From: Goldmann, Elizabeth []
To: jsims@blm.gov [jsims@blm.gov]
CC:
Subject: FW: EPA letter - Analysis of 404 CWA mitigation proposals for proposed Rosemont Mine
Sent:

Hi Jeff

I understand Ms. Hillman is the new Tucson Office Manager. I sent her the email below.

Thanks, Elizabeth

From: Goldmann, Elizabeth
Sent: Tuesday, November 12, 2013 1:06 PM
To: 'Vhillman@blm.gov'
Subject: EPA letter - Analysis of 404 CWA mitigation proposals for proposed Rosemont Mine

Dear Ms. Hillman,

For your information, I have attached a letter from U.S. EPA to the U.S. Army Corps of Engineers dated November 7, 2013 regarding an analysis of the compensatory mitigation proposals for the proposed Rosemont Mine.

If you have any questions, please call Jason Brush, Manager of the Wetlands Office, at 415-972-3483, or have your staff contact me at 415-972-3398.

Sincerely,

Elizabeth Goldmann

Physical Scientist

Wetlands Office, Region IX

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

NOV 07 2013

Colonel Kim Colloton
District Engineer, Los Angeles District
U.S. Army Corps of Engineers
P.O. Box 532711
Los Angeles, California 90053-2325

Subject: Analysis of updated draft Clean Water Act §404 Compensatory Mitigation Proposals for Rosemont Mine, Pima County, Arizona

Dear Colonel Colloton:

On September 10, 2013, our regulatory managers and senior staff met to discuss impacts from the proposed Rosemont Mine and recent conceptual compensatory mitigation proposals. We subsequently received the 4-page *Rosemont Copper Project Conceptual Habitat Mitigation and Monitoring Plan Summary* (Summary) on September 25, 2013. As part of ongoing coordination under our agencies' Memorandum of Agreement, enclosed is our analysis of the Summary for consideration in your permit decision. Briefly, our review reaffirms conclusions from our January 25, 2013 letter (also enclosed) to the U.S. Army Corps of Engineers (Corps) on mitigation that currently proposed activities would be insufficient to avoid "significant degradation" of the aquatic ecosystem. Such degradation would be a substantial and unacceptable impact to aquatic resources of national importance, including the "Outstanding Waters" of Davidson Canyon and Cienega Creek.

The Summary discusses three regional sites where waters of the U.S. (waters) could be preserved and/or potentially enhanced for Clean Water Act (CWA) §404 mitigation credit. As discussed at our September 10th meeting and described in the attached analysis, we agree with your staff's assessment that two of the three sites would not provide appropriate compensatory mitigation for impacts to waters from the Rosemont Mine project. We also agree that one site, immediately below Pantano Dam, would benefit from enhancement activities if water supplies were available and design uncertainties could be overcome, and that those activities could then lend themselves to an In Lieu Fee (ILF) program arrangement for 404 impacts from small projects (*e.g.*, flood control and highway projects). However, the proposal at Pantano Dam is inadequate to compensate for impacts proposed to be permitted at Rosemont Mine.

The proposed copper mine lies within the Cienega Creek watershed, which contains regionally rare, largely intact mosaics of some of the highest quality stream and wetland ecosystems in Arizona. The construction of the mine would permanently fill approximately 18 miles of streams across an

approximately 5,000-acre project footprint and result in the fragmentation of an intact natural hydrologic landscape unit composed of hundreds of streams stretching many linear miles. The mine pit would reverse groundwater flow direction well beyond the project, and cause permanent regional drawdown of groundwater that currently sustains hundreds of acres of springs, seeps, streams, and wetlands and their aquatic and wetland dependent fish, wildlife and plant species.[1] The persistence and health of aquatic resources associated with Cienega Creek and its major tributaries of Barrel Canyon, Davidson Canyon, Empire Gulch, Gardner Canyon and other waters are dependent on contributions of water from the site of the proposed mine.

These impacts would be a direct consequence of the CWA 404 permit action under consideration by the Corps, and represent a large and permanent change in the regional ecology of the Cienega Creek watershed to a significantly drier, less biologically diverse stream and riparian condition. The region in question includes vast areas of National Forest, federal land preserve, County preservation areas and state-designated "outstanding" resource waters, and is home to ten federally listed endangered or threatened species. In this context, the EPA finds the proposal to enhance the approximately 250-acre Pantano Dam site to be out of balance with the impacts to be permitted.

In our attached discussion, we describe the resource at risk, the current mitigation actions proposed, and key policy considerations related to use of ILF programs, criteria for setting and interpreting mitigation ratios under Corps procedures, and compliance with the CWA 404(b)(1) Guidelines. Based on the information currently available, the permit application does not appear to comply with The Guidelines at 40 CFR 230.10(b), (c) and (d) and should not be permitted as proposed. We hope you will find these comments useful in consideration of your pending permit decision, and we look forward to working closely with your staff on the Interagency Review Team (IRT) for mitigation projects under ILF programs in Arizona. We also remain available to assist the Corps and applicant with a risk-based assessment to determine the full extent of indirect (or "secondary") impacts to waters and an appropriate functional assessment model to scale compensatory mitigation activities under a watershed approach.

Thank you for your ongoing partnership implementing CWA programs. If you have any concerns or questions, please do not hesitate to contact me at (415) 947-8707, or have your Regulatory Division Chief contact Jason Brush at (415) 972-3483.

Sincerely,

Jane Diamond
Director
Water Division

[1] PAFEIS, July 3013, Chapter 3, *Seeps, Springs and Riparian Areas*

cc: Marjorie Blaine, U.S. Army Corps of Engineers
Jim Upchurch, U.S. Forest Service
Mike Fulton, Arizona Department of Environmental Quality
David Baker, Bureau of Land Management
Steven Spangle, U.S. Fish and Wildlife Service
Chuck Huckelberry, Pima County
Suzanne Shields, Pima County Regional Flood Control District
Applicant

Attachments:

(1) EPA Evaluation of Impacts and to the Aquatic Ecosystem and Proposed CWA Compensatory Mitigation for the Rosemont Mine

(2) EPA letter to Corps LA District dated January 25, 2013

ATTACHMENT
EPA EVALUATION OF IMPACTS TO THE AQUATIC ECOSYSTEM AND PROPOSED CWA COMPENSATORY MITIGATION FOR THE ROSEMONT MINE
PIMA COUNTY, ARIZONA

I. INTRODUCTION

The U.S. Environmental Protection Agency, Pacific Southwest Region (EPA) has prepared this document to assist the Corps in determining compliance with the Clean Water Act §404(b)(1) Guidelines (Guidelines), particularly with regard to significant degradation of the aquatic ecosystem (40 CFR 230.10(c)), and the compensatory mitigation that may be necessary to avoid it.

The document utilizes information presented and referenced in the Preliminary Administrative Final Environmental Impact Statement (PAFEIS), dated July 2013, prepared by Coronado National Forest; Rosemont's *Rosemont Copper Project Conceptual Habitat Mitigation and Monitoring Plan Summary* (Summary), dated September 2013; meetings with Rosemont, the Corps and Pima County; site visits by EPA staff; and other information contained in documents from multiple sources. EPA's careful review of this information, including our assessment of the full range of probable direct and secondary adverse impacts to the aquatic ecosystem resulting from permit issuance, leads us to conclude that the proposed Rosemont Mine project does not comply with 40 CFR §§ 230.10(b), (c) and (d) of the Guidelines and should not be permitted as proposed.

II. ADVERSE ENVIRONMENTAL IMPACTS TO THE AQUATIC ECOSYSTEM

The environmentally-damaging nature of the proposed project (*i.e.*, a large-scale, long-lasting, extractive mineral mine) and its geographic location (*i.e.*, large, high-functioning, undisturbed landscape) will combine to cause and/or contribute to significant, persistent degradation of the regional aquatic environment. This sensitive area is largely within National Forest boundaries, is adjacent to both federal and local nature preserves, is home to ten federally listed species, and is a hydrologic source area for state designated Outstanding Resource waters. These aquatic resources are recognized as being of regional and national importance.

The project will impact aquatic and wetland resources within Pima County's Cienega Creek Natural Preserve and the Bureau of Land Management's (BLM) Las Cienegas National Conservation Area (NCA). The National Landscape Conservation System was established to protect some of the most remarkable public lands in the American West.[2] At its nearest point, the mine site lies approximately 3 miles from the NCA. The Las Cienegas NCA was established by Congress and the President, in large part, to conserve, protect and enhance the unique and nationally important aquatic, wildlife, vegetation and riparian resources such as those in the Cienega Creek watershed. Six types of rare ecosystems are protected within the NCA, including aquatic ecosystems such as cienegas (marshlands), cottonwood-willow riparian wetlands, and mesquite bosques.

