**EPA Analysis of the *Final Habitat Mitigation and Monitoring Plan***
***Permit NO. SPL-2008-00816-MB Rosemont Copper Project dated September 12, 2017***

***EPA Comments October 5, 2017 (Revised November 30, 2017)***

**The Mitigation Proposed by Rosemont Mine Will Not Offset Impacts to Waters of the U.S. Below the Level of Significant Degradation.**

EPA has reviewed the *Final Habitat Mitigation and Monitoring Plan Permit NO. SPL-2008-00816-MB Rosemont Copper Project dated September 12, 2017* (HMMP*).* The mitigation proposed in the final HMMP includes two components: the Sonoita Creek Ranch (SCR) project and the onsite stock tank removal. Rosemont Copper Company (Rosemont) submitted the mitigation package to compensate for impacts to waters of the United States by the proposed Rosemont Copper Mine (Rosemont Mine)
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Our review of the HMMP affirms our position that the mitigation does not comply with EPA's 404(b)(1) Guidelines and the requirements of the Mitigation Rule.[1] The HMMP proposed by Rosemont fails to offset the proposed mine's impacts to aquatic resources in the Cienega Creek watershed.

**Sonoita Creek Ranch and RX Ranch**
**Defining Compensatory Mitigation: Application of the wrong mitigation terminology.**

A significant and pervasive problem is the HMMP's misapplication of mitigation terminology. Mitigation credit is miscalculated by Rosemont in the Mitigation Ratio Checklist (MRC) and this erroneously inflates the credit value of the proposed mitigation. This error, coupled with the HMMP mischaracterization of the functions at the mine impact site, skews the MRC credit outcome.

For example, Rosemont proposes *reestablishment* of Sonoita Creek, but the activities described in the HMMP are *rehabilitation*. The definitions described in the Mitigation Rule are subtle, but translate into significant differences in compensatory outcome when applied to the MRC. Reestablishment is the manipulation of a site with the goal of returning natural historic functions to a **former** (emphasis added) aquatic resource. This results in rebuilding a former aquatic resource and results in a gain in aquatic resource area and function.[2] Rehabilitation is the manipulation of the characteristics of the site with the goal of repairing natural historic functions to a degraded aquatic resource as a result of anthropogenic disturbances and natural processes.[3] With regard to SCR, Sonoita Creek still exists and provides important functions at the proposed mitigation site and therefore the creek would not be reestablished, but rehabilitated. And, while the HMMP describes a site design to increase the on-site acreage of Sonoita Creek, it fails to mimic important aspects of onsite reference reaches, or the reference site at Walnut Gulch

[1] Federal Register (33 CFR Parts 325 and 332 and 40 CFR Part 230). *Compensatory Mitigation for Losses of Aquatic Resources: Final Rule* dated April 10, 2008.
[2] Mitigation Rule. 33 CFR 332.2
[3] Ibid.

Experimental Watershed (WGEW). The HMMP proposes a site designed to increase the number of mitigation credits. This is contrary to the intent of restoration as described in the Mitigation Rule. As presented in the HMMP, the design is not sustainable.[4]

The HMMP misuses other mitigation terms such as *enhancemen*t to maximize credit generation on the SCR site. Enhancement means the manipulation of the characteristics of an aquatic resource to improve a specific aquatic resource function.[5] For example, the HMMP proposes *enhancement* credit of ephemeral washes and their buffers following the construction of a wildlife exclusion fence, stating the wildlife exclusion fence will enhance wildlife connectivity and wildlife habitat.[6] Yet, the HMMP states, *Sonoita Creek Ranch has not been intensively grazed so a substantial response in vegetation resulting from the excluding of grazing is not anticipated.*[7] In fact, it is likely the existing ephemeral washes and ephemeral wash buffers may already meet or exceed the performance standards proposed in the HMMP. Rosemont cannot demonstrate they can provide any measurable improvement and therefore, the 14.4 *enhancement* mitigation credits proposed in the HMMP are unacceptable.[8,9]

**Sonoita Creek Ranch is Not in the Same Watershed as the Mine Impacts and Consequently Does Not Offset the Pervasive Damage to Aquatic Resources in the Cienega Creek Watershed.**

SCR lies outside the watershed where the Rosemont Mine project will be constructed and therefore, mitigation proposed at SCR/RX Ranch will not offset any direct or secondary impacts to aquatic resources within the Cienega Creek watershed.[10] This is a serious deficiency in the conceptual design of the mitigation plan. By any measure, the Cienega Creek watershed supports one of the most exceptional and unimpaired aquatic ecosystems remaining in the American Southwest; as a result of the project this watershed will experience significant, permanent unmitigated impacts to its aquatic environment. The mine will irreparably undo decades of public efforts to protect drinking water supplies, biological resources and sensitive aquatic ecosystems within the Cienega Creek watershed. A crucial factor in our determination that the mine will result in significant degradation of the aquatic ecosystem is the lack of meaningful mitigation being proposed within the Cienega Creek watershed.

[4] Mitigation Rule, 33 CFR Parts 325 and 332
[5] Mitigation Rule, 33 CFR 332.2
[6] HMMP, p. 43
[7] HMMP, p. 54
[8] HMMP, Table 3
[9] Other examples include the "enhancement" of the ponds and the request for "rehabilitation" credit of uplands, which the Mitigation Rule excludes as a form of restoration. Preamble p. 19624-19625.
[10] Although Sonoita and Cienega creeks flow to the Santa Cruz River they lie within separate sub-watersheds and combined flow 100's of river miles within separate sub-watersheds prior to reaching a common confluence at the Santa Cruz River in Tucson. Furthermore, the Mitigation Rule states: *The size of the watershed addressed using a watershed approach should not be larger than is appropriate to ensure that the aquatic resources provided through compensation activities will effectively compensate for adverse environmental impacts resulting from activities authorized by DA permits.* 30 CFR 332.3 (c)(4)

**The Assessment and Comparison of Functions of Waters Between the SCR Mitigation Site and the Rosemont Mine Impact Site are Speculative, Inaccurate and Scientifically Flawed.**

The most serious underlying flaw with the HMMP's assessment of functions for the determination of mitigation credits is that it contains no quantitative functional assessment of waters at SCR, or the Rosemont Mine impact site. This fact alone limits the usefulness of this mostly speculative discussion in determining appropriate mitigation crediting.

A recurring flaw in the current and previous versions of the Rosemont HMMP is the use of direct qualitative functional comparisons of Sonoita Creek with streams at the mine impact site. From a hydrogeomorphic perspective, Sonoita Creek and streams at the mine impact site are incommensurable, and therefore should not be judged by the same standard. It is widely understood within the scientific community that comparisons of aquatic functions are meaningful only when comparing waters within the same hydrogeomorphic class or sub-class.[11] As is done in this HMMP, comparison of the functions of waters within different hydrogeomorphic sub-classes results in the false perception that one stream is functionally better than another. Below, we provide a simple analogy to illustrate this critical concept and the flawed logic when the HMMP compares the functions of Sonoita Creek at SCR with those of the streams at the Rosemont Mine site:

- Linnea and Joan both throw the shot put. Linnea can consistently throw a 10-pound shot put a greater distance than Joan can throw a 16-pound shot put. Linnea is better at throwing the shot put than Joan.

Obviously, this is not a valid comparison. While both girls throw the shot put, the shot put weights are different. Therefore, one cannot make a meaningful comparison and conclusion about who is better at throwing the shot put. Similarly, while streams at SCR and the mine site are riverine features, they are in entirely different hydrogeomorphic subclasses. Any direct comparison of the level of functions they perform is not ecologically meaningful, especially when using the comparison of functions to determine mitigation crediting. If anything, the fact that Sonoita Creek at SCR and streams at the mine site are in different hydrogeomorphic sub-classes highlights that the proposed mitigation for waters at SCR is different (*i.e.*, out-of-kind) from waters at the mine impact site.

We offer the following additional comments on the HMMP, *Section 7, Determination of Credits*.

1. The HMMP states: *The reestablished riparian floodplain system, including ephemeral channels and associated riparian habitat, have been designed to replicate, to the extent practicable, the form and function (gradient, sinuosity, composition, etc.) of the previous system that existed within the Sonoita Creek floodplain prior to the channelization of Sonoita Creek into its current configuration.*[12] Existing evidence supports the conclusion that Sonoita Creek was a single thread channel that was much less sinuous than the

[11] It is curious why the HMMP explicitly adopts functions derived from the Hydrogeomorphic (HGM) Approach, but fails to follow the HGM approach by then comparing the functions between different hydrogeomorphic sub-classes of waters. HMMP, Section 7.1.1, Background, p. 36.
[12] HMMP, Section 7.1.2.1, Reestablishment of Sonoita Creek Floodplain and Channel, p. 40.

proposed reestablished channel design.[13]

