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To: Mark Andre, Director of Environmental Services
City of Arcata
736 F Street
Arcata, CA 95521
mandre@cityofarcata.org

From: Todd Kraemer, CPESC, Hydrologist
Colin Hughes, CEG #2717
Danny Hagans, Principal Earth Scientist
Pacific Watershed Associates Inc.
P.O. Box 4433
Arcata, CA 95518-4433

Subject: Evaluation of Fickle Hill Road Trail Crossing options and CEQA initial study for a new segment of the Arcata Ridge Trail, Humboldt County, CA

Purpose of Memorandum

This memorandum is intended to inform stakeholders and agencies about the potential impacts to geology, soils, hydrology, and water quality regarding the Fickle Hill Segment, a new 1,600 ft-long recreational trail segment of the Arcata Ridge Trail, and for the 3 proposed trail crossing options of Fickle Hill Road.

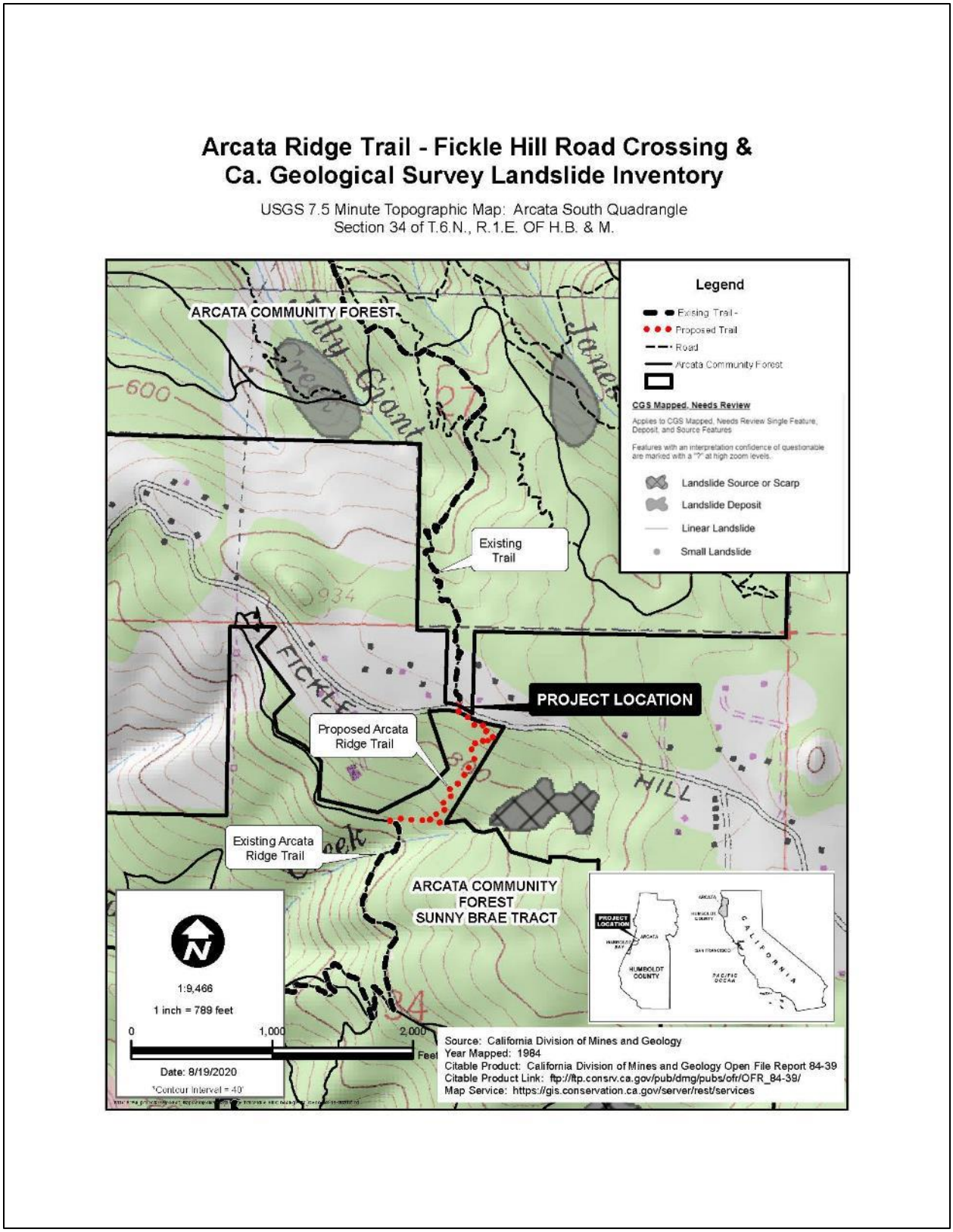
Introduction

A new 1,600 ft-long recreational shared-use trail segment of the Arcata Ridge Trail will cross Fickle Hill Road to link recreational use between the Arcata Community Forest and Sunny Brae Forest (Map 1). This portion of the Arcata Ridge Trail, the Fickle Hill Segment, will be constructed following the description of the Arcata Ridge Trail-Fickle Hill Segment Project – Initial Study /Negative Declaration (ART-FHS IS/ND) written by the City of Arcata and per recommended guidelines listed herein (Appendix B), and will connect and provide access to several trails and forest attractions. An environmental study is required to evaluate the potential for environmental impacts from the construction, operation, and long-term maintenance of the all-season recreational trail (Appendix A Checklist).

Scope of Assessment

The City of Arcata retained the services of Pacific Watershed Associates (PWA) to evaluate the feasibility of the Fickle Hill Segment of the Arcata Ridge Trail and the 3 trail crossing options of Fickle Hill Road. Specific objectives of the Project are to:

- Provide Fickle Hill Road crossing alignment recommendations to establish access for trails that connect the Arcata Community Forest to the Sunny Brae Forest.
- Provide a technical memo of environmental factors potentially affecting a) geology and soils and b) hydrology and water quality.