[2]http://www.blm.gov/wo/st/en/prog/blm_special_areas/NLCS.html

Impacts from the proposed project include direct fill and secondary impacts which will result in the loss, conversion and functional degradation of aquatic and terrestrial habitats over several thousand acres. The consequence of groundwater drawdown from the proposed mine pit is the indirect loss or conversion of hundreds of acres of riparian vegetation, including wetlands, and the drying of streams currently characterized by permanent flow. These large-scale shifts in the amount and species composition of riparian areas and the loss of stream surface flows is an example of an ecological regime shift; a large threshold change in the ecological state or condition of the Cienega Creek watershed to drier conditions.

The project site supports 101.6 acres of waters, including wetlands associated with springs and seeps. The project will adversely affect three types of Special Aquatic Sites (wetlands, sanctuaries and refuges, and riffle and pool complexes, see 40 CFR 230.40-45) as well as Tier 3 "unique waters"; portions of Davidson Canyon Wash and Cienega Creek are designated by the State of Arizona as "Outstanding Arizona Waters" (section 303 of the CWA and 40 CFR 131.12). EPA has identified these waters as "Aquatic Resources of National Importance" pursuant to the CWA §404(q) MOA.

Filling streams, constructing the massive mine pit (2,900 feet deep), and land clearing disturbances will dramatically alter in perpetuity the topography and surface and subsurface hydrology within the Cienega Creek watershed. Placement of permanent fill and other mine-related features within this undisturbed landscape will fragment high-functioning blocks of aquatic and terrestrial wildlife habitat used as foraging and movement corridors, rendering surrounding habitats less suitable for fish and wildlife. [3]

Direct Impacts

The proposed project will directly fill 39.97 acres of waters, including a largely undisturbed network of 18 linear miles of streams comprised of up to 154 individual drainages. In addition, five springs and their associated wetlands will be filled.

Indirect / Secondary Impacts

EPA's Guidelines (40 CFR 230.11(h)) and the 2008 Mitigation Rule (40 CFR 230.93) clearly state the need to compensate for losses of waters due to secondary impacts. The requirement that secondary impacts be fully compensated is consistent with standard practice for projects of this magnitude and essential given that the range, extent and severity of secondary adverse impacts upon aquatic resources are as significant as the direct impacts.

To the extent the Corps may wish to utilize the assessment of secondary impacts provided by the Forest Service's NEPA document for the Corps' decision document, the Corps should consider the limitations of the current assessment. As described below, secondary impacts have yet to be analyzed upstream of

[3]For example, the U.S. Fish and Wildlife Service's biological opinion concludes that, because of the indirect effects of groundwater drawdown, the proposed project is likely to adversely affect designated critical habitat for the federally-listed endangered Gila chub and threatened Chiricahua leopard frog, and likely to adversely affect the federally-listed endangered Gila topminnow.

the mine and downstream of the mine beyond the confluence of Davidson Canyon and Cienega Creek. Moreover, the secondary impacts that are currently assessed by the Forest Service rely upon models that, while valid, lack the sensitivity to detect adverse impacts to much of the affected arid aquatic environment. These assessments will be necessary under the Guidelines to make defensible decisions regarding the regulatory restrictions on discharges and the possibility of mitigation.

Lost Functions to Waters Upstream of Mine - As discussed above, the project site supports 101.6 acres of waters of which 39.97 acres will be directly impacted. The remaining 62 acres of waters on the project site will likely be indirectly impacted. Some of these secondary impacts are accounted for with regard to reduced surface stormwater flows in Barrel and Davidson Canyons within the project area downstream of the mine site. However, there will also be secondary impacts to drainages upstream of the mine. These impacts include severing surface hydrology and connectivity, decreasing quality of wildlife habitat, and fragmentation of animal movement corridors. We believe that secondary impacts to waters that lie upstream from the mine site need to be more completely quantified and ultimately mitigated.

Reductions in Surface Water Flow Downstream of the Mine - At the request of the Corps, Rosemont estimated indirect impacts to jurisdictional waters in Barrel and Davidson canyons downstream from the proposed mine due to modeled reductions in surface water volume resulting from the Rosemont Project.[4] Secondary impacts to downstream waters were estimated at 28.4 acres during mine operation. The estimate shows impacts at the confluence of Cienega Creek and Davidson Canyon, but ceases its analysis at that confluence. EPA believes data showing an impact at this confluence is a signal that impacts are likely to extend some point beyond this confluence, and recommend that secondary impacts to waters downstream from the mine site include the reach of Cienega Creek from its confluence with Davidson Canyon downstream to Pantano Dam. Certainly, reductions in surface water flow volume have the potential to adversely affect other surface waters, including wetlands, in Cienega Creek downstream from the confluence of Davidson Canyon. These surface water impacts are likely to be significant, especially given the cumulative effects of predicted reductions in groundwater levels from the proposed mine pit.

Groundwater Drawdown - Secondary effects on the aquatic environment include dramatic and persistent changes to surface hydrologic and hydraulic regimes driven by groundwater hydrology.[5] Portions of sensitive and regionally significant downstream receiving waters, including Outstanding Arizona Waters, rely in part or whole on groundwater contributions to baseflow. Secondary impacts from project-related groundwater drawdown will reduce streamflows, increase water temperatures, and disrupt breeding, spawning, rearing and migratory movements, or other critical life history requirements of fish and wildlife resources.

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[4] Email from Brian Lindenlaub, Westland Resources to Elizabeth Goldmann, EPA, dated August 16, 2013.

[5] Following mine closure the pit lake will continue to permanently divert, capture and evaporate 35-127 acre-feet of mountain-front groundwater recharge in perpetuity. This natural groundwater would otherwise replenish sensitive downstream receiving waters (PAFEIS. July 2013, Chapter 3, *Alternatives, Including the Proposed Action*; Comment Letter from Pima County to U.S. Forest Service on PAFEIS, dated August 14, 2013). During active mining, the pit will cause significant losses to recharge between 18,000-26,000 acre-feet, or about 900-1300 acre-feet annually.

According to the PAFEIS, eleven springs are highly likely to be indirectly impacted due to groundwater drawdown. An additional fifty-nine springs may be indirectly impacted due to drawdown. An additional 13 riparian areas associated with springs would be directly or indirectly disturbed with high certainty and an additional 36 riparian areas associated with springs may be indirectly disturbed. Although not formally delineated, subsets of these riparian areas contain jurisdictional wetlands and other waters of the U.S.[6]

Modification to the water balance along portions of Davidson Canyon, Empire Gulch, Gardner Canyon and Cienega Creek will adversely impact special aquatic sites. The 2,900-foot deep mine pit will permanently convert the hydrologic regime of the site from a water source area to a terminal sink, significantly lowering the surrounding regional aquifer. The pit will permanently reverse the natural direction of groundwater flow toward and into the mine pit, and away from the sensitive aquatic habitats in Las Cienegas NCA and Cienega Creek Natural Preserve. This will add to a baseline trend of decreasing groundwater, causing a permanent reduction of water in streams and wetlands along Empire Gulch, Mattie Canyon, Gardner Canyon and Cienega Creek with potential adverse impacts to over 30 seasonal and perennial wetlands, and threatened and endangered aquatic habitat dependent plants, fish and wildlife.

Groundwater drawdown will result in stress and degradation of riparian habitat, including wetlands. The PAFEIS estimates that indirect effects from the proposed mine project will change the composition of 1,071 acres of riparian vegetation along Empire Gulch (*i.e.*, 407 acres of hydroriparian) and Barrel and Davidson canyons.[7] Several additional springs, seeps, streams, emergent marshes, and riparian areas within the project assessment area likely contain jurisdictional waters, including wetlands, which will be indirectly impacted by the proposed project, primarily from groundwater drawdown.[8]

Sensitivity and Applicability of Groundwater Models – All three groundwater models utilized by the Forest Service show an increasing, long-term trend of significant declines in groundwater levels due to

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[6] A June 2013 field inspection by EPA, BLM and Pima County staff estimates the presence of tens to hundreds of acres of jurisdictional waters/wetlands in the assessment area likely to be impacted by groundwater drawdown. To date, the geographic extent of potentially jurisdictional waters along Empire Gulch, Gardner Canyon, Cienega Creek, and the other noted waters, has not been formally delineated and therefore secondary impacts to jurisdictional waters have not been quantified.