2. Page 41 of the HMMP provides comparisons of various physical features (*e.g.*, floodplain width, depth of alluvium, watershed size) of Sonoita Creek and streams at the mine site. These comparisons support the above contention that waters at the two sites differ significantly and are in different hydrogeomorphic subclasses.
3. The HMMP states: *As described elsewhere in this HMMP, the channelized reaches of Sonoita Creek are currently performing most functions poorly…*[14] There is no quantitative functional assessment of the current functions of Sonoita Creek upon which to base this speculative statement.
4. The HMMP states: *The 2008 Mitigation Rule allows for mitigation credit for non-aquatic riparian buffer habitat where necessary to ensure the long-term viability of aquatic resources (33 C.F.R. § 332.3(i)), and that is certainly the case for the reestablished riparian habitat within the Sonoita Creek floodplain. It is important to note that this mitigation component goes well beyond the simple "preservation" of buffer habitat.*[15] The Mitigation Rule states that *Non-aquatic resources* [including riparian areas, buffers, and uplands] *can only be used as compensatory mitigation for impacts to aquatic resources authorized by DA permits when those resources are* ***essential*** *to maintaining the ecological viability of adjoining aquatic resources.*[16] [emphasis added] The Mitigation Rule further defines buffer as *…an upland, wetland, and/or riparian area that protects and/or enhances aquatic resource functions associated with wetlands, rivers, streams…from* ***disturbances associated with adjacent land uses****.*[17] [emphasis added] The proposed reestablished Sonoita Creek channel will lie in the center of a large preserved parcel that is not threatened by adjacent land uses. As such, buffer functions will be provided by *simple preservation* of the floodplain. Awarding additional mitigation credits for buffer habitat functions that are already being met through preservation is not consistent with either the definition of buffer, or the meaning of *essential* within the context of the Mitigation Rule.
5. The HMMP states: *Rehabilitation of the Sonoita Creek channel will result in a more stable channel, thereby reducing bank erosion and excessive sediment transport while promoting groundwater infiltration and wildlife habitat development.*[18] There has been no analysis supporting the contention that Sonoita Creek suffers from excessive bank erosion or sediment transport (refer to discussion that follows below on bank erosion, and sediment transport and deposition in Sonoita Creek). The existing Sonoita Creek is a losing stream and already promotes groundwater infiltration.
6. The HMMP states: *Enhancement of all onsite ephemeral washes and riparian buffer (including the existing Sonoita Creek channel, Corral Canyon, and the other tributaries on the east side of the property) will be accomplished by the construction of wildlife-*

[13] Refer to Figure 3 and discussion in Kondolf and Ashby, Final Technical Memorandum to EPA, Conceptual Design for Sonoita Creek, AZ, Technical Review Support (Order Number EP-G149-00241), July 27, 2015. The Figure 3 aerial photograph depicts the Patagonia and Sonoita Creek area in a 1935, Fairchild Aerial Surveys, Inc. flight number C-3250, housed at U.S. Department of Agriculture's Natural Resource Conservation Service, Tucson, AZ.

[14] HMMP, Section 7.1.2.1, Reestablishment of Sonoita Creek Floodplain and Channel, p. 41

[15] Ibid, p. 42

[16] 33 CFR 332.8(o)(7)

[17] 33 CFR 332.2

[18] HMMP, Section 7.1.2.2 Rehabilitation of Sonoita Creek, p. 42

*friendly fence and exclusion of livestock grazing. The functions to be enhanced within the potential WOTUS at Sonoita Creek Ranch as a result of the exclusion of grazing are wildlife connectivity (through the construction of wildlife-friendly fencing) and wildlife habitat (through the anticipated modest increase in forage production).*[19] As discussed in more detail, below, there is no quantitative functional/condition assessment of the ephemeral waters proposed for fencing, nor for the functions allegedly enhanced.

7. The HMMP states: *As noted in the preamble to the 2008 Mitigation Rule, "[t]he term 'in-kind' in § 332.2 [§ 230.92] is defined to include similarity in structural and functional type; therefore, the focus of the in-kind preference is on classes of aquatic resources (e.g., forested wetlands, perennial streams)." (73 FR 19601). As such, any mitigation that includes ephemeral washes (the class of aquatic resource impacted at the Project Site) would be considered in-kind by the Rule.*[20] This interpretation of the definition of *in-kind* in the Mitigation Rule is not correct and is not scientifically valid. It is indisputable that the structural and functional types of aquatic resources at the mine site are different from Sonoita Creek. To state otherwise demonstrates a complete lack of understanding of the structure and function of these waters at both sites. By the same logic presented in the HMMP, a farm pond would be comparable to Lake Tahoe because they are both lacustrine classes.
8. The HMMP states: *Rare or regionally-significant habitat types in southern Arizona would include perennial water features, such as the ponds at Sonoita Creek Ranch and the perennial systems at the LSPRWA ILF Project. The aquatic resources to be impacted at the Rosemont Project are almost exclusively ephemeral washes.* ***These washes do not represent rare or regionally significant habitat types as ephemeral washes are common in southern Arizona****.*[21] [emphasis added] This statement and similar statements in the HMMP demonstrates a lack of understanding of the critical importance of the watershed at the mine site to the maintenance of perennial flows, riparian wetlands and drinking water supplies within the Cienega Creek watershed. It is undisputed that the washes at the mine site provide surface flow and recharge functions that support miles of perennial stream and many acres of riparian wetland critical to endangered fish and wildlife downstream from the project site within the Cienega Creek watershed.
9. The HMMP states: *The enhanced ephemeral washes and associated buffer habitat are comparable to the smaller washes associated with the Rosemont impact site, and therefore represent in-kind mitigation.*[22] As discussed in detail above, the proposed mitigation at SCR is almost exclusively out-of-kind.

**The HMMP Fails to Adequately Assess or Mitigate for Impacts to Existing Functioning Waters, Floodplain and Buffers at SCR/RX Ranch, or at the Mine Site.**

Implementation of the HMMP at SCR/RX Ranch will result in significant adverse impacts to the existing functioning waters and other valuable habitats that have not been adequately assessed or mitigated.

[19] HMMP, Section 7.1.2.4 Enhancement of Ephemeral Channels and Riparian Buffer, p. 43
[20] HMMP, Section 7.4 Type Conversion, p. 44
[21] Ibid.
[22] HMMP, Section 7.4.2 Sonoita Creek Ranch, p. 45

The HMMP characterizes several high functioning habitats at SCR that will be directly and secondarily impacted by implementation of the mitigation plan:
*Riparian vegetation adjacent to existing ephemeral drainages occurs on the ranch along Sonoita Creek, Corral Canyon, and their major tributaries. Oak (Quercus sp.), Arizona sycamore, velvet ash, Goodding's willow, Arizona walnut (Juglans major), and desert willow (Chilopsis linearis) were commonly observed during field assessments, though mesquite was dominant, particularly in the northern part of the ranch.*

*Large meadows of big sacaton grass (Sporobolus wrightii) are present in the Sonoita Creek floodplain south of the agriculture fields and in the broad, flat areas where drainages flowing off the Canelo Hills discharge into the Sonoita Creek floodplain. These large sacaton bottoms contain interspersed velvet mesquite, desert willow, velvet ash, and Arizona walnut. Again, mesquites become more prominent as one moves north.*

*The approximately 115 acres of agricultural fields exhibit varying densities and degrees of maturity of mesquites, likely indicators of time lapse since the fields were last cultivated. The most recently-cultivated fields are characterized by tall, dried stalks of Johnson grass (Sorghum halepense) with almost no mesquite saplings. The next older fields have no grass stalks and numerous small, multi-stemmed mesquite saplings, which indicate simultaneous establishment, likely within a year or two of the last cultivation of the field. Progressively larger mesquites indicate fields with longer periods without cultivation, culminating in a relatively old field at the north end of the property, in which there is a diversity of mesquite sizes; the largest mesquites are approximately 20-feet tall and up to 12 inches in diameter.*[23]

The HMMP calls for filling 8.9 acres of Sonoita Creek waters at SCR/RX Ranch, including about 28 acres of existing riparian buffer habitat.[24] In addition, 12.1 acres of existing riparian/floodplain buffer habitat will be impacted by the proposed rehabilitation of channel and buffer habitat on SCR.[25] Construction of eight soil repositories on SCR/RX Ranch will impact 116 acres of existing riparian, mesquite floodplain, and sacaton grassland habitat. Thus, a total of at least 153 acres of existing channel, riparian and floodplain habitat will be impacted by implementation of the HMMP at SCR/RX Ranch. These impacts have not been adequately assessed and there is no mitigation proposed for several of the impacted habitats. In addition, impacts to buffer and other upland habitats at the mine site have not been mitigated.[26] It is inequitable and therefore inappropriate to accept mitigation credit for rehabilitated and enhanced channel, buffer and floodplain at SCR/RX Ranch for impacts to waters of the United States (WOTUS) at the mine site without first applying those credits to offset impacts at SCR/RX Ranch and the mine site. Such an approach encourages the disproportionate use of relatively abundant upland habitat to offset impacts to scarce WOTUS. This strategy is employed when

[23] HMMP, Section 5.2, Existing Vegetation, pp. 24-25
[24] Estimate of existing buffer habitat (assumed 50' width except for east bank) to be impacted by implementation of SCR/RX Ranch channel filling: SCR reach, east bank (13.26 ac) + west bank (9.14 ac) = 22.4 ac. RX Ranch (total = 5.51 ac). Total buffer impacted for SCR/RX Ranch = 27.91 ac.
[25] HMMP, Summary of Mitigation Credits Provided by All Mitigation Elements, p. ES-5
[26] The proposed mine will result in the permanent loss, alteration or degradation of 5,431 acres of vegetation, including direct impacts to 585 acres of riparian, 2,557 acres of grassland and 2,690 acres of Madrean evergreen scrub (FEIS, Table 2, p. 666). In addition, about 436 acres (18 linear miles of stream channel x 2 sides x 50-foot buffer width) of existing buffer habitat will be destroyed by mine construction.

determining mitigation credits to offset 21.2 acres of fill into the Rosemont Mine headwater streams; the majority of proposed mitigation credits being sought are from enhancement, rehabilitation and reestablishment of upland buffers and floodplain. This is disturbing because the impacted headwater streams at mine site perform several critical ecosystem functions that will not be offset by this proposed mitigation.

**The Use of Reference Reaches as a Design Guide for SCR/RX Channel Reestablishment.**

The channel reach from Flume 6 to Flume 2 at the Walnut Gulch Experimental Watershed (WGEW) and Reaches 6 and 8 at SCR are used as reference reaches to guide the channel design cross-sectional shape for the reestablishment of Sonoita Creek at SCR and RX Ranch.[27] The HMMP identifies Site 6 on Sonoita Creek as a reference design reach primarily because it has not been historically straightened and presumably exhibits relatively undisturbed hydrologic, geomorphic and ecological attributes and functions.[28] Comparison of 1935[29] and recent Google Earth aerial photography of SCR and RX Ranch indicates that Sonoita Creek beginning near and including Site 6 and continuing upstream to beyond the proposed reestablishment channel at RX Ranch has not been straightened and has remained stable for at least 82 years. This means that the entire reach along Sonoita Creek from Site 6 upstream could be used as reference, including for calculations of channel sinuosity for the proposed reestablished channel.