Map 1. Location Map of the Arcata Ridge Trail - Fickle Hill Segment

- Provide treatment recommendations for the new crossing and connecting trail segment.
- In addition to these objectives, this investigation briefly considers recommended alternatives for modifying the new trail segment alignment to avoid potential impacts to soil loss and water quality.

Field Activities

On October 16, 2020 technical staff from PWA conducted an assessment of the 6.17-acre project site (Project) and scoped the Fickle Hill Segment trail alignment and Fickle Hill Road crossing alternatives to identify environmental factors potentially affecting: a) geology and soils and b) hydrology and water quality. PWA staff returned to the site on November 6, 2020 and assessed the trail alignment, mapped geomorphic features, and surveyed distances to streams, wetlands, and a domestic water intake using a topographic LiDAR hillshade base map. These features were incorporated into the project base map for use in the trail and crossing assessment (Map 2).

Project Assessment

An assessment of the Project was conducted with field surveying equipment and a LiDAR hillshade base map with provisional hydrology and 5-ft contour intervals. The base map covers the 330-acre community forest tract south of Fickle Hill Road, owned by the City of Arcata and within the Arcata City limits, which is managed for public access, timber production, wildlife habitat and open space (APN 500-022-004). The assessment included detailed evaluation of the Fickle Hill Road proposed crossing Options #1.0, 1.5, and 2.0, the new Fickle Hill Segment, hillslope hydrology, geologic-hazards, and existing domestic water system.

Geomorphic and hydrologic data collected in the assessment included:

- Slope gradient of hillslopes, streamside hillslopes, trail alignment, road fillslopes, and hillslope slope instabilities and/or failures.
- Disturbed hillslope hydrology from past timber harvest and skid trail construction.
- Distances to stream channels, stream channel diversions, a wetland, multiple domestic water intakes and storage tanks, and parcel boundaries.
- Stream channel flow paths and riparian boundaries.
- Location and characterization of landslides.

Assessment data was used to generate a topographic base map in ARC GIS. Subsequent geomorphic mapping, analysis, and trail alignment planning added additional details to the base map. The base map of existing environmental constraints, geologic-hazards, and existing conditions with the 3 Fickle Hill Road crossing options is provided.

Fickle Hill Crossing and Arcata Ridge Trail – Fickle Hill Segment Evaluation

Potentially Affected Environment by the Proposed Trail Addition

Geologic setting

The Project is located within the Coast Ranges Geomorphic Province, north of the Mendocino Triple Junction, California's most seismically active region. Although no faults have been

documented within the immediate vicinity (50-ft) of the Project, this site is located within the fold and thrust belt of the Cascadia subduction zone. There are active seismic sources regionally which have the potential to produce strong ground shaking capable of inducing slope movements. Large to very large >8.0 magnitude earthquakes can originate from compressional faults located within the North American plate such as faults within the Mad River fault zone (MRFZ) and the Little Salmon fault zone (LSFZ) (Figure 1). The MRFZ is generally considered to consist of the Fickle Hill fault, Mad River fault, McKinleyville fault, Blue Lake fault, Trinidad fault, Big Lagoon fault, and numerous smaller faults within the area. Over 60 earthquakes within the region have produced damage and over 25 earthquakes of magnitude 6 or greater have originated in the north coastal region since the mid-1800's (Dengler, et al., 1992).

The Project lies within the MRFZ and is located on the upthrown block of the Fickle Hill fault. The Fickle Hill fault is the closest potential seismic source to the Project and the Fickle Hill fault Alquist-Priolo earthquake fault zone is mapped approximately 0.7 miles to the west of the Project.