[7] PAFEIS, July 2013, Chapter 3, *Seeps, Springs and Riparian Areas*

[8] For example, the PAFEIS states that for Empire Gulch and Cienega Creek all three groundwater models predict near- and long-term stream flow drawdown along Upper Cienega Creek. Comparing these projected model drawdowns with minimum monthly stream flows (2001-2010 period of record) for Upper Cienega Creek indicates that the predicted drawdown would cause the stream to go dry during critical low flow months (Chapter 3, Figure 70). The PAFEIS further concludes that a small change in stream flow could result in the loss of surface flow during these drought periods (PAFEIS, Chapter 3, *Seeps, Springs and Riparian Areas*). In addition, the PAFEIS states that Upper Cienega Creek receives surface water [and groundwater] flow from Empire Gulch and the potential exists for a reduction in Empire Gulch stream flow to result in reductions in Cienega Creek's stream flow as well. Small amounts of groundwater drawdown could affect near-and long-term stream flow in Empire Gulch and Cienega Creek and hydrologic changes predicted for Empire Gulch from drawdown could have a potential effect on springs and stream flow, potentially shifting some or all of the stream length from perennial to intermittent (PAFEIS, July 2013, Chapter 3, *Seeps, Springs and Riparian Areas*). Pima County, as well as the BLM which manages the NCA, have expressed similar concerns regarding the secondary effects to Empire Gulch and Cienega Creek surface waters from groundwater drawdown (Comments submitted to the Forest Service by Pima County and BLM on the PAFEIS, dated August 14, 2013). In addition, secondary impacts to intermittent surface flows are likely to occur in Box Canyon, Sycamore Canyon, Adobe Tank Wash, and Mulberry Canyon which all lie within the modeled 5-foot drawdown area (Comments submitted to the Forest Service by Pima County on the PAFEIS, dated August 14, 2013).

the mine pit. Although there are limitations in groundwater model accuracy, the drawdown at Upper Empire Gulch Spring is within the accuracy of the models to predict (*i.e.*, 5- foot drawdown contour) and therefore, we believe impacts to streamflow and wetlands from drawdown within Empire Gulch are reasonably certain and will be significant.[9] We also believe that there is a high potential for many additional waters, including Cienega Creek, Gardner Canyon and others, to be adversely impacted by mine pit drawdown. These resources can be sensitive to changes in groundwater supply measured in inches, and thus EPA has questioned the applicability of even the best available modeling with respect to answering questions about probable impacts.

To address the limitations in the accuracy of the groundwater models, EPA recommends that a risk-based or weight-of-evidence approach be developed to combine multiple lines of evidence on mine projects' impacts from groundwater drawdown. Combining various lines of evidence reduces the probability of making false conclusions based on a single line of evidence (*e.g.*, relying only on models with limited accuracy), allows the use of multiple methods or information sources about the situation being assessed (*e.g.*, likely mine project effects on ground and surface water resources), and consequently allows decision makers to make better informed decisions.

III. ROSEMONT COPPER MINE - 404 CWA MITIGATION

To EPA's knowledge, no compensatory mitigation plan compliant with the regulations has been prepared to date. However, EPA has provided written comments to the Corps and the USFS on different versions of Rosemont's proposed mitigation activities.[10] The most recent information is a 4-page "Summary" dated September 2013, which appears to be a stand-alone document rather than a summary of a more substantive document or plan. A complete mitigation plan that satisfies each element of the 2008 Mitigation Rule will be necessary to issue a 404 permit.

Based on the Summary, proposed 404 mitigation consists of: 1) enhancement of waters and non-aquatic upland habitat at Cienega Creek below Pantano Dam, and, if necessary 2) conservation and establishment of waters at Sonoita Creek Ranch (SCR) and 3) conservation of a 160 acre parcel along a portion of Mulberry Canyon.[11] These components are sequential; the SCR and Mulberry Canyon activities are presented as a contingency if an ILF project with sufficient credits is not available for Rosemont's purchase at Pantano Dam. To date, EPA is not aware of any supporting documentation or assessment demonstrating the mitigation proposed to offset impacts to waters is compensatory.[12]

Cienega Creek Enhancement below Pantano Dam

Rosemont has acquired the rights to purchase 1,122 acre-feet per annum of surface water rights, a groundwater well, and an approximately 2-acre parcel at Pantano Dam supporting open water and

[9] PAFEIS, Chapter 3, Biological Resources, pp. 86-87.
[10] EPA letter to the Corps dated January 25, 2013 addressing mitigation plans at SCR. EPA letters to the USFS dated February 21, 2013 and August 15, 2013, responding to mitigation as presented in the DEIS and PAFEIS.
[11] EPA meeting with the Corps on September 10, 2013 and Rosemont's Summary dated September, 2013.
[12] See EPA letter dated January 25, 2013 regarding the inadequacies of the "functional assessment" for SCR.

riparian habitat. Rosemont proposes to allocate 826 AFY of water rights to an ILF sponsor for development of an ILF project below Pantano Dam. Based on Pima County monitoring, the actual average "wet" water at the site is 360 AFY. The project undertaken by the third party sponsor would include various enhancement actions to generate "credits" under the ILF program for prospective 404 permittees. If Rosemont were to use an ILF program for its mitigation obligations, the total credits needed would be based upon calculation of a mitigation ratio using the Corps' Mitigation Ratio Checklist. Although the crediting mechanism and amount necessary for Rosemont's impacts are yet to be determined, Corps staff has stated that Rosemont's need is anticipated to be at least equal to all the credits generated by the Pantano Dam ILF project as currently described. To mitigate all secondary impacts, Rosemont proposes credit for the water rights transfer, the 2-acre parcel and the water well. [13]

On June 19, 2013, EPA met with the Corps, Pima County Regional Flood Control District (Pima County) and Tucson Audubon Society to discuss the feasibility of such an ILF project in Cienega Creek, downstream of Pantano Dam. On September 4, 2013 the Corps met with Pima County to discuss a revised ILF project. Under the current plan, Pima County as an ILF sponsor would accept 826 AFY of water rights from Rosemont to enhance approximately 150 acres of non-aquatic upland habitat, and 91 acres of Cienega Creek primarily through the release of water at several distribution points. The project would also create in-channel "microbasins" and channel modifications (berms) aimed at correcting head cutting and erosion.[14]

While EPA supports returning surface water to this reach of Cienega Creek, it is uncertain whether proposed water distribution points along Cienega Creek will result in any significant enhancement of aquatic functions; much of the released water will likely drain into the porous substrate and deep aquifer without functionally meaningful improvement in riparian habitat. This concern, and the availability of sufficient wet water for success, have been echoed by the ILF sponsor themselves:

> *We have concluded that significant uncertainty exists regarding our ability to mitigate for streams, seeps, and springs based on approximately 20 years of data documenting progressively declining surface water within Cienega Creek...We estimate that approximately 700 AFY are needed to sustainably raise the groundwater level downstream of the dam to a level that would support hydro-riparian species without continued surface irrigation. The current baseflow is insufficient and may actually decrease if the downward trend in surface water quantity continues. Ongoing irrigation is not a sustainable strategy for the long-term survival of hydro-riparian species nor does it meet the conditions of the 2008 404 Mitigation Rule...The diminishing base flows in Cienega Creek, from studies conducted for over 20 years and most recently by the Pima Association of Governments, is a trend that is expected to continue in to the future. It is possible that, under the best of circumstances, there may only be enough surface flow to maintain the existing riparian vegetation upstream of the dam in the future, if that.* (pp.1-2).[15]

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[13] The Summary is unclear, but it appears the ILF credits would be purchased to mitigate only direct fill impacts.

[14] Per EPA phone call September 9, 2013 with Chris Cawein, Pima County, 826 AFY of water rights approximates 350 AFY or less of wet water. Moreover, long-term monitoring clearly demonstrates that there is insufficient wet water available for the proposed project *(i.e.,* no dependable water is available for 40% of the 1908 senior water right, and perhaps none for the remaining water rights).

[15] Letter from Pima County Regional Flood Control District to Marjorie Blaine, Crops, dated July 31, 2013.