Attachment 2 of the HMMP states that typical values of sinuosity observed in the least altered reaches of Sonoita Creek ranged from 1.1 to 1.4.[30] Our analysis indicates that this range in sinuosity is significantly overestimated. Our initial calculations observed that the sinuosity of existing Sonoita Creek ranges from 1.05 to 1.26 (mean sinuosity = 1.13) based on the following individual reaches: 1) RX Ranch = 1.05; 2) Sonoita Creek adjacent to the proposed reestablished reach = 1.08; 3) Reference Reach 6 upstream to Adobe Canyon confluence = 1.09; 4) confluence of Casa Blanca Wash downstream to the end of Reference Reach 8 at the road crossing = 1.17; and 5) Reference Reach 6.5 to the end of Reach 8 = 1.26. Attachment 2 goes on to erroneously claim that the proposed restored channels at SCR and RX Ranch will have a maximum design sinuosity of 1.2.[31] We calculated the sinuosity of the proposed reconstructed channels at RX Ranch and SCR at 1.10 and 1.61, respectively. This means that the design sinuosity for SCR is 22 to 35 percent greater that the sinuosity of existing reference reaches at SCR and RX Ranch. In fact, the design sinuosity for SCR (1.61) is 33 percent greater than at the reference reaches at Walnut Gulch Experimental Station, Flume 6 to Flume 2 (1.07). A visual side-by-side

[27] According to Pima County, the WGEW is an inappropriate reference for Sonoita Creek Channel Design. Letter from C.H. Huckelberry, Pima County Administrator, to R. Sherill, ADEQ, RE: 2017 Addendum to Water Quality Permit, Rosemont Copper Project, ACOE Application No. SPL-2008-00816-MB, dated November 17, 2017.
[28]Attachment 2, Final Design of the Sonoita Creek Mitigation Project (September 8, 2017), prepared by Water and Earth Technologies, Section 5.1, Reference Reaches Surveyed at Sonoita Creek Ranch, p. 26.
[29] Refer to Figure 3 in Kondolf and Ashby, Final Technical Memorandum to EPA, Conceptual Design for Sonoita Creek, AZ, Technical Review Support (Order Number EP-G149-00241), July 27, 2015. The Figure 3 aerial photograph depicts the Patagonia and Sonoita Creek area in a 1935, Fairchild Aerial Surveys, Inc. flight number C-3250, housed at U.S. Department of Agriculture's Natural Resource Conservation Service, Tucson, AZ.
[30]Attachment 2, Final Design of the Sonoita Creek Mitigation Project (September 8, 2017), prepared by Water and Earth Technologies (WET), Section 5.1, Reference Reaches Surveyed at Sonoita Creek Ranch, p. 25.
[31] Ibid.

comparison of the proposed channel design figures and drawings with existing reference reaches underscores these discrepancies.

Calculating accurate sinuosity along reference reaches is important for two reasons. First, the jurisdictional area of channel below the 5-year flow (Ordinary High Water Mark - OHWM) is a function of channel width and length; therefore, the greater the sinuosity the greater the stream length and area below the OHWM. A reconstructed SCR channel design that mimicked the average sinuosity of reference reaches at SCR and WGEW (*i.e.,* 1.13) would result at least 30 percent less area below the 5-year flow or OHWM. This would mean that a maximum of 40.3 acres of *reestablished* channel would be available at SCR/RX (57.4 ac – 17.1 ac = 40.3 ac). A second important reason is that if the channel design is too sinuous for the geomorphic setting, then there is a greater likelihood that channel will adjust and significantly straighten after the first high flow. Why should *reestablishment* credit be given in an amount in-excess of what can be sustained under natural flow conditions? Clearly, the attempt here is to design a channel with a sinuosity that will maximize *reestablishment* credit in-excess of what is appropriate given the geomorphic setting.

As mentioned, the channel reach from Flume 6 to Flume 2 at the WGEW is used as a reference reach to guide the channel design cross-sectional shape for the reestablishment of Sonoita Creek at SCR and RX Ranch. Attachment 2 notes the similarities between WGEW from Flume 6 to Flume 2 and Sonoita Creek (*e.g.*, watershed area, channel gradient, channel substrate).[32] WET further states *Walnut Gulch has numerous reaches exhibiting broad, shallow channel forms with significant channel braiding near to, and downstream of, Flume 6.* p. 13. WET cites *Exhibit 1, Walnut Gulch and Sonoita Creek Comparison* to make its case for why Sonoita Creek can expect to exhibit a braided channel pattern similar to Walnut Gulch. The problem is that WET Exhibit 1 depicts a reach of Walnut Gulch from Flume 7 to downstream of Flume 1 which is not within the same reference reach and, in fact, is not comparable to Sonoita Creek in terms of critical geomorphic variables that would affect sinuosity and channel braiding. For example, the contributing watershed area, number of tributary connections/inputs, and channel dimensions (average channel width is 100-200 feet) from Flume 7 to Flume 1 are significantly greater than the Flume 6 to Flume 2 reference reach (40-50 feet). Why doesn't WET use the reference reach from Flume 6 to Flume 2, as they do for channel design metrics, for a comparison of channel form and braiding patterns? One answer is that the Flume 6 to Flume 2 reach doesn't exhibit braiding patterns and, in fact, demonstrates that Sonoita Creek will likely not exhibit and any significant braiding.

As discussed above, Attachment 2 of the HMMP[33] states that the cross-sectional geometry of the restored (reestablished) channel designs for the RX Channel and SCR Channel emulate the Sonoita Creek reference reach cross sections identified and surveyed during the field investigation. Specifically, Site 6 is chosen as a reference reach because it is 2,000 feet upstream from the historically straightened reach of Sonoita Creek. The report states: *The two (2) reference reach sites in Sonoita Creek are characterized by self-formed geometry, relatively large channel widths, **frequent floodplain access by flows** [emphasis added], and relative*

[32] Ibid.

[33]Attachment 2, Final Design of the Sonoita Creek Mitigation Project (September 8, 2017), prepared by Water and Earth Technologies, Section 5.1, Reference Reaches Surveyed at Sonoita Creek Ranch, p. 26.

*channel equilibrium. Channel braiding and perched overbank channels were also observed at both of these sites. These two sites possessed the highest ecological function of all the reference sites and were used to develop the final restored channel designs. The RX Channel and SCR Channel cross-sectional shape is based on reference reaches at Site 6 and Site 8…Channel bottom widths in the reference reaches range from approximately 40 feet up to 70 feet with an average bottom width slightly greater than 50 feet. Typically, at least one, and usually both sides of the existing channel have horizontal bench and floodplain features that lie 1 to 3 feet above the active channel bottom. The combined right and left bench widths range from approximately 28 feet up to 175 feet.*[34]

A review of Google Earth aerial photography shows that there is infrequent floodplain access by flows within this reference reach, especially on the adjacent horizontal bench and floodplain features. A photograph dated June 1996 depicts a scoured channel main and floodplain channel, with the formation of a mid-channel bar. By September 2003, this main channel sandbar and the adjacent floodplain channel were vegetated. The floodplain channel apparent in the 1996 aerial photograph is clearly cut off from the main channel. There is no compelling photographic evidence from 2003-2017 (and perhaps since about 1996) that the floodplain benches (even the main channel sandbar) have received frequent floodplain access by flows. This site-specific physical evidence calls into question whether flow analysis assumptions and results are valid; suggesting that the modeled frequency of overbank flooding is significantly overestimated.

**The Proposed Meander Belt Geometry for the SCR Channel Does Not Mimic the Reference Reaches.**

The proposed meander belt geometry for the SCR/RX Ranch channels do not mimic the reference reaches at SCR or WGEW. In addition, the regular meander path design for the SCR/RX Ranch channels do not resemble a complex, deformed pattern found in natural settings. For these reasons, the proposed reconstructed channels are not sustainable. While the HMMP generally recognizes that channel dimensions and geometry will change over time, it is likely that such changes will occur almost immediately after the first large discharge. This raises the question of why the amount mitigation credit for the reconstruction of WOTUS (as measured by areas below the modeled 5-year return flow) should be based on a channel design that is not sustainable.

**There is No Compelling Ecological Justification to Reestablish Sonoita Creek at the RX Ranch Property, or at SCR.**

As discussed above, the HMMP identifies Site 6 on Sonoita Creek as a reference design reach primarily because it has not been historically straightened and presumably exhibits relatively undisturbed hydrologic, geomorphic and ecological attributes and functions.[35] Comparison of 1935[36] and recent Google Earth aerial photography of SCR and RX Ranch indicates that Sonoita

[34] Ibid.
[35] Attachment 2, Final Design of the Sonoita Creek Mitigation Project (September 8, 2017), prepared by Water and Earth Technologies, Section 5.1, Reference Reaches Surveyed at Sonoita Creek Ranch, p. 26.
[36] Refer to Figure 3 in Kondolf and Ashby, Final Technical Memorandum to EPA, Conceptual Design for Sonoita Creek, AZ, Technical Review Support (Order Number EP-G149-00241), July 27, 2015. The Figure 3 aerial

Creek beginning near Site 6 and continuing upstream to beyond the proposed reestablishment channel at RX Ranch has not been straightened and has remained stable for at least 82 years. This means that the entire reach from Site 6 upstream could be used as a reference reach.

