Iris douglasiana	Douglas iris
Juncus effusus	common rush
Juncus patens	spreading rush
Lathyrus torreyi	redwood pea or Torrey's pea
Lathyrus vestitus	wood pea
Leontodon taraxacoides	hawkbit
Leucanthemum vulgare	ox-eye daisy
Linum bienne	western blue flax
Lolium perenne	perennial ryegrass
Lolum multiflorum	Italian ryegrass
Lonicera hispidula var. *vacillans*	hairy honeysuckle
Lotus corniculatus	birdfoot trefoil
Lotus micranthus	rose-flowered lotus

SCIENTIFIC NAME	COMMON NAME
Lupinus rivularis	riverbank lupine
Luzula parviflora	small-flowered wood rush
Madia sativa	coast tarweed
Marah oreganus	coast man-root
Medicago arabica	spotted bur clover
Mentha pulegium	pennyroyal
Navarretia squarrosa	skunkweed
Osmorhiza chilensis	mountain sweet-cicely
Oxalis oregana	redwood sorrel
Parentucellia viscosa	yellow parentucellia
Pentagramma triangularis ssp. *triangularis*	goldback fern
Plantago lanceolata	English plantain
Poa annua	annual bluegrass
Poa kelloggii	Kellogg's bluegrass
Polygala californica	California milkwort
Polystichum munitum	sword fern
Prunella vulgaris var. *lanceolata*	self-heal (native, lg. leaves and erect)
Prunella vulgaris var. *vulgaris*	self-heal (exotic, sm. lvs. and prostrate)
Pteridium aquilinum var. *pubescens*	western bracken fern
Ranunculus repens	creeping buttercup
Raphanus sativus	wild radish
Rubus ursinus	Pacific bramble or California blackberry
Rumex crispus	curly dock
Sanicula crassicaulis	Pacific snakeroot
Satureja douglasii	yerba buena
Senecio jacobaea	tansy ragwort
Senecio vulgaris	common butterweed
Smilacina racemosa	branched Solomon's seal
Sonchus asper ssp. *asper*	prickly sow thistle
Sonchus oleraceus	common sow thistle
Stachys ajugoides var. *rigida*	hedge nettle
Stellaria crispa	crisp chickweed
Stellaria media	common chickweed
Synthyris reniformis	snow queen
Taraxacum officinale	dandelion
Torilis arvensis	field hedge-parsley or rattlesnake weed

SCIENTIFIC NAME	COMMON NAME
Trientalis latifolia	Pacific star flower
Trifolium arvense	rabbitfoot clover
Trifolium dubium	little hop clover or shamrock clover
Trifolium repens	white clover
Trifolium subterraneum	subterranean clover
Trifolium variegatum	white-tipped clover
Trillium ovatum	western trillium
Verbascum thapsis	woolly mullein
Vicia hirsuta	hairy vetch
Vicia sativa ssp. *sativa*	common vetch or spring vetch
Viola sempervirens	evergreen violet
Vulpia bromoides	six week fescue
Vulpia myorus	Rat's Tail Fescue
Whipplea modesta	modesty
LICHENS	
Alectoria vancouverensis	
Bryoria sp.	
Cladonia bellidiflora	
Cladonia fimbriata	
Cladonia macilenta	
Fuscopannaria pacifica	
Hypogymnia enteromorpha	
Hypogymnia imshaugii	
Hypogymnia inactiva	
Ochrolechia oregana	
Parmelia sulcata	
Peltigera neopolydactyla	
Platismatia herreii	
Pseudocyphellaria anthraspis	
Pyrrhospora gowardiana	
Tuckermannopsis chlorophylla	
Usnea flavocardia	
Usnea rubicunda	
LIVERWORTS	
Calypogeia sp.	
Cephaloziella sp.	

SCIENTIFIC NAME	COMMON NAME
Porella navicularis	
Radula bolanderi	
Scapania bolanderi	
HORNWORTS	
Anthoceros sp.	
MOSSES	
Aulacomnium androgynum	
Brachythecium asperrimum	
Buxbaumia aphylla	
Dendroalsia abietina	
Dicranoweisia cirrata	
Fissidens bryoides	
Funaria hygrometrica	
Isothecium cristatum	
Isothecium stoloniferum	
Kindbergia oregana	
Neckera douglasii	
Orthotrichum papillosum	
Polytrichum juniperinum	

APPENDIX D

POTENTIAL FOR SENSITIVE SPECIES AND COMMUNITIES TO OCCUR IN THE PROJECT AREA

Table D-1. Evaluation of Special Status Plant Species Potential to Occur in the Project Area. Include searches from federal, state and CNPS listed species, as well as plants of regional significance.

PLANT NAME (SCIENTIFIC & COMMON)	CNPS LIST	FED	STATE	CNDDB ELEMENT RANK		HABITATS/NATURAL COMMUNITIES	BLOOMS	HABITAT PRESENT WITHIN PROJECT AREA?
				G RANK	S RANK			
Arctostaphylos mendocinoensis pygmy manzanita	1B.2	-	-	G1	S1?	Closed-cone coniferous forest (CCFrs) / acidic sandy clay	Jan	Marginal
Astragalus agnicidus Humboldt milk-vetch	1B.1	-	-	G1	S1.1	Broadleafed upland forest (BUFrs) | North Coast coniferous forest (NCFrs)/disturbed areas	Apr-Sep	Marginal
Calamagrostis bolanderi Bolander's reed grass	4.2	-	-	G3	S3.2	Bogs & fens (BgFns)/Broadleaf upland forests (BUFrs)/Closed cone coniferous forest (CCFrs)/Coastal scrub (CoScr)/Meadows & seeps (Medws) | /Marshes & Swamps (MshSw) (freshwater)/North Coast coniferous forests (NCFrs) (mesic)	May-Aug	Present
Calamagrostis foliosa Leafy reed grass	4.2	-	CR	G3	S3.2	Coastal bluff scrub (CBScr) | North Coast coniferous forest (NCFrs)(rocky)(Most occurrences from King Range)	May-Sep	Marginal
Calystegia purpurata ssp. *saxicola* Coastal bluff morning glory	1B.2	-	-	G4T2	S2.2	Coastal dunes (CoDns) | Coastal scrub (CoScr) | North Coast coniferous forest (NCFrs)	May-Sep	Marginal
Campanula californica swamp harebell	1B.2	-	-	G3	S3.2	Bogs and fens (BgFns) | Closed-cone coniferous forest (CCFrs) | Coastal prairie (CoPrr) | Meadows and seeps (Medws) | Marshes and swamps (MshSw) (freshwater) | North Coast coniferous forest (NCFrs) / mesic	June-Oct	No
Carex arcta Northern clustered sedge	2.2	-	-	G5	S1S2	Bogs and fens (BgFns)/North Coast coniferous forest (NCFrs) (mesic)	Jun-Sep	No
Carex californica California sedge	2.3	-	-	G5	S2?	Bogs and fens (BgFns) | Closed-cone coniferous forest (CCFrs) | Coastal prairie (CoPrr) | Meadows and seeps (Medws) | Marshes and swamps (MshSw) (margins)	May-Aug	Marginal
Carex lenticularis var. *limnophia* Lakeshore sedge	2.2	-	-	G5T5	S1S2.2	Bogs and fens (BgFns) | Marshes and swamps (MshSw) | North Coast coniferous forest (NCFrs)/shores, beaches; often gravelly	Jun-Aug	No
Carex viridula var. *viridula* green sedge	2.3	-	-	G5T5	S1.3	Bogs and fens (BgFns)) | Marshes and swamps (MshSw) (freshwater) | North Coast coniferous forest (NCFrs) / mesic	June-Sept	No
Castilleja mendocinensis Mendocino coast Indian paintbrush	1B.2	-	-	G2	S2.2	Coastal bluff scrub (CBScr) | Closed-cone coniferous forest (CCFrs) | Coastal dunes (CoDns) | Coastal prairie (CoPrr) | Coastal scrub (CoScr)	Apr-Aug	No
Ceanothus gloriosus var. *gloriosus* Point Reyes ceanothus	4.3	-	-	G3G4T3	S3.3	Coastal bluff scrub (CBScr)/Closed cone coniferous forest (CCFrs)/Coastal dunes (CoDns)/Coastal scrub (CoScr)/sandy	Mar-May	Marginal
Coptis laciniata Oregon goldthread	2.2	-	-	G4G5	S3.2	Meadows and seeps (Medws) | North Coast coniferous forest (NCFrs)streambanks/mesic	Mar-Apr	No
Callitropsis pygmaea pygmy cypress	1B.2	-	-	G2T2	S2.2	Closed-cone coniferous forest (CCFrs) / usually podzol-like soil	May-July	Present
Erythronium revolutum Coast fawn lily	2.2	-	-	G4	S2.2	Bogs and fens (BgFns) | Broadleafed upland forest (BUFrs) | North Coast coniferous forest (NCFrs)(mesic)	Mar-Jul(Aug)	Marginal

PLANT NAME (SCIENTIFIC & COMMON)	CNPS LIST	FED	STATE	CNDDB ELEMENT RANK		HABITATS/NATURAL COMMUNITIES	BLOOMS	HABITAT PRESENT WITHIN PROJECT AREA?
				G RANK	S RANK			
Lasthenia conjugens Contra Costa goldfields	1B.1	FE	-	G1	S1.1	Cismontane woodland (CmWld) | Playas (Plyas)(alkaline) | Valley and foothill grassland (VFGrs) | Vernal pools (VnPls)/mesic	Mar-Jun	No
Lasthenia californica ssp. *bakeri* Baker's goldfields	1B.2	-	-	G3TH	SH	Closed-cone coniferous forest (CCFrs) (openings) | Coastal scrub (CoScr) | Meadows and seeps (Medws) | Marshes and swamps (MshSw)	Apr-Oct	No
Lilium maritimum coast lily	1B.1	-	-	G2	S2.1	Broadleafed upland forest (BUFrs) | Closed-cone coniferous forest (CCFrs) | Coastal prairie (CoPrr) | Coastal scrub (CoScr) | Marshes and swamps (MshSw) (freshwater) | North Coast coniferous forest (NCFrs)	May-Aug	Yes
Lotus formosissimus Coastal lotus	4.2	-	-	G4	S3.2	Broadleafed upland forest (BUFrs) | Coastal bluff scrub (CBScr) | Closed-cone coniferous forest (CCFrs) | Cismontane woodland (CmWld) | Coastal prairie (CoPrr) | Coastal scrub (CoScr) | Meadows and seeps (Medws) | Marshes and swamps (MshSw) | North Coast coniferous forest (NCFrs) | Valley and foothill grassland (VFGrs)/wetlands, roadsides	Mar-Jul	Yes
Lycopodium clavatum running-pine	2.3	-	-	G5	S2S3	Marshes and Swamps (MshSw) | North Coast coniferous forest (NCFrs) / mesic	N/A	Marginal
Microseris borealis northern microseris	2.1	-	-	G4?	S1.1	Bogs and fens (BgFns) | Lower montane coniferous forest (LCFrs) | Meadows and seeps (Medws) / mesic	June-Sept	No
Microseris paludosa Microseris	1B.2	-	-	G2	S2.2	Closed-cone coniferous forest (CCFrs) | Cismontane woodland (CmWld) | Coastal scrub (CoScr) | Valley and foothill grassland (VFGrs)	Apr-Jun(Jul)	Marginal
Packera bolanderi var. *bolanderi* seacoast ragwort	2.2	-	-	G4T4	S1.2	Coastal scrub (CoScr) | North Coast coniferous forest (NCFrs)/sometimes roadsides	(Apr)May-Jul	Marginal
Pinus contorta ssp. *bolanderi* Bolander's pine	1B.2	-	-	G5T3	S3.2	Closed-cone coniferous forest (CCFrs) (podzol-like soil)	N/A	Yes
Pleuropogon hooverianus North Coast semaphore grass	1B.1	-	CT	G1	S1.1	Broadleafed upland forest (BUFrs) | Meadows and seeps (Medws) | North Coast coniferous forest (NCFrs) / open areas, mesic	Apr-Jun	Marginal
Pleuropogon refractus Nodding semaphore grass	4.2	-	-	G4	S3.2?	Lower montane coniferous forest (LCFrs) | Meadows and seeps (Medws) | North Coast coniferous forest (NCFrs) | Riparian forest (RpFrs)/mesic	Apr-Aug	No
Potentilla hickmanii Hickman's cinquefoil	1B.1	FE	CE	G1	S1.1	Coastal bluff scrub (CBScr) | Closed cone coniferous forest (CCFrs) | Meadows and seeps (Medws) (vernally mesic) | Marshes and swamps (MshSw)(freshwater)	Apr-Aug	Marginal
Sanguisorba officinalis great burnet	2.2	-	-	G5?	S2.2	Bogs and fens (BgFns) | Broadleafed upland forest (BUFrs) | Meadows and seeps (Medws) | Marshes and swamps (MshSw) | North Coast coniferous forest (NCFrs) | Riparian forest (RpFrs) / often serpentinite	July-Oct	No

PLANT NAME (SCIENTIFIC & COMMON)	CNPS LIST	FED	STATE	CNDDB ELEMENT RANK		HABITATS/NATURAL COMMUNITIES	BLOOMS	HABITAT PRESENT WITHIN PROJECT AREA?
				G RANK	S RANK			
Sidalcea malachroides Maple-leaved checkerbloom	4.2	-	-	G3	S3.2	Broadleaf upland forest (BUFrs)/Coastal prairie (CoPrr)/Coastal Scrub (CoScr)/North Coast coniferous forest (NCFrs)(often disturbed areas)	Apr-Aug	Yes
Sidalcea malviflora ssp. *patula* Siskiyou checkerbloom	1B.2	-	-	G5T1	S1.1	Coastal bluff scrub (CBScr)/Coastal prairie (CoPrr)/North Coast coniferous forest (NCFrs) (often roadcuts)/One collection 2 miles south of Albion in roadside ditch	May-Aug	Marginal
Sidalcea malviflora ssp. *purpurea* purple stemmed checkerbloom	1B.2	-	-	G5T2	S2.2	Broadleafed upland forest (BUFrs) | Coastal prairie (CoPrr)	May-Jun	No
Veratrum fimbriatum Fringed false-hellebore	4.3	-	-	G3	S3.3	Bogs and fens (BgFns)/Coastal scrub (CoScr)/Meadows and seeps (Medws)/North Coast coniferous forests (NCFrs)	Jul-Sep	Marginal
Viola adunca Dog violet	-	-	-	-	-	Coastal prairie (CoPrr)		Marginal

Table D-2. Scoping List of Sensitive Plant Communities with Potential to Occur within the Project Area.

Special-Status Plant Community	Global Ranking	State Ranking	Present on Site
Active Coastal Dunes	G3	S2.2	No
Beach Pine Forest	G4	S2.1	No
Coastal Brackish Marsh	G2	S2.1	No
Coastal Chinook Salmon Stream	G2	S2.1	No
Coastal Coho Salmon Stream	G2	S2.1	No
Coastal Douglas Fir Western Hemlock Forest	G4	S2.1	No
Coastal Terrace Prairie	G2	S2.1	No
Fen	G2	S1.2	No
Freshwater Swamp	G2	S2.2	No
Grand Fir Forest	G1	S1.1	No
Ledum Swamp	G2	S2.1	No
Mendocino Pygmy Cypress Forest	G2	S2.1	No
North Coast Alluvial Redwood Forest	G2	S2.2	No
North Coast Black Cottonwood Riparian Forest	G1	S1.1	No
North Cobble Intertidal	G2	S2.2	No
North Cobble Shore	G2	S2.2	No
North Embayment	G1	S1.2	No
North Eusaline Lagoon	G1	S1.2	No
North Mesosaline Estuary	G2	S2.1	No
North Mixosaline Estuary	G2	S2.1	No
North Mixosaline Lagoon	G1	S1.2	No
North Oligosaline Estuary	G2	S2.1	No
North Rock Intertidal	G2	S2.2	No
North Seasgrass Bed	G1	S1.1	No
Northern Bishop Pine Forest	G2	S2.2	No
Northern Claypan Vernal Pool	G1	S1.1	No
Northern Coastal Bluff Scrub	G2	S2.2	No
North Coast Riparian Scrub	G3	S3.2	No
Northern Dune Scrub	G2	S1.2	No

Special-Status Plant Community	Global Ranking	State Ranking	Present on Site
Northern Foredune Grassland	G1	S1.1	No
Northern Foredunes	G2	S2.1	No
Northern Silk Tassel Scrub	G3	S2.3	No
Red Alder Riparian Forest	G3	S2.2	No
Sitka Spruce Forest	G1	S1.1	No
Sitka Spruce Grand Fir Forest	G4	S1.1	No
Sphagnum Bog	G3	S1.2	No
Wildflower Field	G2	S2.2	No

Sensitivity Ranking Explanations for Tables D-1 and D-2:

Federal: includes federally rare (FR), threatened (FT), or endangered (FE)
State: State of California status includes rare (CR), threatened (CT), or endangered (CE)

California Native Plant Society (CNPS)
1A. Presumed extinct in California
1B. Rare or Endangered in California and elsewhere
2. Rare or Endangered in California, more common elsewhere
3. Plants for which we need more information - Review list
4. Plants of limited distribution - Watch list

List 1A: Plants Presumed Extinct in California
The plants of List 1A are presumed extinct because they have not been seen or collected in the wild in California for many years. Although most of them are restricted to California, a few are found in other states as well. In many cases, repeated attempts have been made to rediscover these plants by visiting known historical locations. Even after such diligent searching, we are constrained against saying that they are extinct, since for most of them rediscovery remains a distinct possibility. Note that care should be taken to distinguish between "extinct" and "extirpated." A plant is extirpated if it has been locally eliminated, but it may be doing well elsewhere in its range.

List 1B: Plants Rare, Threatened, or Endangered in California and Elsewhere.
The plants of List 1B are rare throughout their range. All but a few are endemic to California. All of them are judged to be vulnerable under present circumstances or to have a high potential for becoming so because of their limited or vulnerable habitat, their low numbers of individuals per population (even though they may be wide ranging), or their limited number of populations. Most of the plants of List 1B have declined significantly over the last century.

List 2: Plants Rare, Threatened, or Endangered in California, but More Common Elsewhere
Except for being common beyond the boundaries of California, the plants of List 2 would have appeared on List 1B. From the federal perspective, plants common in other states or countries are not eligible for consideration under the provisions of the Endangered Species Act. Until 1979, a similar policy was followed in California. However, after the passage of the Native Plant Protection Act, plants were considered for protection without regard to their distribution outside the state.

List 3: Plants About Which We Need More Information - A Review list
The plants that comprise List 3 are united by one common theme--we lack the necessary information to assign them to one of the other lists or to reject them. Nearly all of the plants remaining on List 3 are taxonomically problematic.

List 4: Plants of Limited Distribution - A Watch list
The plants in this category are of limited distribution or infrequent throughout a broader area in California, and their vulnerability or susceptibility to threat appears low at this time. While we cannot call these plants "rare" from a statewide perspective, they are uncommon enough that their status should be monitored regularly. Should the degree of endangerment or rarity of a List 4 plant change, we will transfer it to a more appropriate list or deleted from consideration.

Threat ranks:
Recently, CNPS added a decimal threat rank to the List ranks to parallel that used by the CNDDB. This extension replaces the E (Endangerment) value from the R-E-D Code. CNPS ranks therefore read like this: 1B.1, 1B.2, etc.

CNDDB ELEMENT RANKING

GLOBAL RANKING

The *global rank* (G-rank) is a reflection of the overall condition of an element throughout its global range.

SPECIES OR NATURAL COMMUNITY LEVEL

G1 = Less than 6 viable element occurrences (Eos) OR less than 1,000 individuals OR less than 2,000 acres.
G2 = 6-20 Eos OR 1,000-3,000 individuals OR 2,000-10,000 acres.
G3 = 21-80 Eos OR 3,000-10,000 individuals OR 10,000-50,000 acres.
G4 = Apparently secure; this rank is clearly lower than G3 but factors exist to cause some concern; i.e., there is some threat, or somewhat narrow habitat.
G5 = Population or stand demonstrably secure to ineradicable due to being commonly found in the world.

SUBSPECIES LEVEL

Subspecies receive a **T-rank** attached to the G-rank. With the subspecies, the G-rank reflects the condition of the entire species, whereas the T-rank reflects the global situation of just the subspecies or variety. For example: *Chorizanthe robusta* var. *hartwegii*. This plant is ranked G2T1. The G-rank refers to the whole species range i.e., *Chorizanthe robusta*. The T-rank refers only to the global condition of var. *hartwegii*.

STATE RANKING

The *state rank* (S-rank) is assigned much the same way as the global rank, except state ranks in California often also contain a threat designation attached to the S-rank.
S1 = Less than 6 Eos OR less than 1,000 individuals OR less than 2,000 acres
S1.1 = very threatened
S1.2 = threatened
S1.3 = no current threats known
S2 = 6-20 Eos OR 1,000-3,000 individuals OR 2,000-10,000 acres
S2.1 = very threatened
S2.2 = threatened
S2.3 = no current threats known
S3 = 21-80 Eos or 3,000-10,000 individuals OR 10,000-50,000 acres
S3.1 = very threatened
S3.2 = threatened
S3.3 = no current threats known
S4 = Apparently secure within California; this rank is clearly lower than S3 but factors exist to cause some concern; i.e. there is some threat, or somewhat narrow habitat. NO THREAT RANK.
S5 = Demonstrably secure to ineradicable in California. NO THREAT RANK.

Notes:

1. Other considerations used when ranking a species or natural community include the pattern of distribution of the element on the landscape, fragmentation of the population/stands, and historical extent as compared to its modern range. It is important to take a **bird's eye or aerial view** when ranking sensitive elements rather than simply counting element occurrences.
2. Uncertainty about the rank of an element is expressed in two major ways: By expressing the ranks as a **range** of values: e.g., S2S3 means the rank is somewhere between S2 and S3. By adding a ? to the rank: e.g., S2? This represents more certainty than S2S3, but less certainty than S2.

