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<u>TECHNICAL MEMO REVIEWING Final Initial Study/Mitigated Negative Declaration for the Meadow Way Bridge Replacement Project</u>
Laurel Collins, May 29, 2020

Dear Mr. Graf,

At your request, I have reviewed technical documents and reports prepared for the Final Initial Study/Mitigated Negative Declaration ("MND") for the Meadow Way Bridge Replacement Project ("Project"). In addition, I have reviewed published landslide maps of the US Geological Survey, viewed available official online Geographic Information System (GIS) maps in the MarinMap Map Viewer and the San Francisco Estuary Institute EcoAtlas, and reviewed 2013 Report from the Department of Fish and Wildlife East Marin County San Francisco Bay Watersheds Stream Habitat Assessment of San Anselmo Creek. WS-1

Based on this review, my opinion is that this project has the potential for significant impacts that have not been adequately disclosed by the Project documents. This is because 1) the potential for landslides on and off-site has not been sufficiently characterized; 2) the channel has unstable hydraulic geometry (width, depth, slope) that will be memorialized through hardening of the banks from project construction that involves grade control, rip rap banks, and concrete walls that will cause continued upstream and downstream instability; 3) the increased extent of concrete wall and narrowed channel width created by the Project wingwalls will increase channel velocity that will result in increased sediment supply from post project channel adjustments involving streambed incision and/or bank erosion that will negatively impact fish habitat and potentially increase downstream flood frequency; 4) the channel was mischaracterized as an intermittent channel while all official documents characterize it as a perennial channel; and 5) the necessary hydraulic geometry analysis of the site – and specifics on pre and post project changes – has not been conducted and therefore it is not possible to establish that negative impacts will not exist or that they can be mitigated. WS-2 WS-3 WS-4 WS-5 WS-6

BACKGROUND
I have been a geomorphologist since 1981 specializing in fluvial, hillslope, and tidal wetland geomorphology and hydrology, sediment budgeting, landslide and WS-7

stream mapping, and analysis of geomorphic change from natural and anthropogenic influences. My opinion on the issues raised by the Project is based on my previous analyses of streams throughout Marin County, including San Anselmo Creek, as well as other streams and geomorphology throughout Sonoma County, Alameda County, and many other parts of California. I have conducted these kinds of analyses for the Marin County Flood Control and Water Conservation District, Marin Parks and Open Space, US Environmental Protection Agency, Contra Costa Clean Water Program, US Geological Survey, US Forest Service, California Department of Forestry, US National Park Service at Point Reyes National Seashore, San Francisco Bay Regional Water Quality Control Board, University of California at Berkeley, San Francisco Estuary Institute, East Bay Regional Park District, and the US Department of Justice. I am the Owner and Principal Geomorphologist of Watershed Sciences consulting firm, which I established in 2001. Attached to this review is a copy of my current CV. A few examples of my experience follow. WS-7 Cont.

COMMENTS

1. Potential for Landslides On and Off-site Has Not Been Sufficiently Characterized.

Based on my review of the MND, I do not believe the potential for landslides on and off-site has been sufficiently characterized. For example, the MND describes the project site as "flatland," which "would not be susceptible to earthquake induced landslides or rainfall-induced landslides." I would strongly disagree with this characterization.

The MND does not appear to take into account the Project's location near debris slide run-out pathways or the proximity of rotational and/or translational landslides along the adjacent hillsides that could put the Project site at risk from potential disruption from uphill slippage. There are off-site but very nearby landslides that could pose on-site impacts. The toes of the two landslides on the southern adjacent hillside have been mapped by Wentworth and Frizzell (USGS, Open File Map 75-281, sheet 11, 1975) (see Figures 1A and B). These slide features appear to be roughly 150 feet from the south side bridge abutment and extend over 400 feet in length from the edge of the alluvial valley to the ridgetop. The USGS map is online at the link below. WS-8
https://pubs.er.usgs.gov/publication/ofr75281

Further, a very large complex landslide, that extends over 3000 feet from ridge top to valley bottom is just downstream of the Project site (its western lateral scarp is about 300 linear feet downstream of the north bridge abutment on the north hillside and its movement at some time in the geologic past was sufficient sometime in the past to block the entire creek and cause backwater alluvial deposition that created the existing landscape of the Project site where now, a much wider alluvial valley exists upstream of the landslide pinch point. The MND provides no discussion or analysis about the existence of these slides or prospect of their future impacts during a large seismic event or extreme rainfall. If a prior large landslide created the alluvial valley that the bridge is sitting on, the MND's characterization of this area as 'flatland' for purposes of landslide impact analysis is misleading and cannot be supported as free of potential geologic hazards.