In addition, cross sections of the existing Sonoita Creek at RX Ranch indicate that much of the immediately adjacent floodplain lies at elevations ranging from 2-5 feet above the existing naturally functioning low flow channel.[37] Site visits and review of aerial photography indicates that the existing Sonoita Creek channel and adjacent floodplain at RX Ranch provides undisturbed buffer and corridor functions (except for a small area of instream gravel extraction and staging operations) connecting on the east to existing high quality publicly owned grassland and woodland habitat through several ephemeral jurisdictional drainages. Much of the abandoned agricultural field to the west of Sonoita Creek (the location of the proposed RX reestablishment channel) is passively re-vegetating, and can be expected to naturally recover to mesquite bosque.

As a reference or near-reference channel with an existing intact, functioning floodplain there is no justifiable ecological reason to fill and reconstruct Sonoita Creek at RX Ranch. There is no demonstrable environmental benefit to moving the existing channel several hundred feet to the center of the floodplain. Many alluvial channels in the arid American west are high functioning in settings where the channel lies at the edge of the floodplain.

As a stand-alone project, the Clean Water Act (CWA) mitigation requirements to offset the proposed filling of Sonoita Creek at RX Ranch would greatly exceed the amount of proposed *reestablishment* there. That means the proposed reconstructed channel isn't fully self-mitigating. It is reasonable to assume that because of temporal habitat losses alone a mitigation ratio much greater than 1:1 replacement-to-loss would be reasonable for filling the existing RX Ranch Sonoita Creek channel. This does not even factor in impacts to existing buffer (existing average 50' channel width x 2,400' channel length x 2 = 5.51 acres of existing buffer impacted) and wildlife corridors, among other functional impacts not addressed in the mitigation plan. Only mitigation credit for the preservation of existing aquatic and floodplain resources is justified at RX Ranch.

Finally, we have concerns regarding the proposed design of the reconstructed RX Ranch channel. A simple comparison of the sinuosity (channel length/valley length) of the reconstructed Sonoita Creek channel (1.15) with the existing Sonoita Creek (1.01) or the reference channel along Walnut Gulch, Flume 6 to Flume 2 (1.07), indicates that the design sinuosity is not within reference, and this channel form is not likely to persist after a high flow. This difference in sinuosity is very apparent in a cursory side-by-side visual comparison of the proposed reconstructed channel sinuosity with the reference reach at Walnut Gulch, or the existing reference reaches along Sonoita Creek.[38] Therefore, we suspect the existing mitigation channel design sinuosity is no more than an effort to maximize mitigation credits for reconstruction and is not justified. As we have stated to the Corps in our review of a previous

photograph depicts the Patagonia and Sonoita Creek area in a 1935, Fairchild Aerial Surveys, Inc. flight number C-3250, housed at U.S. Department of Agriculture's Natural Resource Conservation Service, Tucson, AZ.

[37] Pg. 584, WET drawing no. 5, RX Existing Sonoita Backfill Detail Sheet.

[38] Ibid.

iteration of the SCR mitigation plan[39] there is no geomorphic justification to expect that the constructed channel junction at Adobe Canyon and Sonoita Creek will remain unchanged. It is difficult to maintain constructed features similar to that proposed in unstable alluvial environments. The proposed takeoff point for the constructed channel at RX Ranch was observed to be very dynamic, and receives high sediment loads from the input of Adobe Canyon. A takeoff point into the proposed constructed channel in this area would be subject to the constant influx of sediment and changing channel geometry due to the highly dynamic alluvial stream behavior. It was additionally observed that for the proposed constructed channel at RX Ranch to accommodate the property ownership available to the project and avoid impacting bordering private parcels, the tie back of the proposed reconstructed channel into Sonoita Creek must occur before the end of Lot 1. This would require a specific angle of connection in order to accommodate those specific property constraints, which would be challenging given the dynamic nature of Sonoita Creek in the proximity of the Adobe Canyon confluence. The existing Sonoita Creek at its confluence with Adobe Canyon is able to adjust to those constraints and remain relatively stable below the confluence.

For many of the reasons discussed above, there is also no compelling reason to reestablish the existing channel on SCR to the center of the floodplain. As noted, many alluvial streams flow at the edges of their floodplains. The existing Sonoita Creek channel could be rehabilitated or enhanced by leaving it in its current alignment and excavating portions of the adjoining floodplain along its eastern bank. Such an approach would require far less excavation of floodplain material (and its associated impacts) and eliminate the need to construct a new channel. This less intrusive, but effective approach to rehabilitation would mean that mitigation credit for channel reestablishment would be far less than under the current proposal.

**Bank and Buffer Rehabilitation along Lower Sonoita Creek is Unnecessary and Will Provide No Permanent Ecological Benefit to the Existing Stream and Floodplain.**

The HMMP proposes 12.1 acres of channel rehabilitation along lower Sonoita Creek beginning at the Sonoita Creek – SCR Channel confluence and continuing downstream for approximately 2,511 feet. Rehabilitation involves excavating a 100-foot wide terrace into the existing left bank that gradually transitions to 25 feet in width further downstream. The terrace will be cut into the existing natural bank approximately 2 vertical feet above the existing channel bottom and will daylight to the existing ground at a 10:1 slope.[40] The HCCP states: *The purpose of the bank widening is to reduce specific stream energy and the resulting* ***high level of ongoing bank erosion****, and to* ***create a riparian zone which is currently non-existent in this reach****.* [emphasis added] *This reach of Sonoita Creek is currently extremely confined with vertical or near vertical banks 6 to 9-feet high that are actively sloughing and eroding. As proposed in the new design, the greater width, lower bank height, and flatter bank slopes will reduce flow velocity and associated bank erosion.*[41] The HMMP depicts this proposed mitigation as *Rehabilitated*

[39] Kondolf and Ashby. Final Technical Memorandum to EPA, Conceptual Design for Sonoita Creek, AZ, Technical Review Support (Order Number EP-G149-00241), July 27, 2015.
[40] Attachment 2, Sonoita Creek Bank Modification Detail, Drawing WET 16, and Final HMMP, Section 6.1.2 Rehabilitation of Sonoita Creek, p. 30.
[41] Ibid.

*Sonoita Creek (5-Year Inundation)* and is also seeking an additional 50 feet of *Rehabilitated Sonoita Creek Buffer* credit for the area immediately adjacent to the excavated terrace.[42] These ill-conceived measures would damage existing high quality sacaton grassland and woodland riparian/floodplain habitat and likely will fail to achieve their stated geomorphic and stream habitat restoration goals. The mitigation proposal involves significant excavation and re-contouring of what is described as an *actively sloughing and eroding* Sonoita Creek bank and floodplain. It is common knowledge that all fluvial systems continually erode, transport and deposit sediment in response to a host of controlling geophysical variables. Bank erosion and channel movement within the setting of a broad, undeveloped alluvial floodplain, as in the case of Sonoita Creek, does not call for large-scale channel remediation. The HMMP does not identify the causes that contribute to the ongoing bank erosion or why these fluvial processes would be expected to cease following implementation of their mitigation measures. Because the HMMP does not identify the underlying causes of bank erosion, there is great risk that these proposed measures would fail to provide any meaningful, long-term ecological benefits to Sonoita Creek greater than what natural processes will eventually achieve.

As discussed in our review of WET's August, 2014 version of channel designs for SCR, there is no ecological benefit to controlling bank erosion at Sonoita Creek: *The plan asserts there will be benefits to controlling bank erosion along Sonoita Creek and presents an example of a high vertical cohesive bank, which is actively eroding. Such high, eroding banks occur naturally when a stream channel impinges into valley side slopes. There is nothing inherently wrong with such banks, and in fact such sites can be important sources of sediment to the channel (Florsheim et al. 2008). Within the project reach, we observed that this condition is rare rather than common. The WET report presents no information to indicate that Sonoita Creek is experiencing unusual, artificially-elevated bank erosion rates. Thus, the available evidence suggests that bank erosion highlighted in the WET report and observed by us during the site visit is a natural process appropriate to this type of stream and necessary for proper ecological function.*[43]

It is noteworthy that the 2014 WET report[44] proposed similar channel and floodplain rehabilitation (*i.e.*, erosion control) measures downstream and including the current SCR reference Reach 8. During a site inspection of Reach 8, EPA's expert fluvial geomorphologist expressed concern to WETs' consultants that the proposed rehabilitation measures were aimed at arresting ongoing natural fluvial processes; the Sonoita Creek channel was actively adjusting its channel as evidenced by bank erosion, sediment deposition and channel meandering. This adjustment was ultimately responsible for the creation of the existing complex channel and high functioning riparian zone and floodplain within Reach 8. In apparent recognition of EPA's observations of the importance of maintaining active fluvial processes for the creation of high-functioning stream and riparian habitat, WET dropped its proposal to rehabilitate Reach 8 and other reaches, and is now proposing their preservation. The HMMP notes that Reach 8 is characterized by active processes of erosion and deposition and is a high-functioning reference

[42] Attachment 2, Sonoita Creek Bank Modification Detail, Drawing WET 16, and Final HMMP, Figure 13.
[43] Kondolf and Ashby. Final Technical Memorandum to EPA, Conceptual Design for Sonoita Creek, AZ, Technical Review Support (Order Number EP-G149-00241), July 27, 2015, pp. 11-12
[44] Conceptual Design for Ephemeral Channel Adjacent to Sonoita Creek, August 12, 2014, Water and Earth Technologies

reach.[45] Similarly, in the absence of the intervention proposed in the current HMMP, the proposed 2,500' rehabilitation reach will continue to naturally move toward equilibrium eventually characterized by a high-functioning floodplain.