Other symbols:
GH All sites are **historical**; the element has not been seen for at least 20 years, but suitable habitat still exists (SH = All California sites are historical). GX All sites are **extirpated**; this element is extinct in the wild (SX = All California sites are extirpated). GXC Extinct in the wild; exists in cultivation. G1Q The element is very rare, but there are **taxonomic questions** associated with it.
T Rank applies to a subspecies or variety.

Table D-3. Special status wildlife species that may occur, or are known to occur in the vicinity of the Study Area. List compiled from USFWS Species lists (USFWS 2009) and a CNDDB search for the Fort Bragg, Inglenook, Dutchman's Knoll, Noyo Hill, Mathison Peak and Mendocino USGS quadrangles (CDFG 2009).

SPECIES	STATUS*	HABITAT	POTENTIAL TO OCCUR IN THE STUDY AREA
Mammals			
Long-eared Myotis *Myotis evotis*	WBWG: Medium	Found in all brush, woodland and forest habitats from sea level to about 9000 feet. Prefers coniferous woodlands and forests. Nursery colonies in buildings, crevices, spaces under bark, and snags. Caves used primarily as night roosts.	**Moderate Potential.** Mature trees and snags may provide roosting habitat.
Fringed Myotis *Myotis thysanodes*	WBWG: High	Associated with a wide variety of habitats including mixed coniferous-deciduous forest and redwood/sequoia groves. Buildings, mines and large snags are important day and night roosts.	**Moderate Potential.** Mature trees and snags may provide roosting habitat.
Long-legged Myotis *Myotis volans*	WBWG: High	Generally associated with woodlands and forested habitats. Large hollow trees, rock crevices and buildings are important day roosts. Other roosts include caves, mines and buildings.	**Moderate Potential.** Mature trees and snags may provide roosting habitat.
Silver-haired Bat *Lasionycteris noctivagans*	WBWG: Medium	Roosts in hollow trees, snags, buildings, rock crevices, caves, and under bark. Primarily a forest dweller, feeding over streams, ponds, and open brushy areas.	**Moderate Potential.** Mature trees and snags may provide roosting habitat.
Western Red Bat *Lasiurus blossevillii*	WBWG: High	Roosts primarily in trees, less often in shrubs. Roost sites often are in edge habitats adjacent to streams, fields, or urban areas. Preferred roost sites are protected from above, open below, and located above dark ground-cover. Such sites minimize water loss. Roosts may be from 0.6-13 m (2-40 ft) above ground level.	**Moderate Potential.** Trees, snags and potentially shrubs may provide roosting habitat.
Hoary Bat *Lasiurus cinereus*	WBWG: Medium	Prefers open habitats or habitat mosaics, with access to trees for cover and open areas or habitat edges for feeding. Roosts in dense foliage of medium to large trees. Feeds primarily on moths. Requires water.	**Moderate Potential.** Mature trees and snags may provide roosting habitat.
Townsend's Big-eared Bat Corynorhinus townsendii	SSC	Primarily found in rural settings in a wide variety of habitats including oak woodlands and mixed coniferous-deciduous forest. Day roosts highly associated with caves and mines. Very sensitive to human disturbance.	**Unlikely.** Sensitivity to human disturbance and lack of suitable roost sites likely precludes presence.
Pallid Bat *Antrozous pallidus*	SSC	Found in deserts, grasslands, shrublands, woodlands, and forests. Most common in open, dry habitats with rocky areas for roosting. Roosts must protect bats from high temperatures. Day roosts are in caves, crevices, mines, and occasionally in hollow trees and buildings. Very sensitive to disturbance of roosting sites.	**Moderate Potential.** Mature trees and snags may provide roosting habitat.

SPECIES	STATUS*	HABITAT	POTENTIAL TO OCCUR IN THE STUDY AREA
Sonoma Tree Vole *Arborimus pomo*	SSC	North coast fog belt from Oregon border to Sonoma County. Occurs In Douglas fir, redwood and montane hardwood-conifer forests. Feeds almost exclusively on Douglas fir needles. Will occasionally take needles of grand fir, hemlock or spruce.	**Moderate Potential.** Nearby occurrence and suitable habitat give this species a moderate potential to occur on site.
Ringtail *Bassariscus astutus*	FP	The Ringtail is widely distributed throughout most of California, absent from some portions of the Central Valley and northeastern California. This species is nocturnal, primarily carnivorous and is associated with a mixture of forest and shrubland in close association with rocky areas or riparian habitat.	**Moderate Potential.** Suitable habitat is present in forested areas and Newman Gulch.
Pacific Fisher *Martes pennanti pacifica*	FC, SSC	Intermediate to large-tree stages of coniferous forests and deciduous-riparian areas with high percent canopy closure. Use cavities, snags, logs and rocky areas for cover and denning. Need large areas of mature, dense forest.	**Unlikely.** Mature forest not present in Study Area. No nearby occurrences.
American Badger *Taxidea taxus*	SSC	Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils. Requires friable soils and open, uncultivated ground. Preys on burrowing rodents.	**Unlikely.** No nearby occurrences.
Birds			
Common Loon *Gavia immer*	SSC	Winter in estuarine and subtidal marine habitats along coast, San Francisco Bay.	**Not Present.** May forage off shore but does not nest here.
Ashy Storm Petrel *Oceanodroma homochroa*	SSC	Breeds on Farallon Islands off of Sonoma Coast.	**Not Present.** At the very northern edge of range.
California Brown Pelican *Pelecanus occidentalis californicus*	FE, SE, CFP	Found in estuarine, marine subtidal, and marine pelagic waters along the coast. Nest on rocky or low brushy slopes of undisturbed islands.	**Not Present.** Uses the shoreline and off shore waters for loafing and foraging. Typical nesting habitat is not present.
Harlequin Duck *Histrionicus histrionicus*	SSC	Found in marine waters along rocky shore during non-breeding season. Nests in inland streams.	**Not Present.** May occur fall through spring but does not breed here.
Golden Eagle *Aquila chrysaetos*	CFP, BCC	Found in rolling foothill and mountain areas, sage-juniper flats, dessert. Cliff-walled canyons provide nesting habitat in most parts of range.	**Unlikely.** Suitable nesting and foraging habitat not present though may fly over site during migration.

SPECIES	STATUS*	HABITAT	POTENTIAL TO OCCUR IN THE STUDY AREA
White-tailed Kite *Elanus leucurus*	CFP	Year-long resident of coastal and valley lowlands; rarely found away from agricultural areas. Preys on small diurnal mammals and occasional birds, insects, reptiles, and amphibians.	**Unlikely.** Typical nesting and foraging habitat not present.
Northern Goshawk *Accipiter gentilis*	SSC	In and on the edges of mixed and coniferous forests. Year-round resident. Hunts medium sized birds.	**Unlikely.** No nearby occurrences.
Northern Harrier *Circus cyaneus*	SSC	Found in open grasslands, prairies, and marshes. Tend to nest near water.	**Unlikely.** Suitable breeding and foraging habitat not present.
Bald Eagle *Haliaeetus leucocephalus*	SE, FD, CFP	Requires large bodies of water, or free-flowing rivers with abundant fish adjacent snags or other perches. Nests in large, old-growth, or dominant live tree with open branchwork.	**Unlikely.** Possible winter migrant.
Ferruginous Hawk *Buteo regalis*	BCC	Frequents open grasslands, sagebrush flats, desert scrub, low foothills surrounding valleys and fringes of pinyon-juniper habitats.	**Unlikely.** Suitable foraging habitat not present.
American Peregrine Falcon *Falco peregrinus anatum*	FD, SE, CFP, BCC	Breeds near wetlands, lakes, rivers, or other water on high cliffs, banks, dunes, mounds. Requires protected cliffs and ledges for cover. Feeds on a variety of birds, and some mammals, insects, and fish.	**Unlikely.** Typical nesting and foraging habitat not present.
Western Snowy Plover *Charadrius alexandrinus nivosus*	FT, SSC	Found on sandy beaches, salt pond levees and shores of large alkali lakes. Need sandy gravelly or friable soils for nesting.	**Not Present.** No breeding or foraging habitat present.
Long-billed Curlew *Numenius americanus*	BCC	Winters in large coastal estuaries, upland herbaceous areas, and croplands. Breeds in northeastern California in wet meadow habitat.	**Not Present.** Typical wintering habitat is not present in Study Area.
Short-tailed Albatross *Diomedea albatrus*	FE, SSC	Feeds on small animals and carrion at water's surface. Comes to land only when nesting. Nests on islands.	**Not Present.** May forage off shore but does not nest here.
Xantu's Murrelet *Synthliborampus hypoleucus*	FC, ST	Pelagic species that breeds on shore in rock crevices or under bushes. Most common in southern Ca.	**Not Present.** May forage off shore but does not nest here.
Marbled Murrelet *Brachyramphus marmoratus*	FT, SE	Breed in old-growth redwood stands containing platform-like branches along the coast.	**Unlikely.** Typical old-growth habitat not on site.
Tufted Puffin *Fratercula cirrhata*	SSC	An open-ocean bird; nests along the coast on islands, islets, or (rarely) mainland cliffs. Require sod or earth into which the birds can burrow, on island cliffs or grassy island slopes.	**Not Present.** May forage off shore but does not nest here.

SPECIES	STATUS*	HABITAT	POTENTIAL TO OCCUR IN THE STUDY AREA
Western Burrowing Owl *Athene cunicularia hypugea*	SSC	Frequents open grasslands and shrublands with perches and burrows. Preys upon insects, small mammals, reptiles, birds, and carrion. Nests and roosts in old burrows of small mammals.	**Unlikely**. May rarely occur during migration.
Short-eared Owl *Asio flammeus*	SSC	Found in open, treeless areas with elevated sites for perches and dense vegetation for roosting and nesting.	**Unlikely.** Suitable nesting and roosting habitat not present.
Northern Spotted Owl *Strix occidentalis caurina*	FT	Relies on large patches of old growth forest for hunting, roosting, nesting.	**Unlikely.** Typical old-growth habitat not on site.
Long-eared Owl *Asio otus*	SSC	(Nesting) riparian bottomlands grown to tall willows and cottonwoods; also, belts of live oak paralleling stream courses. Require adjacent open land productive of mice and the presence of old nests of crows, hawks, or magpies for breeding.	**Unlikely.** Typical habitat is not on site.
Vaux's Swift *Chaetura vauxi*	SSC	Forages high in the air over most terrain and habitats but prefers rivers/lakes. Requires large hollow trees for nesting.	**Moderate Potential.** May forage over site, known to nest in chimneys in Fort Bragg.
Black Swift *Cypseloides niger*	SSC	Nests in riparian jungles of willow, often mixed with cottonwoods with thick lower story.	**Unlikely.** Suitable nesting habitat not present on site.
Little Willow Flycatcher *Empidonax traillii brewsteri*	SE	Most numerous where extensive thickets of low, dense willows edge on wet meadows, ponds, or backwaters. Winter migrant.	**Not present.** Outside of range
Rufous Hummingbird *Selasphorus rufus*	BCC	Found in a wide variety of habitats that provide nectar-producing flowers. A common migrant and uncommon summer resident of California.	**Moderate Potential.** Suitable breeding habitat present.
Olive-sided Flycatcher *Contopus cooperi*	SSC	Most often found in montane conifer forests where tall trees overlook canyons, meadows, lakes or other open terrain	**Moderate Potential.** Suitable breeding habitat present.
Purple Martin *Progne subis*	SSC	Inhabits woodlands, low elevation coniferous forest. Nest in old woodpecker cavities and human-made structures.	**Moderate Potential.** Some suitable nesting and foraging habitat available on site.
Bank Swallow *Riparia riparia*	ST	Migrant in riparian and other lowland habitats in western California. Nests in riparian areas with vertical cliffs and bands with fine-textured or sandy soils in which to nest.	**Not present.** May be a rare migrant.
Loggerhead Shrike *Lanius ludovicianus*	SSC	Prefers open habitats with scattered shrubs, trees, pots, utility lines from which to forage for large insects. Nest well concealed above ground in densely-foliaged shrub or tree.	**Unlikely.** Some dense riparian and suitable foraging habitat available on site but this species is rare in Mendocino County.

SPECIES	STATUS*	HABITAT	POTENTIAL TO OCCUR IN THE STUDY AREA
Yellow Warbler *Dendroica petechia*	SSC	Usually found in riparian deciduous habitats in summer: cottonwoods, willows, alders, and other small trees and shrubs typical of low, open-canopy riparian woodland. Also breeds in montane shrubbery in open conifer forests; perhaps a recent phenomenon (Gaines 1977b).	**Unlikely.** Some dense riparian habitat available on site but probably does not breed on this section of coast.
Grasshopper Sparrow *Ammodramus savannarum*	SSC	This species nests on dense grasslands on rolling hills, lowland plains, in valleys and on hillsides on lower mountain slopes. It favors native grasslands with a mix of grasses, forbs, and scattered shrubs. Loosely colonial when nesting.	**Unlikely.** Typical habitat not present.
Bryant's Savannah Sparrow *Passerculus sandwichensis alaudinus*	SSC	Associated with the coastal fog belt, primarily between Humboldt and northern Monterey Counties. Occupies low tidally influenced habitats, adjacent to ruderal areas; often found where Pickleweed communities merge into grassland. Infrequently found in drier grasslands. Builds nests in taller grasses and rushes along roads, levees, and water conveyance canals.	**Unlikely.** Typical habitat not present.
Tricolored Blackbird *Agelaius tricolor*	SSC	Usually nests over or near freshwater in dense cattails, tules, or thickets of willow, blackberry, wild rose or other tall herbs.	**Unlikely.** Thick cattail stands present on site but not common north of Sonoma County.
Reptiles and Amphibians			
Northern Pacific Pond Turtle *Actinemys marmorata marmorata*	SSC	Occurs in perennial ponds, lakes, rivers and streams with suitable basking habitat (mud banks, mats of floating vegetation, partially submerged logs) and submerged shelter.	**Unlikely.** No nearby occurrences.
Coastal Tailed Frog *Ascaphus truei*	SSC	Most California populations occur in areas that receive more that 100 cm (40 in) of rainfall annually, and distribution may be limited by required presence of permanent streams (Bury 1968). Permanent water is critical because the aquatic larvae require 2 to 3 years to transform.	**Moderate Potential.** Suitable habitat is available for this species in Newman Gulch.
California Red-legged Frog *Rana aurora draytonii*	FT, SSC	Associated with quiet perennial to intermittent ponds, stream pools and wetlands. Prefers shorelines with extensive vegetation. Documented to disperse through upland habitats after rains.	**Not present.** Outside of range.
Northern Red-legged Frog *Rana aurora aurora*	SSC	Occurs in the vicinity of quiet, permanent pools of streams, marshes, and occasionally ponds. Prefers shorelines with extensive vegetation	**Moderate Potential.** Suitable breeding habitat exists for this species in existing reservoir.

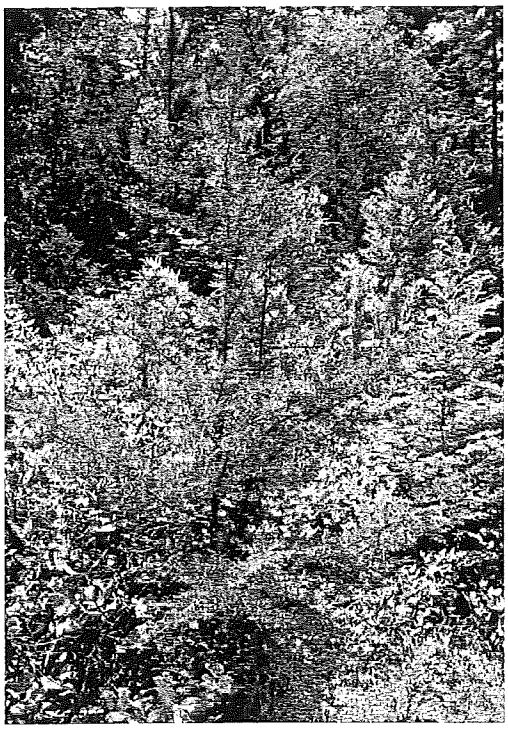
SPECIES	STATUS*	HABITAT	POTENTIAL TO OCCUR IN THE STUDY AREA
Foothill Yellow-legged Frog *Rana boylii*	SSC	Found in or near rocky streams in a variety of habitats. Feed on both aquatic and terrestrial invertebrates.	**Unlikely.** Sedimentation in Newman Gulch and lack of turbulence likely precludes presence.
Southern Torrent Salamander *Rhyacotriton variegatus*	SSC	Cold, permanent seeps and small streams with rocky substrate.	**Moderate Potential.** Suitable breeding habitat exists for this species in Newman Gulch.
Del Norte Salamander *Plethodon elongatus*	SSC	Redwood and North Coast forests with talus slopes and hardwood understories.	**Not Present.** Outside of range.
Fish			
Tidewater Goby *Eucyclogobius newberryi*	FE, SSC	Brackish water habitats along the California coast from Agua Hedionda Lagoon, San Diego County to the mouth of the Smith River. Found in shallow lagoons and lower stream reaches, they need fairly still but not stagnant water and high oxygen levels.	**Not Present.** Suitable aquatic habitat is not available in the Study Area and this species is not known from the Noyo River.
Coho Salmon - Central CA Coast ESU *Oncorhynchus kisutch*	FE, SE, NMFS	Federal listing includes populations between Punta Gorda and San Lorenzo River. State listing includes populations south of San Francisco Bay only. Occurs inland and in coastal marine waters. Requires beds of loose, silt-free, coarse gravel for spawning. Also needs cover, cool water and sufficient dissolved oxygen.	**Not Present.** Suitable aquatic habitat is not available in the Study Area; however, construction activities have the potential to affect downstream water quality.
Steelhead - Northern California ESU *Oncorhynchus mykiss*	FT, NMFS	Adults migrate upstream to spawn in cool, clear, well-oxygenated streams. Juveniles remain in fresh water for 1 or more years before migrating downstream to the ocean.	**Not Present.** Suitable aquatic habitat is not available in the Study Area; however, construction activities have the potential to affect downstream water quality.
Chinook Salmon - CA Coastal *Oncorhynchus tshawytscha spring-run*	ST, FT, RP, NMFS	Federal listing includes populations spawning in Sacramento River and tributaries. Adult numbers depend on pool depth and volume, amount of cover, and proximity to gravel. Water temps >27 degrees C lethal to adults.	**Not Present.** Suitable aquatic habitat is not available in the Study Area; however, construction activities have the potential to affect downstream water quality.

SPECIES	STATUS*	HABITAT	POTENTIAL TO OCCUR IN THE STUDY AREA
Invertebrates			
lotis blue butterfly *Lycaedes argyrognomon lotis*	FE	Sphagum-willow bogs at coastal prairie and Bishop pine-and fir-Bolander's pine forest transitional zones. Coast trefoil and Bolander's sweet pea are suspected host plants.	**Unlikely.** Host plants not detected on site. No bog habitat present.
Behren's silverspot butterfly *Speyeria zerene behrensii*	FE	Inhabits coastal terrace prairie habitat. Foodplant is Viola adunca	**Unlikely.** Host plants not detected on site and no coastal prairie present.

*** Key to status codes:**
Status codes used above are:
FE - Federal Endangered
FT - Federal Threatened
FC - Federal Candidate
FPD - Federal Proposed Delisted
FD - Federal Delisted
MMPA- Marine Mammal Protection Act
NMFS - Species under the Jurisdiction of the National Marine Fisheries Service
SE - State Endangered
ST - State Threatened
SR - State Rare
SSC - CDFG Species of Special Concern
CFP - California Fully Protected Species
SLC - Species of Local Concern
WBWG - Western Bat Working Group priority species

ATTACHMENT 4

PYGMY CYPRESS MITIGATION PLANTING AREA AND PLAN



Summers Lane Reservoir Pygmy Cypress Mitigation Planting Area and Plan

19701 Summers Lane Fort Bragg, CA 95437 APN 019-070-13

City of Fort Bragg

BACKGROUND INFORMATION

PROJECT SUMMARY: The City of Fort Bragg plans to develop a new 45 acre-feet raw water reservoir to store raw water from Waterfall Gulch to meet drought-related water storage needs of the Fort Bragg water service area. In order to facilitate this development, approximately eight acres of second and third growth redwood dominated mixed coniferous forest would need to be cleared. The project area was most recently logged in 1993.

The project area was surveyed for protected and sensitive plant and animal species in 2008 and 2009 by Redwood Coast Associates and WRA, Inc. The project area was surveyed again in 2013 by Darcy Mahoney. Measures have been developed to avoid where possible, and otherwise minimize impacts to protected and sensitive plant and animal species as outlined in the Timber Harvest Plan and CEQA Mitigated Negative Declaration for the project. An estimated 72 pygmy cypress (*Hesperocyparis pygmaea*) trees are currently present in the project area, constituting approximately $1/7^{th}$ of the canopy cover, and will need to be removed to accommodate the project. Because pygmy cypress is a rare tree that only occurs within Mendocino and Sonoma Counties, this mitigation and monitoring plan has been designed to assure that a sufficient number of pygmy cypress trees are replanted in the project area (3:1 ratio) that at least the number of trees that must be removed will eventually grow back and reach maturity within the project area.

BIOLOGICAL IMPORTANCE OF PLANTS TO BE IMPACTED: Pygmy cypress (*Hesperocyparis pygmaea)* is an evergreen perennial tree native to the pygmy forests of Mendocino and Northern Sonoma Counties, and is naturally found nowhere else in the world. The pygmy forest plant community is located on coastal terraces generally found from two to five miles east of the ocean. The soil on pygmy terraces is highly leached of nutrients and acidic. For this reason, vegetative growth is slow, causing stunting, and a limited number of plant species have adapted to and are present within this habitat type.

Pygmy cypress can and do grow outside of these nutrient poor, acidic conditions, and when they take root in nutrient rich soil they grow much taller than the cypress found within the pygmy forest. In more nutrient rich habitats, however, other tree species are able to outcompete pygmy cypress for sunlight, and they can become overshaded and eventually die out.

Pygmy cypress is not currently listed as a Federally Endangered Species or State Endangered Species, however it is listed by the California Native Plant Society as a 1B.2 species, which indicates that pygmy cypress is endemic to and considered fairly endangered in California.