Since the mine itself will worsen this baseline condition of diminishing water supplies, EPA questions the viability of ILF or permittee-responsible mitigation below Pantano Dam. [18, 16]

EPA has several concerns with the ILF proposal which in our judgment render the project untenable for the mine's compensatory mitigation needs:

1. **High risk and uncertainty** – To be successful, the project would depend on wet water from rights that haven't produced at the necessary amounts, would require artificial means of retarding or eliminating infiltration (*i.e.,* liners), and is likely to need maintenance in perpetuity.

2. **Ecologically inappropriate** – The project, if successful, would provide credits to mitigate impacts to a high functioning water source area by enhancing a water sink area. The project would purport to replace the functions of 18 linear miles of streams across a landscape with a single segment of stream less than two miles in length.

3. **Counterproductive hydrological interventions** – Rather than provide enhancement, proposed erosion protection structures upstream of Colossal Cave Road may actually exacerbate erosion problems elsewhere along Cienega Creek, further reducing the project's overall value for aquatic resource compensation. Similarly, planned in-channel rock/earthen berms for slowing and retaining surface flows in tributary channels will likely quickly back up with sediment, or be washed away during large storm events.

4. **Jurisdictional area** – EPA believes the reach and extent of jurisdictional waters may be significantly overestimated at the Pantano Dam site. Most of the area proposed for enhancement is non-aquatic, upland habitat.

5. **Mitigation Rule** – the proposal lacks the certainty and other assurances required under the 2008 regulations (such as enforceable and ecologically meaningful success criteria).

6. **Temporal loss** – The amount of time likely required to sever and transfer water rights to the ILF sponsor also makes the consideration of any ILF credits as mitigation for Rosemont Copper unacceptable. The approval process could take two years or more and there are no guarantees Rosemont Copper will obtain approval from Arizona Department of Water Resources to sever and transfer these water rights should irrigation districts and other water right holders object.[17] Although there is discussion of purchasing water rights directly for Pima County, to avoid potential sever and transfer issues, the process issues have not been resolved.

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[16] During the June 19, 2013 meeting with the Corps, Pima County and Tucson Audubon, Pima noted there is incomplete information on the existing geologic condition below Pantano Dam. The potential exists for surface water to percolate deep into the aquifer without providing necessary hydrologic conditions to support enhancement of existing riparian.

[17] p. 44, Supplemental to the Biological Assessment Proposed Rosemont Copper Mine Santa Rita Mountains, Pima County, Arizona Nogales Ranger District, dated February 2013.

Sonoita Creek Ranch

The 1,200-acre Sonoita Creek Ranch (SCR) is six miles south of Sonoita, Arizona. Approximately 590 acre-feet per annum of water rights are appurtenant to the ranch. The SCR proposal described in Rosemont's Summary proposes a site protection instrument on the 1,200-acre ranch, and a permittee-responsible mitigation project including modification of grazing and an unspecified amount of creation of aquatic habitat within the floodplain of Sonoita Creek.

The Corps has determined the Sonoita Creek Ranch (SCR) site is not acceptable compensatory mitigation under § 404 CWA for impacts from the Rosemont Mine.[18] EPA concurs with this determination. EPA recognizes the conservation value of Sonoita Creek Ranch, but given the existing geomorphology of the site, we remain highly skeptical of the proposals to create and enhance wetlands on the ranch. In addition, the site is far removed from the Davidson Creek and Cienega Creek watersheds and therefore, does not provide ecological benefit for the loss of acreage and function that would occur from the proposed copper mine.

Preservation of 160-acre parcel in Mulberry Canyon

In the event that mitigation credits beyond Pantano Dam and SCR are required for the Rosemont Project, the Summary suggests that additional mitigation may be provided by preservation of the 160-acre Mulberry Canyon parcel. There is no information on the extent of aquatic resources on the site. Under this proposal, Rosemont would record a site protection instrument prohibiting certain land uses on the parcel (Summary, p.4).

Pursuant to the 2008 Mitigation Rule, preservation as 404 mitigation can be used when the resources to be preserved provide important physical, chemical or biological functions for the watershed; contribute significantly to the ecological sustainability of the watershed; and are under threat of destruction or adverse modification (33 CFR Part 332.3(h)).

EPA does not believe preservation of this parcel is appropriate compensation for project impacts. This proposed mitigation parcel does not have water rights. The parcel is surrounded by USFS land and is not under any foreseeable threat of destruction or adverse modification. In addition, the mitigation parcel lies downstream from the mine. The proposed Mulberry Canyon mitigation parcel would be adversely affected by the very impacts it is meant to mitigate.[19]

The Corps has determined the Mulberry Canyon parcel is not acceptable compensatory mitigation under § 404 CWA for impacts from the Rosemont Mine.[20] EPA concurs with this determination. Indeed, Mulberry Canyon represents a potential secondary impact area of the project itself that should be assessed, and for which Rosemont may be required to mitigate.

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[18] EPA-Corps meeting September 10, 2013; phone conversation between David Castanon and Jason Brush September 26, 2013.
[19] PAFEIS, July 2013, Chapter 3, *Seeps, Springs and Riparian Areas.*
[20] Phone conversation between David Castanon and Jason Brush dated September 26, 2013.

Additional Conservation Lands

Rosemont Copper has developed a Conservation Lands Program, but has not presented this as part of proposed 404 mitigation. The program proposes conservation of lands surrounding the proposed mine to address federal and state endangered and sensitive species, cultural resources and public viewsheds. However, in a meeting with Rosemont and the Corps on August 7, 2013, Rosemont suggested that 1,700 acres at Fullerton Ranch and 940 acres at Helvetia Ranch Annex North might be considered as mitigation under §404 CWA. The Corps determined these conservation lands were not suitable as mitigation under §404 CWA.[21] EPA concurs with the Corps' determination.

Adequacy of Proposed §404 CWA Mitigation

The 2008 Mitigation Rule states, *The fundamental objective of compensatory mitigation is to offset environmental losses resulting from unavoidable impacts to waters of the United States authorized by DA permits* (33 CFR 323.3(a)(1)). EPA has identified significant flaws in Rosemont's plans for offsetting the project's environmental harm. First, the proposals lack an adequate functional assessment characterizing the services performed by streams/springs and wetlands directly and indirectly impacted by the project, or of those resources at the proposed mitigation lands. Second, the compensatory mitigation proposals do not account for the interrelationship of the headwater streams and the surrounding terrestrial ecology and will not replace the high quality resources in the Cienega Creek watershed. Enhancement of existing waters and upland habitat (Pantano Dam) in the lower watershed would not offset the mine's impacts to high quality headwater streams. Third, despite some assurances inherent in ILF proposals, there is great ecological uncertainty in the Pantano Dam proposal. Based on the information to date, EPA finds the proposed mitigation grossly inadequate to compensate for mine impacts. In summary:

- There is no acceptable functional assessment of the mine site or proposed mitigation sites on which to make a determination how the proposed ILF or other proposals compensate for project impacts (2008 Mitigation Rule, 33 CFR 332.8(o)(2), 33 CFR 332.3(f)(1)), ILF Enabling Instrument, June 2013, p. 15);
- There is significant uncertainty whether the ecological condition at the ILF site is suitable to support the proposed mitigation;
- The ILF sponsors will not assume full legal responsibility for the required reestablishment of specific acreage of riparian vegetation downstream of the dam site;[22]
- Additional water rights are necessary to conduct enhancement downstream of Pantano Dam;
- Declining water levels due to drought and exacerbated by climate change, and the proposed mine, will continue to reduce the availability of water in Cienega Creek;
- The proposed ILF project, if approved, would consist of enhancement of existing waters/uplands, providing limited compensation for the loss of aquatic area and function in the watershed as a result of the proposed project;
- The SCR proposal would not benefit the watershed affected by the mine, and its ecological success and sustainability are unlikely, and;

[21] EPA-Corps meeting September 10, 2013 and phone discussion between Jason Brush and David Castanon September 26, 2013.
[22] Memorandum dated August 13, 2013 from C.H. Huckelberry, County Administrator to Pima County Board of Supervisors.

- Preservation of the Mulberry Canyon parcel is an inadequate compensatory measure because it is a probable impact site and is not under foreseeable threat from development.

Usefulness of the Standard Operating Procedure for Determining Mitigation Ratios

The Corps' Mitigation Ratio checklist is a standard operating procedure (SOP) in the South Pacific Division used for determining compensatory mitigation amounts. The SOP seeks to simplify compliance with the 2008 Mitigation Rule by applying stepwise criteria to arrive at a compensation ratio (acres replaced for acres lost). The SOP allows both qualitative and quantitative approaches, but consistent with the Mitigation Rule, requires use of functional or condition assessment data to inform a quantitative approach whenever practicable.