Finally, the HMMP erroneously describes the riparian zone in this reach as *currently non-existent…*[46] This overly simplistic characterization dismisses the ecological importance of the existing floodplain. Observations of this reach during several site visits and review of current aerial photography confirms that the floodplain adjoining Sonoita Creek is composed of high functioning, regionally rare, sacaton grassland[47] interspersed with mesquite and other native riparian woodland species. In fact, the HMMP describes high quality, natural, existing vegetation communities within this proposed rehabilitation area.[48] Finally, vegetation monitoring conducted at SCR also documents the high native plant diversity and healthy vegetative cover that characterizes the existing floodplain, especially in areas not disturbed by past agricultural practices.[49] Despite this compelling description in the HMMP and repeated cautioning by EPA about the ecological importance of these sacaton grasslands/meadows, the current HMMP proposes rehabilitation measures that will destroy this native grassland habitat. The HMMP naively assumes that reestablished riparian woodland is more ecologically important than the existing native riparian grassland – woodland (also a riparian habitat). This unjustified bias will result in the loss of an existing high functioning riparian habitat; an impact that itself warrants mitigation.

**Extension of Three Tributary Channels to the Reconstructed SCR Channel is Unnecessary and Will Not Provide Any Long-term Ecological Benefit.**

The HMMP states, *There are three existing ephemeral drainages east of Sonoita Creek that no longer have a direct flow path to Sonoita Creek since they are intercepted by an access road*

[45] *Site 8 is located near the southern end of the SCR Project in a complex, highly ecologically-functional reach with numerous secondary channels and microtopographic complexity that Fremont cottonwood trees. This reach of Sonoita Creek will be preserved…The two (2) reference reach sites in Sonoita Creek are characterized by self-formed geometry, relatively large channel widths, frequent floodplain access by flows, and relative channel equilibrium. Channel braiding and perched overbank channels were also observed at both of these sites. These two sites possessed the highest ecological function of all the reference sites and were used to develop the final restored channel designs.* p. 23, Section 5.1, Reference Reaches Surveyed at Sonoita Creek Ranch.

[46] Attachment 2, Sonoita Creek Bank Modification Detail, Drawing WET 16, and Final HMMP, Section 6.1.2 Rehabilitation of Sonoita Creek, p. 30.

[47] Tiller, R., Hughes, M., and G. Bodner. 2013. Sacaton Riparian Grasslands of the Sky Islands: Mapping Distribution and Ecological Condition Using State-and- Transition Models in Upper Cienega Creek Watershed. USDA Forest Service Proceedings RMRS-P-67. https://www.fs.usda.gov/treesearch/pubs/44474

[48] *Large meadows of big sacaton grass (Sporobolus wrightii) are present in the Sonoita Creek floodplain south of the agriculture fields and in the broad, flat areas where drainages flowing off the Canelo Hills discharge into the Sonoita Creek floodplain. These large sacaton bottoms contain interspersed velvet mesquite, desert willow, velvet ash, and Arizona walnut. Again, mesquites become more prominent as one moves north.* HMMP, Section 5.2 Sonoita Creek Ranch, p. 23.

[49] In particular, note the results for vegetative cover, species diversity and woody species density for Reach #6.5 that lies in proximity of the proposed rehabilitation reach. Appendix F2, Sonoita Creek Mitigation Project, Vegetation Characterization Report, p. 484

*located along the eastern edge of the agricultural field. During construction of the SCR Channel, the three tributary channels will be extended to flow directly into the SCR Channel.*[50]

Tributaries E1, E2, and E3 will be extended past their natural canyon mouths termini about 470 feet, 350 feet and 700 feet, respectively.[51] A review of Google Earth aerial photography and the 1935 aerial photograph[52] show that these tributaries are not naturally characterized by discharges that would connect to the main channel of Sonoita Creek, nor in the absence of constructed channels would they naturally reach the reconstructed SCR channel. The access road on the eastern edge of the agricultural field does not block their flows as alleged; the defined stream channels end before meeting the road. Stream power under natural flows is not sufficient to form a permanent bed and bank channel. As a result, water recharges into the alluvial fan at the mouths of these canyons far from the main Sonoita Creek channel. In addition, several soil repositories will be constructed mostly within 10 to 75 feet of the channels.[53] The repositories will be constructed of floodplain alluvium that is highly erosive. It is reasonable to expect elevated levels of erosion and sediment deposition from the repositories into the newly constructed channels, until the slopes of the repositories are effectively stabilized, if ever. This means that the proposed artificially constructed channels will not be sustainable under existing tributary flow regimes or newly constructed slope conditions. The channels will quickly fill with sediment and no longer maintain a bed and bank and ordinary high water mark. These artificial channels will quickly cease to be WOTUS. For these reasons, it is not appropriate to award mitigation credit for these unsustainable constructed drainage features.

**Preservation of Existing Wildlife Migration Corridors at SCR Will Not Mitigate for Fragmentation of Critical Animal Migration Corridors at the Project Impact Site.**

The HMMP states that *…the Sonoita Creek Ranch is located in the Patagonia to Santa Rita Linkage as identified by the Arizona Wildlife Linkages Workgroup (AGFD 2009). The linkages were identified to provide for the safe movement of wildlife minimizing further habitat fragmentation and ensuring the survival of wildlife. Restoration of riparian habitat from agricultural fields and the broader floodplain will promote safe wildlife passage along Sonoita Creek between areas downstream such as the Patagonia-Sonoita Creek Preserve and upstream to the Las Cienegas National Conservation Area.*

*By comparison, while the Project Site and the riparian areas contained within are likely used by wildlife for movement, they are located within an area defined as a wildland block (Figure 8; Beier et al. 2008). Wildland blocks are large areas that are relatively unfragmented and contain little to no anthropogenic impedance to wildlife movement. Riparian corridors, like those associated with Sonoita Creek, are unique in that they provide refugia along disturbed areas (i.e.*

[50] HMMP, Section 6.1.1 Reestablishment of Sonoita Creek Floodplain and Channel, p. 30
[51] Attachment 2, Tributary Channel Details, WET Drawing 17. Compare with recent Google Earth aerial photographs.
[52] Refer to Figure 3 in Kondolf and Ashby, Final Technical Memorandum to EPA, Conceptual Design for Sonoita Creek, AZ, Technical Review Support (Order Number EP-G149-00241), July 27, 2015. The Figure 3 aerial photograph depicts the Patagonia and Sonoita Creek area in a 1935, Fairchild Aerial Surveys, Inc. flight number C-3250, housed at U.S. Department of Agriculture's Natural Resource Conservation Service, Tucson, AZ.
[53] Attachment 2, Sonoita Creek Mitigation Project, WET Drawing 3 and Tributary Channel Details, WET Drawing 17

*SR 82) allowing for wildlife shelter, usage, and movement. They also allow for lateral movement between two habitat blocks that are separated by open or disturbed areas.*[54]

We would agree that the existing wildlife corridors through Sonoita Creek Ranch constitute an important linkage and habitat for the passage of wildlife. However, we are incredulous by the attempt to denigrate the significance of the wildlife migration corridors at the mine project site simply by describing these lands as *wildland blocks*.

It is well understood that the Santa Rita Mountains provide several critical regional animal movement corridors or wildlife linkages.[55] The recontouring of the mine site and the filling of the extensive stream network will irreversibly change the natural topography of the site. The mine will result in the significant fragmentation of six animal movement corridors and this will significantly disrupt animal dispersal and migration patterns for many species currently using these corridors.[56] Within the six impacted corridors, a total of 1,626 acres of habitat will be directly impacted (greater than the total size of Sonoita Creek Ranch), including the permanent filling of jurisdictional waters comprising the stream network at the mine site.[57] Thus, the discharge of fill material will result in the loss of corridors critical to animal movement and migration for numerous resident and transient wildlife species. The fragmentation of animal migration corridors has the potential to adversely disrupt populations of animals utilizing adjacent mountain ranges through restrictions to their natural dispersal routes. It is incongruous that the HMMP touts the importance of SCR as providing wildlife linkages to the Santa Rita Mountains and Las Cienegas Creek National Conservation Area when these very areas will be destroyed and degraded by the mine project.

**Mitigation at Sonoita Creek Ranch Will Not Contribute Water to Impacted Portions of the Cienega Creek Groundwater Basin.**

The HMMP implies that alleged improvements in groundwater recharge attributed to the SCR channel reconstruction and floodplain rehabilitation will benefit Cienega Creek groundwater supplies.[58] While it is true that SCR lies at the divide between the Cienega Creek groundwater basin boundaries, it is well documented that groundwater recharged into the Sonoita Creek channel and floodplain moves in a southwesterly direction toward Patagonia along the hydraulic gradient.[59] Recharged water actually enters the Santa Cruz groundwater basin. Thus, the SCR portion of the HMMP will provide no mitigation to offset significant water losses and environmental impacts to waters and wetlands from significant direct and secondary impacts from the mine within the Cienega Creek watershed.

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[54] HMMP, Section 4.2.1 Sonoita Creek Ranch, p. 13
[55] FEIS, Table 118, Figure 76
[56] FEIS, Table 129
[57] Ibid.
[58] Ibid, p. 15
[59] See Figure 3.3-6, Cienega Creek Basin Groundwater Conditions www.azwater.gov and Nassereddin, Muhamad. 1967. Hydrogeological analysis of groundwater flow in Sonoita Creek basin, Santa Cruz County, Arizona. Thesis. Department of Geology. University of Arizona http://hdl.handle.net/10150/191488

**There Appears to be No Sediment Supply Reach Assessment Conducted for Sonoita Creek.**

The design and success of any alluvial channel restoration project first needs to understand the existing sediment budget that is determined by the magnitude and frequency of all sediment transporting flows. The mean annual sediment load for a restored channel reaches (capacity) must match the mean annual sediment load in the supply upstream reach (supply). Without this analysis, it is not possible to confidently predict how the reestablished channels at SCR/RX Ranch will behave or function.