The individuals found at the project site have taken root in the nutrient rich soils of the redwood dominated mixed coniferous forest. They are taller than the cypress found in the pygmy forest, and it is likely cleared areas resulting from during past logging efforts accommodated establishment within the project area.

EXISTING CONDITIONS

The project area is typical of a marine terrace soil with a second growth redwood forest. This area is adjacent to the Celeri & Sons Rhododendron Nursery, and was logged as recently as 1993. As a result, the stand here supports a relatively young age class with 90 percent of the stand at a diameter at breast height (DBH) of 24 inches or smaller. The forest stand supports redwood (*Sequoia sempervirens*), Douglas fir (*Pseudotsuga menziesii*), pygmy cypress, Bishop pine (*Pinus muricata*), grand fir (*Abies grandis*), and tan oak (*Lithocarpus densiflorus*). The project area is a forest edge area subject to the affect westerly winds. Vigor and health is declining in the Douglas fir, pygmy cypress, and Bishop pine trees. A number of trees have been blown over and it is anticipated that blow down will continue as some species decline and gap areas increase.

Pygmy cypress now occurs as a minor component of the forest canopy, composing approximately 10 percent of the total basal area of the project area. The diameter at breast height (DBH) ranges from seedlings (less than 1/4 inch) to 24 inches. Approximately 68 percent of the pygmy cypress trees in the project area have a DBH of 16 inches or smaller. Seedlings are sparse and restricted to canopy gaps along the roads.

In Blacklock or aboriginal soils pygmy cypress typically dominates the canopy but is limited in height to less than two meters, and is the climax community. However in deeper, well-drained soils, like those in the project area, pygmy cypress typically persists as a mid-successional species and is usually outcompeted by faster growing and taller conifers including redwood and Douglas fir.

Prior to logging, the area was likely dominated by redwood and Douglas fir and supported an occasional pygmy cypress in gaps created from natural processes. Over time the shade-intolerant cypress species likely declined until another gap or disturbance provided an opportunity for germination or release of suppressed seedlings and saplings. Logging activities and road building created gaps in the canopy and disturbance to the understory and soils. Species such as pygmy cypress benefited from the disturbance and germination of these species was likely stimulated by opening of the canopy.

The shade-intolerant pioneer species pygmy cypress and Bishop pine are declining in both the overstory and understory. Absent disturbance, shade-tolerant species will outcompete the pioneer components of the stand over time.

PLANTING AND MONITORING PLAN

The proposed reservoir project will permanently remove approximately 72 special status pygmy cypress trees with an average diameter at breast height (DBH) of 18 inches from the project area. As mitigation for these impacts, planting areas have been established (the "mitigation area") to replace the trees at a 3:1 ratio. The size of the mitigation area was selected to allow for establishment of over 216 mature trees, with each tree occupying an estimated 100-square foot area (Figure A), although it is not expected that trees will grow in a uniform manner. To allow for immediate visual buffering of the project on the west side, where the reservoir will be visible from the neighboring residential property, some trees and brush will remain after the timber harvest and conversion. Approximately 56 cypress would be planted within this visual buffer area, which is 10 feet wide and approximately 560 feet long. The number of cypress that will establish within this buffer area will depend on how many adequately sized clearings are created during the timber harvest and clearing operations, and how much healthy mature

vegetation can safely remain. Additional planting areas will be created as needed if inadequate rooms exists in the visual buffer area for cypress establishment and growth.

Methods for establishing and maintaining 216 pygmy cypress are described as follows. Topsoil to be disturbed or removed by project construction will be stockpiled temporarily onsite. Once the project has been completed the topsoil will be spread over the 0.54-acre mitigation area. It is expected that pygmy cypress will germinate naturally from the existing seed bank in the topsoil, due to relatively exposed conditions of bare soil and location next to the newly-constructed reservoir. In case of inadequate existing seed bank in the topsoil, seedling and cone collection shall occur prior to vegetation removal for the project. 100-200 seed cones shall be collected and 50 or more seedlings shall be salvaged and transplanted to containers and stored at a local nursery.

Three years after construction activities the mitigation area (Figure A) will be surveyed for number of trees per acre. If the number of trees per acre is equal to or greater than the 3:1 ratio, then no more visits shall be required. If after year three, the densities are below the designated ratio, then the area should be replanted back to the mitigated ratio with seedlings, either germinated from seed or collected from site. Seedlings will be planted by hand in native topsoil, in a hole deep enough to allow roots to be positioned downward and not curved over. Seedlings will be planted in the late fall or early winter to increase survival rates. At year 5, the area should be re-surveyed. If stocking or replanting goals have been achieved then no more surveys shall be required. If the density is below, then replanting of dead and dying trees back to the mitigated ratio shall occur, and no more monitoring shall be required.

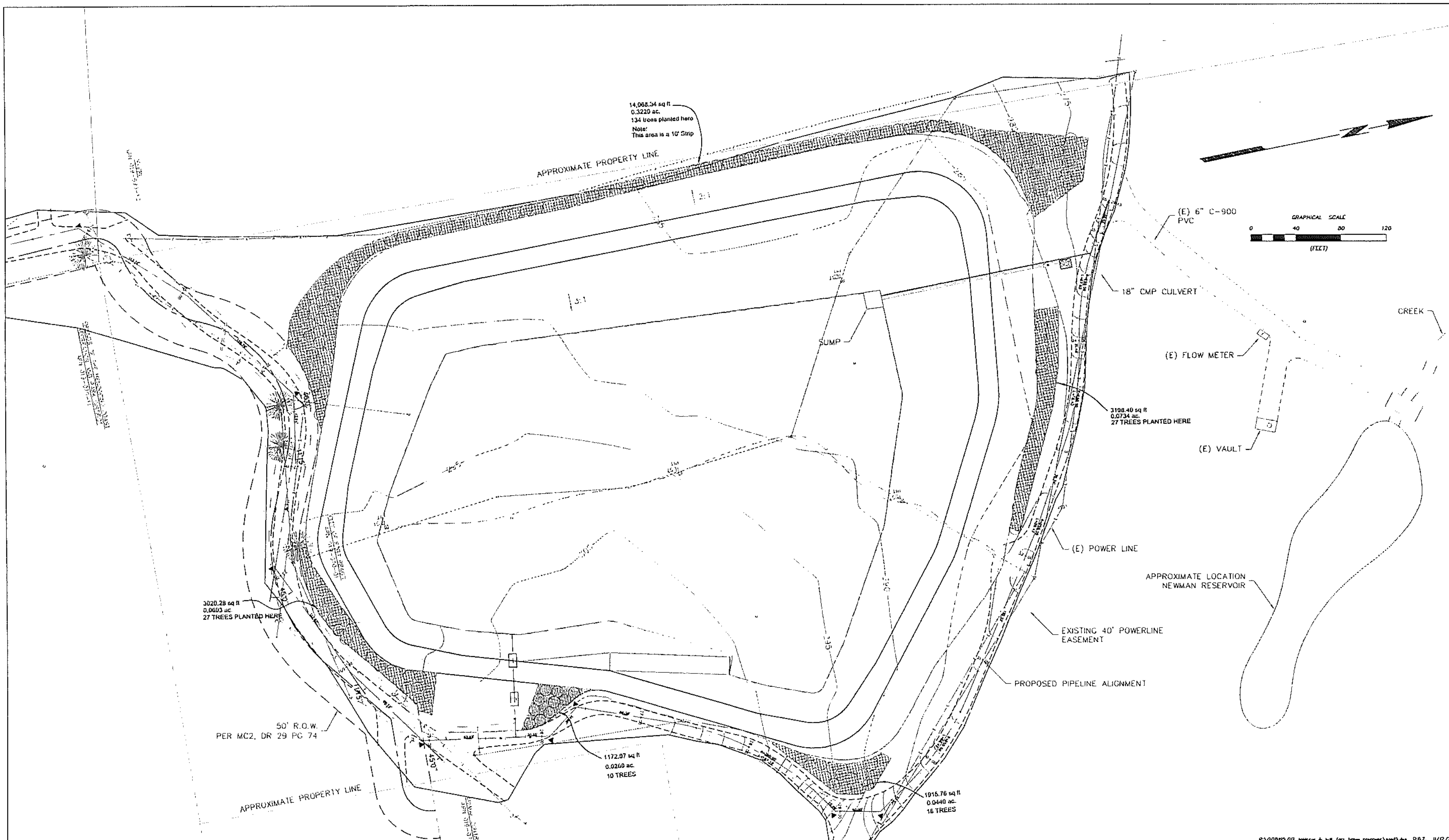
During the initial visit at three years (and at year 5) all competing conifer seedlings and invasive species in the mitigation area shall be removed in an effort to reduce competition and the potential spread of invasive species.

At year three and year five monitoring, a short summary report of conditions will be documented and placed in the project file at City Hall. The summary reports will contain information on the number of cypress trees established, dimensions, and any actions taken including weeding and planting. Photographs will be taken and included with the summary reports.

The pygmy cypress which will occur onsite after construction are expected to have a higher lifespan than the pre-project cypress would have since competition for sunlight will be reduced, particularly in areas outside of the westerly visual buffer area. If no project were to occur in the conversion area, the existing pygmy cypress trees would likely diminish as the forest canopy matures. The mitigation area along the roads and near the reservoir will create a permanent gap in the canopy, pygmy cypress will be able to persist for longer duration than if it were in a forested environment absent of disturbance.

CONCLUSION

The loss of approximately 72 pygmy cypress trees will be temporary. Once construction of the reservoir is complete, the planting area will be covered with topsoil that was removed prior to construction, in an effort to minimize the replanting effort. The goal is to achieve a 3 to 1 replacement within five years for pygmy cypress tress impacted by the construction. It will likely take 10-20 years before a similar age class or diameter distribution to the one being lost will be achieved.



NO.	DATE	REVISIONS	BY	CHK

DRAWN BY:	PROJECT NO:
ENGINEER:	SCALE:
CHECKED BY:	APPROVED BY:
DATE:	DATE:

LEGEND:

REPRESENTS 100 SQ FT AREA FOR PYGMY CYPRESS TREE AND AREA DEDICATED FOR RE-POPULATION.

PROPOSED SUMMER'S LANE RESERVOIR

FOR THE CITY OF FORT BRAGG
416 N. FRANKLIN STREET
FORT BRAGG, CA. 95410

PYGMY CYPRESS TREE
RE-POPULATION

DRAWING:
SHEET: 1 OF 1
REVISION NO:
DATE: 11/18/09

ATTACHMENT 5

HOLDREGE & KULL REPORT: SUMMERS LANE RESERVOIR, FORT BRAGG CA GEOTECHNICAL INVESTIGATION REPORT, OCTOBER 2, 2009, SECTION 8

8 EARTHWORK GRADING RECOMMENDATIONS

Our earthwork grading recommendations include: stripping and grubbing, native soil preparation for engineered fill placement, engineered fill construction, engineered fill construction with geotextile reinforcements, engineered fill construction with non-testable earth materials, fill slope grading, cut slope grading, soil corrosion potential, construction dewatering, surface water drainage, underground utility trenches, grading plan review, reservoir outlet works seepage cut-off wall, and construction monitoring. Our earthwork grading recommendations are presented below.

8.1 STRIPPING AND GRUBBING

The site should be stripped and grubbed of vegetation and other deleterious materials as described below.

1. Strip and remove the top 4 to 18 inches of soil containing shallow vegetation roots and other deleterious materials (peat). This highly organic topsoil can be stockpiled onsite and used for surface landscaping, but should not be used for constructing compacted engineered fills. Grub the underlying 6 to 8 inches of soil to remove any large vegetation roots or other deleterious material while leaving the soil in place. The project geotechnical engineer, or their representative, should approve the use of any soil materials generated from clearing and grubbing activities.
2. Remove all large roots and tree stumps. Excavate the remaining cavities or holes to a sufficient width so that an approved backfill soil can be placed and compacted in the cavity or holes. Sufficient backfill soil should be placed and compacted in order to match the surrounding elevations and grades. The project geotechnical engineer, or their representative, should observe and approve the preparation of the cavities and holes prior to placing and compacting fill in the cavities or holes.
3. Remove all rocks greater than 3 inches in greatest dimension from the top 12 inches of the soil. Rocks with a greatest dimension larger than 3 inches will be referred to in this report as "over sized" rock materials. Over sized rock materials can be stockpiled onsite and used to construct engineered fills; however they must be placed at or near the bottom of deep fills, but not shallower than 3 feet from the finished subgrade surface, with approval of the project engineer. The oversized rock should be placed with enough space between them to avoid clustering and the creation of void space. The project engineer or his/her representative should approve the use and placement of all over sized rock materials prior to constructing compacted fills.
4. Vegetation, other deleterious materials, and over sized rock materials should be removed from the site.

8.2 NATIVE SOIL PREPARATION FOR ENGINEERED FILL PLACEMENT

After completing site clearing and grubbing activities, the exposed native soil should be prepared for placement and compaction of engineered fills as described below.

1. The native soil should be scarified to a minimum depth of 8 inches below the existing land surface or cleared and grubbed surface, and then uniformly moisture conditioned. If the soil is classified as a fine grained soil by the USCS (i.e., CL, CH, ML, MH) then it should be moisture conditioned between 2 to 4 percentage points greater than the ASTM D1557 optimum moisture content. If the soil is classified as a coarse-grained soil by the USCS (i.e., GP, GW, GC, GM, SP, SW, SC or SM) then it should be moisture conditioned to within ± 3 percentage points of the ASTM D1557 optimum moisture content.
2. The native soil should then be compacted to achieve a minimum relative compaction of 90 percent of the ASTM D1557 maximum dry unit weight (density). The moisture content, density, and relative percent compaction should be tested by the project engineer or the project engineer's field representative to evaluate whether the compacted soil meets or exceeds this minimum percent compaction and moisture content recommendations. The earthwork contractor shall assist the project engineer or the project engineer's field representative by excavating test pads with the onsite earth moving equipment. Native soil preparation beneath concrete slab-on-grade structures (i.e., floors, sidewalks, patios, etc.), asphalt concrete (AC) pavement should be prepared as specified in Section 8.2 (Structural Improvements).
3. The prepared native soil surface should be proof rolled with a fully loaded 4,000 gallon capacity water truck with the rear of the truck supported on a double-axel, tandem-wheel, undercarriage or approved equivalent. The minimum tire pressure should be 65 pounds per square inch (psi). The proof rolled surface should be visually observed by the project engineer or the project engineer's field representative to be firm, competent, and relatively unyielding. The project engineer or the project engineer's field representative may also evaluate the surface material by hand probing with a ¼-inch-diameter steel probe; however, this evaluation method should not be performed in place of proof rolling.
4. Construction quality assurance tests should be performed using the minimum testing frequencies presented in Table 8.2 or as modified by the project engineer to suit the site conditions.

Table 8.2, Minimum Testing Frequencies

ASTM No.	Test Description	Minimum Test Frequency(3)
D1557	Modified Proctor Compaction Curve	1 per 10,000 SF (1) or Material Change (2)
D2922	Nuclear Moisture Content	1 per 5,000 SF
D3017	Nuclear Density	1 per 5,000 SF

Notes: (1) SF = square feet.
(2) Whichever criteria provide the greatest number of tests.
(3) These are minimum testing frequencies that may be increased or decreased at the project engineer's discretion on the basis of the site conditions encountered during grading.

5. The native soil surface should be graded to minimize ponding of water and to drain surface water away from the reservoir and associated structures. Where possible, surface water should be collected, conveyed, and discharged into natural drainage courses, storm sewer inlet structures, permanent engineered storm water runoff percolation/evaporation basins, or engineered infiltration subdrain systems.

8.3 ENGINEERED FILL WITHOUT GEOTEXTILE REINFORCEMENTS

H&K encountered both cohesive and cohesionless soils during our site investigation that can be used to construct the reservoir perimeter earth levee structure. The engineered fills required to construct the reservoir perimeter earth levees should be constructed with non-expansive soil with and without geosynthetic reinforcements as described herein, or as modified by the project engineer. If soil is to be imported to the site for constructing engineered fills, then H&K should be allowed to evaluate the suitability of the borrow soil source by taking representative soil samples for laboratory testing.

1. Non-expansive, cohesive soil used to construct engineered fills should consist of soil classified by the USCS as silty sand (SM), clayey sand (SC), low plasticity clay (CL), or low plasticity silt (ML), predominantly of materials less than 1/2 inches in greatest dimension and should not contain rocks greater than 3 inches in greatest dimension (over sized material). Non-expansive, cohesive soil should have a plasticity index (PI) of less than or equal to PI ≤ 20 and a liquid limit (LL) of less than or equal to LL ≤ 45 as determined by ASTM D4318 Atterberg Indices test method, and have a minimum of 15 percent by weight passing a No. 200 sieve as determined by ASTM D422 test method. No oversized materials (rocks greater than 3 inches) can be placed within the embankment fills, unless placed at or near the bottom of deep fills, but not within 3.0 feet of the finished subgrade surface, with approval of the project engineer. Deep fills are defined as fills that are greater than 10 feet in vertical thickness. Over sized materials should be spread apart to prevent clustering so that void spaces are not created. The project engineer or project engineer's field representative should approve the use of over sized materials for constructing fills and observe placement.

2. Non-expansive, cohesive soil used to construct reservoir embankment engineered fills should be uniformly moisture conditioned. If the soil is classified by the USCS as coarse grained (i.e., SC or SM), then it should be moisture conditioned to within ± 3 percentage points of the ASTM D1557 optimum moisture content. If the soil is classified by the USCS as low plasticity and fine grained (i.e., CL or ML), then it should be moisture conditioned to between 2 to 4 percentage points greater than the ASTM D1557 optimum moisture content. Soil classified by the USCS as high plasticity and fine grained (i.e., CH or MH) should not be used to construct engineered fills without the approval of the project geotechnical engineer.
3. Engineered fills should be constructed by placing uniformly moisture-conditioned soil in maximum 8-inch-thick loose lifts (layers) prior to compacting.
4. The soil should then be compacted to achieve a minimum relative compaction of 90 percent of the ASTM D1557 maximum dry density.
5. The earthwork contractor should compact each loose soil lift with a needing or tamping foot compactor such as a Caterpillar (CAT) 815 Compactor or equivalent as approved by our project engineer or the project engineer's field representative. A smooth steel drum roller compactor should not be used to compact loose soil lifts for construction of engineered fills.
6. The field and laboratory CQA tests should be performed consistent with the testing frequencies presented in Table 8.3, or as modified by the project engineer, to better suit the site conditions.

Table 8.3, Minimum Testing Frequencies For Reservoir Perimeter Earth Levee Engineered Fills

ASTM No.	Test Description	Minimum Test Frequency(3)
D1557	Modified Proctor Compaction Curve	1 per 3,000 CY (1) or Material Change (2)
D2922	Nuclear Moisture Content	1 per 250 CY = 8-In. Loose Lift By 100-Ft. x 100-Ft.
D3017	Nuclear Density	1 per 250 CY = 8-In. Loose Lift By 100-Ft. x 100-Ft.

Notes:
(1) CY = cubic yards.
(2) Whichever criteria provide the greatest number of tests.
(3) These are minimum testing frequencies that may be increased or decreased at the project engineer's discretion on the basis of the site conditions encountered during grading.

7. The moisture content, density, and relative percent compaction of all engineered fills should be tested by the project engineer's field representative during construction to evaluate whether the compacted soil meets or exceeds the minimum compaction and moisture content recommendations. The earthwork contractor shall assist the project engineer's field representative by excavating test pads with the onsite earth moving equipment.

8. The prepared finished grade or finished subgrade soil surface should be proof rolled with a fully loaded 4,000 gallon capacity water truck with the rear of the truck supported on a double-axel, tandem-wheel, undercarriage or approved equivalent. The minimum tire pressure should be 65 pounds per square inch (psi). The proof rolled surface should be visually observed by the project engineer or the project engineer's field representative to be firm, competent, and relatively unyielding. The project engineer or the project engineer's field representative may also evaluate the surface material by hand probing with a ¼-inch-diameter steel probe; however, this evaluation method should not be performed in place of proof rolling as described in the preceding.

8.4 ENGINEERED FILL WITH GEOTEXTILE REINFORCEMENTS

Construction of geotextile reinforced engineered fills for the reservoir perimeter earth levee should be performed as described below. In general, only the 2H:1V exterior reservoir perimeter earth levee slopes will require the installation of geotextile reinforcements.

1. The engineering material properties and the placement, moisture conditioning and compaction of engineered fills for construction of the reservoir perimeter earth levees should be performed consistent with the recommendations presented in Section 8.1.3.
2. The mechanically reinforced engineered slopes shall be constructed with multiple layers of a woven geotextile such as Propex 2006 or an approved equivalent.
3. The woven geotextile fabric should be placed with a maximum vertical spacing of 2-foot (center to center), starting at the base of the earth levee structure (placed on the existing prepared subgrade surface) and extending to a maximum of 2 feet below the finished grade surface of the perimeter levee road.
4. The woven geotextile fabric should be placed no closer than approximately 24 inches from the finish slope face and extend a minimum of 25 feet into the fill slope.
5. Each geotextile panel should be overlapped a minimum of 1 foot in the plane of the geotextile panel.
6. The woven geotextile fabric should be pulled into a taught condition to remove wrinkles prior to placing any engineered fill soil on the geotextile surface.
7. Care should be taken to avoid tearing and/or puncturing the geotextile panels during placement and covering with compacted engineered fill soil. If a tear or puncture occurs, then the damaged portion of the panel should be replaced or the damaged portion should be sewn together as approved by the project engineer.
8. A low ground pressure dozer (less than 5 psi) should be used to spread a minimum 12 inch thick loose lift of soil over the geotextile prior to compacting with a kneading foot compactor.

9. A smooth drum roller shall be used to compact and smooth the compacted soil surface over which the geotextile fabric is place.