The 1975 USGS landslide map indicates that the northeast abutment is not necessarily on alluvial sediments, yet the MND provides no information whether the abutment is on or near bedrock or the condition of the bedrock that exists. The MND does not explain whether the abutment is concordant with bedrock at depth on the other side or if there is evidence of faulting between the bridge abutments as could be possible due the presence of the fault that is mapped nearby, nor does it provide any information about the actual subsurface condition here and what is the known depth and condition of bedrock at the site. In my opinion without this information, the MND's impact assessment is inadequate as it fails to address the potential for impacts that could occur from severe seismic shaking from the large San Andreas and Hayward Fault systems as well as offset and sheared rock conditions from local mapped faults as well as landslides. Local faults and landslides can mechanically weaken the bedrock by shearing it, cracking it, and thereby weaken the strength of the bedrock to support structures. If either side of the bridge abutment is in different types of soil or bedrock structural design must be developed to suit the different conditions. Proximity of faults and landslides is a red flag to needing subsurface and off-site investigations to build safe structures that require piers for support. WS-9

Interpretation of landslide conditions by Wentworth and Frizell is supported by recent landslide hazard classification shown online at the MarinMap Viewer, as shown in Figure 2. The current online map (as shown 5/2020) characterizes much of the watershed to be landslide prone. The area of large northern slide, as indicated by the earlier USGS mapping, is shown as mostly landslide and the extent of the toe is much closer to the Project site than previously indicated (about 150 linear feet as opposed to 300 feet. This suggests that recent landslide interpretation finds the extent of landslide hazard to be bigger yet there is no discussion of the reason for the differences in interpretation which could relate to possible recent landslide activity or more thorough investigations nearby. WS-10

Compounding this, the MND fails to describe accurately the seismic issues in the Project area, only concluding instead that the project site is not located within a State-designated Alquist-Priolo Earthquake fault rupture zone. In addition to the landslide hazards, the MarinMap Map Viewer (herein referred to as MarinMap) also shows a distinct northwest trending fault about 2200 feet to the northwest of the site. The MND fails to describe the fault or its southeastern projection into the footprint of the Project. This fact that they do not reference this source of information is even more bewildering given that they reference MarinMap as a source of GIS and environmental information. The importance of the fault should be evaluated relative to potential effects on the weakness of sheared and mechanically weakened bedrock at the site and for the potential for vertical or lateral offset during a large magnitude earthquake from the San Andreas Fault system. How the proposed structural design elements of the proposed bridge and piers may or may not be appropriate at this site must be evaluated given the unresolved presence of sheared bedrock due to either the projection of this fault or from WS-11

underlaying landslide debris. In my opinion, the influence of the fault and its status must be established to avoid negative impacts to expected longevity of the bridge and risk to human life during a large seismic event associated with severe shaking from the San Andreas Fault. The MarinMap is online at the link below. WS-11Cont.
https://www.marinmap.org/Html5Viewer/Index.html?viewer=smmdataviewer

As a result of the MND's failure to describe these previously identified geologic hazards, its conclusion that the potential for landslides or liquefaction from seismic activity is less than significant due to the Project area's "relatively flat topography" cannot be supported and in fact is contradicted by the existing geologic setting. In this case, the flat topography is simply a band of alluvium, variable in width, that is sandwiched between steep landslide-prone hillsides. Note that MarinMap depicts the same alluvium as surficial deposits. The alluvial valley at the Project site was mostly formed as a result of backwater sedimentation following blockage of the large north bank landslide. The mapping of the slide done in 1975 and more recent MarinMap hazard classification further demonstrates the need for a site specific on the ground investigation because the full extent of landsliding has not been adequately constrained. It slides might be larger than initially interpreted by remote mapping methodologies. Perhaps more importantly, the causes of the landslides have not been identified and are very likely associated with either rainfall-related instability, seismic triggering, or a combination of the two. The MND concludes by noting that the Project site is not located in an ABAG-designated earthquake-induced landslide area or within an existing rainfall-induced landslide or debris flow area. However, based on the mapping I have reviewed, this conclusion is likely incorrect. As a result, the MND's further conclusion that implementation of Mitigation Measure GEO-1, impacts associated with landslides, would be less than significant, cannot be established as this issue was not assessed appropriately. Assessment of on and off-site landslide impacts is sorely missing in the MND. WS-12

2. Hardening of the Stream Channel Due to Project Construction Will Alter Upstream and Downstream Stability Leading to Adverse Impacts Due to Flooding and Loss of Summer Rearing Habitat for Wildlife.