**Rehabilitation and Buffer Mitigation Credit for Fencing Functioning Ephemeral Streams and their Floodplains is Not Justified.**

The HMMP proposes and discusses the alleged benefits of the following mitigation measures as rehabilitation and buffer mitigation credit:

*In order to enhance the habitat connectivity function of the onsite ephemeral potential WOTUS (including the unaltered portions of Sonoita Creek) and associated 50-foot buffers, all portions of the mitigation parcel will be fenced in association with mitigation activities, to exclude domestic livestock while allowing wildlife movement into and through the parcel…Establishment of this fence will enhance wildlife habitat associated with existing potential WOTUS and associated buffer by facilitating wildlife movement into and out of Sonoita Creek Ranch. In addition, some degree of enhancement of forage resources for wildlife will be realized by removing the competing livestock…Establishment of this fence will enhance wildlife habitat associated with existing potential WOTUS and associated buffer by facilitating wildlife movement into and out of Sonoita Creek Ranch. In addition, some degree of enhancement of forage resources for wildlife will be realized by removing the competing livestock…The remaining drainages that cross the property boundary are not anticipated to generate enough flow to require swinging flood gates.* [60]

*Enhancement of all onsite ephemeral washes and riparian buffer (including the existing Sonoita Creek channel, Corral Canyon, and the other tributaries on the east side of the property) will be accomplished by the construction of wildlife-friendly fence and exclusion of livestock grazing. The functions to be enhanced within the potential WOTUS at Sonoita Creek Ranch as a result of the exclusion of grazing are wildlife connectivity (through the construction of wildlife-friendly fencing) and wildlife habitat (through the anticipated modest increase in forage production). As described above, the buffer width for mitigation credit is estimated at 50 feet.*[61]

When discussing the ecological performance standards for this proposed mitigation the HMMP states that ***Sonoita Creek Ranch has not been intensively grazed so a substantial response in vegetation resulting from the exclusion of grazing is not anticipated*** [emphasis added]. *However, it is anticipated that the buffer area adjacent to the ephemeral washes at the site will still experience recovery following livestock grazing exclusion, and these areas would be expected to* ***achieve performance criteria comparable to the Sonoita Creek floodplain*** *as these*

[60] HMMP, Section 6.1.6 Enhancement of Existing WOTUS and Buffers, p. 35-36

[61] HMMP, Section 7.1.2.4 Enhancement of Ephemeral Channels and Riparian Buffer, p. 43

*areas are both classified as Loamy Bottom or Loamy Swale ecological sites by NRCS.*[62] [emphasis added]. In addition, when discussing soil repositories the HMMP states, *Drainage density was determined by delineating an undisturbed reference watershed in the SCR Project site (**Tributary 3**)*.[63] [emphasis added]

It is unacceptable that the HMMP is proposing to receive 14.4 enhancement credits for ephemeral wash channels and buffers[64] by implementing exclusion fencing measures that by its own admission will not result in a significant or real improvement in vegetation condition, and in the case of Tributary 3 was used as *an undisturbed reference site*.[65] That the HMMP then goes on to state that it anticipates some unknown *recovery following livestock grazing exclusion*[66] is therefore inconsequential as a justification for receiving enhancement credit. In addition, the HMMP claims that fencing will somehow improve wildlife connectivity along tributaries that currently function as wildlife corridors. It is well known that *wildlife friendly fencing* is not as friendly as the *absence* of fencing in the context of wildlife movement corridors. Furthermore, it is baffling why existing, functioning, vegetated, small tributaries would be expected to achieve performance criteria comparable to those areas of the Sonoita Creek floodplain that are proposed to be filled and that will be initially unvegetated. In addition, there is no baseline condition assessment of Coral Canyon and the other ephemeral tributaries. Our field observations and review of photographs included in the HMMP[67] supports a conclusion that these tributaries likely already meet or exceed the proposed performance criteria.

**The Soil Repositories Will Result in Impacts that Have Not Been Adequately Assessed or Mitigated.**

Channel *reestablishment* on SCR/RX Ranch will require the excavation, filling and recontouring of almost 300,000 cubic yards of excavated floodplain soils. Six spoil repositories will be used. These repositories include the filling of two existing reaches of Sonoita Creek, spreading material onto the Sonoita Creek floodplain (agricultural fields), and piling and contouring material on undisturbed hill slopes to the east of the Sonoita Creek floodplain. Hill-slope repositories would be shaped to have swales or channels to carry runoff from the surface, evidently with the goal that the spoil piles would be "erosionally stable" without requiring riprap or other stabilization measures.

The creation of these spoil piles can be expected to have impacts in at least two significant ways. First, excavation of 300,000 cubic yards of spoil is a massive undertaking, with inevitable impacts of heavy equipment compacting sensitive soils, disrupting the existing topography, etc. Once the spoil piles are built and contoured, it is implausible that they would not be subject to some erosion, even with the contouring proposed. These would be significant piles of disturbed

[62] HMMP, Section 10.1.5 Enhanced Existing WUS and Riparian Buffer Habitat, p. 54

[63] HMMP, Appendix 2, Soil Repositories, p. 35

[64] HMMP, Table 3, Summary of Mitigation Credits Provided by All Mitigation, p. 47. Enhanced ephemeral washes = 5.2 acres + enhanced ephemeral was buffer = 9.2 acres = 14.4 acres. It is also noteworthy that these existing washes already support high-functioning channels and buffers.

[65] Ibid.

[66] Ibid.

[67] Attachment 3, Sonoita Creek Ranch Photos 12-40, Final Design of the Sonoita Creek Mitigation Project (September 8, 2017), prepared by Water and Earth Technologies

soil and alluvial sediment, lacking in geologic or soil structure, which would perched above the surrounding landscape and inherently prone to erosion. Moreover, such spoil piles inevitably experience differential settlement, so the constructed drainage pathways may not work as planned. The WET report does not present an analysis of the geomorphic, ecological, and visual impacts of the proposed spoil piles.

The HMMP proposes no mitigation for direct impacts from the placement of soil on existing floodplain and buffer habitats. Significant portions of the existing agricultural fields where spoils will be spread support reestablishing mesquite woodland. In addition, secondary impacts can be expected to ephemeral streams flowing from the eastern hills from sediment eroding from unstable slopes.

**Enhancement of Two Ponds at SCR.**

According to the HMMP, Rosemont is requesting 404 CWA mitigation credit for the enhancement of two ponds located at SCR. The two existing ponds will be renovated to support the recovery of sensitive aquatic species per the Endangered Species Act (ESA) Biological Opinion. The final designs have not been completed but will include passive flow.[68] Enhancement of the two ponds at SCR does not provide compensatory mitigation for the followings reasons:

- Enhancement credit requested to support recovery efforts of listed endangered species does not offset the physical loss of headwater streams at the mine site;
- Rosemont has failed to demonstrate there is sufficient water from Monkey Spring to support any enhancement or establishment of wetlands/waters;
- Performance standards used to determine whether the compensatory mitigation project is achieving its objectives are lacking; and
- The temporal loss of waters could be significant due to a lengthy and risky Arizona Department of Water Resources (ADWR) approval process.

**Monkey Spring Has Not Been Demonstrated as a Reliable Water Source**.

The HMMP states that Monkey Spring, a perennial spring located approximately 0.8 miles north of the ranch, provides a perennial water source to the interior of the ranch. Water is distributed via canal from Monkey Spring to a pair of ponds where it can then be diverted to the agriculture fields for irrigation or allowed to flow into the second pond for storage.

SCR has a certificated water right of approximately 590 acres per annum (AFA), associated with Certificate of Water Right for Monkey Spring. The certificated water right for SCR is 75 percent of 785 AFA based upon measured spring discharge at the time of the Certificate of Diversion.[69]

[68] HMMP, p. 7

[69]HMMP. P. 26-27. Specifically, the water right is broken down as 588.75 AFA for irrigation purposes and 657,000 gallons (approximately 2.02 AFA) for stock watering. Cumulatively, approximately 590.77 AFA of certificated water right is appurtenant to SCR.

The percentage of water right is determined by usage times and not actually a measurement of flow volume.[70]

Since 2014, EPA and the Corps have requested flow discharge measurements from Monkey Spring.[71] Rosemont has failed to provide the necessary information citing restricted site access. Alternately, in April 2015, Rosemont installed a flow monitoring station within the irrigation canal upstream of the two-onsite ponds. According to Rosemont, the flow monitoring indicates that Monkey Spring flows discharging to SCR continue to be 5 to 12 percent higher than that allocated by the Certificate of Water Right for the property (WestLand Resources Inc. 2017).[72]

Flow measurements at the source by a third-party certified water engineer are necessary in order to ensure the water allocation of 590 AFA is available. EPA understands that the flow has not been measured from Monkey Spring since approximately 1973. It is highly uncertain whether Monkey Spring currently produces the full water allocation as described in the Certificate of Water Right from ADWR, and whether available water is sufficient to support wetlands at SCR. An affidavit by a previous owner, Raymond Rich, stated Monkey Spring flowed at 1100 gallons/ minute = 1,774 AFA in 1966. The current estimate indicates a drastic decline in the amount of available water since 1966. Given natural drought, climate change, and potential future mining in the watershed, it is uncertain whether flows from Monkey Spring are sustainable. There are anecdotal accounts of local wells drying in the area in response to drier climatic conditions.

In addition, the HMMP states that an additional water source, Cottonwood Spring, located on another property to the north, can contribute flows to the monitored irrigation channel as well. The HMMP states that flows from Cottonwood Spring could be captured by the flow monitoring station and in the data reported.[73]

Without appropriate monitoring at the spring source, factors such as contributions from Cottonwood Spring, changing water use needs of the upstream owner, monsoonal rains, overland flows and flow sensor malfunctions prevents an accurate determination of the water allocation to SCR.[74]

**Enhancement Credit for 404 CWA Mitigation Has Not Been Demonstrated**.

The renovation of ponds proposed by Rosemont is designed to support recovery of endangered species. The HMMP describes the wetlands associated with the ponds as forested and emergent

[70]HMMP, p. 26-27. SCR has water delivered for 15 hours a day from Tuesdays through Fridays (morning and nights), 19 hours on Saturday, 21 hours on Mondays, and 24 hours on Sundays for a total of 124 hours a week. The time SCR receives water is slightly less than 75 percent of the hours per week (124 hours of 168 hours, or 74 percent of the time).