As currently applied, the calculation of a simple ratio through the SOP for a project of this scope and magnitude fails to meet the clear intent of Corps regulations at 33 CFR 320.4(r)(2), which state: *"...all mitigation will be directly related to the impacts of the proposal, appropriate to the scope and degree of those impacts, and reasonably enforceable."*

- The SOP (Checklist Step 3) recommends that a functional/condition assessment should be required for impacts over 0.5 acre or 300 linear feet. The mine would result in 95,040 linear feet of stream impact and 40 acres of fill.
- Absent functional or condition assessment data, it is all the more important that any ratios generated by the SOP be rigorously defensible. The SOP's maximum ratio adjustment of 4:1 for the qualitative method is without adequate justification, and inappropriate in this context of landscape-scale impacts. Particularly with non-aquatic habitat preservation, ratios higher than 4:1 are allowed under the SOP (Question 11 – June 2013, Corps' SOP training PowerPoint).
- Out of kind, preservation-dominated mitigation activities such as those proposed in the Summary fail to address the net loss of function and area within the hydrologic source area landscape.
- Section 4.0 of the SOP defines enhancement as, *"the manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource functions, but may also lead to a decline in other aquatic resource function(s)."* Proposed enhancement of non-aquatic upland is not considered enhancement in the SOP, but it is recognized in the Mitigation Rule (p. 19661) only when it has been demonstrated as critical for maintaining the integrity and sustainability of aquatic resource functions. A functional assessment is necessary to make this determination.
- EPA has noted several examples of significant risk and uncertainty above. The SOP notes: *"If too many uncertainty factors are identified this may indicate the overall mitigation proposal design is not acceptable."*(checklist #7, SOP PowerPoint).[23]
- Compensatory mitigation is required for secondary impacts (SOP checklist #9). Secondary impacts are not only wildly underestimated, but to our knowledge, only paper water rights,

[23] The Mitigation Rule Preamble notes the likelihood of success must be considered when evaluating compensatory mitigation proposals. If the potential for satisfying the objectives of a proposal is low, then alternative mitigation proposals with a higher likelihood of success should be required. Risk and uncertainty must be minimized as much as possible (p. 19633).

preservation of a 2-acre site, and retirement of an existing well have been proposed to date as compensation for secondary impacts.

- For ILF projects, an appropriate assessment method or other suitable metric must be used to assess and describe the aquatic resource types that will be restored, established, enhanced and or preserved. The number of credits must reflect the functional or condition assessment or other suitable metric (33 CFR 332.8).
- Separate assessments must be used for each resource impact (*e.g.*,springs, ephemeral waters) and for each mitigation type (*e.g.*, upland buffer preservation, in-stream enhancement)(SOP Section 7.3). The approach taken in the Summary appears to group all impacts into an acreage total and simply apply a ratio.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

JAN 25 2013

Colonel R. Mark Toy
District Engineer, Los Angeles District
U.S. Army Corps of Engineers
Attn: Regulatory Branch (SPL-2004-01399-MB)
5205 E. Comanche Street
Tucson, Arizona 85707

Subject: Draft Rosemont Copper Project Habitat Mitigation and Monitoring Plan (HMMP)

Dear Colonel Toy:

EPA Region 9 appreciates the Corps' ongoing coordination regarding your pending permit decision for the Rosemont copper mine, located on 4,750 acres of predominantly on U.S. Forest Service (USFS) lands in Pima County, Arizona. Enclosed please find comments reflecting our detailed technical review of the project's November 2012 HMMP and related documents,[1] which we trust will be useful to the Corps in advancing the project through the regulatory process.

In summary, we believe implementation of the HMMP would fail to fully compensate for the project's impacts to regulated waters. The methods used to assess aquatic functions at the project site and proposed mitigation sites are scientifically flawed, and therefore fail to adequately identify and quantify those functions. This fundamental error is then compounded by the attempt to establish appropriate compensation ratios. Among the most significant issues are:

- The failure to fully assess the direct, indirect and cumulative impacts from the proposed project;
- The functional assessment methodology does not provide any meaningful assessment of the functions of ephemeral systems across the proposed project and mitigations sites and significantly underestimates the function of impacted waters; and
- The habitat creation proposed at Sonoita Creek Ranch may not be ecologically sustainable and may not result in the creation of jurisdictional waters.

EPA remains concerned that substantial loss and/or degradation of water quality and other aquatic ecosystem functions are likely if the proposed mine is constructed. Although we are pleased to provide the enclosed detailed analysis of proposed compensatory mitigation, the applicant should be reminded that mitigation begins with the avoidance and minimization of impacts, and that compliance with 40 CFR 230.10(a) (alternatives) is prerequisite to assessing compliance with 40 CFR 230.10(d) (mitigation) or the requirements of Subpart J of the 404(b)(1) Guidelines.

[1] All documents November 2012 by WestLand Resources, Inc on behalf of Rosemont Copper Company: (a) *Functional Analysis of Impacted Waters of the U.S.* (RCFA); (b) *Sonoita Creek Ranch Functional Analysis and Mitigation Ratio Determination* (SCR); and (c) *State Route 83 Corridor and Davidson Parcels: Functional Analysis and Mitigation Ratio Determination* (SR83/Davidson).

Thank you for your ongoing partnership in implementing CWA programs. As additional information on this project's regulatory progress becomes available, please ask your staff to coordinate with Elizabeth Goldmann at (415) 972-3398 or Dr. Robert Leidy at (415) 972-3463.

Sincerely,

Jason Brush
Supervisor
Wetlands Office

Attachment

cc: Rosemont Copper Company
U.S. Forest Service
U.S. Fish and Wildlife Service

Rosemont Copper Mine
404 Comments on HMMP

Proposed Project Impacts

In our evaluation of the proposed HMMP, it is important to identify in advance the discrepancy that exists between EPA's and Rosemont's assessment of project impacts upon which the HMMP has been developed. In addition to other significant concerns (*e.g.,* functional analysis) described in this letter, the HMMP fails to provide compensation as required by the Guidelines and 2008 Mitigation Rule for the entire scope of direct and indirect/secondary project impacts associated with the proposed project.

The proposed project site supports 101.6 acres of waters, including wetlands, in the Cienega Creek watershed providing hydrologic, chemical and biological connectivity to Cienega Creek and the Santa Cruz River. In developing the HMMP, Rosemont identified only 39.97 acres of direct impacts and 2.79 acres of indirect impacts in their mitigation analysis.

EPA maintains the impacts from the proposed project include direct fill, secondary impacts resulting in functional degradation, and habitat conversion of aquatic and terrestrial resources over a large geographic area. The project will result in the loss or conversion of approximately 7,000 acres including semi-desert grassland, Madrean evergreen woodland, and Sonoran desert scrub communities, and their associated aquatic and riparian habitats, that form a vast, largely unfragmented, natural landscape.

The proposed project will authorize the direct fill of 39.97 acres of waters, including a largely undisturbed network of 18 linear miles of stream comprised of up to 154 individual drainages. There will also be direct impacts to aquatic habitats associated with several springs. Secondary effects on the aquatic environment include dramatic and persistent changes to hydrologic and hydaulic regimes within the project and adjoining watershed, adversely affecting the function of sensitive and regionally significant downstream receiving waters, including wetlands. The U.S. Forest Service estimates 1,364 acres of riparian habitat, likely to include a significant amount of jurisdictional riparian wetlands, impacted by the proposed project.[2] The project will adversely affect three types of Special Aquatic Sites (wetlands, sanctuaries and refuges, and riffle and pool complexes, see 40 CFR 230.40-45) as well as Tier 3 "unique waters"; portions of Davidson Canyon Wash and Cienega Creek are designated by the State of Arizona as "Outstanding Arizona Waters" (section 303 of the CWA and 40 CFR 131.12). In addition, EPA identified these waters as "Aquatic Resources of National Importance" pursuant to the 404q MOA.