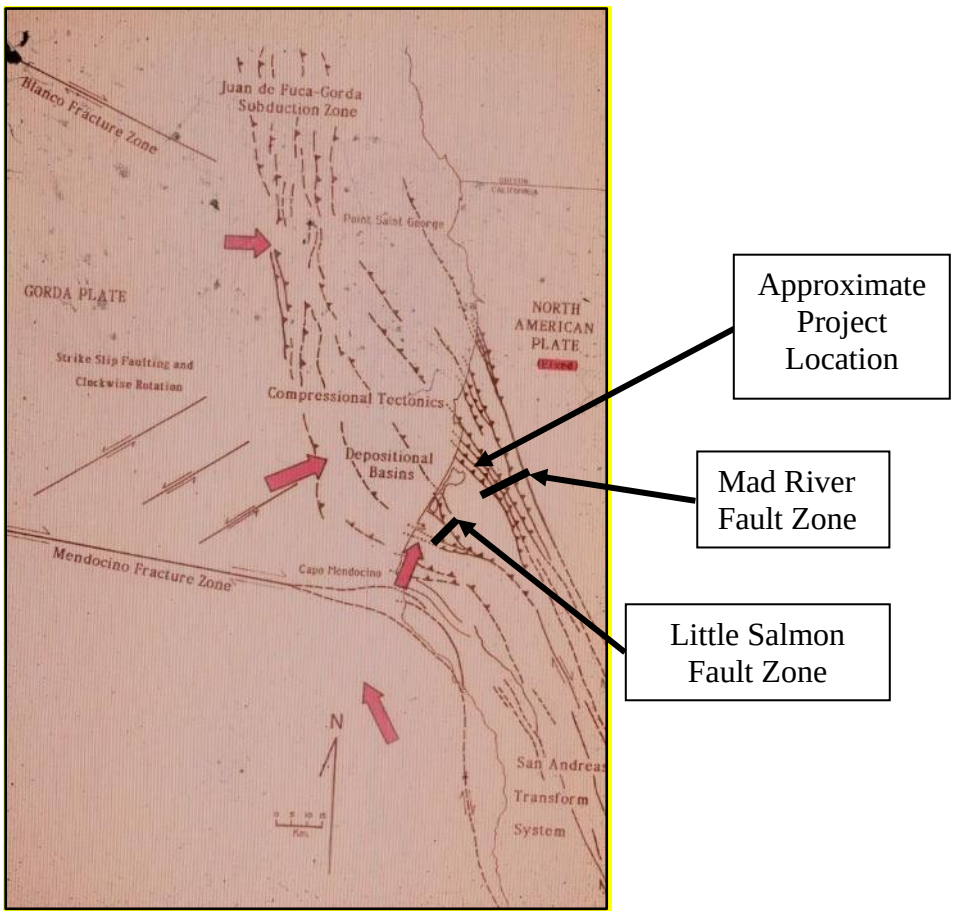


Figure 1. Cartoon depiction of compressional tectonics of the southern Cascadia Subduction Zone displaying the numerous unnamed faults within the subducting Gorda plate as well as upper plate faults within the North American plate. Red arrows indicate relative Plate Motion. (Personal Comm., unpublished documents of Gary Carver, 1989).

Geologic maps of this region indicate that the Project is underlain by bedrock of

Cretaceous/Jurassic age Franciscan mélange (KJfm) component of the Central belt of the Franciscan Complex (McLaughlin, *et al*, 2000). The Franciscan melange is characterized by highly sheared massive sandstone with interbedded siltstone or sandstone/siltstone. Boulders of greenstone, chert, blueschist, greenschist, amphibolite schist may be present (Strand, 1962). Franciscan melange typically forms rolling hummocky terrain; melange boulders form scattered knobs that protrude out of grassland and grass-oak woodland (Knudsen, 1993). Several of these house sized boulders are present within the dense redwood forest project area. The Project falls within a mapped area of the *"cm2"* subunit of Franciscan mélange described as having subequal amounts of metasandstone and meta-argillite (McLaughlin, *et al*, 2000). The *cm2* subunit exhibits irregular topography lacking well incised sidehill drainages.

Site soils

According to the Natural Resources Conservation Service (NRCS) Web Soil Survey (NRCS, 2020), the Project is located on two soil map units, Coppercreek-Tectah-Slidecreek complex, 9-30 percent slopes (Map Unit 580) and Coppercreek-Slidecreek-Tectah complex, 30-50 percent slopes (Map Unit 581). The Coppercreek, Slidecreek, and Tectah series consist of deep, well drained, non-hydric soils developed from colluvium and residuum derived from sandstone, mudstone, schist, and metasedimentary parent rocks. Based on the NRCS soil unit descriptions, soil depth to bedrock is typically more than 80 inches. Classification of shallow soils from the NRCS soil series descriptions identifies the textural classification of project soils as *clay loam* to *loam.*

Rainfall and soil moisture

The proposed crossing of Fickle Hill Road and the new 1,600 ft-long Fickle Hill Segment are located within the upper Grotzman Creek watershed, which is located north of the Beith Creek watershed and south of the Jolly Giant Creek watershed. Precipitation in the watershed arises from rain and fog-drip (fog condensing on vegetation). In most years, rainfall is experienced each month of the year, although amounts are negligible from June through August. In the last 30 years, seasonal totals average more than 40 inches in the driest area and exceed 70 inches in the zones of heavy precipitation (Prism, 2020).

Streams

Headwater Class I (domestic water sources), II, and III streams are present and have been disturbed historically by logging and skid trail construction (Map 2). Timber harvest has affected the hydrology, infiltration rate, rate of water delivery to streams through changes in the permeability of the soil and by changes in the drainage network. Changes in ground permeability are caused by compaction within harvest areas, or by compaction in the construction of roads and skid roads. Areas that have been tractor yarded are especially prone to changes in runoff rates. In highly compacted areas, water is unable to enter the ground and tends to flow much more quickly overland to stream channels. Disturbed streams throughout the project area were mapped during PWA's field investigations.

Diverted stream

PWA identified that a lower portion of the new Fickle Hill Segment is aligned upslope of an abandoned road/skid trail with an active diversion gully from a Class III stream channel diverted on an adjacent private ownership to the east (Map 2). The stream catchment is topographically

well-defined and is approximately 2.15-acres in area. The watercourse is diverted onto the legacy abandoned road alignment downslope of the project trail for a length of approximately 225-ft and has eroded at least three gullies into the outboard fillslope (Figure 2).

Figure 2. Photo of Class III stream diversion along proposed trail alignment.

Wetland and wetland vegetation

Wetlands within the Project have been mapped by TransTerra Consulting, 2020. Like the stream channels, the soil, hydrology, and vegetation have been disturbed historically by logging and skid trail construction.

Water quality

The project area and proposed trail additions are located within a dense advancing second growth redwood forest with a closed canopy, with thick organic litter duff covering the ground and very little exposed mineral soil visible. Based on qualitative visual inspection, water quality appears to be very good. Foul odors or color were not observed during our field assessment. However, water quality sampling conducted by the City of Arcata on December 17, 2019 identified the presence of total coliforms and E. Coli at the large wooden water building associated with the water diversion system (Map 2).

Groundwater

Based on the NRCS Map Unit classification of soils, the water table is expected to be 7 feet or more below the ground surface. Actual groundwater levels may be higher or lower than what is interpreted by NRCS classification. Groundwater depth varies by location and will fluctuate with

variations in rainfall, runoff, and other changes in hydrologic conditions. At localized areas (e.g. wetlands and springs) groundwater is shallow in the soil profile and emerges where it intersects the ground surface.

Domestic water intakes and storage structures

There is a well-developed series of in-stream domestic water diversion and storage infrastructure downslope of Fickle Hill Road to the west of the proposed new trail (Map 2). PWA identified that the proposed Fickle Hill Segment is not in the same headwater drainage basin area or catchment that the observed domestic water infrastructure is located (Map 2). An approximately 18 ft-wide wooden water building is the active surface water intake and diversion structure (Map 2, Figure 3). This is located 140 to 160-ft to the west of the new proposed Fickle Hill Segment alignment. A legacy cement capped domestic water intake (Personal comm., Mark Andre, 2020) is located upstream of the active surface water intake and diversion structure (Map 2).