8.5 ENGINEERED FILL WITH NON-TESTABLE EARTH MATERIALS

If non-testable earth materials are encountered at the site during grading, and if these materials are used to construct engineered aerial fills and/or engineered utility trench backfills, then a performance based (procedural) construction quality assurance (CQA) method shall be used to evaluate the compaction work performed by the earthwork contractor. Non-testable earth materials generally consist of mixtures of gravels and/or cobbles with a matrix of sand, silty and/or clay materials. The gravel and larger particle size material content (materials retained above the No. 4 mesh sieve) generally is greater than 30 percent by dry weight of the total mass of the material. Use of non-testable earth materials for constructing engineered aerial fills and engineered utility trench backfills should be approved by the project geotechnical engineering consultant on a case-by-case basis. The performance based compaction method and criteria to be used during large scale grading should be determined by constructing a small test fill area for engineered aerial fills and a small test trench section for engineered utility trench backfills. The compaction method and CQA criteria should include the following site specific criteria:

1. **Specified Compaction Equipment:** We recommend that the contractor use a CAT815 Compactor equipped with kneading-foot wheels or an approved equivalent for construction of engineered aerial fills and a CAT245D Excavator equipped with a kneading-foot compactor wheel or an approved equivalent for construction of utility trench backfills. A smooth steel drum roller compactor should not be used to compact loose soil lifts for construction of engineered fills with non-testable earth materials.
2. **Maximum Loose Lift:** We recommend that the maximum loose lift (layer) thickness prior to compaction for both aerial fills and utility trench backfills should not exceed 12-inches.
3. **Moisture Content Range:** We recommend that the fill material be moisture conditioned such that the moisture content range of the matrix soil materials is between 0 to 4 percentage points greater than the ASTM D1557 optimum moisture content for a compaction curve performed only on the matrix soil material.
4. **Minimum Number of Compactor Passes:** We recommend that the minimum number of specified compactor equipment passes for each loose lift coverage of earth materials used for construction of aerial fills and utility trench backfills be 8 and 20 passes, respectively. The actual number of compactor passes should be approved by the project geotechnical engineer or his/her representative from the results of constructing aerial test fills and/or utility trench test fills.
5. **Compaction Test Trenches:** At the direction of the CQA field technician, the earthwork contractor shall periodically use his onsite equipment to excavate test

trenches into the compacted non-testable engineered fill materials. The CQA field technician will evaluate the competency and stability of the compacted engineered fill material by making the following observations:

- The relative difficulty of the contractor's equipment to excavate the compacted engineered fill materials. In other words, the relative competency of the compacted engineered fill materials to resist excavation by the contractor's equipment.
- The presence or lack of presence and quality of imprints left in the matrix soil materials by the gravels, cobbles and/or rocks that were removed by the contractor's equipment during excavation of the test trench.
- The presence, or lack of presence, of newly broken gravel, cobble and/or rock materials that were sheared by the contractor's equipment during excavation of the test trench.
- The moisture content of the matrix soil materials exposed in the test trench is relatively uniform and is between 0 to 4 percentage points greater than the ASTM D1557 optimum moisture content.

6. **Proof Rolling:** The prepared finished grade or finished subgrade soil surface constructed with non-testable earth materials should be proof rolled with a fully loaded 4,000 gallon capacity water truck with the rear of the truck supported on a double-axel, tandem-wheel, undercarriage or approved equivalent. The minimum tire pressure should be 65 pounds per square inch (psi). The proof rolled surface should be visually observed by the project engineer or the project engineer's field representative to be firm, competent, and relatively unyielding. The project engineer or the project engineer's field representative may also evaluate the surface material by hand probing with a ¼-inch-diameter steel probe; however, this evaluation method should not be performed in place of proof rolling as described in the preceding.

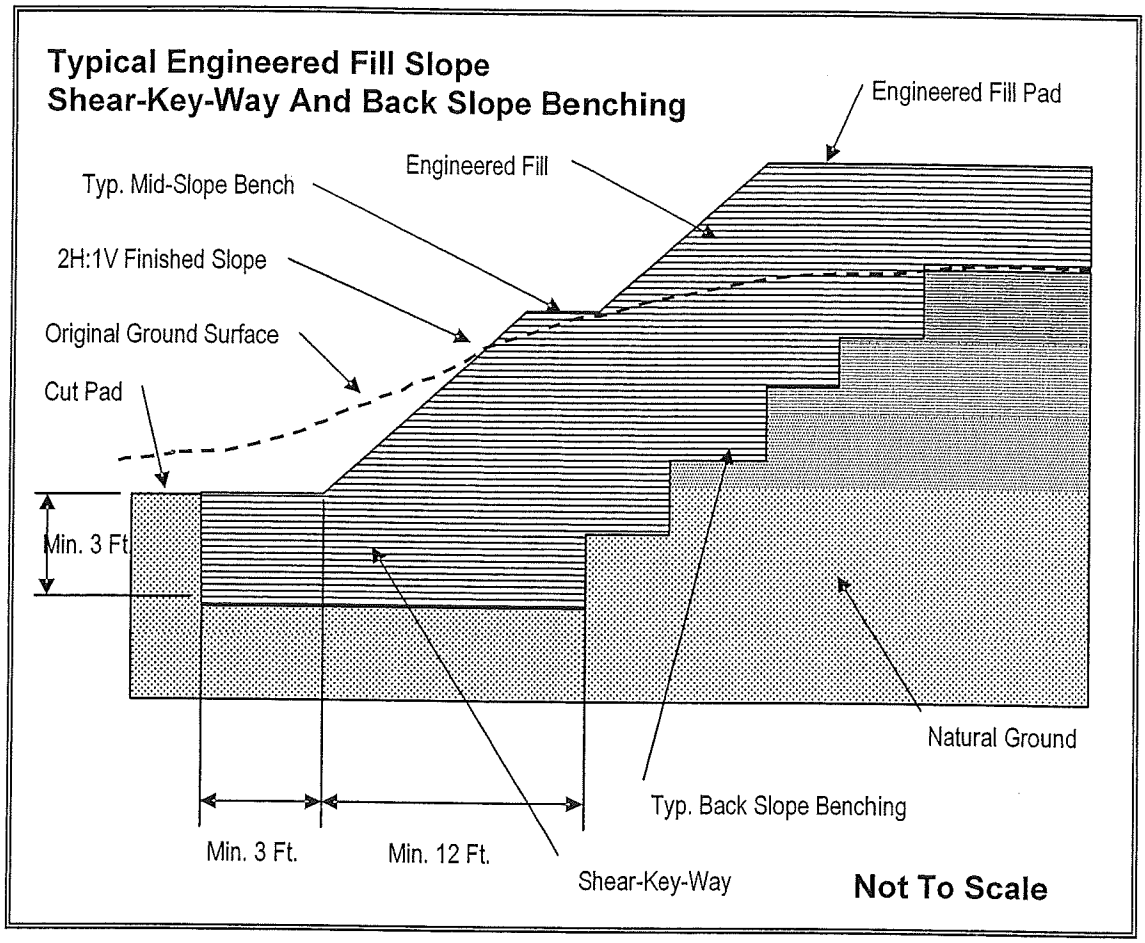
8.6 FILL SLOPE GRADING

The reservoir perimeter earth levee slope shall be graded as described below.

1. The exterior reservoir perimeter earth levee fill slopes should be graded with a maximum slope gradient of 2H:1V (horizontal to vertical slope ratio) and with a maximum vertical height of 25 feet. If the exterior reservoir earth levee fill slopes are to be graded with steeper than 2H:1V gradients and/or with a vertical height greater than 25 feet, then H&K should be notified so that slope stability analysis of the proposed slope configuration can be performed and provide revised recommendations.
2. The interior reservoir perimeter earth levee fill slopes should be graded with a maximum slope gradient of 3H:1V (horizontal to vertical slope ratio) and with a maximum vertical height of 25 feet. If the interior reservoir earth levee fill slopes are to be graded with steeper than 3H:1V gradients and/or with a vertical height

greater than 25 feet, then H&K should be notified so that slope stability analysis of the proposed slope configuration can be performed and provide revised recommendations.

3. A shear-key-way should be graded at the base of the fill slope prior to constructing the fill slope. The shear-key-way should be a minimum of 15-feet-wide and extend to a minimum depth of 3-feet below the finished subgrade surface. The shear-key-way base should be graded with a minimum slope gradient of 2 percent towards the interior fill slope surface.
4. Fill slopes should be graded in horizontal lifts to the lines and grades shown on the grading plans. The design finished grade of a fill slope should be achieved by over building the slope face and then cutting it back to the design finished grade. The in-slope edge of each horizontal lift should be benched into the firm, competent, and relatively unyielding soil of the natural ground slope.
5. If groundwater seepage from the slope and/or shear-key-way areas are encountered during grading or if the site conditions indicate that groundwater seepage does occur during the wet winter season, then H&K should be notified so that we can assess the conditions and provide a design for installation of permanent dewatering subdrains.



6. Surface benches should be graded into the finished fill slope with a minimum width of 10 feet and with maximum vertical intervals of 25 feet between benches or at the mid slope height if the total vertical slope height is greater than 25 feet. Benches should be graded with a minimum slope gradient of 2 percent towards the inside fill slope surface; in other words, the bench slope gradient should cause surface water to drain towards the fill slope side of the bench (not over and down the fill slope face).
7. Fill slopes should not be constructed or extended horizontally by placing soil on an existing slope face and then track walking to achieve the required percent relative compaction.
8. Fill soils used to construct slopes should be uniformly moisture conditioned, placed in loose lifts, and compacted as described in Section 8.1.3.

8.7 CUT SLOPE GRADING

1. The reservoir earth cut slopes to be graded on the interior of the reservoir should be graded as described below.
2. Cut slopes should be graded with a maximum slope gradient of 3H:1V (horizontal to vertical slope ratio) and with a maximum vertical height of 25 feet. If cut slopes are to be graded with steeper than 3H:1V gradients and/or with a vertical height greater than 25 feet, then H&K should be notified so that we can determine if a slope stability analysis of the proposed slope configurations should be performed and provide revised recommendations, if necessary.
3. Benches should be graded with a minimum width of 10 feet and with maximum vertical intervals of 25 feet between benches or at the mid slope height if the total vertical height is greater than 25 feet.
4. The benches should be graded with a minimum slope gradient of 2 percent towards the cut; in other words, the bench slope gradient should cause surface water to drain towards the cut slope side of the bench (not over and down the cut slope face).

8.8 EROSION CONTROLS

1. Erosion controls should be installed as described below.
2. Erosion controls should be installed on all cut and fill slopes to minimize erosion caused by surface water runoff.
3. Install on all slopes either an appropriate hydroseed mixture compatible with the soil and climate conditions of the site as determined by the local U.S. Soil Conservation District or apply an appropriate manufactured erosion control mat.
4. Install surface water drainage ditches at the top of all cut and fill slopes to collect and convey both sheet flow and concentrated flow away from the slope face.
5. Install surface water drainage ditches on the inside of all cut and fill slope benches to collect and convey both sheet flow and concentrated flow away from the slopes and to designed over side drain structures.
6. The drainage swales and over side drain structures should be lined with a minimum 2-inch-thick gunite concrete surface, erosion mats, or other suitable materials. Over side drains can also be designed with corrugated metal pipe that are anchored to the slope. If over side drains are deemed necessary, then H&K should be allowed to perform both hydraulic and structural analyses for design of these surface water drainage control structures.
7. The intercepted surface water should be discharged into natural drainage course or into other collection and disposal structures.

8.9 SOIL CORROSION POTENTIAL

The selected materials used for constructing underground utilities should be evaluated by a corrosion engineer for compatibility with the onsite soil and groundwater conditions. H&K did not perform a corrosion potential evaluation of the on site soil and ground water as part of our scope-of-services.

8.10 CONSTRUCTION DE-WATERING

H&K does not anticipate the need to perform de-watering of the site during earthwork grading. However, the earthwork contractor should be prepared to de-water the utility trench excavations and any other excavations if the groundwater table is encountered during grading. The following recommendations are preliminary and are not based on performing a ground water flow analysis. A detailed de-watering analysis was not a part of our proposed work scope. It should be understood that it is the earthwork contractor's sole responsibility to select and employ a satisfactory de-watering method for each excavation.

1. H&K anticipates that de-watering of utility trenches can be performed by constructing sumps to depths below the trench bottom and removing the water with sump pumps.
2. Additional sump excavations and pumps should be added as necessary to keep the excavation bottom free of standing water and relatively dry when placing and compacting the trench backfill materials.
3. If ground water enters the trench faster than it can be removed by the de-watering system thereby allowing the underlying compacted soil to become unstable while compacting successive soil lifts, then it may be necessary to remove the unstable soil and replace it with free draining, granular drain rock. Native backfill soil can again be used after placing the granular rock to an elevation that is higher than the ground water table.
4. If granular rock is used it should meet or exceed the following gradation specifications: 100 percent passing the 3/4 inch sieve, 95 to 100 percent passing the ½ inch sieve, 70 to 100 percent passing the 3/8 inch sieve, 0 to 55 percent passing the No. 4 sieve, 0 to 10 percent passing the No. 8 sieve, and 0 to 3 percent passing the No. 200 sieve.
5. H&K recommends that the utility trench excavations be performed as late in the summer months as possible to allow the ground water table to reach its' lowest seasonal elevation.

8.11 SURFACE WATER DRAINAGE

1. H&K recommends the following surface water drainage mitigation measures:

2. Grade all slopes to drain away from the reservoir area with a minimum 2 percent slope for a distance of not less than 10 feet from the tow of the external reservoir slopes.
3. Grade all landscape areas near and adjacent to the reservoir slopes to prevent ponding of water.

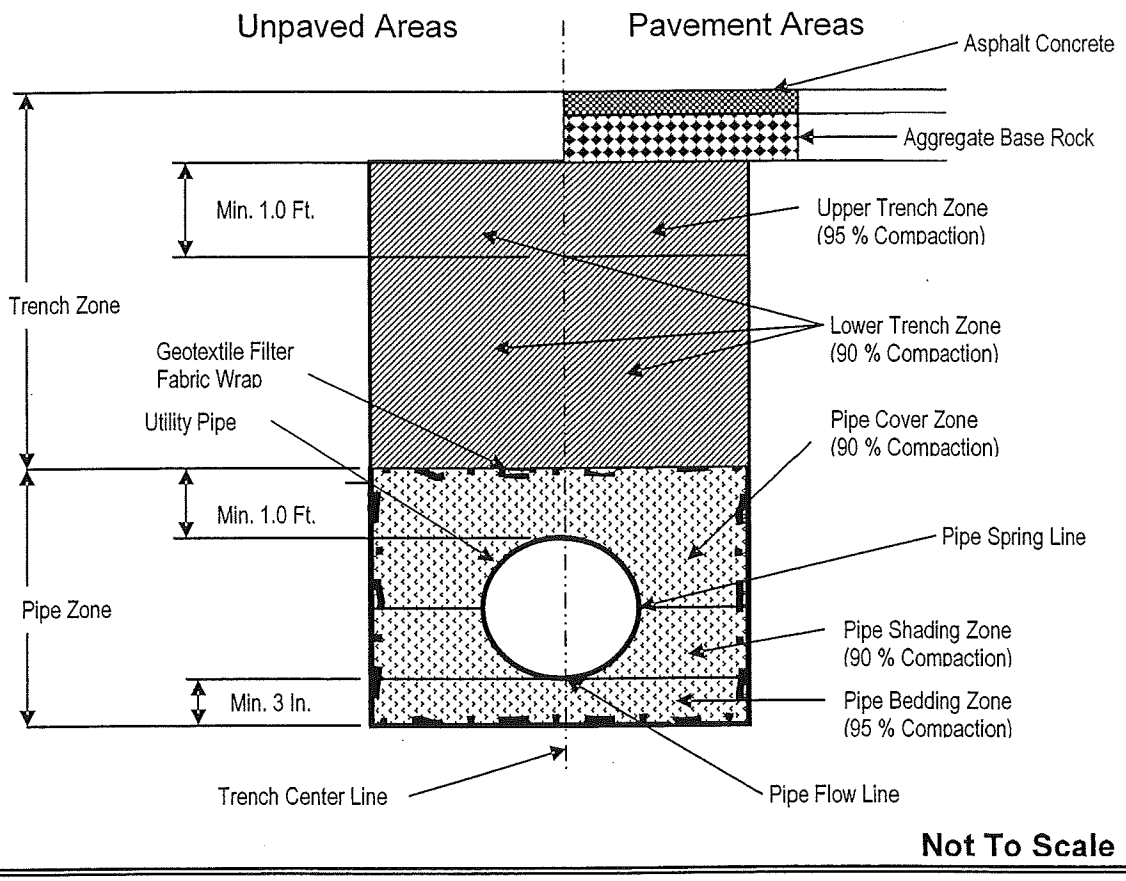
8.12 UNDERGROUND UTILITY TRENCHES

Underground utility trenches should be excavated and backfilled as described below for each trench zone as shown in the figure below.

1. **Trench Excavation Equipment:** H&K anticipate that the contractor will be able to excavate all underground utility trenches within the first 10 to 15 feet below the current ground surface with a Case 580 Backhoe or equivalent.
2. **Trench Shoring:** All utility trenches that are excavated deeper than 4 feet below the surrounding ground surface are required by the California Occupational Safety and Health Administration (OSHA) to be shored with bracing equipment prior to being entered by any individuals, whether or not they are associated with the project.
3. **Trench Dewatering:** H&K does not anticipate that the proposed underground utility trenches will encounter shallow ground water. However, if the utility trenches are excavated during the winter rainy season, then shallow or perched ground water may be encountered. The earthwork contractor may need to employ de-watering methods as discussed in Section 8.1.10 in order to excavate, place and compact the trench backfill materials.
4. **Pipe Zone Backfill Type And Compaction Requirements:** The backfill material type and compaction requirements for the pipe zone which includes the bedding zone, shading zone and cover zone as shown in the Figure 8.1.12 are described below.
    - **Pipe Zone Backfill Material Type:** Trench backfill used within the pipe zone which includes the bedding zone, shading zone and cover zone should consist of ¾-inch minus, washed, crushed rock with less than 5 percent (by dry weight) passing a No. 200 sieve. If ground water is encountered within the trench, then the pipe zone material should be wrapped with a minimum 6 ounce per square yard, non-woven, geotextile filter fabric. The geotextile seam should be along the trench centerline and have a minimum 1-foot overlap. If the utility pipes are coated with a corrosion protection material, then the pipes should be wrapped with a minimum 6 ounce per square yard, non-woven, geotextile cushion fabric with a minimum 6 inch seam overlap. The geotextile cushion fabric will provide the pipe with protect against scratching from the crushed rock backfill material.
    - **Pipe Bedding Zone Compaction:** Trench backfill soil placed in the pipe bedding zone (beneath the utilities) should be a minimum 3-inches thick,

moisture conditioned to within ± 3 percentage points of the ASTM D1557 optimum moisture content and compacted to achieve a minimum relative compaction of 95 percent of the ASTM D1557 maximum dry density.

FIGURE 8.12 TYPICAL TRENCH BACKFILL ZONES



- **Pipe Shading Zone Compaction:** Trench backfill soil placed within the pipe-shading zone (above the bedding zone and to a height of one pipe radius length above the pipe spring line) should be moisture conditioned to within ± 3 percentage points of the ASTM D1557 optimum moisture content and compacted to achieve a minimum relative compaction of 90 percent of the ASTM D1557 maximum dry density. The pipe shading zone backfill material should be shovel sliced to remove voids and to promote compaction.
- **Pipe Cover Zone Compaction:** Trench backfill soil placed within the pipe cover zone (above the pipe shading zone to one foot over the pipe top surface) should be moisture conditioned to within ± 3 percentage points of the ASTM D1557 optimum moisture content and compacted to achieve a

minimum relative compaction of 90 percent of the ASTM D1557 maximum dry density.

5. **Trench Zone Backfill And Compaction Requirements:** The trench zone backfill materials consists of both lower and upper zones as discussed below.

   - **Trench Zone Backfill Material Type:** Soil used as trench backfill within the lower and upper intermediate zones as shown on the preceding figure should consist of non-expansive soil with a plasticity index (PI) of less than or equal to $PI \leq 15$ (based on ASTM D4318) and should not contain rocks greater than 3 inches in greatest dimension.

   - **Lower Trench Zone Compaction:** Soil used to construct the lower trench zone backfills should be uniformly moisture conditioned to within 0 to 4 percentage points of the ASTM D1557 optimum moisture content, placed in maximum 12-inch-thick loose lifts (layers) prior to compacting and compacted to achieve a minimum relative compaction of 90 percent of the ASTM D1557 maximum dry density.

   - **Upper Trench Zone Compaction (Road And Parking Lot Areas):** Soil used to construct the upper trench zone backfills should be uniformly moisture conditioned to within 0 to 4 percentage points greater than the ASTM D1557 optimum moisture content, placed in maximum 8-inch-thick loose lifts (layers) prior to compacting and compacted to achieve a minimum relative compaction of 95 percent of the ASTM D1557 maximum dry density.

   - **Upper Trench Zone Compaction (Non-Road And Non Parking Lot Areas):** Soil used to construct the upper trench zone backfills should be uniformly moisture conditioned to within 0 to 4 percentage points greater than the ASTM D1557 optimum moisture content, placed in maximum 8-inch-thick loose lifts (layers) prior to compacting and compacted to achieve a minimum relative compaction of 90 percent of the ASTM D1557 maximum dry density.

6. **CQA Testing And Observation Engineering Services:** The moisture content, dry density, and relative percent compaction of all engineered utility trench backfills should be tested by project engineer's field representative during construction to evaluate whether the compacted trench backfill material meet or exceed the minimum compaction and moisture content requirements presented in this report. The earthwork contractor shall assist the project engineer's field representative by excavating test pads with the on-site earth moving equipment.

   - **Compaction Testing Frequencies:** The field and laboratory CQA tests should be performed consistent with the testing frequencies presented in Table 8.12 or as modified by the project engineer to better suit the site conditions.

Table 8.12, Minimum Testing Frequencies For Utility Trench Backfill

ASTM No.	Test Description	Minimum Test Frequency[3]
D1557	Modified Proctor Compaction Curve	1 per 1,500 CY [1] Or Material Change [2]
D2922	Nuclear Moisture Content	1 Test Per 100 LF Per 24-Inch-Thick Compacted Thickness, With No Loose Lift Exceeding 12 Inches In Thickness [3]
D3017	Nuclear Density	1 Test Per 100 LF Per 24-Inch-Thick Compacted Thickness, With No Loose Lift Exceeding 12 Inches In Thickness [3]

Notes:
(1) CY = cubic yards.
(2) Whichever criteria provide the greatest number of tests.
(3) LF = linear feet.
(4) These are minimum testing frequencies that may be increased or decreased at the project engineer's discretion on the basis of the site conditions encountered during grading.