In my opinion, the stream conditions have not been adequately evaluated to establish whether the channel is stable at the project site or beyond. Mapping and stream classification conducted by California Department of Fish and Wildlife (CDFW) that is provided in their 2013 East Marin County San Francisco Bay Watersheds Stream Habitat Assessment of San Anselmo Creek shows that the channel is presently in an unstable form based upon their use of the Rosgen Stream Classification methodology. The site is characterized as an F4 stream type which essentially means that it is an entrenched gravel-bedded channel with an over-widened streambed relative to its bankfull depth. In unstable F4 channels with overly widened streambeds, excessive sedimentation causes the channel gradient to flatten. This results in more sedimentation and during summer drought in a typically perennial stream, this can cause summer WS-13 base flow to convert to subsurface ground water flow that isolates pools between dry reaches and contributes to a loss in volume and viable habitat. An entrenched F-type channel has a very narrow floodprone width (measured at two times maximum bankfull depth) that is less than 1.4 times its bankfull width. This kind of unstable condition usually leads to eroding banks during large flood events due to very high shear forces within the entrenched channel, inevitable production of sediment and downstream sediment transport, leading to subsequent sedimentation and loss of channel capacity elsewhere. F4 channels remain unstable until they attains a stable form by adjusting their hydraulic geometry of width, depth, and gradient through natural erosional processes. The MND does not provide the channel classification information provided by the CDFW nor does it provide any description of the channel geometry or stability status. If an analysis of stable form was conducted, the project could lead to improved stream habitat by designing the correct dimensions needed for channel stability. Since the site has been classified by others as unstable, surely it would surely be prudent to establish the causes of instability to assess whether they could have potential impacts to the proposed bridge or surrounding properties as a result of the bridge. The CDFW report is available online at the link below (file:///Users/laurelco/Downloads/92289%20(2).pdf) WS-13Cont.

In my opinion, considerable excavation and reconstruction of the stream channel within the Project area has the potential for significant hydrological impacts that have not been addressed in the MND. Based on my review, it appears that the stream channel has unstable hydraulic geometry (width, depth, gradient) that will be memorialized through hardening of the banks from project construction that involves grade control, rip rap banks, and concrete walls that will cause continued upstream and downstream channel instability.

The MND states that the bridge abutments and retaining walls attached to the abutments will need to be supported on piles and that 24-inch diameter cast-in-drilled-hole concrete piles will be used to support the walls. The MND states that the creek bed would be excavated approximately eight feet deep to reach the approximate elevation of the concrete pile heads, after which drilling rigs would be called upon to drill the 24-inch-diameter piles supporting the future structural elements. The MND describes another wet-drilling technique as creating 24-inch diameter concrete piles, which would be capped with a concrete footing known as a pile cap. Once the concrete pile caps are constructed, their top surface would be five to six feet below the creek bed. WS-14

In my opinion, the potentially significant effects of this proposed excavation and drilling is not analyzed adequately in the MND. For example, the MND does not describe the size of the concrete pile caps or whether they extend beyond the diameter of the pier such that rip rap will be sitting on top of them. The MND also does not provide clear information about the depth of drilling that will be required below the 8-foot excavation. Without this information, impacts cannot be assessed and therefore certainly cannot be assumed to be nonexistent.

From what can be gathered from the MND, it appears the base elevation of grade control of the stream bed will be 2-3 feet lower than its initial level, with additional rip rap on top, bringing the bed back to its preexisting elevation at the time of creek mapping or the elevation at the time that construction work begins. This means that the bed elevation will essentially become fixed by this grade control structure at whatever this elevation is, and it will permanently influence the ability of the stream to lower its elevation beneath the bridge and for some unspecified distance upstream. Yet, the profile of the upstream channel is unknown and therefore it is not possible to determine how far upstream the grade control structure will affect the distribution of pools, riffles, and sediment transport. If the cross sectional width beneath the bridge is reduced by the rip rap that is proposed to be placed on the banks, the increased shear forces could transport and remove the native gravels that will placed as a cover on top of the rip rap, exposing just the rip rap grade control rocks. These impacts have clearly not been evaluated because analyses of sediment transport and pre- and post-project hydraulic geometry have not been conducted. Therefore, the impacts cannot be established as insignificant and if likely significant, no mitigation has been proposed. WS-15

The MND states the contractor will be required to install a bypass pipe to convey certain minimum low-flow volumes through the construction site and release downstream of the bridge. This will be accomplished through installation of a low dam across the creek bed upstream of the bridge to collect the summer flows and guide it to the pipe, whereby water will be collected in excavation pits or pools on the creek bed will be run through sediment control tanks before being released to the creek. In my opinion, this approach has a substantial likelihood of disrupting downstream conveyance such that the water will go subsurface and thus not provide viable habitat for downstream aquatic species requiring summer pool habitat such as steelhead or foothill yellow-legged frog. Further, in my opinion, it is likely the summer groundwater elevation within the Project area and downstream will be adversely influenced by the 8-feet and then possible 20-feet excavation and dewatering activities within the project site. Based on my review, the MND appears to provide no analysis of the sphere of influence of the dewatering activities. Without such it cannot be assumed that negative impacts to the distribution of surface and groundwater flow will not harm threatened species. WS-16

The MND further states that the reconstructed stream channel will be designed so that a log grid is made integral with large rock rip-rap pieces placed within it and stacked under the new overtopping embankment slope. However, the MND provides no information about the size of the rip rap, nor what would be the appropriate size to prevent the 100-year flood from moving it beneath the bridge where the channel cross section is confined, especially by the newly proposed wingwalls that will increase downstream shear forces. The MND states that the creek substrate is a mix of small gravel to larger cobble. The MND fails to characterize the natural stream sediment size and thus does not provide information as to whether that existing sediment will be adequately replaced by large rip rap at whatever the size that is likely to be proposed. As discussed, the MND appears to contain no analysis of what proposed mitigation is to assure that the rip rap will not be exposed or become part of the bedload. In my opinion, it is impossible to size the rip rap without a bedload transport analysis for the post WS-17 construction cross-sectional area beneath the bridge. WS-17Cont.