Figure 3. Active domestic surface water intake and diversion infrastructure identified as "Large wooden water building" on Map 2.

A series of buildings, pump house, and water storage structures that culminate in a large cylindrical metal water tank (40-ft long by 10-ft diameter). They are located both on and just outside to the west of the cities APN 500-022-004 boundary and used to store domestic water diverted from a watercourse within the adjacent parcel (Map 2). Active overflow from the tank was observed to be flowing down a legacy skid road, eroding a gully through the skid road fill, and discharging onto an active landslide (Map 2). The toe or the downslope extent of the large active landslide feature is located within the parcel owned by the City of Arcata. The poorly located overflow drainpipe may be contributing to the slope instability.

Evaluation of 3 Fickle Hill Road Crossing Options

The City of Arcata has developed 3 potential trail crossing alignments of Fickle Hill Road (Map 2). Each of the options will likely require varying degrees of brushing within the right-of-way.

Crossing Option #1.0-

This option is located at the maintenance road and gate to the existing north segment of the Arcata Ridge Trail. Several potential complications with the construction and use of Option #1.0 were identified and do not support construction of this crossing option. The Option #1.0 trail alignment is located approximately 75 to 85-ft upslope of the Class 1 stream headwaters which is the source supply for domestic surface water diversions located further downstream (Map 2). Public usage of the Option #1.0 crossing and trail alignment has the highest probability of the 3 crossing options to impact surface waters used for domestic purposes.

On the south side of Fickle Hill Road, the Option #1.0 trail would be positioned on steep slopes along a dormant landslide scarp and on the existing over-steepened fillslope of Fickle Hill Road (Map 2). Construction of the trail in this location would likely require an engineered trail route (e.g. crib wall, engineered fill, tie-backs) due to the steepness of the hillslope along the proposed route. Construction of engineered trail route options would result in a greater area of ground and vegetation disturbance (tree removal, etc.) than non-engineered trail construction.

Crossing Option #1.5-

This is identified by PWA as the preferred route location for crossing Fickle Hill Road. Crossing Option #1.5 route would be offset from the maintenance gate and contour through the forest for +/-100-ft to reconnect to the existing Arcata Ridge Trail to the north of Fickle Hill Road. The proposed alignment would drain runoff into a different headwater drainage catchment to the east of the drainage basin with the identified domestic water supply sources (Map 2). The existing fillslope at the Option #1.5 location is moderately sloped and observed to be stable. Little or no modification of the cutbank would be required to develop the Option #1.5 crossing alignment.

Crossing Option #2.0-

Crossing Option #2.0 is located on a slight curve in Fickle Hill Road, and modification of the cutbank within the right-of-way would likely be required to safely allow trail users to walk along the north side of Fickle Hill Road for 50 to 80-ft to the proposed Option #2.0 crossing location. Cutbank modification would entail engineered and cutbank grading and stabilization beneath an upslope private property.

Evaluation of New Section of Arcata Ridge Trail Potential Impacts to Resources

Impacts of Fickle Hill Segment to geology

As proposed, the Project does not entail significant earth moving, excavation/cutting, filling/loading, lateral destabilization, vegetation removal, altering surface runoff drainage patterns, or directing runoff onto existing landslide features, structural fillslopes, or embankments. The proposed trail segment crosses hillslopes with evidence of past hillslope creep, but construction, use, and maintenance of the trail as proposed will not significantly further impact hillslope stability. The project trail route generally crosses slopes that are less than

45% in steepness and is aligned around large trees and old growth stumps which provide root strength to soils and assist in hillslope stabilization (Figure 4).

Impacts of Fickle Hill Segment to soil

As proposed, the Project will not result in significant impact to site soils, soil stability, or topsoil resources and characteristics. Minimization of the trail width (two to four feet wide), trail surfacing with rock aggregate, and installation of rolling dip drainage structures in accordance with best-management-practice standards will be sufficient to minimize surface erosion of trail and off-trail soils (Appendix B). To the north, in the Arcata Community Forest recently completed trail projects demonstrate that with proper design, construction, and maintenance, the region's soil offers adequate stability for building excellent, highly sustainable trail networks.

Figure 4. PWA geologist assesses the slope gradient and the risk of landsliding in the vicinity of the ART-FHS.

Impacts of Fickle Hill Segment to water quality

Stormwater discharge- Surface water impacts due to construction, operations, and maintenance are predicted to be minor and less than significant. This is largely our finding because >99% of the proposed trail alignment is located >50 ft from any surface waters (Map 2). The best management practices (BMPs) proposed for the trail will also further reduce any significant negative effects to hillslope runoff processes and stormwater discharge. Trail construction in combination with rolling dips and frequent breaches in the berm will force water rapidly off the trail and will prevent risks of trail use and runoff from degrading water quality. The trail bed will be constructed with a 3 to 5% outslope to sheetwash flow rapidly across the trail surface, the

outsloped trail will disperse runoff and potential pollutants onto the downhill side of the trail, well away from natural surface streams and springs. The surface of the trail bed will be rocked and compacted to prevent trail erosion and impacts to stormwater discharge.

An objective of the trail layout process is to identify pollutant sources that may affect the quality of stormwater discharge and implement BMPs to reduce and potentially eliminate pollutants carried by stormwater runoff. Guidelines have been developed to ensure that construction, operations, and maintenance techniques will follow BMPs through the more complex aspects of trail development to prevent erosion, sediment delivery, and pollutant runoff to steams (Appendix B).