- **Final Proof Rolling:** The prepared finished grade aggregate base (AB) rock surface and/or finished subgrade soil surface of utility trench backfills should be proof rolled with a fully loaded minimum 4,000 gallon capacity water truck with the rear of the truck supported on a double-axel, tandem-wheel, undercarriage or approved equivalent. The minimum tire pressure should be 65 pounds per square inch (psi). The proof rolled surface should be visually observed by the project engineer or the project engineer's field representative to be firm, competent and relatively unyielding. The project engineer or the project engineer's field representative may also evaluate the surface material by hand probing with a ¼-inch-diameter steel probe; however, this evaluation method should not be performed as a substitute for proof rolling as described in the preceding.

8.13 RESERVOIR OUTLET WORKS SEEPAGE CUT-OFF WALL

If an outlet structure will be constructed through the earthen levee to allow the reservoir to be drained, then a low permeability cut-off wall should be constructed around the conveyance pipe or box culvert structure to minimize seepage along the exterior surface of the structure. The following presents recommendations for construction of the low permeability cut off wall:

1. The cut-off wall should extend a into the earthen levee structure a minimum of 5 feet in all directions oriented perpendicular to the long axis of the conveyance structure.
2. The cut-off wall should be a minimum of 5 feet thick oriented parallel to the long axis of the conveyance structure.
3. The cut-off wall should be constructed with cement-bentonite grout mixture that flow completely around the conveyance structure.

4. The cut-off wall cement-bentonite grout mixture shall setup with a maximum permeability of 1.0E-6 centimeters per second. Prior to construction, the contractor shall submit for review and approval laboratory test results to demonstrate that their proposed mix design will not exceed this design specification maximum permeability. Samples of the setup grout mixture shall be taken in the field during construction and tested in the laboratory to verify that the field permeability of the grout mixture does not exceed the design specification maximum permeability. All laboratory permeability tests should be performed using the ASTM D5084 guideline procedures.

8.14 GRADING PLAN REVIEW AND CONSTRUCTION MONITORING

Construction quality assurance includes review of plans and specifications and performing construction monitoring as described below.

1. H&K should be allowed to review the final earthwork grading improvement plans prior to commencement of construction to determine whether our recommendations have been implemented, and if necessary, to provide additional and/or modified recommendations.
2. H&K should be allowed to perform construction quality assurance (CQA) monitoring of all earthwork grading performed by the contractor to determine whether our recommendations have been implemented, and if necessary, to provide additional and/or modified recommendations.
3. Our experience, and that of our profession, clearly indicates that during the construction phase of a project the risks of costly design, construction and maintenance problems can be significantly reduced by retaining the design geotechnical engineering firm to review the project plans and specifications and to provide geotechnical engineering construction quality assurance (CQA) observation and testing services. Upon your request, we will prepare a CQA geotechnical engineering services proposal that will present a work scope, tentative schedule, and fee estimate for your consideration and authorization. If H&K is not retained to provide geotechnical engineering CQA services during the construction phase of the project, then H&K will not be responsible for geotechnical engineering CQA services provided by others nor any aspect of the project that fails to meet your or a third party's expectations in the future.

ATTACHMENT 6

LAWRENCE & ASSOCIATES TECHNICAL MEMORANDUM

ATTACHMENT 6

LAWRENCE & ASSOCIATES TECHNICAL MEMORANDUM

LAWRENCE
& ASSOCIATES
ENGINEERS & GEOLOGISTS

Technical Memo

To: Mr. Jesse Solorio

From: Ms. Bonnie Lampley

CC: Ms. Katryna Baker, City of Fort Bragg

Date: October 5, 2009

Re: Evaluation of separation between groundwater and bottom of reservoir

---

Introduction

This memo presents the results of my evaluation of the separation between the groundwater table and the bottom of the proposed Summers Lane Reservoir (Reservoir). The question regarding the separation arose as a result of an inquiry by the neighbor immediately to the west of the site (Mr. Celeri, Rhododendron Nursery) whether the Reservoir's subdrain would alter groundwater levels, thereby adversely affecting water levels in his well.

Summary

To address the question of separation, we measured the depth to water in several wells on the adjacent Mendocino Coast Recreation and Parks District (MCRPD) site and in the Nursery Well. The depth to water measurements then were used to calculate the groundwater elevation, which in turn was compared to the proposed base elevation of the reservoir. Then, the distance (separation) between the groundwater and reservoir elevation was calculated.

Currently, there is between approximately 20 and 30 feet of separation between the groundwater table and the proposed base elevation of the reservoir. Past measurements, taken during wetter periods when the groundwater table was higher, show that the separation during wetter periods could be between about five and 15 feet.

Thus, it is unlikely that the reservoir will intercept shallow groundwater under either dry or wet conditions. Additionally, the Nursery well is not directly downgradient from the Reservoir, and it is unlikely that the Reservoir sub-drain, if it ever collected groundwater, would intercept water that would have moved towards the Nursery well. Therefore, water level in the Nursery well will not be affected by the Reservoir sub-drain.

Discussion

On September 18, 2009, Mr. Dan Jensen of Lawrence & Associates (L&A) measured depth to water in the MCRPD wells that could be located. The wells that were measured were installed at various times in the past (between 1995 and 2004) to evaluate groundwater conditions at the MCRPD site. Depth to water was measured with a two-wire electric sounder; depth was measured from the top of the casing. The difference between the top of the casing and ground surface also was measured.

The ground-surface elevation at each well location was taken from topographic maps previously prepared for MCRPD work. The groundwater elevation was calculated by subtracting the depth to water value (accounting for the top of casing level) from the ground-surface elevation.

Table 1 shows the results and **Figure 1** shows a map of the groundwater elevation contours based on that data.

Table 1: Summary of Groundwater-Level Measurements & Calculations

Well	Ground-Surface Elevation	Depth to Water	Groundwater Elevation
	feet MSL	feet bgs	feet MSL
MW-1	322	7.21	315
MW-5	300	6.16	294
MW-6	295	5.80	289
MW-7	293	7.72	285
MW-8	292	8.42	284
MW-9	375	11.66	363
OB-6	442	60.38	382
PW-1	295	11.59	283
PW-4	295	13.40	282
NURSERY WELL	285	23.60	261

The current groundwater contours and gradient are similar to those previously calculated, although current water levels are about 5 to 13 feet lower than in 2004 (the last time levels were measured).

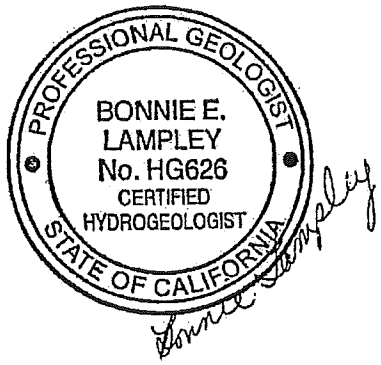
The groundwater-elevation contours then were compared to the proposed base-grade elevation for the Reservoir. **Figure 2** shows a detail of the proposed Reservoir in relation to the Nursery well and current groundwater elevations.

To calculate the separation between the base of the Reservoir and groundwater, the groundwater elevation was subtracted from the base-grade elevations. Currently, there would be between 20 and 30 feet of separation between the base grade and groundwater. In wetter years, the separation would decrease to about 5 to 15 feet.

Thus, it is unlikely that the Reservoir sub-drain will collect groundwater, thereby having no effect on groundwater level at the Nursery well. Also, the Nursery well is not directly downgradient from the Reservoir; that is, water moving towards the Nursery well does not pass directly beneath the Reservoir. Therefore, it is unlikely that the Reservoir sub-drain, if it ever collected groundwater, would intercept water that would have moved towards the Nursery well.

Bonnie E. Lampley

Bonnie Lampley
Principal Hydrogeologist



enc.: Figure 1. Groundwater elevation contour map, September 2009
Figure 2. Current separation between groundwater and proposed bottom of reservoir

ATTACHMENT 7

LAWRENCE & ASSOCIATES BREACH INUNDATION REPORT

LAWRENCE
& ASSOCIATES
ENGINEERS & GEOLOGISTS

008195.01

SCREENING LEVEL RESERVOIR BREACH INUNDATION REPORT FOR THE PROPOSED SUMMERS LANE 45 ACRE-FOOT RESERVOIR, CITY OF FORT BRAGG

MARCH 17, 2014

PREPARED FOR:

CITY OF FORT BRAGG
416 NORTH FRANKLIN STREET
FORT BRAGG, CA 95437

3590 Iron Court • Shasta Lake, California 96019 • (530) 275-4800 • fax (530) 275-7970 • www.lwrnc.com

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Appendices

1. BACKGROUND

A screening level dam breach flood inundation study was requested by the City of Fort Bragg to consider potential risks to the safety of the public and of damage to structures in the unlikely event of a breach in the embankment of the proposed Summers Lane reservoir.

The City of Fort Bragg directed Lawrence and Associates to only consider the area of interest for the dam break inundation analysis as the property immediately to the west of the proposed reservoir (**Figure 2**). This property contains a plant nursery and a single family residence. The analysis included assumptions that produced a worst case scenario for a dam break affecting this residence.

The proposed reservoir will be a "small dam" as defined by California Code of Regulations, Title 23, Chapter 1, Article 4, Section 322, since it will be less than 25 feet in height and less than 2,000 acre-feet in volume. The reservoir will be "non-jurisdictional" as defined by Division 3, Part 1, Chapter 1, Section 6002 of the California Water Code, since the embankments will be less than 25 feet in height and have less than 50 acre-feet in effective storage capacity.

1.1. Reservoir Location

The proposed Summers Lane reservoir is located in the City of Fort Bragg, California. The City is located on the North Coast along Highway 1 in Mendocino County. The property is located approximately 2.5 miles inland at the north end of Summers Lane. The site is bounded by a farm and residence to the west, an existing City reservoir to the North, and an animal shelter to the South-East. The west side of the reservoir consists of a ridgeline with elevations equal to the top of the reservoir embankment. **Figure 1** shows a site location map.

- Latitude: 39° 25' 31" N (39.4252°)
- Longitude: 123° 46' 04" W (123.7678°)

1.2. Reservoir Description

The proposed Summers Lane reservoir will be filled with water piped from Waterfall Gulch. The reservoir will be lined with 60-mil high-density polyethylene (HDPE) liner. The walls of the reservoir will be constructed of homogenous earth fill with synthetic geonet material incorporated in every two feet of wall height for stability. The interior side slopes of the reservoir will be approximately 3:1 Horizontal to Vertical (H:V) and the exterior side slopes will be approximately 2:1 H:V.

The Summers Lane Reservoir will store approximately 45 acre-feet of water at the level of the designed spillway. It will receive no inflow from the surrounding watershed because the reservoir walls will be sloped away from the reservoir. The contributing area to the reservoir will

be limited to the surface area of the reservoir, approximately 4.4 acres. **Table 1** shows the reservoir summary data. The proposed reservoir grading plan is provided in **Appendix E.**

Table 1:
Reservoir Summary Data

Dam Dimensions	**Measurement**
Type of Construction	Geo-grid Reinforced Earth Fill
Type of Liner	60-mil HDPE
Max. Dam Height (downstream toe to top of dam), (ft)	25
Length of Dam, (ft)	480
Width of Dam Crest, (ft)	18
Interior Slope, (H:V)	3:1
Exterior Slope, (H:V)	2:1
Elevation, Top of Dam, (ft)	300
Elevation, Invert of Reservoir, (ft)	275
Contributing Area to Reservoir, (acres)	4.4
Volume at Spillway (acre-feet)	45
Volume at Top of Freeboard (acre-feet)	58
Overflow Outlets	**Measurement**
HDPE Pipe, (diameter)	36-inch
Concrete Spillway Capacity, (cubic feet per second, cfs)	32

1.2.1 Overflow (Spillway)

An overflow path, commonly referred to as a spillway, is provided on reservoirs to provide a safe release in the event that inflow exceeds outflow during a condition when the water surface elevation is at full pool. The embankment of the reservoir with the spillway is the most likely to breach during an overtopping event since that embankment will have the most or all of the overtopping flow that could cause a breach.

Historical data provided by the City Water Treatment Plant dating back 12 years show a maximum flow in the existing pipeline that will feed the proposed reservoir to be 350 gpm (less than 1 cfs). The peak flow rate from the reservoir would be approximately 31 cfs for a 100-year storm return period of 5 minutes duration (equal to the time of concentration). Peak flows from longer duration storms would be significantly less since precipitation intensities decrease with longer model storm durations. The combined maximum inflow is 32 cfs. The outflow capacity provided by the 36-inch HDPE spillway pipe is 50 cfs with 6-inches of head over the pipe. The outflow capacity of the concrete spillway is approximately 32 cfs.

The spillway will route the water down the north side of the pond via an HDPE lined and rip-rapped swale. There are no structures or public areas between the reservoir spillway and the Noyo River.

1.2.2 Underdrain

To prevent groundwater from saturating the soil beneath the embankment, and to prevent groundwater from accumulating beneath the liner, an underdrain consisting of 2- to 3-inch perforated schedule 40 PVC pipe bedded in gravel, and filter fabric, is proposed to be installed in the native soil installed beneath the liner. The underdrain will be installed to a depth of 3-feet below ground surface, be spaced every 100-feet along the reservoir bottom, and gravity drain downhill to an erosion-protected discharge point. For the last 20-feet of piping before it exits the slope, blank pipe and 3-sack sand-cement slurry backfill will be used.

2. METHODOLOGY

For this size dam and the level of effort requested, a "screening" level of analysis is warranted. A screening level of analysis is very conservative and is used to determine if further analysis is required.[1] This level of analysis uses empirical dam breach equations to determine breach formation and peak breach outflow and steady or unsteady state hydraulic flow routing model. For this analysis, the Froelich 2008 Method[2] was used for dam breach formation, the Simplified DMBRK[3] model was used for the peak breach discharge, and the FLO-2D[4] two- dimensional hydraulic model was used to calculate downstream peak water surface depths and velocities in the area of interest.

Dam failures are very unlikely events and the results of a dam breach inundation analysis should be considered in this context. Dam breach analysis consists of three parts. The first is the simulation of a dam breach hydrograph. The hydrograph is the flow through the dam breach over a period of time. Second, is the location of the dam breach on the reservoir embankment. Certain breach locations have more impacts than other locations. Third, is the routing of the inundation over the area of interest. This routing includes simulation of peak velocities and maximum flow depths.

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[1] Guidelines for Dam Breach Analysis, State of Colorado Department of Natural Resources, February 10, 2010.

[2] Froehlich, D. C., (2008). Embankment Dam Breach Parameters and Their Uncertainties, Journal of Hydraulic Engineering, Vol. 134, No. 12, May, pgs 1708-1720.

[3] Wetmore, J. N. and Fread, D. L. (1984). *The NWS Simplified Dam Break Flood Forecasting Model for Desk-top and Hand-held Microcomputers.* Federal Emergency Management Agency. 1984.

[4] FLO-2D GDS Version 2009.06 Build No. 09b-12.10.11

2.1. Dam Failure Scenario

The dam failure scenario is the worst case scenario dam breach affecting the property immediately to the west of the reservoir. In the case of this reservoir which is not connected to a large hydrologic area, the design flood breach is equivalent to an overtopping breach where the storage in the reservoir is set to the top of the embankment.

2.1.1 Failure Mode

Dam breach failure modes for small earthen dams are usually either overtopping or piping. Overtopping failures are caused by flood water or seich waves overtopping and eroding away a section of the embankment until it is sufficiently weakened to cause a large breach. This is statistically the most likely cause of failure for an earthen dam.[5] Piping failure (internal erosion) is caused when an initial breach formation occurs below the top of the dam due to erosion in an internal channel through the embankment of the dam caused by escaping water. Both failure modes were tested with the overtopping mode producing the larger peak breach discharge. **Table 2** shows the reservoir parameters at the assumed location of the simulated breach.

The volume at the spillway of the reservoir is 45 acre feet. The rim of the proposed reservoir will be 3 feet above the elevation of the spillway (an additional 13 acre feet). For the overtopping condition it is assumed the reservoir will be full to the rim (both spillways are blocked). The breach location has an embankment height of 15 feet. This leaves approximately 8.0 acre-feet in the bottom of the reservoir below the bottom of the breach elevation. The total reservoir breach volume is 50 acre feet.

Table 2:
Reservoir Breach Input Parameters.

Breach Input Parameter	Failure Scenario
Failure Mode	Overtopping
Reservoir Water Surface Depth at Breach Location (ft)	15
Reservoir Volume Above Breach Elevation (ac-ft)	50.0
Reservoir Surface Area (ac)	4.4

2.1.2 Location

Along the west side of the reservoir embankment, the dam embankment height ranges from approximately 14 feet above the surrounding terrain near the southwest corner to 18 feet near the

[5] Association of Dam Safety Officials. www.damsafety.org. (34% of all failures due to overtopping)

northwest corner. Although the embankment is higher in the northwest corner, a breach in this location would have no chance of reaching the residence. A breach near the southwest corner would have a greater chance of reaching the residence.

By inspection of the contours in the area of interest, a breach in the location of the reservoir embankment was chosen to create the highest depth of flooding and flood velocity for the residence located west of the reservoir. This breach location is in the southwest corner of the reservoir (**Figure 2**). All other possible breach locations on the reservoir embankment would produce either less depth or no depth of flood water at the residence.

2.1.3 Failure Mechanism

The proposed reservoir will be lined and the embankments will be constructed using geogrid reinforcement. In the event of overtopping and the downcutting of the embankment the liner and the geogrid would act to limit the rate of downcutting by providing a physical barrier with the liner and a soil stabilizing layer every two feet down the bank in the case of the geogrid reinforcement. The available breach formation equations and models do not allow for these factors. For a conservative analysis, the breach formation assumes an earth dam without HDPE liner or geogrid reinforcement.

2.2. Dam Breach Parameters

Dam breach parameters define the overall shape and size of the breach as well as the timing of the formation of the breach. Empirical equations developed by Froehlich (2008)[6] were used to determine the average breach width, the breach side slopes, and the breach development time.

The average final breach width was predicted using empirical equations[7] that are recommended for small, non-jurisdictional dams:

$$b = 8.239 K_o V_s^{0.32} H^{0.04}$$

Where:

b = average breach width (ft)

K_0 = failure mode factor, 0.7 for piping and 1.3 for overtopping failure

V_s = storage volume (ac-ft)

H = height of water over breach bottom (ft)

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[6] Froehlich, D. C., (2008). Embankment Dam Breach Parameters and Their Uncertainties, Journal of Hydraulic Engineering, Vol. 134, No. 12, May, pgs 1708-1720.

[7] Guidelines for Dam Breach Analysis, State of Colorado Department of Natural Resources, February 10, 2010.

The recommended (Froehlich 2008) side slopes (See figure in **Appendix A**) for an overtopping breach are 1:1 (H:V), a piping failure is 0.7:1 (H:V).

The breach development time represents the time from initial formation to peak breach failure. It is sometimes used to estimate the available evacuation time. Breach development time is given by the equation:

$$T_f = 3.664\sqrt{\frac{V_w}{gH_b^2}}$$

Where:

Tf = breach development time (hours)

Vw = reservoir volume stored corresponding to Hw (ac-ft)

g = acceleration due to gravity, 32.2 ft/sec2

Hb = height of breach, vertical distance between dam crest and breach invert (ft)

The result of the breach parameter calculation is shown in **Table 3**.

Table 3:
Breach Simulation Results

Breach Parameter	Results
Average Breach Width (ft)	41
Breach Side Slopes (H:V)	1
Breach Formation Time (hr)	0.22

The final elevation for the bottom of the breach was set at the side of the reservoir embankment at the location of the breach, 15 feet down from the crest of the reservoir. This is approximately the same level of the surrounding ground surface immediately to the west of the breach in the area of interest. This represents a catastrophic breach of the entire vertical height of the reservoir embankment.

2.3. Breach Peak Discharge Estimation

The breach peak discharge was calculated using the Wetmore and Fread (1984)[8] equation which was developed for the Simplified DAMBRK computer model.

$$Q_p = 3.1 B_{avg} {H_w}^{1.5} \left(\frac{\gamma}{\gamma + T_f\sqrt{H_w}}\right)^3$$

[8] Wetmore, J. N. and Fread, D. L. (1984). *The NWS Simplified Dam Break Flood Forecasting Model for Desk-top and Hand-held Microcomputers.* Federal Emergency Management Agency. 1984.

Where:

Qp = dam breach peak discharge (cfs)

Bavg = average breach width (ft)

Hw = maximum depth of water stored behind the breach (ft)

Tf = breach development time (hrs)

γ = instantaneous flow reduction factor, 23.4As/Bavg

As = surface area of the reservoir at Hw (acres)

The peak breach discharge is shown in **Table 4**.

Table 4:
Breach Peak Discharge

Breach Parameter	Results
Average Breach Width (ft)	41
Maximum depth of water (ft)	20
Breach Formation Time (hr)	0.22
Reservoir Surface Area (ac)	4.4
Peak Breach Discharge (cfs)	4235

2.4. Hydraulic Model Development

A two dimensional model was used to analyze the flood depths in the area of interest because there is no confined channel to act as a floodplain. HEC-RAS and other one-dimensional models need a defined channel to accurately route the flood flow. The area of interest is on a ridgeline with most flow from a dam breach turning north and some flow splitting to the south.

The reservoir breach inundation analysis utilizes FLO-2D, a two-dimensional finite difference computer model that routes the flood hydrograph over unconfined surfaces using the dynamic wave approximation to the momentum equation. FLO-2D is an approved model that meets the requirements of the FEMA National Flood Insurance Program.

2.5. Two-Dimensional Hydraulic Model Geometry

Flo-2D utilizes a uniform grid system to describe the topography of the project area. Each grid is assigned an elevation and a Manning's roughness coefficient. The overland flow path is primarily controlled by the topography. The roughness n-values control the overland floodwave speed. N-values were for open terrain ranged from 0.05 to 0.06. Forested areas were assigned 0.08. The topography used to create the elevation grid for the study area consisted of a 10-meter resolution National Elevation Dataset (NED) obtained from the USGS National Map Database.