The MND further states that the ends of the logs perpendicular to the creek centerline will protrude out of the base of the embankment into the creek's edge flow, catching small woody drift, which will end up restoring the site to a deep and wide soil 'trough; traversing the bridge site for natural fish passage without any obstructions in the creek other than creek materials and native plants. In my opinion, this conclusion is unsupported and lacks the requisite information. An analysis of the stream gradient and the pool/riffle ratio has not been conducted to establish what the impacts of the newly "fixed" elevation of the rip rap grade control will cause upstream, downstream, and beneath the bridge. Furthermore, there is no discussion of how much the logs should protrude into the channel to maximize the potential for creating a stable condition rather than creating another type of unstable form referred to as a Rosgen G4 stream class. Such a channel has similar conditions relative to entrenchment with a narrow floodplain width compared to bankfull width, but the channel banks relative to stream depth are too narrow, leading to continued instability through streambed incision. Without sufficient hydraulic analysis, it cannot be established that any reconstructed pools will have any benefit or permanence. Channel stability is naturally achieved by creating a floodplain of appropriate width at the approximate bankfull elevation of a channel. This creates less in-channel shear stress during floods and adjustability of the stream bed during bankfull flows or floods that transport bed load. A trough shape does not by definition create a floodplain and if it is a hardened trough, such as will occur in this place due to the addition of rip rap and impingement into the active channel cross section, the channel will ultimately have an unstable configuration and will have excess shear forces particularly during floods. It will essentially try to distribute its expenditure of energy equally throughout the channel system, and this will result in erosional or depositional impacts to the channel downstream beyond the proposed bridge. WS-18

The MND states further that the foundations of the new walls and bridge abutments would be protected with filter fabric and a two- to two and a half--foot layer of rock riprap on top for scour control. However, in my opinion, the rip rap will prevent natural adjustability of the stream bed and potentially increase upstream sedimentation, that could lead to upstream bank erosion and potential property losses. The MND states that the "site and the configuration of the existing bridge have resulted in historic bank erosion and bridge foundation scour," which would indicate that the existing hydraulic geometry is still out of whack and the channel is trying to adjust. If the site configuration is leading to instability, why is this the case? Are the s-shaped bends cause by former landslides or was their excessive sedimentation due to blockage from downstream landslides or and use practices? While it might be true that hardening of the banks would reduce erosion at the site, such hardening will transfer erosion and sedimentation issues elsewhere due to channel adjustments induced by the project alterations. At the least, hardening of the bed or banks without assessment of local and cumulative impacts prevents the stream from naturally adjusting its hydraulic geometry to climate change impacts, thereby leading to accelerated rates of erosion and downstream sedimentation that are well known to be associated with land use activities. WS-19

Sedimentation is likely to be exacerbated by the Project's proposed construction of an earthen 'access' ramp to transport materials and heavy equipment, such as pile drilling rigs, dump trucks cranes, loaders, excavators and large containers to the creek bed elevation and back. However, this access ramp is not labeled in Figure 5 of the MND, nor does the MND discuss what kind of erosion control would be applied during the winter. The MND contains no description in particular of how potential flood flows will not wash away the bare soils even if it has silt fences or hay bales applied to reduce uphill road runoff. The road tread will be within the active channel and floodprone area. In the event of a bankfull or greater flows the access road could become a specific project-related source of sediment that would negatively impact downstream aquatic habitat. WS-20

The MND claims that the 'net effect' of the Project will be to restore the site to a deep and wide soil "trough" traversing through the bridge site for natural fish passage without any obstructions in the creek bed or anything other than creek materials and native plants. As discussed, in my opinion, this explanation raises significant issues with respect to downstream stability during and after the conclusion of Project construction. A deep wide trough is hardly the natural channel geometry for a stable channel at this site. Without assessment of the appropriate "stable" hydraulic geometry for width, depth and slope for various frequencies of discharges there is no way to ascertain whether this proposed channel shape will provide long-term stability either at the site or in the upstream and downstream directions. Indeed, it is not clear if all the rip rap on the stream bank will be buried or if some of it will be exposed at some elevation on the banks, or how the gravels placed on top the rip rap will be "held" in place during winter floods that are certainly foreseeable in the future. The MND asserts that the underground riprap would crawl up on the wall face to some height and be subsequently covered with three feet of creek bed materials, restoring the creek bed and embankment slopes to their original levels through the site. However, even this assertion simplistically assumes the future stability of 'creek bed materials' placed atop rip rap boulders, when in fact there is no basis for that assumption. WS-21