Non-stormwater discharge- Construction of the trail will require hand-tools, for the majority of the 1,600 ft-long by 2 to 4-ft wide recreation, shared-use trail. Construction of the short trail segment will also require the use of power tools (i.e., chainsaws) with oils and other petroleum products that could pose a potential impact to water quality if these hazardous materials were spilled during construction. Emergency procedures for responding to hazardous materials releases will be described in the ART-FHS IS/ND and guidelines in Appendix B. The use of hand tools and handheld power tools has a very low potential to introduce fluids, lubricants, and other toxic substances resulting from accidental spills or mishandling of these materials, into the surrounding environment and local receiving waters.

Impacts of Fickle Hill Segment to hydrology
Surface water- The Project is recommended to cross Fickle Hill Road at Crossing Option #1.5 and construct a narrow with minimal cut and fill 1,600 ft-long shared-use trail. The ART-FHS IS/ND and Appendix B document that the proposed trail will not impede water quality, nor be constructed in the same catchment within the parcel that currently harbors a surface water intake and diversion for domestic use. During construction, BMPs will be implemented so that on-site and off-site erosion and sedimentation will be prevented and controlled to the extent practicable (Appendix B). Additional BMPs will be implemented wherever the trail alignment crosses soft soils or wet areas to ensure that erosion and sediment delivery does not occur due to project construction and use. As previously stated, surface water impacts due to construction, operations, and maintenance are predicted to be minor and less than significant.

Groundwater- The Project will construct a 1,600 ft-long by 2 to 4-ft wide shared-use recreation trail (3,200 to 6,400-sq ft of disturbed surface area). Trail construction will be performed by hand and will not result in the creation of large areas of impervious surfaces that could prevent water from infiltrating into the groundwater nor will it result in direct additions or withdrawals to existing groundwater.

Impacts of Fickle Hill Segment to domestic water sources
The Fickle Hill Crossing and Arcata Ridge Trail will follow contours and switchbacks along portions of skid trails constructed during previous timber harvest plans (Timber Harvesting Plan 1-08-166 HUM). Excepting Fickle Hill Crossing Option #1.0, the proposed trail route is located outside headwater areas and catchments with domestic water infrastructure, therefore there is no potential impact to domestic water sources from the proposed Project. The domestic surface water intake and diversion structure is a minimum 140 to 160-ft away from the new proposed

Fickle Hill Segment alignment.

Recommendations

Based on the PWA project area assessment of potential risk to physical natural resources, we find the potential for adverse impacts to water, soil and geologic resources is very low (Appendix A). To ensure the finding remains accurate, the following recommendations should be implemented at the time of construction to further minimize potential impacts to geology, soils, hydrology, water quality and domestic water infrastructure:

Geology

- The project trail should be constructed with an average 5% outslope and as stated in the ART-FHS description and guidelines in Appendix B, without the use of heavy machinery and minimizing excavation/cutting or filling. As proposed, limit grading for trail construction to work that can be completed with hand labor.
- Avoid trail building on steep landslide scarps and over-steepened road fills.
- Rock the trail surface where located in soft soil or wet terrain, or on-trail segments that exceed 5 to 7% in steepness to reduce deformation of the trail surface, erosion from concentrated surface runoff, and pulverization by trail usage. Ensure that rock surfacing is adequate for all designed shared-use modes, including bicycle and equestrian usage.

Soils

- Avoid trail building on steep slopes that may concentrate surface runoff and quickly erode the trail surface.
- Rock the trail surface where located in soft or wet terrain, or on road gradients that exceed 5 to 7%, to reduce deformation of the trail surface, erosion from concentrated surface runoff, and pulverization by trail usage. Ensure that rock surfacing is adequate for all designed shared-use modes, including bicycle and equestrian usage.
- Steep, greater than 10% in steepness, trail segments should not exceed 30-40 feet in length.
- Install frequent rolling dips along the trail alignment to reduce the concentration of trail runoff and the risk of acceleration sediment production.

Hydrology

- Follow the ART-FHS IS/ND and Appendix B, which describe and contains specific actions for construction, operations, and maintenance monitoring.
- Avoid fall-lines in order to reduce the risk of concentrating surface and overland runoff, increasing erosion rates and the volume of potential erosion. The trail's grade should not exceed half the grade of the hillside or sideslope that the trail traverses.
- Operations will follow BMPs for site grading activities, trail surface rock compaction, soil stabilization, handling, and storage of construction materials and equipment.
- Apply corrective actions to muddy or rutted trail sections and consider a wet weather use policy to prevent accelerated trail erosion during wet weather conditions.

Water quality

- Managers must ensure that formal trails have a sustainable alignment, well-marked, and maintained to be the better preferred route to prevent informal trails.
- Offering superior, accessible (legal) trail experiences such as gravity flow lines, and single-track flow trails, users will gladly gravitate away from non-system trails.
- Communication with visitors to inform about special and rare plants, sensitive soils, downstream user groups, and the implications of soil erosion caused by off trail use.
- Communication with visitors to inform about implications of animal feces and water quality.

Domestic water infrastructure

- Avoid construction of the trail within 100 ft of surface waters with existing domestic diversion.

Additional Recommendations

Stream Diversion

- Work with the adjacent landowner (APN 500-022-005) to correct the stream diversion on their property to the east to prevent further erosion on City of Arcata property and sediment delivery to the stream system (Map 2).

Domestic Water Tank Overflow

- As a temporary remedial measure, the City of Arcata should work with the western owner of the water tank (APN 500-032-014) to modify and relocate the overflow infrastructure to outlet directly into the source stream channel (Class II) downslope of the tank (Map 2).

Appendixes

Appendix A – Initial Study Checklists Explanations for Geology and Soils, and Hydrology and Water Quality.

Appendix B – Construction, operation, and maintenance guidelines for the Arcata Ridge Trail – Fickle Hill Segment.