The proposed project is likely to have significant impacts to downstream reaches of Davidson Canyon, Empire Gulch and Cienega Creek, including:[3]

- Modification to the water balance along portions of Davidson Canyon, Cienega Creek and Empire Gulch Creek adversely impacting special aquatic sites;
- Secondary impacts from project-related groundwater drawdown disrupting breeding, spawning, rearing and migratory movements, or other critically life history requirements of fish and wildlife resources;
- Groundwater drawdown resulting in stress and mortality to riparian habitat, including wetlands;

[2] DEIS for the Rosemont Copper Project (December 11, 2011), Chapter 3, Table 98.
[3] Letters from EPA to Corps dated January 5, 2012 and February 13, 2012

- Modification of sediment yield resulting in adverse impact to downstream water quality. Permanent surface water quality impacts to 2.5 miles of Barrel Canyon Wash and 14 miles of Davidson Canyon Wash through increased channel scour and aggradation. Other changes include bank erosion and loss of riparian habitat;
- Adverse effects on aquatic organisms due to elevated suspended sediments;
- Loss of 18 miles of stream channel resulting in significant reduction of groundwater recharge functions within Davidson.

Rosemont's Habitat Mitigation and Monitoring Plan

On October 11, 2011, Rosemont Copper submitted a CWA 404 permit to the Corps requesting a permit to discharge dredged or fill material into waters to construct the proposed Rosemont Copper Mine. On November 8, 2012, EPA received a copy of the Rosemont Copper Mine HMMP. Rosemont Copper proposes the HMMP as compensatory mitigation in compliance with the CWA 404 permit and the 2008 Mitigation Rule.

The 2008 Mitigation Rule states the fundamental objective of compensatory mitigation is to offset environmental losses resulting from unavoidable impacts to waters. Compensatory mitigation may be performed using the methods of restoration, enhancement, establishment, and in certain circumstances, preservation.

Preservation

As described in the HMMP, Rosemont proposes to record a conservation easement on 1774 acres of land containing 35.34 acres of aquatic resources and approximately 39.45 acres of riparian vegetation within the Santa Cruz River watershed on the following parcels:

State Route 83 Corridor Parcels - The State Route 83 parcels consist of 4 parcels totaling 545 acres. The size of each parcel is not described in the referenced documents. These parcels contain surface water features that occur within or drain into Davidson Canyon (SR83/Davidson p. 2). Waters located within these conservation parcels total 13.76 acres and range from 0.94 acre to 7.28 acres per parcel. There are no water rights associated with the SR 83 parcels.

Davidson Parcels - The Davidson parcels consist of 2 parcels totaling 29 acres. These parcels consist of two adjoining parcels of land encompassing both sides of Davidson Canyon. Waters located within these conservation parcels total 1.75 acres (SR83/Davidson p. 3). There are no water rights associated with the Davidson parcels.

Sonoita Creek Ranch Parcel – The Sonoita Creek Ranch parcel is 1200 acres consisting of ranching, open space and agriculture. Perennial Monkey Spring is located 0.8 mile north of the ranch and provides surface water to the ranch. There are 19.83 acres of aquatic resources on the Sonoita Creek Ranch consisting of: 1) 13.03 acres of ephemeral drainages; 2) 0.16 acre of perennial drainage; 3) 5.92 acres of wetlands; and 4) 0.72 acre of 5 seasonal ponds. A total of 52.01 acres of riparian vegetation was identified on the parcel (SCR p. 6).

Creation

Sonoita Creek Ranch Parcel - The HMMP is proposing 115.5 acres of habitat consisting of a drainage feature, wetland fringe and riparian buffer (p. 9 SCR). Based on the maps provided in the HMMP, Rosemont is proposing a 3,000' riverine corridor with a 5' channel (1' to 2' bottom width) and 20' riparian habitat on each side (HMMP p. 17). This would result in approximately 0.34 acre of wetted channel and 2.75 acre of adjacent riparian habitat. The remainder of the 112 acres proposed as mitigation on this parcel would be sown with native seed mix. The native seed mix is comprised of approximately 91% upland species (HMMP p. 22-23). The 112 acres would remain as uplands.

Rosemont would share certified water rights on Monkey Springs with an upstream property owner and flow would be based on a water delivery schedule agreed to with the other property owner (HMMP p. 8). The flow of water would be controlled through existing infrastructure. This water would be used to create a perennial compacted drainage feature and adjacent riparian. Waters within the proposed 3,000' riverine channel will eventually infiltrate due to the nature of the soils on the agricultural field. Therefore, this channel may not be considered a jurisdictional water as it would not have a surface water connection with Sonoita Creek.

MRA - Functional Analysis of Jurisdictional Impacts

According to the 2008 Mitigation Rule, compensatory mitigation must be, to the extent practicable, sufficient to replace lost aquatic resource functions. If a functional or conditional assessment, or other suitable metric is not used, a minimum one-to-one acreage or linear foot compensation ratio must be used. The Corps must require a ratio greater than one-to-one where necessary to account for the method of compensatory mitigation (*e.g.,* preservation), the likelihood of success, differences between the functions lost at the impact site and the functions expected to be produced by the compensatory mitigation project, temporal losses of aquatic resource functions, the difficulty of restoring or establishing the desired aquatic resource type and functions, and/or the distance between the affected aquatic resources and the compensation site (CFR 230.93(f)).

To assess the functional condition of aquatic resources on the proposed project site as well as the proposed mitigation lands, WestLands modified a Rapid Stream-Riparian Assessment[4] (RSRA) for their own use and called it the Modified RSA approach or "MRA." The original methodology involves a quantitative evaluation of between two to seven indicator variables in five different ecological categories: water quality, fluvial geomorphology, aquatic and fish habitat, vegetation composition and structure, and terrestrial wildlife habitat. Each variable is rated on a scale that ranges from "1," representing highly impacted and non-functional conditions, to "5," representing a healthy and completely functional system. Whenever possible, scores are scaled against what would be observed in control or reference sites that have similar ecological geophysical characteristics, but which have not been heavily impacted by human activities.

Although the RSRA was designed to assess the functional condition of perennial systems, WestLands modified the RSRA in order to apply it to ephemeral systems. In addition, they propose the MRA can also be used to compare functions between ephemeral, intermittent and perennial stream reaches on the

[4] Steven, L.E., Stacey, P.B., Jones, A.K., Duff, D., Gourley, C., and J.C. Catlin. 2005. A protocol for rapid assessment of southwestern stream-riparian ecosystems. Proceedings of the Seventh Biennial Conference of Research on the Colorado Plateau titled *The Colorado Plateau II, Biophysical, Socioeconomic, and Cultural Research.* Charles van Riper III and David J. Mattsen Ed.s. pp. 397-420. Tucson, AZ: University of Arizona Press.

same scale. They used the MRA scores as an absolute assessment based upon the values and indicators in the RSRA Guidebook rather than as scores for comparison of stream reaches with similar biotic and abiotic characteristics (RCFA, p.4). The MRA averaged the indicators for each ecological category, and then calculated an overall score by averaging the five ecological categories. As a result, all ephemeral streams using the MRA scored "0" for water quality, fluvial geomorphology and fish/aquatic habitat. The overall MRA score of the Rosemont Project area was 1.17, indicating the aquatic resources are non-functioning or highly impacted (RCFA p. 11).

The MRA used by WestLands does not provide any meaningful assessment of the functions of ephemeral systems across the proposed project and mitigation sites. The MRA is not scientifically sound. Therefore, the MRA does not satisfy the requirements of a suitable assessment method to assess the loss of aquatic function (33 CFR 332.3 (f)(1)). Since 1993, the federal government has expressed the need for improvement of rapid assessment techniques to allow for better consideration of the functions of waters/wetlands in the context of the CWA Section 404 process. Fundamental to the development of a functional assessment is the recognition that waters/wetlands perform certain functions better than others, not because they are impacted in some way, but because waters are inherently different. Therefore, it is critical to accurately describe functions for each class of waters/wetlands that occur within a study area. It is not appropriate to strictly compare functions across classes of waters/wetlands. For example, comparison of the functions of 1st through 3rd order ephemeral riverine waters with those of perennial waters/wetlands for the purpose of computing MRA scores is not meaningful. Even though some functions overlap significantly between classes, which they often do, the functions are likely to be performed through the combination of slightly difference processes and at different levels or intensities.

Essential to the development of a functional assessment, is the use of reference systems. Reference sites are the observed and measured characteristics of a range of similar sites within a regional or study area. Development of a reference framework allows the use of a relative rather than an absolute scale, which provides for better resolution of expected functions and a regional standard for comparison. For example, within the context of a regional reference framework the 1st through 3rd order ephemeral streams on the Rosemont Project impact site likely would be scored as high functioning (*i.e.*, an overall functional rating or 4 or 5 within the RSRA framework).