In my opinion, without the appropriate hydraulic analyses it cannot be established whether the stream bed beneath the bridge will erode to the grade control structure or possible cause increased sedimentation because of a flattened gradient caused by the rip rap. If sedimentation ensued there would be a loss of channel capacity and hence loss of freeboard, thereby increasing the potential for flooding. Increased velocities beneath the bridge could cause downstream stream bed incision resulting in the formation of a head cut or nick point at the downstream end of the rip rap. Over time or during intense prolonged flooding, this could result in undermining the rip rap and re-exposing the filter fabric and pier caps. Further, the MND describes a bridge with arch ribs and the transverse connecting beams that would be 'self-supporting' once the falsework is removed by October 15th, at which point the remainder of formwork would be attached to the arch ribs themselves above the 100-year flows from that point forward. However, the MND lacks any supporting documentation describing future flood levels or any flood frequency analysis. Without this information, the MND's analysis is in reality simply guesswork. WS-22

Further substantial questions arise with respect to the proposed two abutments and downstream wingwalls connecting with the abutment corners. The MND states that the slopes above the retaining walls and wingwalls would be contour-graded. However, no eddy flow protection is shown beyond the downstream wing walls. The MND map in Fig 5 shows about 170 feet length of stream bank rip rap on the west bank, which is in my opinion is a significant length of stream channelization that is likely to increase downstream flooding and erosion. WS-23 The MND does not address the fact that rip rap structures inhibit natural vegetation and its beneficial functions. When the near stream bank are covered in rip rap, it is very difficult for large woody riparian vegetation to become established, which is critical for shading the stream and keeping the summer base flow cool during the summer to maintain steelhead fishery. If woody vegetation is only established on the high banks away from stream flow, it will take decades before any sufficient shading will be provided. Increased local stream H_2O temperature can have cumulative downstream impacts particularly during extended drought years when the isolated pools in the previously perennial sections might already be approaching lethal thresholds. Much of the existing vegetation on the older rip rap banks along the channel is simply overhanging berry vines. They do not contribute to significant bank stability or shading. WS-24

Another problem is the lack of sufficient access to the creek to remove potential woody debris or debris jams that could form at the entrance to the bridge or beneath it. Long-term maintenance needs must be considered to clean trapped sediment from beneath the bridge otherwise its design capacity to convey floods and move sediment are likely to be compromised. The MND does not appear to provide any analysis of the sediment supply and transport capacity of the stream in this area. As discussed above, the canyon and bridge location have a high number of different kinds of landslides that during intense or prolonged rainfall can generate very high suspended sediment and coarse bed load to the creek. In addition, the channel appears to be incised as well as entrenched, which means that especially during large floods it can generate abundant sediment from high shear forces contributing to local bank erosion and tree fall into the creek. If the cross sectional geometry of the stream is going to be permanently narrowed by construction of the wing walls at the bridge location, the potential for trapping large woody debris within the structure will be increased. As such, formations of woody debris jams will likely cause a loss of channel capacity from backwater sedimentation, which can result in increased potential for upstream flooding and unanticipated new sites of erosion. WS-25

Overall, in my opinion, there has been no discussion or evaluation of the design capacity that will be achieved or that must be maintained in the future. In addition maintenance needs and costs are not discussed. WS-26 Without a stream gradient analysis it cannot be established what the impacts of the project will be to upstream channel stability, abundance and viability of pools, and distribution of surface flow during drought conditions. In my opinion, these changes to the stream system are likely to reduce the local groundwater level and thus negatively affect local habitat during the time of construction by eliminating or substantially altering the frequency and location of WS-27 downstream pool habitat that is critical for wildlife such as local steelhead or foothill yellow-legged frogs. WS-27Cont.

3. The MND Fails to Provide Adequate Information Regarding the Environmental Setting with Respect to the Issues Described Above.

The MND also does not provide information with respect to the environmental setting that would be necessary to understand the potential impacts of this Project.