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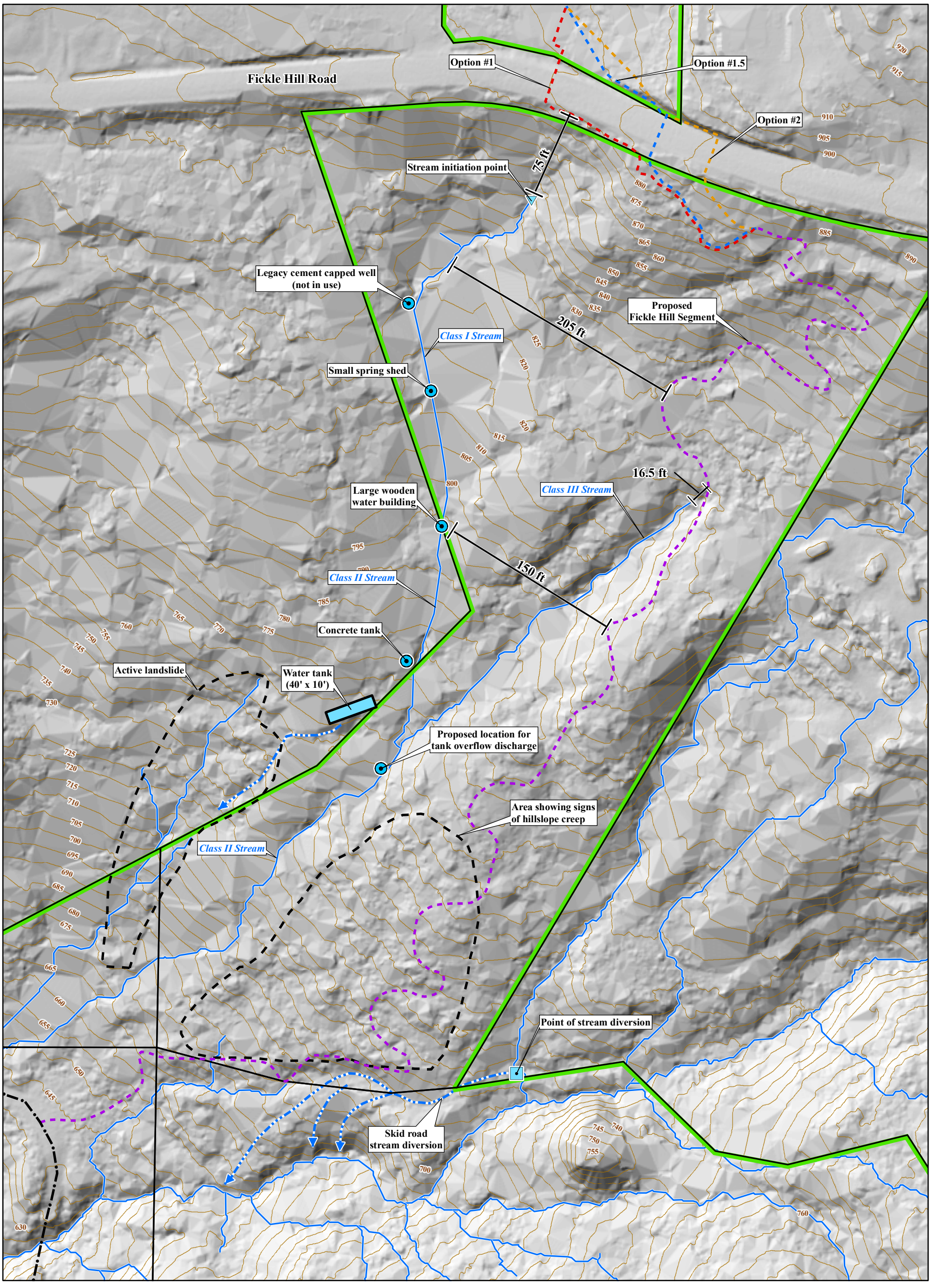

Domestic water infrastructure
Point of stream diversion
Stream initiation point
Stream
Gully
Option #1
Option #1.5
Option #2
Proposed Fickle Hill Segment
Existing trail
Contributing area
Unstable area
Water tank (40' x 10')
Parcel boundary
City of Arcata - community forest

City of Arcata provided a 1-ft DEM which was used to derive hillshade,contours and streams
Parcel boundary data: City of Arcata

N

0 37.5 75 150 Feet

Scale 1:900 1 inch = 75 feet
Contour interval: 5 foot

Prepared November 2020 by:
Pacific Watershed Associates
www.pacificwatershed.com

PACIFIC WATERSHED ASSOCIATES

Map 2. Arcata Ridge Trail, Proposed Fickle Hill Segment, Arcata, Humboldt County, California.

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APPENDIX A

GEOLOGY AND SOILS CHECKLIST

a) Would the Project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:
✖ Less than significant impact

i) Alquist-Priolo regulated surface rupture?
✖ No impact

The Project is not located within an area designated by the State Geologist as an Alquist-Priolo designated Earthquake Fault Zone.

ii) Strong seismic ground shaking?
✖ Less than significant impact

Ground shaking is a regional hazard. The Project will not increase the potential for loss, injury, or death due to seismic ground shaking above that of the regional hazard. There is no conceivable mechanism in which construction of the project trail will affect seismic ground shaking intensity.

iii) Seismic-related ground failure, including liquefaction?

✖ Less than significant impact

The project description states that no heavy equipment will be used in construction of the trail and that power tools to be used will include chain saws, brush cutters, and a vibratory plate compactor. Because this Project does not entail significant excavation/cutting, filling/loading, lateral destabilization, or direction of water onto existing landslide features, the Project will have a less than significant impact to the potential for seismic-related ground failure.
iv) Landslides?