The MRA also assigns a score of zero to RSRA categories that rely on the presence of water for proper functioning. The MRA assumes that "any variable within the five major RSRA categories that rely on the presence of surface water that cannot be assessed due to the lack of an appropriate water regime at the time of sampling will result in the overall major category receiving a score of zero, representing a lack of functionality" (p. 4). This fails to acknowledge that by definition ephemeral and intermittent streams are functioning aquatic ecosystems that periodically contain flowing water. Any scientifically valid functional assessment of ephemeral and intermittent streams must account for the seasonal nature of flows and either: 1) assess and score functions when water is present, or 2) assay the probable functions in the absence of flows. The MRA assumption that the ephemeral and intermittent streams have no function because there is no water present at the time of the assessment demonstrates a clear lack of understanding of how these aquatic ecosystems function. Ephemeral and intermittent streams on the Rosemont Project impact site perform important functions that were not properly assessed by the MRA. In this regard, there are several hydrogeomorphic (HGM) functional assessments available for modification and use in arid western systems similar to environmental conditions found at the Rosemont project site. The RSRA or other functional assessment methodologies could have been easily modified

to fully assess the functions of ephemeral and intermittent streams or other methodologies for the Rosemont Project.

The MRA does not assess the full range of functions that are performed by riverine waters at the Rosemont Project site. Several important functions not assessed by the MRA performed by ephemeral and intermittent riverine waters in the Arid West and that would be expected to occur in the Rosemont Project area include the following:

Hydrologic Functions

- *Surface and Subsurface Water Flow, Storage and Exchange* - The retention and/or circulation of surface and ground water within the floodprone area.
- *Sediment Mobilization, Transport, and Deposition/Storage* – The mobilization, transport, and deposition of sediment influences the channel pattern, dimension, and profile, channel bed materials, and vegetation of riverine waters/wetlands at the assessment site and in downstream waters.
- *Energy Dissipation* – Energy dissipation results in the allocation of potential energy to other forms of kinetic energy as water moves into, through, and out of a water/wetland.
- *Landscape Hydrologic Connections* – The hydrologic connectivity of contributing areas to riverine waters/wetlands and then, in turn, to other down-gradient waters/wetlands.

Biogeochemical Functions

- *Element and Compound Cycling* – Element and compound cycling includes the abiotic and biotic processes that convert compounds (e.g., nutrients and metals) from one form to another.
- *Organic Carbon Export* – The export of dissolved and particulate organic carbon through leaching, flushing, displacement, and erosion from waters/wetlands.
- *Detention, Retention, and Removal of Imported Elements, Compounds and Particulates* – The delay, transformation and removal of imported nutrients, contaminants, particulates, and other compounds into, through, and out of the riverine system.

Habitat/Faunal Support Functions

- *Maintenance of Spatial Structure of the Habitat* – The capacity of waters/wetlands to support animal populations and guilds by providing heterogeneous habitats.
- *Maintenance of Habitat Interpersion and Connectivity* – The capacity of a water/wetland to permit aquatic, semi-aquatic and terrestrial organisms to enter and leave a riverine system via permanent, intermittent, or ephemeral channels, floodprone areas, or unconfined hyporheic gravel aquifers, or other large contiguous habitat patches.
- *Distribution and abundance of Invertebrates and Vertebrates* – The capacity of the water/wetland to maintain the density and spatial distribution of characteristic aquatic, semi-aquatic and terrestrial invertebrates and vertebrates.

Several of the MRA sampling method indicators are not adequate to assess a particular function. For example, water quality is a societal value and not strictly a function. Hydrologic functions (*e.g.*, element and compound cycling, removal of compounds) are better measures of the ability of a water/wetland to affect "water quality." The MRA uses a single indicator (*e.g.*, channel shading, solar exposure) for water quality. Also, as noted above, it is not reasonable to assign a zero score to the functioning of a

water/wetland just because there is no water present at the time the assessment was conducted. Clearly, the waters that were assessed on the Rosemont Project impact site function in some capacity to improve the quality of downstream receiving water. The MRA is not designed to capture the performance of this function.

Other MRA sampling method indicators are inappropriate for the types to waters being assessed. For example, the logic for using variables 8 (riffle-pool distribution), 9 (underbank cover), and 10 (cobble embeddedness), to assess the functioning of fish/aquatic habitat in 1st and 2nd ephemeral streams is unclear. These variables are better suited for assessing fish and invertebrate habitat in perennial streams, not streams where one would not expect to find fish. If these variables are to be used, the logic for their use needs to be clearly justified and the scoring definitions need to be scaled within the context of a reference framework. In addition, there are 10 plant-related indicators for assessing riparian and vegetation and terrestrial wildlife habitat that are similar (sensu autocorrelated), which would tend to bias the combined scores.

The overall MRA water quality, hydrogeomorphology, and fish/aquatic habitat scores for the Rosemont Project area are zero (*e.g.*, Table 5), even though the scores for individual variables for these functions may not have scored zero. For example, if for the water quality function a site receives a score of "2" for channel shading from solar exposure in the absence of surface water, then why would it not receive the same score when surface water is present? Again, the assignment of a "zero" score in the absence of water at the time of the assessment unjustifiably lowers the overall MRA scores.

Calculating Mitigation Ratios

To assist in calculating a compensatory mitigation ratio, the functions and values of the mitigation sites were evaluated relative to the functions and values of the impact site prior to the occurrence of impacts. The functional scores of the impact and mitigation site informed the final mitigation ratio (RCFA p.13).

Using the MRA, WestLands calculated the overall functional score of the aquatic habitat: 1) Rosemont site scored 1.17; 2) Sonoita Creek Ranch scored 1.25; 3) and the SR 83 Corridor and Davidson Parcels scored 1.25. In order to determine compensatory mitigation ratios for the proposed Rosemont Copper Project, WestLands used the Mitigation Ratio Setting Checklist Attachment 12501.2 SPD. Using a qualitative impact mitigation comparison and ratio adjustment, WestLands concluded their proposed mitigation would provide 592% of the required mitigation credits. In other words, the compensatory mitigation package proposed by Rosemont Copper will provide nearly six times the required mitigation for unavoidable impacts to waters (HMMP p. 9).

Following our review of the HMMP and mitigation ratio calculations, we have identified several significant concerns:

- The MRA used in calculating the mitigation ratios is based on a flawed functional assessment methodology (see above) and, in all likelihood, significantly underestimates the function of the impacted waters.
- The Step Adjustment in the Mitigation Setting that relied, in part, on the MRI is therefore incorrect and skewed.
- The MRA functional analysis of Sonoita Creek Ranch scored nearly all (approaching 100%) of the drainage features, while the MRA for the impacted waters scored only 10% of the drainages, which would likely bias the overall scores.

- The proposed creation of 115.5 acres of habitat consisting of a drainage feature, wetland fringe, and riparian buffer proposed at Sonoita Creek Ranch (SCR, p. 9) may not result in the creation of jurisdictional waters of the U.S. Only 3.5 acres of the proposed 115.5 acres of habitat may qualify as a three-parameter jurisdictional wetland (SCR, p. 21).
- The proposed design would not be self-sustaining as it would largely rely on the release of regulated releases of irrigation water (see HMMP, pg. 19). Because of variable soil conditions that characterize the creation site, it is unclear whether the amount of water proposed for release is sufficient to maintain the proposed wetted channel and adjacent riparian wetlands.
- The aquatic habitat proposed at Sonoita Creek Ranch consists of 112 acres of uplands (91% of the proposed native seed mix consists of upland plants) and is not aquatic habitat.
- The preservation of wetlands at Sonoita Creek Ranch, formed from controlled water releases of irrigation water upstream may be isolated aquatic features that are not jurisdictional waters of the U.S. If so, they are unacceptable as mitigation.
- It is unclear why Rosemont did not propose a continuous corridor from the ponds through the agricultural field, hydrologically connecting to Sonoita Creek. Based on the information presented, we believe the proposed creation at Sonoita Creek Ranch is unlikely to be ecologically successful and sustainable, as required in the 2008 Mitigation Rule.
- It appears as though the mitigation proposal includes 101.3 acres of upland buffer as compensation for unavoidable impacts to waters (HMMP Table 7, p. 12). Any proposed upland buffer mitigation should be first applied toward the direct and indirect impacts to upland buffers on the project site. We do not believe Rosemont has conducted this analysis.
- The scoring of several mitigation ratio adjustments on the Mitigation Ratio Setting Checklist for the SCR and SR83/Davidson Canyon Parcels are unsupportable.
- The HMMP states that plants used for the Sonoita Creek Ranch habitat creation will "be obtained from the nearest local grower to take advantage of the local genotype to maximize success." (HMMP p. 21). All plant materials used for site restoration should come from within the Sonoita Creek Ranch or from within the Sonoita Creek watershed.
- Monitoring of all created habitat should be for a minimum 10-year period, not 5-years as implied in the HMMP.
- The success criteria presented in the HMMP do not adequately address invasive species control (p. 24).
- The SR 83 and Davidson Canyon mitigation parcels all lie downstream from the impacted drainages and yet the functional assessment used to determine compensatory mitigation does not factor in indirect effects from the proposed Rosemont copper mine to the proposed mitigation sites, thereby inflating the value of the site.
- Rosemont may convey the Sonoita Ranch property to another entity at any time (HMMP p. 25). Conveyance of the property should be pursuant to approval by the Corps.