For example, the MND lists special status species in the Project area as limited to steelhead, Northern spotted owl, Allen's hummingbird and olive-sided flycatcher. This list neglects any mention of the foothill yellow legged frog, a California candidate species that is likely to be greatly and adversely affected by changes in stream flow, flooding, groundwater-pool levels and stream bank habitat along San Anselmo Creek where they have been found repeatedly over the last several decades. WS-28

Further, the MND, while acknowledging the theoretical presence of steelhead in the Project area, provides no information about whether this species occurs in this stretch of the Creek, and what habitat limitations it already faces to avoid extirpation, except to note that "two barriers to anadromy exist downstream of the project site." The MND provides no information as to the location and nature of these barriers, including whether they are year round or just during certain flow conditions. If barriers exist just during certain flow conditions then the Project should be designed to provide for steelhead migration and appropriate year-round rearing and sheltering habitat. Streams with high shear stress that are often confined within concrete walls or hardened by rip rap grade control do not provide such conditions during flood events and steelhead fry can be washed downstream. The MND states that "no migratory corridors or nursery sites are anticipated to be affected by the project." However, this conclusion does not address how various flow velocities and/or sedimentation (due to the new, unadjustable rip rap channel bed at the bridge) will affect summer time fish rearing and winter refuge beyond the bridge during high flow and base flow conditions, how changes in groundwater table will influence rearing or stranding of species in isolated pools at or near the project site, or how loss of shading from streamside vegetation along the future rip rap and concrete walls will influence summer base flow water temperature. Although the MND acknowledges that juvenile steelhead remain in fresh water for 1 or more years before migrating downstream to the ocean, no discussion is provided about the location of pools at the project site, as well as downstream and upstream, that will be likely adversely affected by the changes in stream hydrology due to changes in channel structure, groundwater levels, and sediment buildup due to Project activities and recontouring of the streambed and channel. The MND appears to contain no information about the presence or absence of summer rearing habitat that is provided by these remnant pools, and no analysis of how the Project will affect their integrity as critical habitat for surviving steelhead. WS-29

Consistent with this lack of analysis, the MND also incorrectly identifies the Project area WS-30 reach of San Anselmo Creek as an 'intermittent stream.' However, this is inconsistent with USGS, National Hydrography Dataset (NHD), CDFW, MarinMap, and San Francisco Estuary Institute EcoAtlas mapping, which characterizes the stream as perennial. In this respect the MND falsely relies on a temporary drought condition, which is further belied by the consistent presence of year-long pool habitat in the Project area for sensitive aquatic species. Treating and assessing the channel system as an intermittent stream can lead to bad assumptions and negative impacts as discussed above. Here the MND concludes that the Project will have "no permanent direct impacts" to the stream resource, a conclusion that is demonstrably false, as the Project will create a grade control structure in an alluvial valley that has an adjustable stream bed, which will permanently affect sediment transport (sedimentation and mobility), impact upstream and downstream pools, and the local groundwater table. As discussed, in my opinion, it is likely that the Project will alter the timing and extent of intermittent flow due to sedimentation within or downstream or upstream of the rip-rapped stream bed. The MND states further that the removal of existing wooden piles from within the creek bed will result in a gain of 12.6 square feet (<0.01 acre) of 'Intermittent Stream habitat' yet provides no discussion of how this change will this affect the cross sectional geometry and future channel adjustments that could lead toward stability. If the channel gains 12.6 feet by removing the piles, the MND conversely provides no information how much channel will be lost by adding support columns on the piers, rip rap on the banks, and even more confining concrete wingwalls. Here, the MND fails to provide this information while at the same time falsely characterizing the channel as intermittent, an assertion that is contrary to the definition adopted by the authoritative agency. . WS-30 Cont.