This NED was used to create a representative surface in FLO-2D known as a Digital Elevation Model (DEM). The two-dimensional grid for the project area consists of 80 foot by 80 foot squares (**Figure 4**). The model was used to interpolate an average elevation for each square of the grid based on the DEM. The grid was inspected for any anomalous data and corrected.

2.6. Boundary Conditions

Boundary conditions define the upstream and downstream limits of the Flo-2D model. The upstream limit is defined by the inflow hydrograph generated by NWS Simple Dam Break Equation with input variables for the Summers Lane Reservoir. The hydrograph is shown in **Figure 3**. This dam breach hydrograph was assigned to grid number 225, which represents the southwest corner of the reservoir embankment (See **Figure 4**). The downstream boundary of the model was set as a defined computational area approximately 750 feet beyond the area of interest. The east side of the computational area is bounded by the reservoir walls which are 15 to 18 feet above the elevation of the area of interest to the north of the reservoir. The boundaries to the north, south, and west of the area of interest were set as outflow cells which act as "sinks" for the flood flow. These sinks are located at elevations approximately 10 to 12 feet in elevation below the elevation of the residence in area of interest. The maximum flood depths at these locations are less than 3-inches and have no influence on the maximum flood depth at the area of interest.

3. RESULTS

3.1. Inundation Map

The FLO-2D model was used to route the dam breach hydrograph across the area of interest. A maximum flood depth inundation map is shown as **Figure 5**. Maximum flood water velocities are shown in **Figure 6**.

The dam breach hydrograph routes a total of 50 acre-feet of water from the proposed reservoir in approximately 30 minutes with a peak dam breach discharge of 2423 cfs. The dam breach was simulated on the reservoir embankment at a location to maximize the dam breach flood water on the residential home west of the reservoir.

The FLO-2D model shows the dam breach flood wave instantly spreading out across the ground surface with the majority of flow turning to the north and flowing downhill towards Newman Gulch. The highest flood depths and velocities are within 250 feet of the breach location.

3.2. USBR Flood Danger Zones

The US Bureau of Reclamation Downstream Hazard Classification Guidelines[9] provide a depth-velocity flood danger level relationships divided into three zones: "low danger", "high danger", and "judgment". The USBR measures the flood danger by the amount of "lives-in-jeopardy". This is defined as all individuals within the inundation boundaries who, if they took no action to evacuate, would be subject to danger commensurate with the three danger zones. The low danger zone assumes "lives-in-jeopardy" associated with the flood hazard is zero. The high danger zone assumes lives are in jeopardy at the flood hazard location. The judgment zone represents the zone of uncertainty and is situation specific. These flood danger-zones graphs for pedestrians, cars, and houses are included in **Appendix D**. These danger zone guidelines are intended as a screening level hazard classification and not for preparation of Emergency Preparedness Plans or Hazard Assessments.

According to the results of the FLO-2D model and the USBR guidelines for danger to pedestrians, the first grid row (211-217) in the area of interest contain high danger zones (cells 212-213), the remaining cells are in the judgment zone. An example pedestrian flood hazard map is shown in **Figure 7**.

The residence of concern, for this worst case dam breach scenario, would experience approximately 20 minutes of flooding with a peak water depth of 0.98 feet and a peak flood wave velocity of 2.62 feet per second. This falls in the "low" danger zone. An adult should be able to wade in this depth and velocity of water without losing his or her footing. The house flood hazard for the residence (cells 169-170 and 154-155) falls in the USBR low danger zone (see **Appendix D**).

3.3. Limitations

The reservoir breach calculations do not account for HDPE lining or geogrid reinforcement of the embankments. This screening level analysis is a conservative estimate of a worst case scenario. An actual breach in the proposed reservoir may have a longer and more staggered breach formation leading to a lower peak discharge with resulting lower flood depths and velocities.

[9] US Bureau of Reclamation, ACER Technical Memorandum No. 11. "Downstream Hazard Classification Guidelines", December 1988.

LAWRENCE & ASSOCIATES
ENGINEERS & GEOLOGISTS

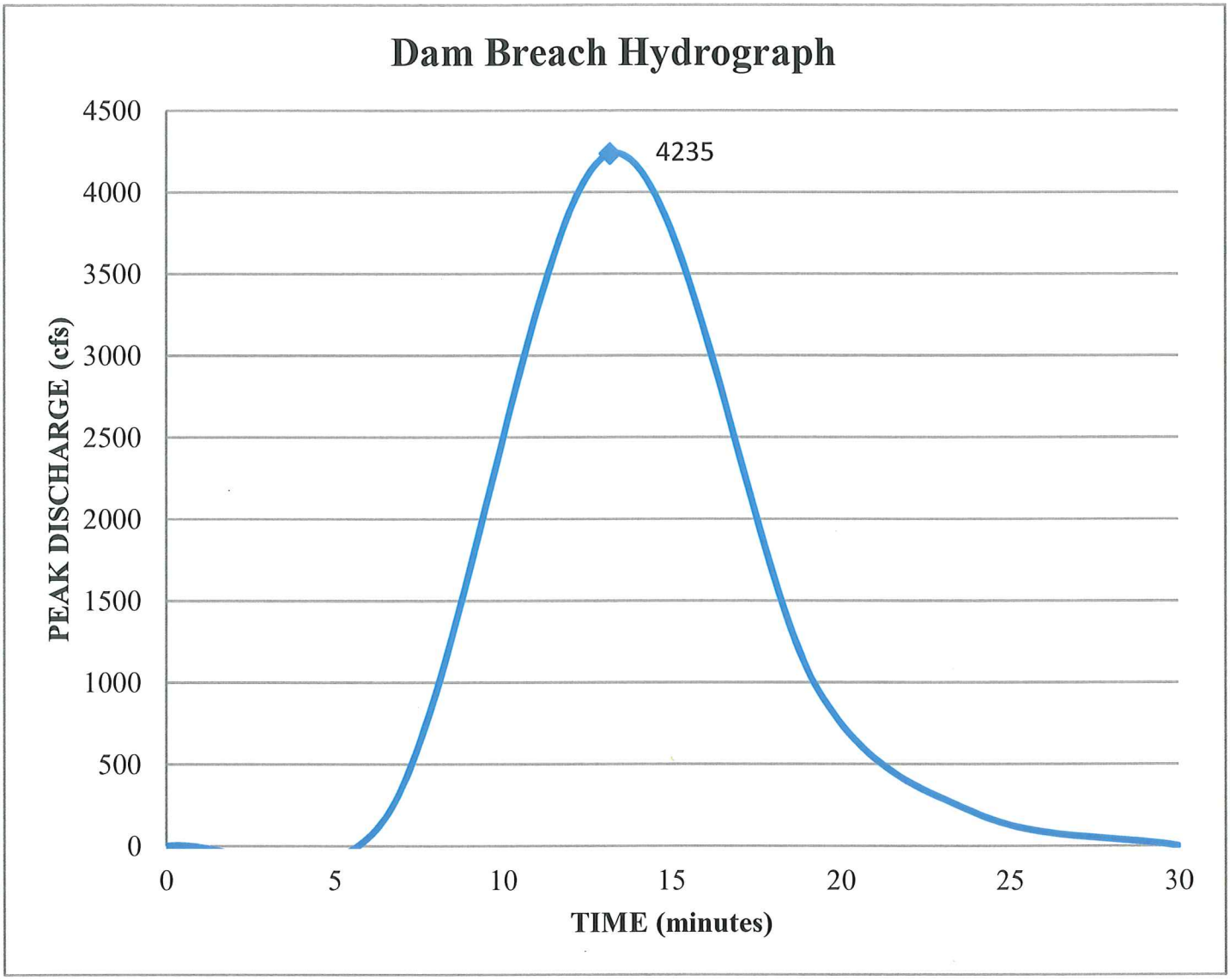
SUMMERS LANE RESERVOIR DAM BREAK ANALYSIS SITE LOCATION

PROJECT NAME:	PROJECT NO:	DATE:
Summers Lane	008195.01	01/15/2014
CLIENT: City of Fort Bragg	DRAWN BY: I. MCFADDEN	FIGURE 1
SCALE: 1" = 2000'	CHECKED BY: J. SOLORIO	

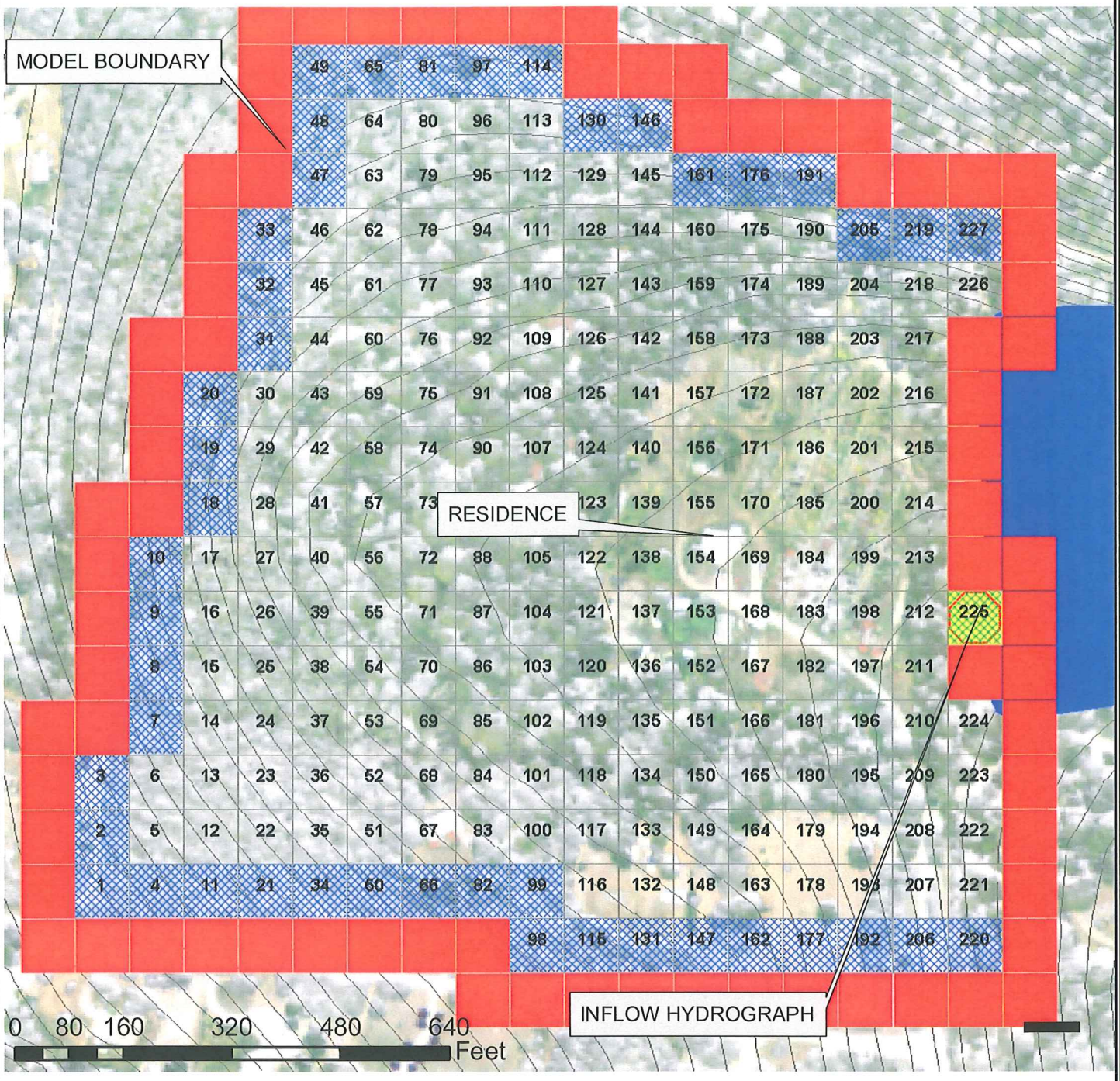
LAWRENCE & ASSOCIATES
ENGINEERS & GEOLOGISTS

SUMMERS LANE RESERVOIR
DAM BREAK ANALYSIS
AREA OF INTEREST

PROJECT NAME:	PROJECT NO:	DATE:
Summers Lane	008195.01	01/15/2014
CLIENT: City of Fort Bragg	DRAWN BY: I. MCFADDEN	FIGURE 2
SCALE: 1" = 200'	CHECKED BY: J. SOLORIO	



LAWRENCE & ASSOCIATES ENGINEERS & GEOLOGISTS	SUMMERS LANE RESERVOIR DAM BREAK ANALYSIS BREACH HYDROGRAPH	PROJECT NAME: Summers Lane	PROJECT NO: 008195.01	DATE: 01/15/2014
		CLIENT: City of Fort Bragg	DRAWN BY: I. MCFADDEN	FIGURE 3
		SCALE:	CHECKED BY: J. SOLORIO	

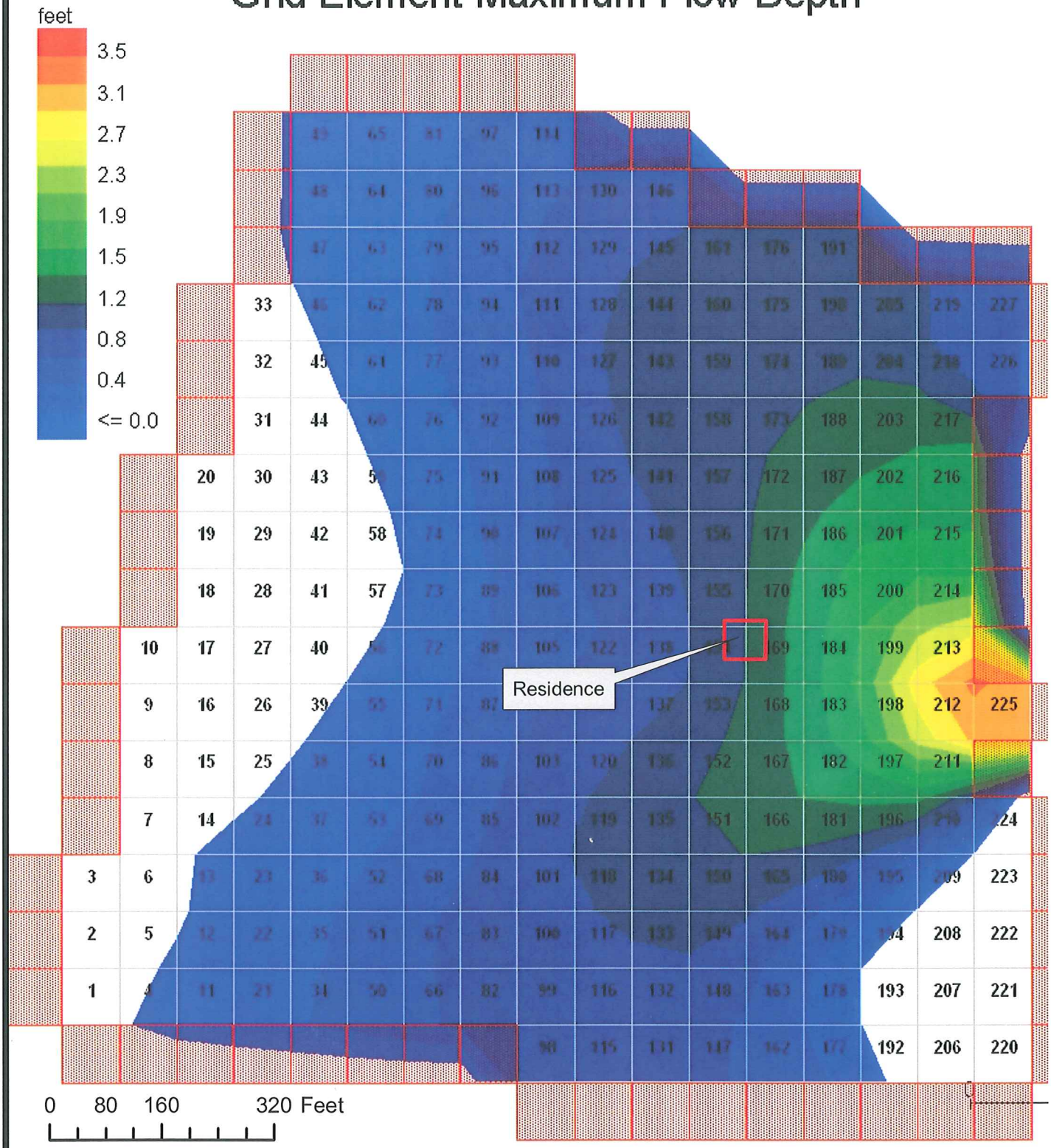


LAWRENCE & ASSOCIATES
ENGINEERS & GEOLOGISTS

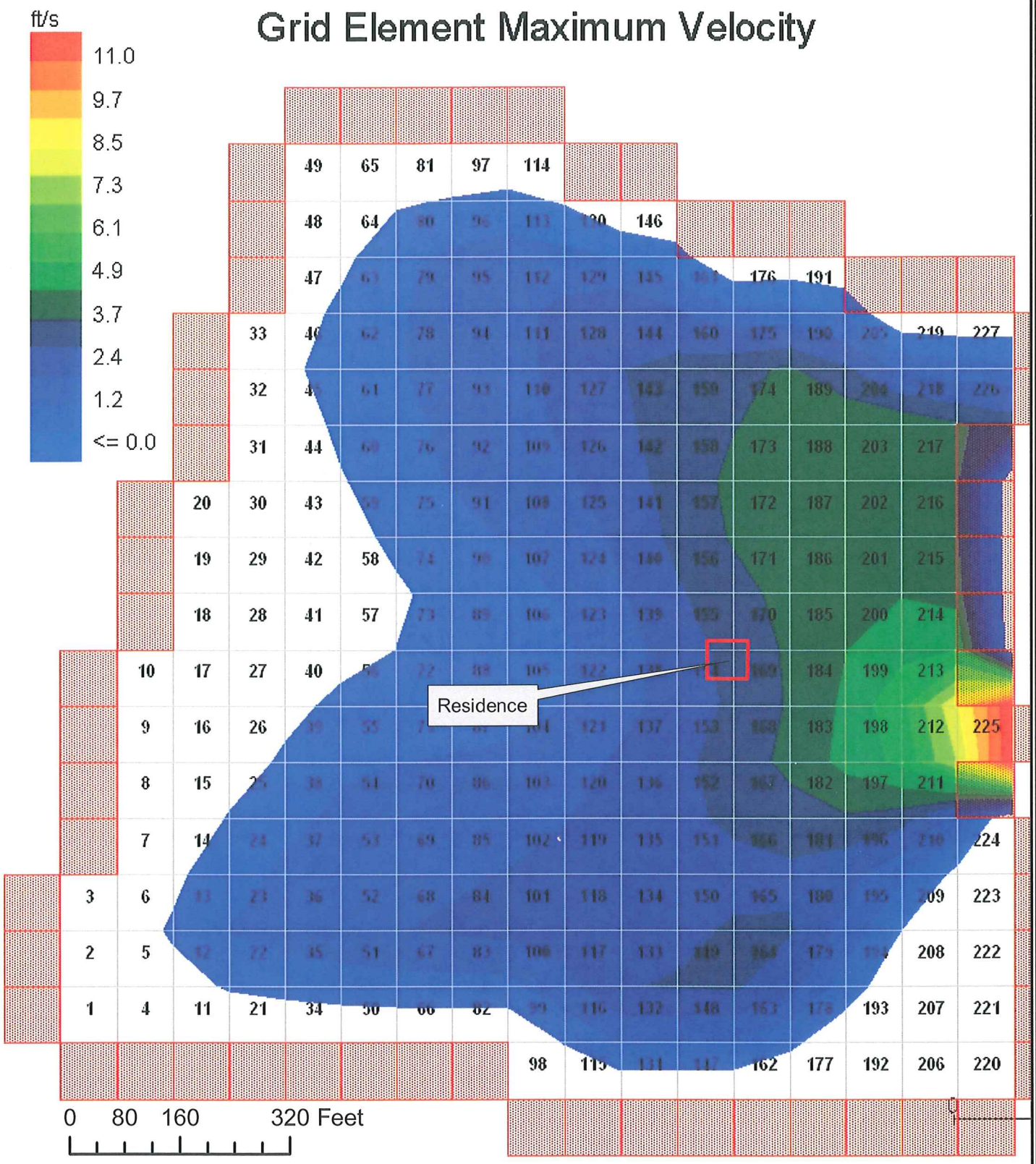
SUMMERS LANE RESERVOIR
DAM BREAK ANALYSIS
FLO-2D GRID

PROJECT NAME:	PROJECT NO:	DATE:
Summers Lane	008195.01	01/15/2014
CLIENT: City of Fort Bragg	DRAWN BY: I. MCFADDEN	FIGURE 4
SCALE:	CHECKED BY: J. SOLORIO	