✖ Less than significant impact

Because this Project does not entail significant excavation/cutting, filling/loading, lateral destabilization, or direction of water onto existing landslide features, nor does any portion of the proposed new trail cross an active landslide feature, the Project will have a less than significant impact on the potential for contributing to landsliding.

b) Result in substantial soil erosion or the loss of topsoil?
✖ Less than significant impact

Section 1.6 of the project description states that the project trail will be 2 to 4-ft wide and constructed to agency best-management-practice standards. Because the trail will be constructed without additional grading and the footprint of the trails surface minimized to 2 to 4-ft in width, erosion resulting from construction and use of the trail will be minimized and not substantial. The project description also states that the trail will be developed with outsloped, surface rock allowing for a year-round durable surface. Application of rock surfacing to the trail surface will

minimize erosion and sediment production from the trail. When constructed in accordance with the project description, this Project will have a less than significant impact on soil erosion and topsoil loss.

c) On- or off-site landsliding, lateral spreading, subsidence, liquefaction, or collapse?
✖ Less than significant impact

Because this Project does not entail significant excavation/cutting, filling/loading, lateral destabilization, or direction of water onto existing landslide features, the Project will have a less than significant impact to result in on- or off-site landsliding, lateral spreading, subsidence, liquefaction, or collapse.

d) Be located on expansive soils as defined by Table 18-1-B, UBC 1994?
✖ Less than significant impact

Because this Project does not involve any type of constructed structure, the effects of expansive soils on the Project will not create substantial direct or indirect risks to life or property. Expansive soils as defined in Table 18-1-B of the Uniform Building Code (1994) are unlikely to be present at the Project based on the NRCS soils mapping for the project area.

e) Soils unsuitable for onsite wastewater management?
✖ No impact

This Project does not propose the construction of wastewater disposal systems and will not create conditions required for the design and construction of wastewater disposal systems.

f) Destruction of unique paleontological resources or geologic features?
✖ No impact

The Project does not propose excavation or grading or damaging of native ground which could significantly affect or destroy paleontological or geologic features or resources.

Because of large-scale folding, faulting, and metamorphism, no macrofossils (vertebrate or invertebrate) are found in Central belt rocks. Microfossils have been reported, primarily Early Jurassic to Early-Late Cretaceous radiolarian faunas recovered from cherts embedded in mélange (Murchey and Jones, 1984), and Cretaceous-age foraminifers from pelagic limestones (Sliter, 1984). In addition, radiolarians and dinoflagellates have been recovered from carbonate concretions and chert nodules in metasandstone and meta-argillite subunits in various locations in the Coast Ranges (Jayko et al., 1989; McLaughlin et al., 2000). Vertebrate fossils and macro-invertebrate fossils are absent.

HYDROLOGY AND WATER QUALITY CHECKLIST

a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade water quality?
✖ Less than significant impact.

The Arcata Ridge Trail layout and drainage plan ensures that the proposed Fickle Hill Road crossing and 1,600 ft-long shared-use trail will not impede water quality or discharge pollutants.

The Arcata Ridge Trail layout and drainage plan has been developed to ensure that construction, operations, and maintenance techniques will follow BMPs through the more complex aspects of trail development to prevent erosion, sediment delivery, and pollutant runoff to streams (Appendix B). The trail bed will be constructed with a 3 to 5% outslope to sheetwash flow rapidly across the trail surface, the outsloped trail will disperse runoff and potential pollutants onto downhill side of the trail well away from natural surface streams and springs. Constructed in combination with rolling dips and frequent breaches in the berm, water will be forced off the trail preventing runoff from degrading water quality.

The goal of the crossing and short trail segment is to safely connect user access from the Arcata Community Forest to the Sunny Brae Forest.

b) Will 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)?
✖ Less than Significant Impact.

The Project will construct a 1,600 ft-long by 2 to 4-ft wide recreation, shared-use trail (3,200 to 6,400-sq ft). This will not result in the construction of large areas of impervious surfaces that will prevent water from infiltrating into the groundwater nor will it result in direct additions or withdrawals to existing groundwater. No groundwater will be extracted.

c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces in a manner which would:
✖ Less than Significant Impact.

i) 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?
✖ Less than Significant Impact.

The proposed trail alignment and minor footprint of the trail is farther than 50 feet from any stream, except in one 65-foot-long section of the trail (Map 2). Project will be implemented as proposed to ensure that erosion and sediment delivery from the 1,600 ft-long trail segment is prevented. During construction, BMPs will be implemented so that on-site and off-site erosion sedimentation will be controlled to the extent practicable (Appendix B). Stream alteration, erosion, and sediment delivery impacts due to construction, operation, and maintenance will be less than significant.

ii) 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?
✖ Less than Significant Impact.

Development of the proposed Project will result in a small increase in the amount of impervious surface area (<0.14 acre), and a small increase in rate and volume of impervious surface runoff from the site.

The trail will also require construction in close proximity to 1 soft and wet crossing. This trail segment is 10-15 ft upslope of a Class III stream (Map 2). Implementation of the Fickle Hill Segment will ensure adequate drainage, that will prevent and avoid erosion or sediment delivery impacts (Appendix B). Any erosion impact will be less than significant after implementation.

iii) 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?
✖ Less than Significant Impact.

iv) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?
✖ No Impact.

No housing units are proposed as part of the Project. The Project will not be located within a 100-year flood hazard area; therefore, no structures will impede or redirect flood flows. No impact will occur.

d) Inundation by seiche, tsunami, or mudflow?
✖ No Impact.

The possibility of exposing people or structures to a substantial risk of loss, injury, or death involving inundation by seiche, tsunami, or mudflow is not possible given the project location 650 ft above sea level, long distance from large bodies of water, and sited on moderately sloping heavily forested hillslopes. Therefore, construction and operation of the new, short segment will not exacerbate the risk of seiche, tsunami, or mudflow.

e) Conflict with or obstruct implementation of water quality control plan or sustainable groundwater management plan?
✖ Less than Significant Impact.

Project BMPs, avoidance of watercourses, and sustainable alignment of the Fickle Hill Segment are consistent with the Federal and State Clean Water Act and regulatory water quality control plans. The proposed trail will not have significant impact on groundwater resources and therefore will not affect any existing of future groundwater management plans.