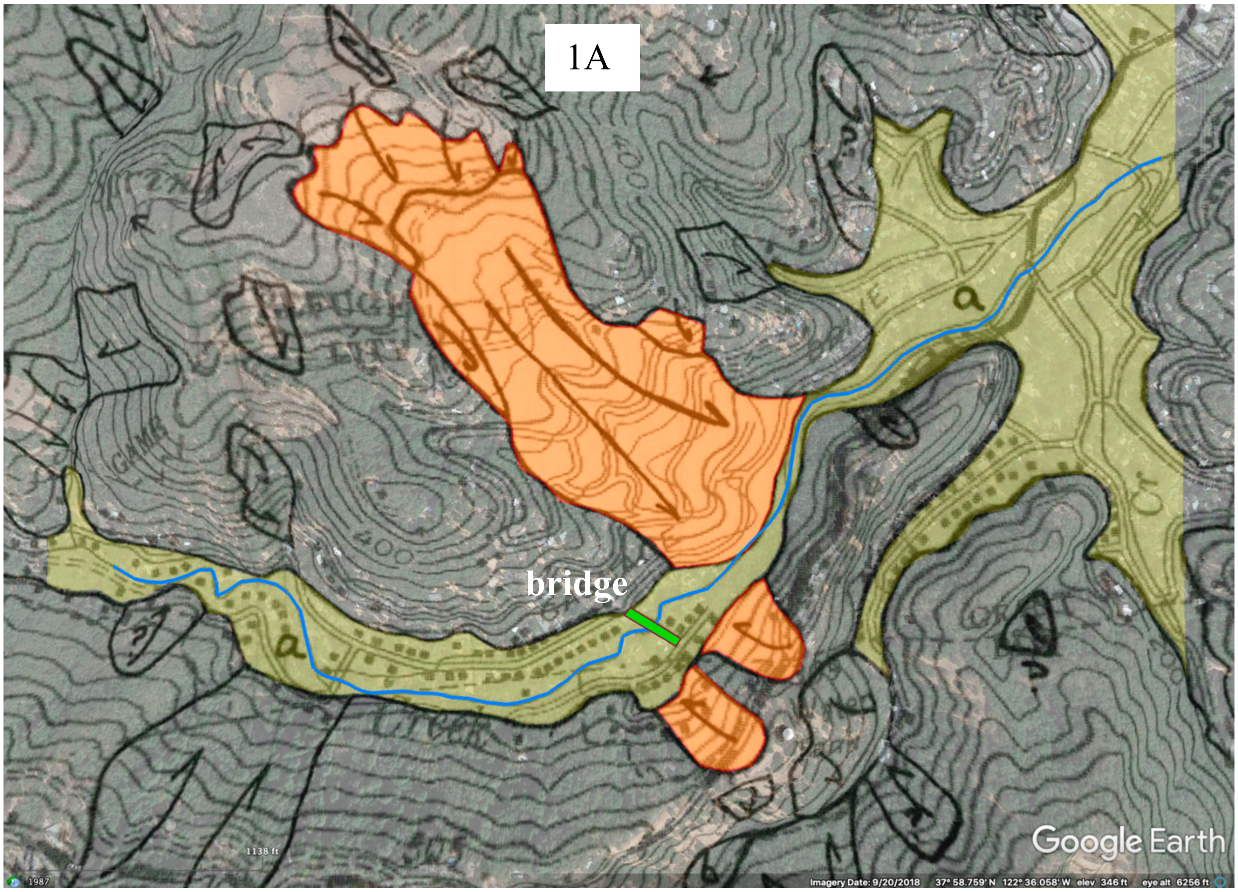
The failure to characterize San Anselmo Creek properly is exacerbated by other information gaps with regards to the environmental setting. For example, the MND states that final grading in the creek bed will conform to the existing creek channel both downstream and upstream and existing bed materials will be replaced with similar sized materials. However, the MND does not describe the depth of bedrock at the site or the frequency for the distribution of pools and riffles over the 300- foot grading stretch, or immediately downstream. In my opinion, this must be a design parameter based upon local stream data and not done haphazardly, yet no data has been presented or apparently evaluated. In my opinion, the MND is fundamentally flawed in providing no information for how the design for the final creek grading will create stream stability or prepare for changes in discharge or sediment supply associated with climate change. Grading a 300 foot long stretch of creek without specific channel design guidelines can result in permanent negative impacts at the site and downstream. WS-31

CONCLUSIONS

In conclusion, it is my opinion that an EIR is imperative to 1) avoid potential and unnecessary negative impacts to the project itself from both on and off-site geologic hazards and 2) to prevent local and cumulative downstream negative impacts to San Anselmo Creek that will increase rates of erosion and subsequent sediment supply and sedimentation, increase downstream flood frequency in areas already prone to flooding in the Town of Fairfax, and deteriorate remaining essential aquatic habitat in this urbanized stream that still supports WS-32 populations of steelhead and yellow-legged frogs. There are published available scientific documents that I believe support my concerns over lacking information in the MND. Their online links have been provided as a convenience to the reader. For all the reasons stated above, I believe this project should not proceed as proposed in the MND without further evaluation of the conditions described and documented. WS-32 Cont.