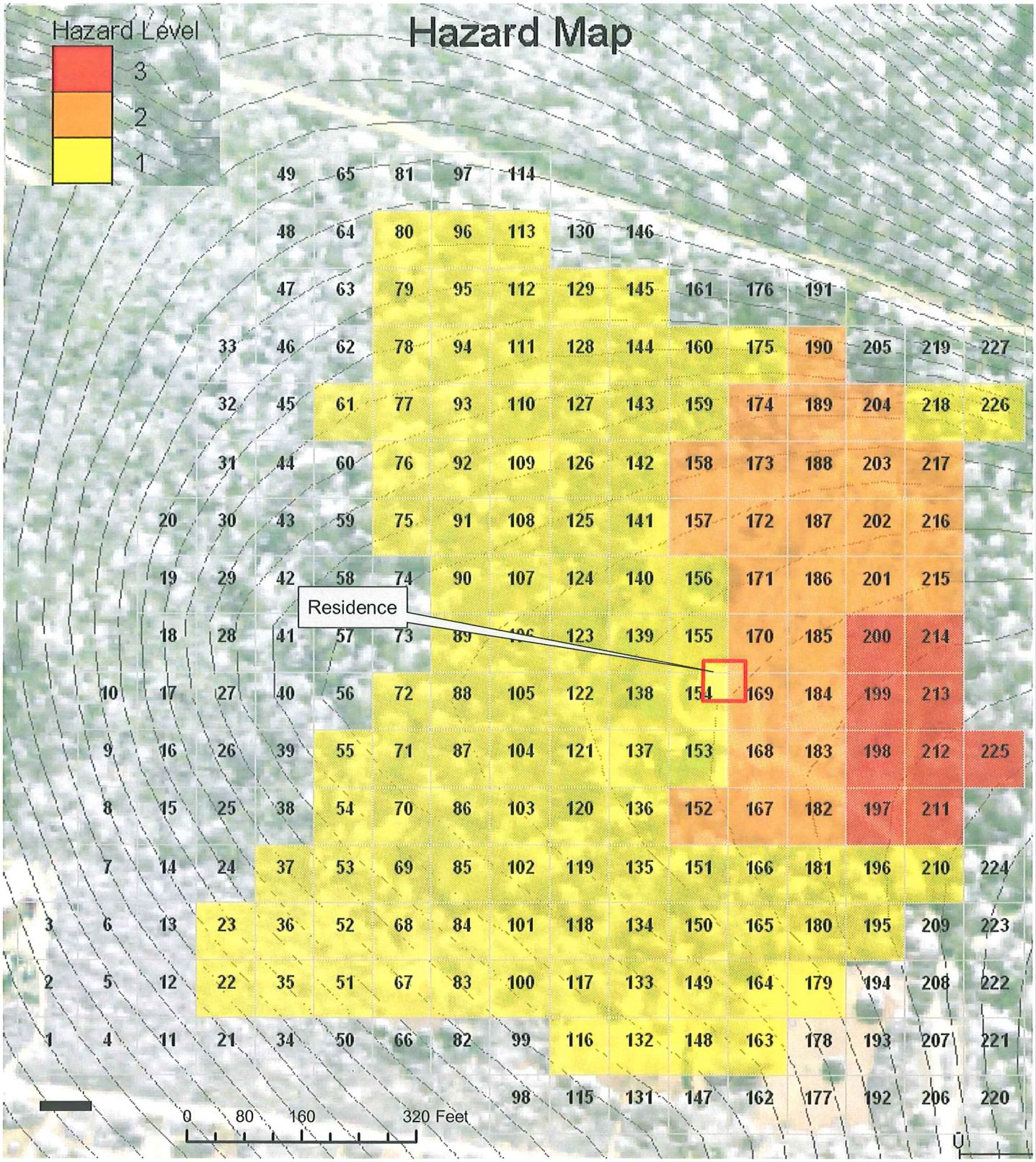
Grid Element Maximum Flow Depth



LAWRENCE & ASSOCIATES ENGINEERS & GEOLOGISTS	SUMMERS LANE RESERVOIR DAM BREAK ANALYSIS FLOOD INUNDATION MAP	PROJECT NAME: Summers Lane	PROJECT NO: 008195.01
		CLIENT: City of Fort Bragg	DRAWN BY: I. MCFADDEN
		SCALE:	CHECKED BY: J. SOLORIO
		DATE: 01/15/2014	FIGURE 5



LAWRENCE & ASSOCIATES ENGINEERS & GEOLOGISTS	SUMMERS LANE RESERVOIR DAM BREAK ANALYSIS FLOOD VELOCITY MAP	PROJECT NAME: Summers Lane	PROJECT NO: 008195.01	DATE: 01/15/2014
		CLIENT: City of Fort Bragg	DRAWN BY: I. MCFADDEN	FIGURE 6
		SCALE:	CHECKED BY: J. SOLORIO	



LAWRENCE & ASSOCIATES ENGINEERS & GEOLOGISTS	SUMMERS LANE RESERVOIR DAM BREAK ANALYSIS EXAMPLE FLOOD HAZARD MAP	PROJECT NAME: Summers Lane	PROJECT NO: 008195.01	DATE: 01/15/2014
		CLIENT: City of Fort Bragg	DRAWN BY: I. MCFADDEN	FIGURE 7
		SCALE:	CHECKED BY: J. SOLORIO	

Appendix A:
Dam Breach Calculations

ESTIMATION OF DAM BREACH PARAMETERS USING THE FROEHLICH 2008 METHOD

PROJECT: Summers Lane Reservoir

BREACH INPUT PARAMETERS:

Select Failure Mode From Drop-Down Menu:	OVERTOPPING	
Height of water over base elevation of breach (H_w) =	20.0	Feet
Volume of water in the reservoir at the time of failure (V_w) =	46.0	Acre-Feet
Reservoir Surface Area at Hw (A_s) =	4.4	Acres
Height of breach (H_b) =	20.0	Feet
Failure Mode Factor (K_o) =	1.3	
Breach Side-Slope Ratio (Z_b) =	1	Z(H):1(V)
Dam Size Class:	Small	Assumes Full Reservoir At Time of Breach.

CALCULATED BREACH CHARACTERISTICS:

Average Breach Width (B_{avg}) =	41.1	Feet
Bottom Width of Breach (B_b) =	21.1	Feet
Breach Formation Time (T_f) =	0.22	Hours
Storage Intensity (SI) =	2.3	Acre Feet/Foot
Predicted Peak Flow (Q_p) =	4235	Cubic Feet per Second

RESULTS CHECK:

Average Breach Width Divided by Height of Breach (B_{avg}/H_b) =	2.06	If (B_{avg}/H_b) > 0.6, Full Breach Devlopment is Anticipated
Erosion Rate (ER), Calculated as (B_{avg}/T_f) =	187.7	
Erosion Rate Divided by Height of Water Over Base of Breach (ER/H_w) =	9.4	If 1.6 < (ER/H_w) < 21, Erosion Rate is Assumed Reasonable

Note: Storage volume of reservoir is outside the data set used to generate the emperical equations used in the Froehlich Method

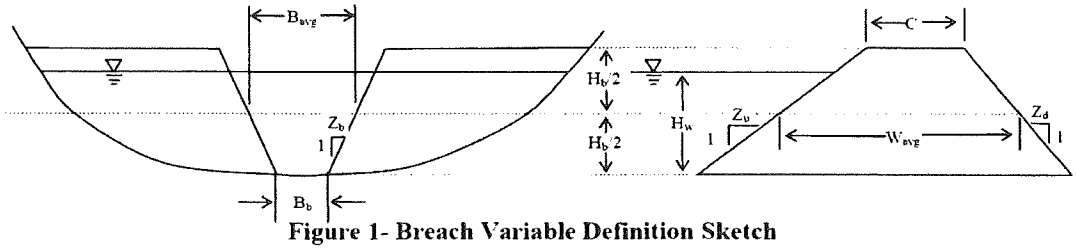


Figure 1- Breach Variable Definition Sketch

Appendix B:
Maximum Dam Breach Flood Inundation Depths

rid #			Maximum Elevation (ft)
1	6060232.00	2285749.00	0.11
2	6060232.00	2285830.00	0.10
3	6060232.00	2285911.00	0.10
4	6060313.00	2285749.00	0.20
5	6060313.00	2285830.00	0.11
6	6060313.00	2285911.00	0.11
7	6060313.00	2285992.00	0.14
8	6060313.00	2286073.00	0.12
9	6060313.00	2286154.00	0.11
10	6060313.00	2286235.00	0.00
11	6060394.00	2285749.00	0.26
12	6060394.00	2285830.00	0.20
13	6060394.00	2285911.00	0.17
14	6060394.00	2285992.00	0.12
15	6060394.00	2286073.00	0.11
16	6060394.00	2286154.00	0.03
17	6060394.00	2286235.00	0.01
18	6060394.00	2286316.00	0.00
19	6060394.00	2286397.00	0.00
20	6060394.00	2286478.00	0.00
21	6060475.00	2285749.00	0.32
22	6060475.00	2285830.00	0.26
23	6060475.00	2285911.00	0.30
24	6060475.00	2285992.00	0.18
25	6060475.00	2286073.00	0.14
26	6060475.00	2286154.00	0.11
27	6060475.00	2286235.00	0.04
28	6060475.00	2286316.00	0.01
29	6060475.00	2286397.00	0.00
30	6060475.00	2286478.00	0.00
31	6060475.00	2286559.00	0.11
32	6060475.00	2286640.00	0.10
33	6060475.00	2286721.00	0.11
34	6060556.00	2285749.00	0.38
35	6060556.00	2285830.00	0.32
36	6060556.00	2285911.00	0.33
37	6060556.00	2285992.00	0.26
38	6060556.00	2286073.00	0.18
39	6060556.00	2286154.00	0.13
40	6060556.00	2286235.00	0.10
41	6060556.00	2286316.00	0.06
42	6060556.00	2286397.00	0.04
43	6060556.00	2286478.00	0.06
44	6060556.00	2286559.00	0.10
45	6060556.00	2286640.00	0.11
46	6060556.00	2286721.00	0.11
47	6060556.00	2286802.00	0.20
48	6060556.00	2286883.00	0.20
49	6060556.00	2286964.00	0.20
50	6060637.00	2285749.00	0.44
51	6060637.00	2285830.00	0.40
52	6060637.00	2285911.00	0.38
53	6060637.00	2285992.00	0.29
54	6060637.00	2286073.00	0.28
55	6060637.00	2286154.00	0.25
56	6060637.00	2286235.00	0.12
57	6060637.00	2286316.00	0.11
58	6060637.00	2286397.00	0.12
59	6060637.00	2286478.00	0.14

60	6060637.00	2286559.00	0.17
61	6060637.00	2286640.00	0.22
62	6060637.00	2286721.00	0.21
63	6060637.00	2286802.00	0.21
64	6060637.00	2286883.00	0.20
65	6060637.00	2286964.00	0.28
66	6060718.00	2285749.00	0.51
67	6060718.00	2285830.00	0.51
68	6060718.00	2285911.00	0.46
69	6060718.00	2285992.00	0.38
70	6060718.00	2286073.00	0.35
71	6060718.00	2286154.00	0.35
72	6060718.00	2286235.00	0.29
73	6060718.00	2286316.00	0.24
74	6060718.00	2286397.00	0.21
75	6060718.00	2286478.00	0.25
76	6060718.00	2286559.00	0.31
77	6060718.00	2286640.00	0.32
78	6060718.00	2286721.00	0.34
79	6060718.00	2286802.00	0.38
80	6060718.00	2286883.00	0.30
81	6060718.00	2286964.00	0.31
82	6060799.00	2285749.00	0.56
83	6060799.00	2285830.00	0.59
84	6060799.00	2285911.00	0.54
85	6060799.00	2285992.00	0.48
86	6060799.00	2286073.00	0.46
87	6060799.00	2286154.00	0.44
88	6060799.00	2286235.00	0.35
89	6060799.00	2286316.00	0.31
90	6060799.00	2286397.00	0.33
91	6060799.00	2286478.00	0.36
92	6060799.00	2286559.00	0.36
93	6060799.00	2286640.00	0.39
94	6060799.00	2286721.00	0.42
95	6060799.00	2286802.00	0.44
96	6060799.00	2286883.00	0.35
97	6060799.00	2286964.00	0.38
98	6060880.00	2285668.00	0.61
99	6060880.00	2285749.00	0.59
100	6060880.00	2285830.00	0.58
101	6060880.00	2285911.00	0.65
102	6060880.00	2285992.00	0.62
103	6060880.00	2286073.00	0.58
104	6060880.00	2286154.00	0.54
105	6060880.00	2286235.00	0.39
106	6060880.00	2286316.00	0.38
107	6060880.00	2286397.00	0.45
108	6060880.00	2286478.00	0.46
109	6060880.00	2286559.00	0.43
110	6060880.00	2286640.00	0.48
111	6060880.00	2286721.00	0.50
112	6060880.00	2286802.00	0.52
113	6060880.00	2286883.00	0.48
114	6060880.00	2286964.00	0.41
115	6060961.00	2285668.00	0.60
116	6060961.00	2285749.00	0.61
117	6060961.00	2285830.00	0.59
118	6060961.00	2285911.00	0.72
119	6060961.00	2285992.00	0.69

120	6060961.00	2286073.00	0.68
121	6060961.00	2286154.00	0.61
122	6060961.00	2286235.00	0.47
123	6060961.00	2286316.00	0.51
124	6060961.00	2286397.00	0.56
125	6060961.00	2286478.00	0.62
126	6060961.00	2286559.00	0.65
127	6060961.00	2286640.00	0.70
128	6060961.00	2286721.00	0.71
129	6060961.00	2286802.00	0.65
130	6060961.00	2286883.00	0.57
131	6061042.00	2285668.00	0.58
132	6061042.00	2285749.00	0.59
133	6061042.00	2285830.00	0.69
134	6061042.00	2285911.00	0.73
135	6061042.00	2285992.00	0.75
136	6061042.00	2286073.00	0.74
137	6061042.00	2286154.00	0.61
138	6061042.00	2286235.00	0.58
139	6061042.00	2286316.00	0.60
140	6061042.00	2286397.00	0.66
141	6061042.00	2286478.00	0.70
142	6061042.00	2286559.00	0.77
143	6061042.00	2286640.00	0.82
144	6061042.00	2286721.00	0.78
145	6061042.00	2286802.00	0.69
146	6061042.00	2286883.00	0.67
147	6061123.00	2285668.00	0.49
148	6061123.00	2285749.00	0.54
149	6061123.00	2285830.00	0.67
150	6061123.00	2285911.00	0.75
151	6061123.00	2285992.00	0.91
152	6061123.00	2286073.00	0.86
153	6061123.00	2286154.00	0.73
154	6061123.00	2286235.00	0.71
155	6061123.00	2286316.00	0.72
156	6061123.00	2286397.00	0.73
157	6061123.00	2286478.00	0.77
158	6061123.00	2286559.00	0.85
159	6061123.00	2286640.00	0.84
160	6061123.00	2286721.00	0.72
161	6061123.00	2286802.00	0.72
162	6061204.00	2285668.00	0.43
163	6061204.00	2285749.00	0.33
164	6061204.00	2285830.00	0.54
165	6061204.00	2285911.00	0.66
166	6061204.00	2285992.00	0.94
167	6061204.00	2286073.00	0.98
168	6061204.00	2286154.00	0.89
169	6061204.00	2286235.00	0.98
170	6061204.00	2286316.00	0.92
171	6061204.00	2286397.00	0.97
172	6061204.00	2286478.00	0.86
173	6061204.00	2286559.00	0.88
174	6061204.00	2286640.00	0.82
175	6061204.00	2286721.00	0.71
176	6061204.00	2286802.00	0.73
177	6061285.00	2285668.00	0.33
178	6061285.00	2285749.00	0.10
179	6061285.00	2285830.00	0.28

180	6061285.00	2285911.00	0.50
181	6061285.00	2285992.00	0.92
182	6061285.00	2286073.00	1.09
183	6061285.00	2286154.00	1.20
184	6061285.00	2286235.00	1.25
185	6061285.00	2286316.00	1.21
186	6061285.00	2286397.00	1.20
187	6061285.00	2286478.00	1.01
188	6061285.00	2286559.00	0.94
189	6061285.00	2286640.00	0.82
190	6061285.00	2286721.00	0.77
191	6061285.00	2286802.00	0.74
192	6061366.00	2285668.00	0.10
193	6061366.00	2285749.00	0.01
194	6061366.00	2285830.00	0.10
195	6061366.00	2285911.00	0.28
196	6061366.00	2285992.00	0.78
197	6061366.00	2286073.00	1.21
198	6061366.00	2286154.00	1.61
199	6061366.00	2286235.00	1.60
200	6061366.00	2286316.00	1.50
201	6061366.00	2286397.00	1.29
202	6061366.00	2286478.00	1.09
203	6061366.00	2286559.00	0.93
204	6061366.00	2286640.00	0.92
205	6061366.00	2286721.00	0.79
206	6061447.00	2285668.00	0.00
207	6061447.00	2285749.00	0.00
208	6061447.00	2285830.00	0.00
209	6061447.00	2285911.00	0.03
210	6061447.00	2285992.00	0.42
211	6061447.00	2286073.00	1.52
212	6061447.00	2286154.00	2.62
213	6061447.00	2286235.00	2.23
214	6061447.00	2286316.00	1.49
215	6061447.00	2286397.00	1.18
216	6061447.00	2286478.00	1.09
217	6061447.00	2286559.00	1.16
218	6061447.00	2286640.00	0.64
219	6061447.00	2286721.00	0.66
220	6061528.00	2285668.00	0.00
221	6061528.00	2285749.00	0.00
222	6061528.00	2285830.00	0.00
223	6061528.00	2285911.00	0.00
224	6061528.00	2285992.00	0.00
225	6061528.00	2286154.00	2.50
226	6061528.00	2286640.00	0.42
227	6061528.00	2286721.00	0.53

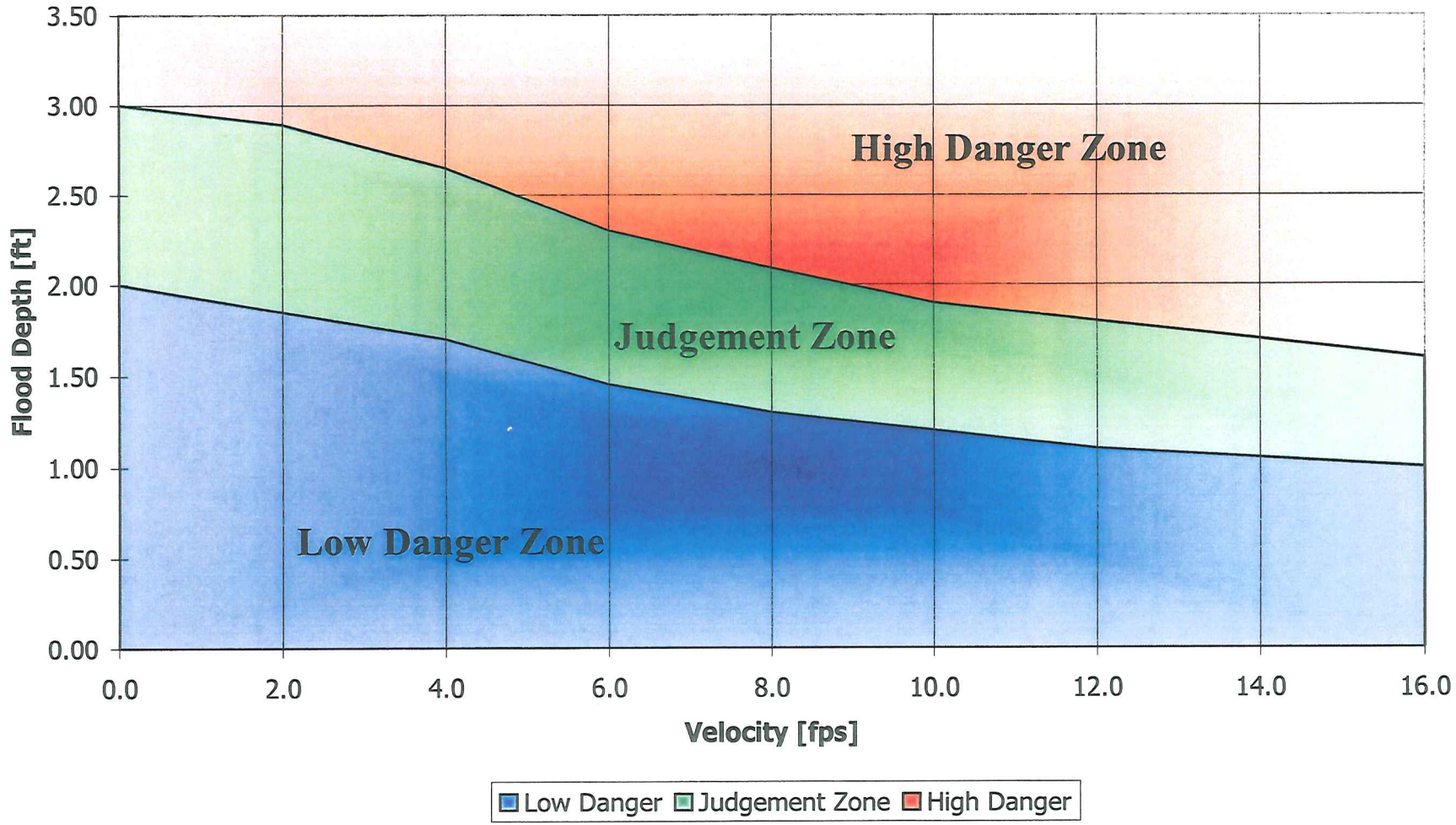
rid #			Maximum Velocity (fps)
1	6060232.00	2285749.00	0.00
2	6060232.00	2285830.00	0.00
3	6060232.00	2285911.00	0.00
4	6060313.00	2285749.00	0.00
5	6060313.00	2285830.00	0.36
6	6060313.00	2285911.00	0.37
7	6060313.00	2285992.00	0.00
8	6060313.00	2286073.00	0.00
9	6060313.00	2286154.00	0.00
10	6060313.00	2286235.00	0.00
11	6060394.00	2285749.00	0.00
12	6060394.00	2285830.00	1.12
13	6060394.00	2285911.00	0.46
14	6060394.00	2285992.00	0.49
15	6060394.00	2286073.00	0.07
16	6060394.00	2286154.00	0.00
17	6060394.00	2286235.00	0.00
18	6060394.00	2286316.00	0.00
19	6060394.00	2286397.00	0.00
20	6060394.00	2286478.00	0.00
21	6060475.00	2285749.00	0.00
22	6060475.00	2285830.00	1.48
23	6060475.00	2285911.00	1.23
24	6060475.00	2285992.00	0.55
25	6060475.00	2286073.00	0.45
26	6060475.00	2286154.00	0.38
27	6060475.00	2286235.00	0.00
28	6060475.00	2286316.00	0.00
29	6060475.00	2286397.00	0.00
30	6060475.00	2286478.00	0.00
31	6060475.00	2286559.00	0.00
32	6060475.00	2286640.00	0.00
33	6060475.00	2286721.00	0.00
34	6060556.00	2285749.00	0.00
35	6060556.00	2285830.00	1.72
36	6060556.00	2285911.00	1.43
37	6060556.00	2285992.00	1.37
38	6060556.00	2286073.00	0.54
39	6060556.00	2286154.00	0.43
40	6060556.00	2286235.00	0.35
41	6060556.00	2286316.00	0.00
42	6060556.00	2286397.00	0.00
43	6060556.00	2286478.00	0.00
44	6060556.00	2286559.00	0.09
45	6060556.00	2286640.00	0.31
46	6060556.00	2286721.00	0.34
47	6060556.00	2286802.00	0.00
48	6060556.00	2286883.00	0.00
49	6060556.00	2286964.00	0.00
50	6060637.00	2285749.00	0.00
51	6060637.00	2285830.00	1.91
52	6060637.00	2285911.00	1.55
53	6060637.00	2285992.00	1.45
54	6060637.00	2286073.00	1.30
55	6060637.00	2286154.00	0.90
56	6060637.00	2286235.00	0.32
57	6060637.00	2286316.00	0.21
58	6060637.00	2286397.00	0.29
59	6060637.00	2286478.00	0.35