[71]See Corps comments to Rosemont dated April 6, 2014. See detailed EPA technical comments to the Corps on the proposed mitigation plans dated February 25, 2014, April 9, 2014, April 28, 2014 and April 21, 2015.

[72] HMMP, p. 25

[73] Ibid.

[74] *Monkey Spring Monitoring System Installation Report dated July 2, 2015, Monkey Spring Flow Monitoring Quarterly Report (Q1) dated April 11, 2017 and Monkey Spring Flow Monitoring Quarterly Report (Q2) dated July 14, 2017.*

vegetative components with high species diversity.[75] There is no information regarding the type or acreage of habitat being enhanced at the ponds or accurate current flow measurements from Monkey Spring to determine whether the ponds are sustainable.

Characterized as diverse and high functioning, the ponds do not provide 404 CWA enhancement mitigation. Pond modification to support endangered species will not provide compensation for the loss of headwater streams.[76] In addition, setting the completion of design construction as the 404 CWA performance standard does not meet the requirements of the Mitigation Rule.[77]

**Temporal Losses Due to Approvals From ADWR Could be Significant.**

The Certificate of Water Right identifies the locations of the place of beneficial use of this water. A sever and transfer will be necessary if ADWR determines the proposed project places the water at a different location on the property. An approved sever and transfer by ADWR would first require approval of the irrigation district, agricultural improvement district, or water user's association. Sever and transfer processes may take several years, especially if any parties protest the action. A recent sever and transfer took 11 years, two others are pending at 9 and 12 years.

The water rights are currently designated for irrigation and stock. Utilization of the water for ESA purposes in the ponds would likely constitute a change in beneficial use. Additionally, constructed channels through agricultural fields many not be considered irrigation and may also constitute a change in beneficial use. If so, then a "Change in Beneficial Use" application would need to be filed with the ADWR.

**Onsite Stock Tank Removal**

**The Proposed Stormwater Flow Mitigation Will Not Restore the Stated Volumes of Storm Flows to Stream Reaches Downstream from the Mine Site.**

The HMMP describes mitigation for losses of stormwater flows for impacts to 28.4 acres of waters downstream from the mine site that involves removing three impoundments within the project area and returning those flows to McCleary Canyon, and to downstream reaches of Barrel and Davidson canyons.[78]

Rosemont contracted with Tetra Tech to revise stormwater modeling in the FEIS because Rosemont believes those models overestimate the reductions in stormwater flows due to mine

[75] HMMP, p. 24-25. The HMMP describes the riparian vegetation surrounding the ponds as "robust." The forested areas generally occur on the wetland edges and include trees such as Arizona sycamore, velvet ash, and Gooding's willow. Commonly observed emergent vegetation included species such as barnyard grass, common cattail, fragrant flatsedge, common spikerush, cloaked bulrush, and swamp smartweed. Additionally, both wetlands have an open water component with submerged aquatic vegetation.

[76] The HMMP states these ponds are regionally rare habitat types and should qualify as mitigation. While the Mitigation Rule allows consideration of out-of-kind mitigation, these ponds do not serve the aquatic resource needs of the Cienega Creek watershed. Given the existing condition of the ponds, we do not believe Rosemont could demonstrate functional gain for 404 CWA purposes. p. 44.

[77] 30 CFR 332.5 Ecological performance standards. Federal Register. Department of the Army, Corps of Engineers and Environmental Protection Agency Compensatory Mitigation for Losses of Aquatic Resources; Final Rule dated April 10, 2008. (Mitigation Rule)

[78] HMMP, Section 2.2.3, Stormwater Flow Management, p. 9

construction.[79]

There are several problems with the Tetra Tech stormwater modeling that cast significant doubt on the accuracy of estimated average-annual runoff volumes reporting to stock ponds. Considered together these flawed assumptions and modeling deficiencies provide sufficient grounds for rejecting the stormwater runoff estimates as a basis for calculating mitigation credits.[80]

- The estimates of average-annual runoff rely on an inappropriate model/regression equation. The regression equation can only apply to the limits of the data. A continuous simulation model with daily time steps would be more appropriate. A regional model such as a SWAT-based model that is localized with smaller resolution girds is an example of such an approach.[81]
- The model unrealistically assumes that the stock ponds can store all the runoff from the watersheds. This serious modeling flaw is discussed in the Tetra Tech Technical Memorandum:

  *Lastly, the storage capacity of stock ponds was not considered in this analysis. Only potential "average-annual" runoff volumes that report to each stock pond were calculated. Whether the stock ponds can actually retain the calculated runoff values on a yearly basis was not considered. Therefore, loss factors such as infiltration, evaporation, and plant transpiration that occur at stock ponds; thus further decreasing the downstream quantity of annual runoff, were also not considered.*[82]

  The HMMP erroneously assumes and seeks mitigation credit for all modeled flows that are currently captured on-site, instead of only much smaller captured flows and held by the stock ponds. It is unclear then how an estimated 39.3 AFA of stormflows can be proffered as mitigation given the critical analytical limitations in the analysis.
- The stock ponds will initially intercept and store smaller flow volumes. Smaller flows in the absence of the stock ponds would not be expected to reach the downstream segments of Barrel and Davidson canyons. Larger flows, especially if stock ponds are near or at capacity, are much more likely reach Barrel and Davidson canyons. It is the larger flows that currently characterize site hydrology that would have the most significant effect on functioning of these waters.
- The model parameterization for average annual rainfall (*i.e.*, 18 inches) in Equation 2 is likely significantly less than values at the higher-elevation stock pond locations.

[79] HMMP, Section 2.1.4.2, Reduction of Stormwater Flow Downstream, pp. 6-7 and Tetra Tech. 2017. Rosemont Stock Ponds – Preliminary Potential Runoff Volumes Calculation, July 14, 2017, 7 pp.
[80] See also concerns expressed by Pima County in Letter from C.H. Huckelberry, Pima County Administrator, to R. Sherill, ADEQ, RE: 2017 Addendum to Water Quality Permit, Rosemont Copper Project, ACOE Application No. SPL-2008-00816-MB, dated November 17, 2017
[81] See also Attachments 1 and 2, Letter from C.H. Huckelberry Pima County Administrator to Alexis Strauss, EPA Region 9 Acting Regional Administrator and Col. D. Peter Helmlinger, Commander South Pacific Division, Corps of Engineers, RE: *Rosemont Copper Mine Section 404 of the Clean Water Act*, dated June 6, 2107
[82] Tetra Tech. 2017. Rosemont Stock Ponds – Preliminary Potential Runoff Volumes Calculation, July 14, 2017, p. 1

In addition, the HMMP proposes to replace the loss of stormwater flows to downstream waters based on an estimated post-mining reduction of 17.2%. Yet, during the 25-30-year active mining of the site, the proposed mine will reduce stormwater runoff by greater than 30-40%, reducing surface flow at the Davidson Canyon/Cienega Creek confluence by a minimum of 7.6 -10.2%.[83, 84] The proposal to remove stock tank impoundments will not replace the loss of wet water in downstream waters including the designated Outstanding Arizona Waters and prevent their degradation.

**In-Lieu Fee Project**

Rosemont states the proposed mitigation plan is more than adequate to compensate for unavoidable impacts to waters at the project site, but is prepared to submit a one-time payment to a Corps approved In-Lieu Fee (ILF) project. Specifically, Rosemont proposes to purchase any required credits from the Lower San Pedro River Wildlife Area (LSPRWA) ILF Project, sponsored by Arizona Game and Fish Department (AGFD).[85]

Purchasing advanced credits from the LSPRWA ILF Project will not provide any compensatory mitigation to offset project impacts. In summary:

- The LSPRWA site is dissimilar in the biotic, abiotic, terrestrial and aquatic ecosystem components compared to Rosemont mine site;
- The use of the ILF Program's HUC-4 geographic service area (SA) establishes a watershed scale too large to ensure that activities at the LSPRWA will effectively compensate for all aquatic resources within the HUC-4, including the Rosemont mine's environmental impacts;
- The Interagency Review Team (IRT) has not approved the LSPRWA Project site. Mitigation design, crediting and the project SA have not been approved; and
- The proposal to purchase advanced credits from AGFD transfers Rosemont's mitigation obligation to the state agency.

**Mitigation at LSPRWA Does Not Compensate for Project Impacts**.

***Ecoregions***. The LSPRWA and the proposed Rosemont Mine site are in different ecoregions. Located 70 miles apart and in different Level III ecoregions, the type, quality and quantity of environmental resources and their relative importance in these ecoregions are quite dissimilar. The proposed Rosemont mine site is located in the Madrean Archipelago. Known as the Sky Islands in the United States, this is a region of basins and ranges with medium to high local relief, typically 3000 to 5000 feet. Native vegetation in the region is mostly grama-tobosa shrub-steppe in the basins and oak-juniper woodlands on the ranges, except at higher elevations where ponderosa pine is predominant. The region has ecological significance as both a barrier and

[83] FEIS, Volume 2, Chapter 3, Table 66, Summary of effects and an email from Chris Garrett, SWCA to Robert Leidy, EPA dated September 15, 2015. We maintain the reduction in surface flow is underestimated.
[84] Letter from C.H. Huckelberry Pima County Administrator to Alexis Strauss, EPA Region 9 Acting Regional Administrator and Col. D. Peter Helmlinger, Commander South Pacific Division, Corps of Engineers, RE: *Rosemont Copper Mine Section 404 of the Clean Water Act*, dated June 6, 2107
[85] HMMP, ES-4. The AGFD ILF Program has a Service Area comprised of 8 HUC-4 watersheds within the state of Arizona. There are 50 advanced credits available for projects within each Program service area.

bridge between two major cordilleras of North America, the Rocky Mountains and the Sierra Madre Occidental. Its exceptional species richness and endemism are also influenced by both western desert and mid-continent prairie biogeography.[86]

Within this Level III ecoregion, the direct and secondary impacts from the proposed mine cover three different Level IV ecoregions in close proximity to each other, which underscores the diversity and importance of this ecosystem.[87]

Conversely, the LSPRWA is located in the Sonoran Basin and Range Level III ecoregion and Arizona Upland/Eastern Sonoran Basins Level IV ecoregion, which is quite dissimilar to the mine, project area.[88] The Sonoran Basin and Range has topography similar to the Mojave Basin and Range to the north and contains large areas of paloverde-cactus shrub and giant saguaro cactus. Other typical Sonoran plants include white bursage, ocotillo, brittlebush, creosote bush, catclaw acacia, cholla, desert saltbush, prickly pear, ironwood, and mesquite.