Sincerely,

Laurel Collins



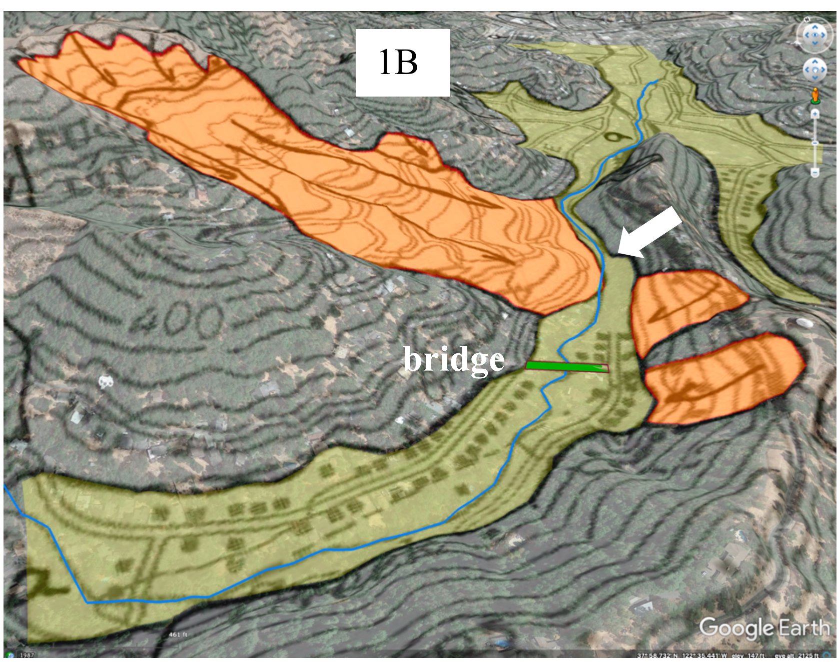


Figure 1A and B show details of the 1975 landslide mapping by Wentworth and Frizzell (USGS, Open File Map 75-281, sheet 11, 1975) that has been laid onto 2018 Google Earth Imagery. Relevant details on the map near the Project have been enhanced by colored polygons. Orange colors with arrows show landslides near the Project, the green rectangle shows Meadow Way Bridge, and yellow shows the mapped alluvial valley fill. Figure A shows the context of the project site and other mapped landslides, while Figure B provides a dimensional view looking downstream shows a white arrow at the pinch point in the alluvial valley that was created by blockage of the large complex slide that formed the wide alluvial valley from backwater deposition at the Project site.

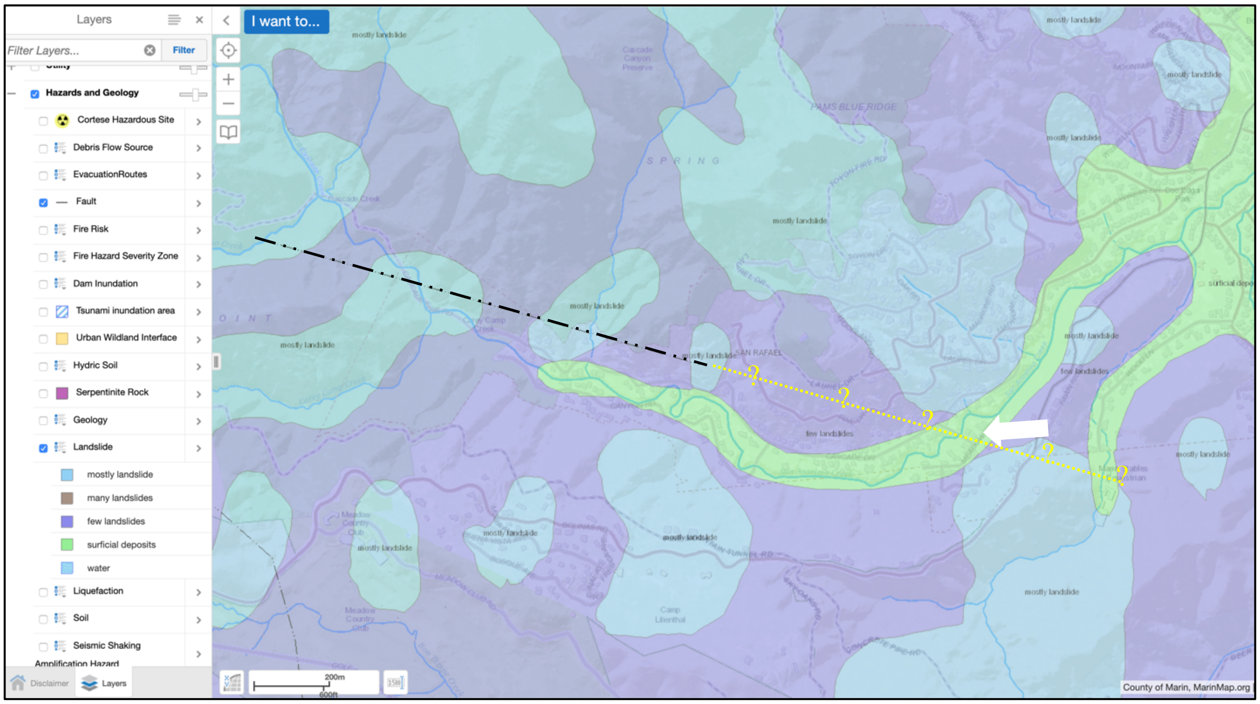


Figure 2 shows fault and landslide hazards in the region of the project site as indicated by the online MarinMap Map Viewer (5/2020). Light blue shading is classified as mostly landslides, while purple shading is classified as few landslides. The light green area is classified as surficial deposits. The Meadow Way Bridge site is shown with a white arrow. The extent of the northern large north bank slides is depicted as much closer to the north bridge abutment, about 150 feet, as compared to the 1975 USGS map. It is not known if the slide is larger than initially depicted or if there has been additional movement. The two slides to the south are merged together as a single polygon representing mostly landslide. The black dashed line with two dots is a fault specifically depicted in the MarinMap. The yellow dotted line with question marks is a projection of the fault added for purpose of the need for on and off-site site investigation. The mapped black line fault is roughly 2200 linear feet from the bridge crossing. There is no discussion in the MND of the kind of fault this is or why it was added as an important fault feature in the MarinMap.