60	6060637.00	2286559.00	0.37
61	6060637.00	2286640.00	0.93
62	6060637.00	2286721.00	1.10
63	6060637.00	2286802.00	0.91
64	6060637.00	2286883.00	0.85
65	6060637.00	2286964.00	0.00
66	6060718.00	2285749.00	0.00
67	6060718.00	2285830.00	2.03
68	6060718.00	2285911.00	1.76
69	6060718.00	2285992.00	1.62
70	6060718.00	2286073.00	1.31
71	6060718.00	2286154.00	1.09
72	6060718.00	2286235.00	0.78
73	6060718.00	2286316.00	0.61
74	6060718.00	2286397.00	0.82
75	6060718.00	2286478.00	1.01
76	6060718.00	2286559.00	1.15
77	6060718.00	2286640.00	1.25
78	6060718.00	2286721.00	1.27
79	6060718.00	2286802.00	1.26
80	6060718.00	2286883.00	1.15
81	6060718.00	2286964.00	0.00
82	6060799.00	2285749.00	0.00
83	6060799.00	2285830.00	2.05
84	6060799.00	2285911.00	1.94
85	6060799.00	2285992.00	1.73
86	6060799.00	2286073.00	1.43
87	6060799.00	2286154.00	1.11
88	6060799.00	2286235.00	0.79
89	6060799.00	2286316.00	0.77
90	6060799.00	2286397.00	1.04
91	6060799.00	2286478.00	1.24
92	6060799.00	2286559.00	1.40
93	6060799.00	2286640.00	1.46
94	6060799.00	2286721.00	1.48
95	6060799.00	2286802.00	1.46
96	6060799.00	2286883.00	1.37
97	6060799.00	2286964.00	0.00
98	6060880.00	2285668.00	0.00
99	6060880.00	2285749.00	0.00
100	6060880.00	2285830.00	1.93
101	6060880.00	2285911.00	1.93
102	6060880.00	2285992.00	1.71
103	6060880.00	2286073.00	1.53
104	6060880.00	2286154.00	1.24
105	6060880.00	2286235.00	0.82
106	6060880.00	2286316.00	0.92
107	6060880.00	2286397.00	1.21
108	6060880.00	2286478.00	1.39
109	6060880.00	2286559.00	1.61
110	6060880.00	2286640.00	1.71
111	6060880.00	2286721.00	1.78
112	6060880.00	2286802.00	1.84
113	6060880.00	2286883.00	1.71
114	6060880.00	2286964.00	0.00
115	6060961.00	2285668.00	0.00
116	6060961.00	2285749.00	2.38
117	6060961.00	2285830.00	1.97
118	6060961.00	2285911.00	1.89
119	6060961.00	2285992.00	1.79

120	6060961.00	2286073.00	1.77
121	6060961.00	2286154.00	1.46
122	6060961.00	2286235.00	0.96
123	6060961.00	2286316.00	1.21
124	6060961.00	2286397.00	1.36
125	6060961.00	2286478.00	1.62
126	6060961.00	2286559.00	1.97
127	6060961.00	2286640.00	2.10
128	6060961.00	2286721.00	2.16
129	6060961.00	2286802.00	2.04
130	6060961.00	2286883.00	0.00
131	6061042.00	2285668.00	0.00
132	6061042.00	2285749.00	2.25
133	6061042.00	2285830.00	2.31
134	6061042.00	2285911.00	1.87
135	6061042.00	2285992.00	1.87
136	6061042.00	2286073.00	1.98
137	6061042.00	2286154.00	1.78
138	6061042.00	2286235.00	1.66
139	6061042.00	2286316.00	1.74
140	6061042.00	2286397.00	2.22
141	6061042.00	2286478.00	2.18
142	6061042.00	2286559.00	2.23
143	6061042.00	2286640.00	2.50
144	6061042.00	2286721.00	2.43
145	6061042.00	2286802.00	2.35
146	6061042.00	2286883.00	0.00
147	6061123.00	2285668.00	0.00
148	6061123.00	2285749.00	2.34
149	6061123.00	2285830.00	2.23
150	6061123.00	2285911.00	1.98
151	6061123.00	2285992.00	2.00
152	6061123.00	2286073.00	2.45
153	6061123.00	2286154.00	2.04
154	6061123.00	2286235.00	2.07
155	6061123.00	2286316.00	2.26
156	6061123.00	2286397.00	2.51
157	6061123.00	2286478.00	2.92
158	6061123.00	2286559.00	2.94
159	6061123.00	2286640.00	2.72
160	6061123.00	2286721.00	2.57
161	6061123.00	2286802.00	0.00
162	6061204.00	2285668.00	0.00
163	6061204.00	2285749.00	1.28
164	6061204.00	2285830.00	2.82
165	6061204.00	2285911.00	2.05
166	6061204.00	2285992.00	2.05
167	6061204.00	2286073.00	2.77
168	6061204.00	2286154.00	2.40
169	6061204.00	2286235.00	2.62
170	6061204.00	2286316.00	2.71
171	6061204.00	2286397.00	3.06
172	6061204.00	2286478.00	3.20
173	6061204.00	2286559.00	2.97
174	6061204.00	2286640.00	2.88
175	6061204.00	2286721.00	2.77
176	6061204.00	2286802.00	0.00
177	6061285.00	2285668.00	0.00
178	6061285.00	2285749.00	0.33
179	6061285.00	2285830.00	1.26

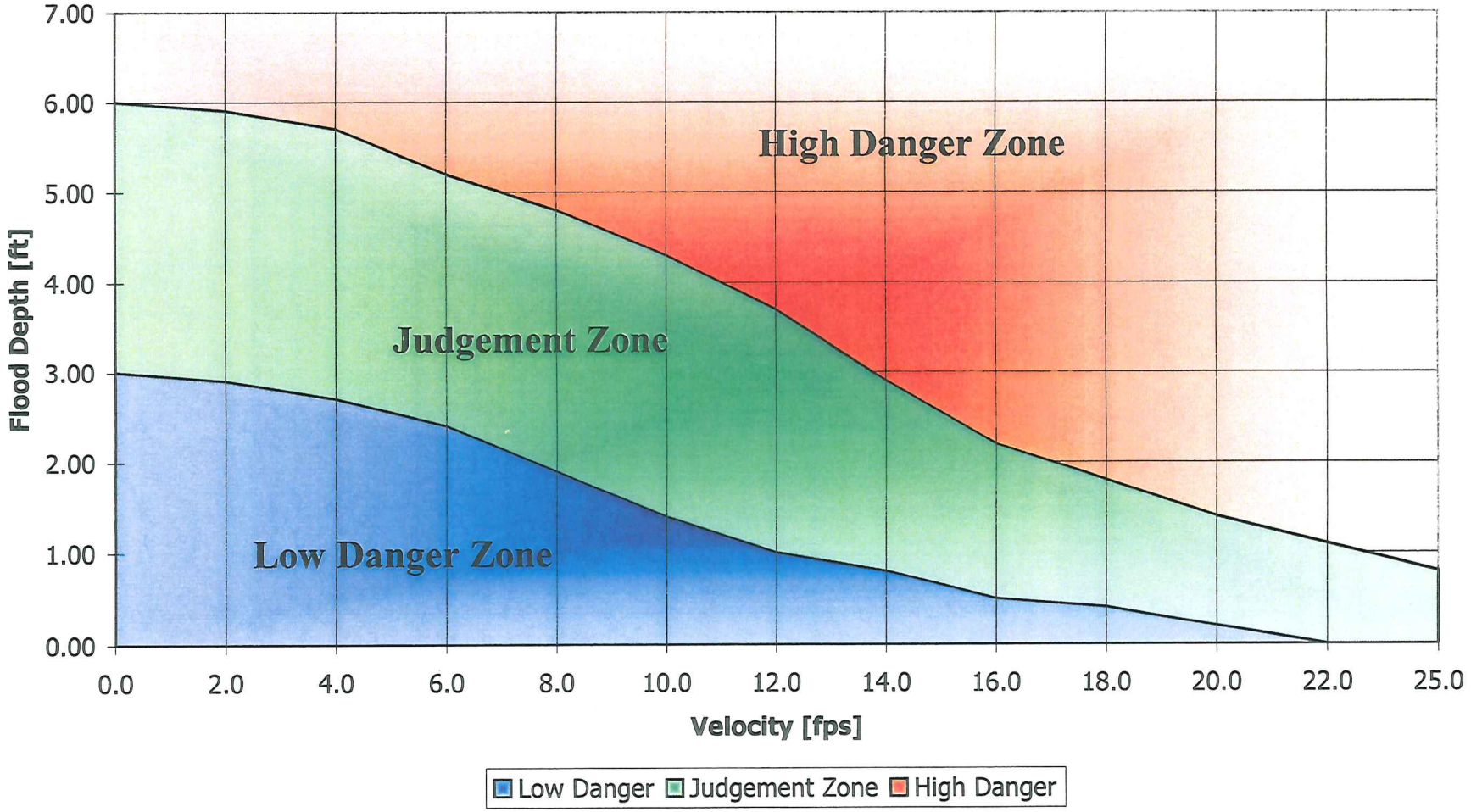
180	6061285.00	2285911.00	2.05
181	6061285.00	2285992.00	1.93
182	6061285.00	2286073.00	3.10
183	6061285.00	2286154.00	3.03
184	6061285.00	2286235.00	3.00
185	6061285.00	2286316.00	3.13
186	6061285.00	2286397.00	3.18
187	6061285.00	2286478.00	3.39
188	6061285.00	2286559.00	3.30
189	6061285.00	2286640.00	3.15
190	6061285.00	2286721.00	3.13
191	6061285.00	2286802.00	0.00
192	6061366.00	2285668.00	0.00
193	6061366.00	2285749.00	0.00
194	6061366.00	2285830.00	0.31
195	6061366.00	2285911.00	1.18
196	6061366.00	2285992.00	1.72
197	6061366.00	2286073.00	3.56
198	6061366.00	2286154.00	3.83
199	6061366.00	2286235.00	3.62
200	6061366.00	2286316.00	3.69
201	6061366.00	2286397.00	3.46
202	6061366.00	2286478.00	3.34
203	6061366.00	2286559.00	3.33
204	6061366.00	2286640.00	3.60
205	6061366.00	2286721.00	0.00
206	6061447.00	2285668.00	0.00
207	6061447.00	2285749.00	0.00
208	6061447.00	2285830.00	0.00
209	6061447.00	2285911.00	0.00
210	6061447.00	2285992.00	1.17
211	6061447.00	2286073.00	3.11
212	6061447.00	2286154.00	4.96
213	6061447.00	2286235.00	4.33
214	6061447.00	2286316.00	3.30
215	6061447.00	2286397.00	3.00
216	6061447.00	2286478.00	2.77
217	6061447.00	2286559.00	3.18
218	6061447.00	2286640.00	3.10
219	6061447.00	2286721.00	0.00
220	6061528.00	2285668.00	0.00
221	6061528.00	2285749.00	0.00
222	6061528.00	2285830.00	0.00
223	6061528.00	2285911.00	0.00
224	6061528.00	2285992.00	0.00
225	6061528.00	2286154.00	7.08
226	6061528.00	2286640.00	2.86
227	6061528.00	2286721.00	0.00

Flood Danger for Cars



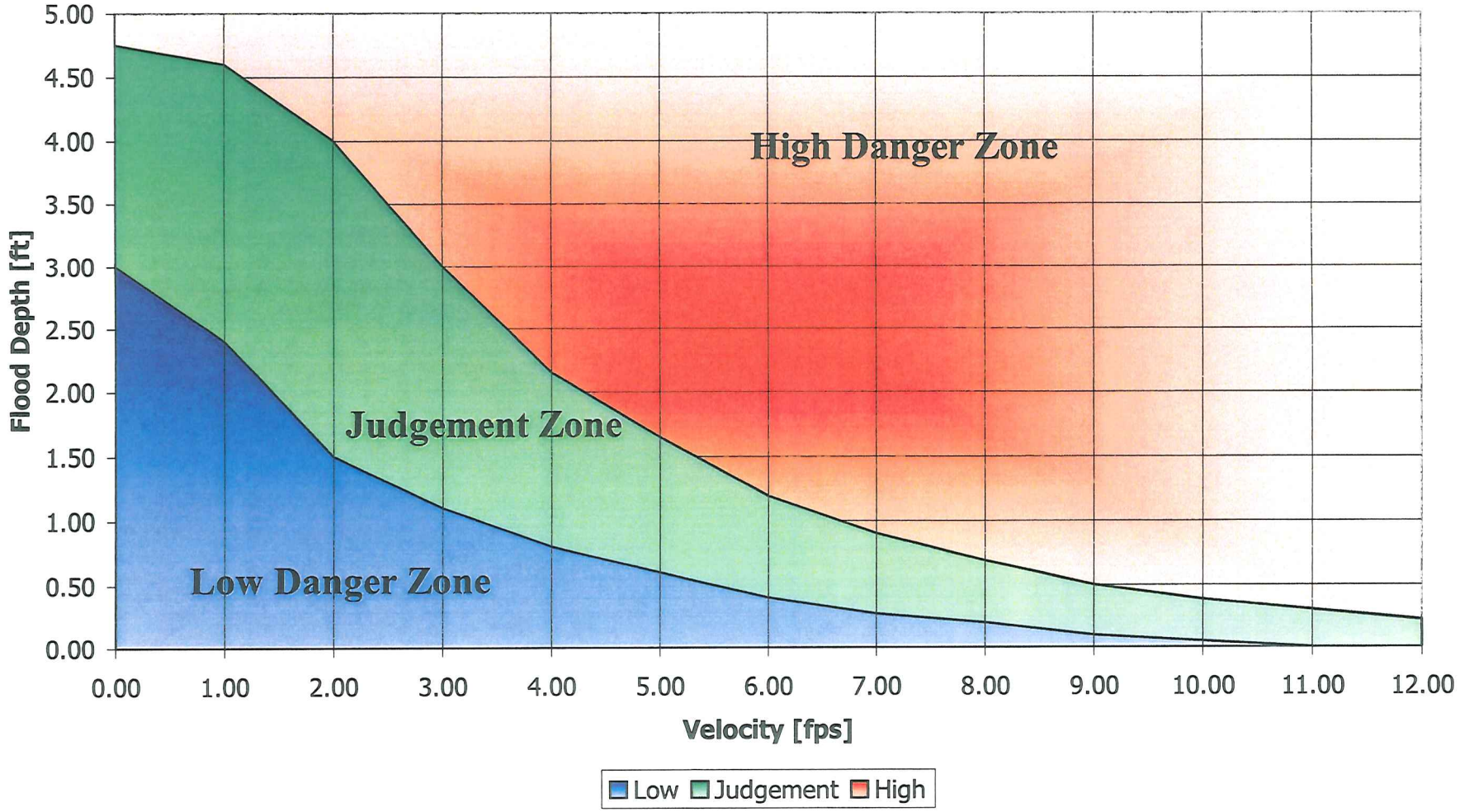
Source: ACER Technical Memorandum No. 11, "Downstream Hazard Classification Guidelines", USBR, 1988

Flood Danger for Houses



Source: ACER Technical Memorandum No. 11, "Downstream Hazard Classification Guidelines", USBR, 1988

Flood Danger for Adults



Source: ACER Technical Memorandum No. 11, "Downstream Hazard Classification Guidelines", USBR, 1988

Appendix E:
Proposed Reservoir Grading Plan

CONTROL COORDINATE LIST

PT#	NORTHING	EASTING	ELEVATION	DESCRIPTION
16	7802.5443	3459.8376	264.536	corner
69	7777.6939	4013.2235	291.1084	spike
87	7747.5371	4026.4215	292.45	cl monument
89	7853.3777	3452.9216	267.0655	spike
103	8128.5131	4019.1752	290.2461	spike
125	8099.6189	4036.825	291.6743	corner
143	8233.666	4189.0984	290.9996	spike
144	8208.2775	4404.8681	299.2737	spike
1212	8338.1951	4535.5614	304.2325	spike

LEGEND

- RIGHT OF WAY
- PROPERTY BOUNDARY
- PROPOSED WATER LINE ALIGNMENT
- EXISTING WATER LINE
- EXISTING ELECTRICAL LINE
- EXISTING DRAINAGE SWALE
- EXISTING FENCE LINE
- F — FLOW METER
- VALVE
- THRUST BLOCK (1 / C2.7)
- CONCENTRIC INCREASER
- TRANSITION COUPLER
- (E) EXISTING

APPROXIMATE PROPERTY LINE

(E) 6" C-900 PVC

12" CMP CULVERT

CREEK

SUMP

UNDERDRAIN

(E) FLOW METER

(E) VAULT

(E) POWER LINE

APPROXIMATE LOCATION NEWMAN RESERVOIR

EXISTING 40' POWERLINE EASEMENT

PROPOSED PIPELINE ALIGNMENT

CONTROL POINT (TYP.)

50' R.O.W. PER MC2, DR 29 PG 74

APPROXIMATE PROPERTY LINE

GRAPHICAL SCALE

0 60 120 180

(FEET)

P:\008195.00_haldrop & kull_fort bragg reservoir\mapstandard JLH. 6/24/2010

NO.	DATE	REVISIONS	BY	CHK
1	7/2/09	PRELIMINARY	JS	CC
2	6/22/10	OUTLET REVISION	JS	CC

DRAWN BY: D. ZAITZ
ENGINEER: J. SOLORIO
CHECKED BY:
DATE:

PROJECT NO: 008195.00
SCALE: 1"=50'
APPROVED BY:
DATE:

LAWRENCE & ASSOCIATES
ENGINEERING GEOLOGY
3590 IRON CT.
SHASTA LAKE, CA 96019
(530) 275-4600
(530) 275-7970 FAX

NEWMAN RESERVOIR

CITY OF FORT BRAGG
416 NORTH FRANKLIN ST.
FORT BRAGG, CA 95437

SITE PLAN

DRAWING: C1.0
SHEET: OF
REVISION NO: REVISION 0
DATE: 12/1/09

LEGEND

- RIGHT OF WAY
- PROPERTY BOUNDARY
- PROPOSED WATER LINE ALIGNMENT
- EXISTING WATER LINE
- EXISTING ELECTRICAL LINE
- EXISTING DRAINAGE SWALE
- EXISTING FENCE LINE
- F — FLOW METER
- VALVE
- THRUST BLOCK (1/C2.7)
- CONCENTRIC INCREASER
- TRANSITION COUPLER
- (E) EXISTING

285
R=60.00
L=101.26
22.00'
43.82'
5%
22.00'
43.82'
5%
18.00'
300
290
280
135.23'
95.23'
286
CONCRETE PAD (12'x12')
POND OVERFLOW ELEV.=298.0'
1/C5.4 HDPE BOOT
A/C3.1
3/C5.2
36" N-12 HDPE
OUTLET FL 274.0'
45 TONS 10"ø RIP RAP ENERGY DISSIPATOR
10" RESILENT GATE VALVE
OUTLET FL 273.0'
POND CLEANOUT FL ELEV.=275.0'
1/C5.3
SEE NOTE #1
HDPE DOUBLE BOOT
1/C5.3
SEE NOTE #1
10" HDPE
ANTI-SEEP COLLAR NOTE 1
8" FAIRCLOTH SKIMMER
30' 6" SCH 40 SOLID PVC BARREL
2/C5.3
BOTTOM OUTLET FL ELEV.=276.0'
10" HDPE
4/C5.2 PIPE BOLLARD 2 TYP.
3/C5.3
1/C5.2 OUTLET VALVES
10" C-900 TEE
10" C-900
POND FULL OUTLET
1/C5.1
3/C5.2
PT = 33+87.60
34+00
35+00
N90°04'37"W 90.88'
N53°48'13"W 9.16'
18°44'36"
28.37'
22.30'
S78°18'13"E 65.74'
0.50% MIN.
12" CMP
15.0'
8.0'
18 TONS 10"ø RIP RAP ENERGY DISSIPATOR
274
275
276
277
278

GRAPHICAL SCALE
0 5 10 20 30
(FEET)

NOTES:

1. CONSTRUCT ANTI-SEEP COLLARS AROUND PIPES PER SECTION 8.13 OF THE GEOTECHNICAL REPORT

P:\008195.00_baldrage & hull_fort bragg reservoir\pond5.dwg JLH. 6/24/2010

NO.	DATE	REVISIONS	BY	CHK
1	7/2/09	PRELIMINARY	JS	CC
2	6/22/10	OUTLET REVISION	JS	CC

DRAWN BY: D. ZAITZ	PROJECT NO: 008195.00
ENGINEER: J. SOLORIO	SCALE: 1"=10'
CHECKED BY:	APPROVED BY:
DATE:	DATE:

LAWRENCE & ASSOCIATES
ENGINEERING GEOLOGY
3590 IRON CT.
SHASTA LAKE, CA 96019
(530) 275-4800
(530) 275-7970 FAX

NEWMAN RESERVOIR

CITY OF FORT BRAGG
416 NORTH FRANKLIN ST.
FORT BRAGG, CA 95437

OUTLET PLAN

DRAWING: C5.0
SHEET: OF
REVISION NO: REVISION 0
DATE: 11/20/09