The aquatic resources at the proposed Rosemont mine site are exceptional and vital to the health of the Cienega Creek watershed. Therefore, the remote and out-of-kind mitigation proposed at the LSPRWA is not compensatory. The HMMP's assertion that habitats at the LSPRWA mitigation site "…are more rare within the regional landscape, have higher productivity, and possess higher wildlife values than the impacted xeroriparian habitats (Lowery, Stingelin, and Hofer 2016)" is baseless.[89] In addition, the HMMP errs when concluding the, "…xeroriparian and upland vegetation communities of the Project Area…are more common and provide less functional value when compared to the riparian areas along the Lower San Pedro River offered by this ILF."[90]

***Watershed Scale.*** The AGFD Program SA is comprised of ten watersheds defined by HUC-4 within the state. This SA was chosen due to AGFD's statewide jurisdiction as a wildlife

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[86] https://www.epa.gov/eco-research/ecoregions. See *Environmental Consequences of the Proposed Rosemont Copper Mine: Significant Degradation to Waters of the United States - Destruction of Highly Diverse Assemblages of Animals and Their Habitats* dated October 5, 2017 (Revised November 30, 2017) pp. 4-5.

[87] Ibid. Level IV ecoregions include: 1) The Madrean Basin Grasslands ecoregion which includes those areas of remaining high-quality native grasslands that occur in the basins and on the low hills. Some native grassland also extends into the hills that are part of the Lower Madrean Woodlands. These semi-desert and plains grasslands are crucial for numerous bird, mammal, and endangered aquatic species; 2) The Lower Madrean Woodlands which occurs at intermediate elevations, generally above 4500 or 5000 feet. It is a mild winter/wet summer woodland that can be shrubby in places. Evergreen oak woodlands, understory grass and pinyon-juniper woodland occupies parts of the region. Riparian areas of cottonwood, sycamore, and willow are valuable to the neotropical birds and other wildlife of the area; and 3) The Madrean Pine-Oak and Mixed Conifer Forests occurs above 6500'. The region includes ponderosa pine-oak forests, ponderosa pine forests, montane fir forests, and mixed conifer forests.

[88] The Arizona Upland/Eastern Sonoran Basins ecoregion includes the broad alluvial plains, fans, and bajadas that occur between the higher relief mountain ranges. Elevations are mostly 1500 to 3000 feet, but are as low as 900 feet in the north and as high as 3600 feet on some upper slopes. Sediments filling the basins represent combinations of fluvial, colluvial, and alluvial deposits. In the plains and lower bajadas, creosote bush and bursage are still common, although here more thornscrub elements of the Sonoran Arizona Upland begin to occur.

[89] EPA could not find any statement in the *Lowery et. al. 2016* proposal comparing the value of the mitigation site with xeroriparian habitat.

[90] HMMP, p. 45. See EPA's *Environmental Consequences of the Proposed Rosemont Copper Mine: Significant Degradation to Waters of the United States* dated October 5, 2017 (revised November 30, 2017) describing the significant importance of Madrean Archipelago habitat in the Cienega Creek watershed.

management agency and their intention to implement ILF projects in all areas of the state where suitable projects are identified and approved.[91] Establishment of Program SA does not imply that ILF project sites located within the same Program SA can automatically serve as mitigation throughout the Program SA. The SA for the LSPRWA project site has not yet been determined since the LSPRWA proposal has not been approved by the IRT. The Public Notice for *Re-authorization of AGFD's Existing In-Lieu Fee Program* states, "Proposed service areas for individual ILF projects will be identified in site-specific mitigation plans, based on an analysis of the extent of ecologically similar areas…"[92] AGFD's First Amended ILF Instrument also requires ILF sponsors to include proposed service area information when adding ILF projects to their Program Enabling Instrument.[93]

The approach to establishing an appropriate SA for an ILF Project Site must be consistent with the 2008 Mitigation Rule.[94] The Mitigation Rule takes a watershed approach through the strategic selection of mitigation sites within watersheds in order to maintain and improve the quality of aquatic resources within a watershed. The rule requires that the size of watershed addressed using a watershed approach should not be larger than is appropriate to ensure that the aquatic resources provided through compensation activities will effectively compensate for adverse environmental impacts resulting from activities authorized by DA permits.[95]

The HUC-4 SA for the AGFD Program is not the appropriate SA for the LPSRWA site. Additionally, the First Amended ILF Instrument does not guarantee that Corps will accept use of the Program Credits for a specific project, and authority for approving use of the ILF Program for Compensatory Mitigation lies with the Corps.[96]

**The LSPRWA Has Not Been Approved by the IRT**.

The IRT has not approved the mitigation design, crediting or SA for the LSPRWA. Therefore, from a regulatory perspective, it would be inappropriate to assume this ILF project site would provide mitigation for the mine's project impacts. Given the significant differences between the ecosystems of the LSPRWA site and the Rosemont mine site, the LSPRWA would not be an appropriate ILF project site to offset project impacts. Any advance credits sold by the AGFD in anticipation of LSPRWA approval results in risk as the ILF sponsor assumes all legal responsibility for fulfilling Compensatory Mitigation requirements for USACE authorized activities for which fees have been accepted.[97] Should the IRT approve a LSPRWA SA located outside the boundaries of the mine's impacts, the AGFD would be required to find another suitable compensatory mitigation ILF project site and conduct land acquisition, initial physical and biological improvements by the third full growing season after the first advanced credit is

[91] *First Amended In-Lieu Fee Enabling Instrument Arizona Game and Fish Department In-Lieu Fee Program dated November 12, 2014.* (First Amended ILF Instrument)
[92] Public Notice SPL-2012-00541-MB dated October 15, 2012. pp. 5-6.
[93] *First Amended In-Lieu Fee Enabling Instrument Arizona Game and Fish Department In-Lieu Fee Program dated November 12, 2014. Exhibit C Instrument Modifications*
[94] Mitigation Rule.
[95] Ibid. 33 CFR 332.8(c)(4).
[96] *First Amended In-Lieu Fee Enabling Instrument Arizona Game and Fish Department In-Lieu Fee Program dated November 12, 2014.* p.14.
[97] Ibid. F.6 Transfer of Credits p.15.

secured by a permittee.[98] This effectively transfers mitigation responsibility from the Rosemont to AGFD for impacts to the Rosemont Mine.

**Rosemont Copper Company Should Mitigate for impacts to the AGFD ILF Cieneguita Wetlands Project Site from Construction of the Mine.**

In 2006, the AGFD developed an ILF project site at the Cieneguita Wetlands Legacy site. By September, 2007, the site sold 40 acres of wetland credits, which serve as compensatory mitigation. If constructed, the Rosemont Mine would cause groundwater drawdown resulting in the degradation of the Cieneguita wetlands at the AGFD ILF site.

According to the Supplemental Information Report (SIR), wetlands within Lower Empire Gulch, including the Cieneguita Wetlands will experience degradation of water quality, contraction of pool volume and surface area impacting aquatic vegetation and obligate plants. The SIR states that pools associated with the Cieneguita wetlands will be reduced in volume anywhere from 25-92% of their original volume.[99] In consideration of climate change, pool volume can reach as low as 8-37% of their original volume.[100]

The wetland areas adjacent to Cienega Creek were analyzed in the SIR due to their importance to biological resources and close proximity to Empire Gulch where higher levels of drawdown are predicted. In addition, the Cieneguita wetlands, located within the Empire Gulch floodplain upstream from the confluence with Cienega Creek, have been identified as a key reach.[101]

Analysis of the mine's impacts concludes a high likelihood the Cieneguita wetlands will be degraded by the mine, yet there has been no mitigation proposed to offset wetland losses at the ILF mitigation site. Rosemont Copper should be responsible for the degradation of any existing mitigation site caused by their mining activities.

**Additional Questions and Comments**

1. Was the basis for calculating the acreage of portions of Sonoita Creek to be filled based on the 5-year discharge? The 5-year discharge was used to identify the OHWM and thereby quantify the acreage of WOUS for purposes of determining reestablishment mitigation credit.
2. The HMMP proposes 12.1 acres of channel rehabilitation along lower Sonoita Creek beginning at the Sonoita Creek – SCR Channel confluence and continuing downstream for approximately 2,511 feet. These activities will require work below the existing OHWM (*i.e.*, areas the 5-year flow line). The proposal will excavate a bench out of the existing bank to accommodate the 2-year return flow. The work will also likely result in the discharge of excavated alluvial bank material into the existing channel. In addition, three existing ephemeral tributaries flowing to the agricultural field from the east will be

[98] Ibid. 33 CFR 332.8(n)(4)
[99] *Supplemental Information Report Rosemont Copper Project. USDA Forest Service Southwest Region. May 2015 (Rev. June 2015).* p. 139.
[100] SIR, p. 140.
[101] SIR, p. 67. Key reaches were selected because they represent core areas of biological importance.

extended to join the reconstructed Sonoita Creek. Design drawings in the HMMP depict channel reconstruction extending upstream beyond the floodplain along existing jurisdictional watercourses.[102] These activities will require authorization under Section 404 of the CWA and mitigation for direct and secondary impacts should be assessed and fully mitigated.

[102] Attachment 2, Tributary Channel Details, WET Drawing 17