APPENDIX B

CONSTRUCTION, OPERATION, AND MAINTENANCE GUIDELINES FOR THE ARCATA RIDGE TRAIL – FICKLE HILL SEGMENT

The construction operation and maintenance guidelines herein require that the proposed Fickle Hill Road crossing and 1,600 ft-long shared-use trail will not alter streams or cause erosion and sediment delivery and impact any other physical natural resources. The short trail segment is designed to be sustainable and have little impact on the environment. The trail bed shape and surface rock will resist erosion and avoid environmental impacts through proper design, construction, and maintenance. Basically, the trail will blend with the surrounding landforms, contours and ridges. The objectives of ART-FHS layout and drainage planning are to follow BMPs:

1) BMPs should be followed within environmental constraints, such as steep hillslopes, unstable soils, stream channels, riparian, and wetlands.
2) BMPs should be implemented to reduce and potentially eliminate pollutants carried by stormwater runoff and sedimentation and the potential for pollutant sources that may affect non-stormwater discharge.
3) BMPs should control trail drainage by reshaping the trail bed, frequently dispersing trail surface runoff onto stable slope and preventing delivery of concentrated runoff to streams.

The ART-FHS layout and drainage plan therefore contains specific actions:

1) Construction-implementation of layout and design plans for construction of the Fickle Hill Crossing and 1,600 ft-long shared-use trail.
2) Operation-site grading activities, trail surface rock compaction, soil stabilization, signage, handling, and storage or construction materials and equipment.
3) Maintenance-monitoring of post-construction runoff or resurfacing areas of soil loss.

The ART-FHS layout and drainage plan follows the construction and maintenance guidelines listed in the PWA, CA State Parks, IMBA, and USFS design manuals to minimize stream alteration or sediment delivery. These guidelines are appropriate for any hiking, biking, or equestrian trails.

Construction

Construction of the trail will require hand-tools for the majority of the 1,600 ft-long by 2 to 3-ft wide recreation, share-use trail. Treatment recommendations and designs will include trail outsloping, construction of rolling dips, and trail surface rock. Soil (loam and clay loam) and vegetation will be cleared from the trail, exposing native mineral soil underneath. Tread will require a minimal 3 to 5% outslope to facilitate drainage, along with the wide dispersal of removed soil onto downhill side. The trail should be constructed with an average grade of 5 to 7%. In some areas it may be acceptable to create steeper grades if the trail's surface is rocked. Steep grades should not exceed 30-ft in length. The trail grade shouldn't exceed half the grade of the hillside that the trail traverses. If the grade *does* exceed half the sideslope, it's considered a fall-line trail. Water will flow down a fall-line trail rather than run across it (IMBA, 2004).

Where necessary, the construction will need full bench construction or other recognized trail construction techniques dependent on slope and ground conditions.

Final preparation of trail will involve the smoothing and or compaction of native soil and rocked trail surface to a reasonable standard. Exposed roots and bedrock need not be removed. Logs may be used to denote trail line and force users onto the correct trail line.

Construction techniques will be used where ground conditions require:

Rolling dips – At trail grades steeper than 8 to 10%, a series of rolling dips should be used to disperse hillslope runoff during storms.

Outsloping – The trail will require a minimal 3 to 5% outslope to facilitate drainage, along with the outsloping on trail grades less than 8 to 10% construct sculpted knicks (IMBA, 2013) along the outer edge of the trail to disperse concentrated trail runoff onto the downhill side.

Rocked trail surface - On wet areas or steep slopes or areas with particularly unstable soil or exposed mineral soil may be capped with a layer of crushed angular rock (2-inch minus). with high fines content. After applying a crushed layer of compacted wet trail surface rock to a minimum fill depth of 2 to 4-inches, it is imperative that all surface rock is compacted as soon as it goes down otherwise the fines will get washed out and it will be useless. Also consider flagstone paving or armoring with composite pavers, additional exposed rock may be embedded within the trail edge or tread as trail features or to denote the trail alignment.

Raised trail—armored raised trail - In areas of soft or wet terrain, the trail may be constructed as per rocked trail surface but laid on unprepared ground. Extensive amounts of trail surface rock may be required to build a raised platform for the construction of crowned trail surface, particularly where the trail may be required to support horse passage.

These types of erosion and sediment treatments will prevent long lengths of uncontrolled runoff and reduce trail wear. Because project construction will occur during the dry season and will not disturb more than one acre, storm water discharge originating from the Project during construction activities is not subject to regulation under the NPDES General Construction Permit. Development of the trail will result in a (1,600 ft-long) forest trail and a small increase in the amount of impervious surface area and an associated increase in the rate and volume of trail surface runoff from the site. The impact will not be potentially significant.

Construction of the trail will also require the use of power tools (i.e., chainsaws) with oils and other petroleum products that could pose a potential impact to water quality if these hazardous materials were spilled during construction. Emergency procedures for responding to hazardous materials releases will be described in Arcata Ridge Trail layout and drainage plan. The use of has a very low potential to introduce fluids, lubricants, and other toxic substances as a result of accidental spills or mishandling of these materials, into the surrounding environment, and local receiving waters.

Operation

During operation, PWA suggests applying corrective actions to moist trail segments and consider a wet weather use policy to prevent accelerated trail erosion during wet weather conditions. An enhanced signing system should be implemented for the area. Signs should include the following:

1) A map of trails and routes
2) Descriptions of the trail features, characteristics, and trail distances
3) Rules, regulations, risk, and hazard warnings
4) Etiquette for trail users

Maintenance

The City of Arcata will continue routine maintenance, plus experience and condition assessments throughout the life of the trail. Observations of the physical characteristics of the trail can indicate problems. Maintenance-monitoring of post-construction conditions and stormwater runoff will identify any areas of soil loss part and requirements for resurfacing and is included in the Fickle Hill Segment Project IS/ND and guidelines listed in Appendix B. Trail sustainability assessments are common components of a monitoring and maintenance protocol, assuring that environmental impacts fall within designated parameters and user experiences are maintained.