On page 13 of the HMMP, Rosemont discusses conservation easements and notes, *"The implementation of mitigation activities described in this HMMP shall not limit or restrict Rosemont or it successors in interest from requesting and if approved securing additional compensatory mitigation credits from the mitigation sites for future 404 permits provided they are able to demonstrate functional capacity above currently proposed conditions of the function and values of the mitigation sites."*

The compensatory mitigation package proposed in the above referenced documents is grossly inadequate, fails to accurately assess the functional condition at the project site and mitigation sites, and

fails to provide compensation for proposed project impacts. Therefore, any future request by Rosemont for securing additional compensation is moot and contrary to mitigation guidelines.

From: Goldmann, Elizabeth []
To: Blaine, Marjorie E SPL [(b)(6)]
CC: Leidy, Robert [Leidy.Robert@epa.gov]; Jessop, Carter [JESSOP.CARTER@EPA.GOV]
Subject: FW: Indirect loss of potential waters of the U.S. at Rosemont
Sent:

Hi Marjorie

(b)(5)

-Elizabeth

From: Brian Lindenlaub [mailto:blindenlaub@westlandresources.com]
Sent: Friday, August 16, 2013 10:50 AM
To: Goldmann, Elizabeth
Cc: Blaine, Marjorie E SPL; 'Kathy Arnold'; Jamie Sturgess; 'ANDERSON, ROBERT'; Greg Williams
Subject: Indirect loss of potential waters of the U.S. at Rosemont

Elizabeth,

Per the request of Marjorie Blaine (Corps), I am providing the attached information describing how indirect impacts to potential waters of the U.S. resulting from the Rosemont Project were calculated.

Per Corps guidance, the estimate of indirect loss of potential waters of the U.S. was initially determined based on the area of Barrel Canyon, within the ordinary high water mark (OHWM), between the toe of the perimeter berm and the confluence of Barrel and McCleary canyons. This area is approximately 2.8 acres.

Approximately three weeks ago, Ms Blaine determined that additional

indirect impacts to potential waters of the U.S. should be calculated based on the 2012 modeled reduction in surface water flow volume resulting from the Rosemont Project. WestLand has estimated these additional impacts based on the “Barrel Alternative” which has been identified as both the LEDPA by the Corps and the preferred alternative by the Coronado National Forest. Once the approach described here is approved by the Corps, these impacts may be readily extrapolated for the other alternatives.

The Preliminary Administrative Final Environmental Impact Statement (PA FEIS) identifies several discrete downstream segments of Barrel and Davidson canyons which will be impacted by the Rosemont Project. In order, from upstream to downstream, these reach segments are referred to as follows (see attached Figure 1):

* Barrel Canyon Reach 1
* Barrel Canyon Reach 2
* Davidson Canyon Reach 2
* Davidson Canyon Reach 3
* Davidson Canyon Reach 4

For our analysis, Barrel Canyon Reach 1 was further divided into Reaches 1A and 1B in order to reflect the short reach of Barrel Canyon down to the confluence with McCleary Canyon.

The post-mining estimated reduction in average annual flow volume at the SR 83 stream gage (at the point that separates Barrel Canyon Reaches 1 and 2) is approximately 17%. During mining operations, the reduction in average annual flow volume peaks at approximately 36%, then reduces steadily during concurrent reclamation to the final post-mining reduction of 17%. The reduction in surface flows will result in a commensurate reduction in sediment loads, though sediment concentration is anticipated to remain largely unchanged. An evaluation by Golder Associates, Inc. (2012), attached, concluded that the development of the Rosemont Project “will have no significant impact on the geomorphology of either Barrel Creek or Davidson Canyon” due to 1) the sediment-transport limited nature of the two streams, 2) the presence of two downstream grade control structures in Barrel Canyon, and 3) the limited nature of the convective storms within the watershed.

In order to estimate the indirect “loss” of potential waters of the U.S. downstream of the Rosemont Project, the OHWM of Barrel and Davidson canyons was mapped via aerial photo review to the confluence of Davidson Canyon and Cienega Creek. Both drainages are generally confined and the aerial photo OHWM mapping effort is anticipated to have a relatively high degree of accuracy. The area of potential waters of the U.S. within each stream segment was then calculated from the OHWM mapping. Because the loss of function within each of the considered stream reaches is considerably less than 100%, it was determined that the “loss of potential waters of the U.S.” (measured in acres) would be some fraction of the total area of each stream segment. The reduction in average annual flow volume provides a reasonable surrogate for the fractional loss of function. Therefore, the “loss of potential waters of the U.S.” was calculated by multiplying the percent reduction in average annual flow volume for a given stream segment by the total acreage of potential waters of the U.S. in each stream segment.

The attached table provides the estimated “loss of potential waters of the U.S.” for both the post-mining period as well as the construction and operations period (an estimated 25-30 years). During operations, an estimated 28.4 acres of potential waters of the U.S will be “lost”, while post-mining the estimated “loss” is 15.3 acres.

As always, if you have any questions or require an additional information please do not hesitate to contact me.

Regards,

Brian Lindenlaub | Principal

WestLand Resources, Inc.

4001 E Paradise Falls Drive | Tucson, AZ 85712

Office: (520) 206-9585 | Fax: (520) 206-9518

TECHNICAL MEMORANDUM

Date:	July 18, 2012	**Project No.:**	093-81962.0007
To:	Chris Garrett, P. HGW.	**Company:**	SWCA Environmental Consultants
From:	Jennifer Patterson and George Annandale	**Email:**	JMPatterson@Golder.com GAnnandale@Golder.com

RE: GEOMORPHIC ASSESSMENT OF BARREL CREEK

Golder Associates Inc. (Golder) was requested to conduct a qualitative geomorphic assessment of Barrel Creek. The goal was to determine the current geomorphic condition and develop an opinion on potential geomorphic changes that could occur with the development of the Rosemont Mine. This letter presents observations from the fieldwork and opinions on potential geomorphic changes that might result due to proposed development of Rosemont Mine.

1.0 INTRODUCTION

Barrel Creek is an ephemeral arroyo located about 25 miles southwest of Tucson (Figure 1). Historic downcutting is evidenced by relatively high banks that are near vertical. This cross-sectional geometry is typical for streams in the arid and semi-arid West. Water flows in the creek only after local precipitation events occur within the watershed. The average annual precipitation estimated at the Rosemont Mine site is 17 inches (USFS 2011). The majority of the precipitation falls during the monsoon period from early July to late August. During the monsoon period, intense thunderstorms build in the late afternoon causing heavy precipitation and flash floods. Streams such as these have extremely high sediment transport rates (for example, Reid, et al., 1998 and Greenbaum and Bergman 2006).

2.0 FIELD OBSERVATIONS

Ms. Jennifer Patterson and Dr. George Annandale conducted a field assessment of Barrel Creek from the headwaters to the confluence with Davidson Canyon on May 1 and 2, 2012. Photographic documentation of the site is recorded from upstream to downstream in the Photographs section below. The photographs illustrate the typical observations from the site.

Two important, geomorphic observations were made during the field visit. The first is that the system is sediment-transport limited. The second is that there is bedrock grade control within the creek upstream of the confluence with Davidson Canyon. Each of these observations is detailed below.

2.1 Sediment-transport Limited

When evaluating the potential impacts for a system, one should consider whether the system is sediment-supply limited or sediment-transport limited. Sediment-supply limited means that the river is transporting as much sediment as is available. The riverbed in a sediment-supply limited system will be composed of

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an armor layer that is transported only during relatively high flows or the bed may be composed of bedrock. An extreme example of sediment-supply limited is “hungry water” that can occur downstream of a dam.

Sediment-transport limited is the exact opposite. There is more sediment in the system than the river can transport during normal or even flood-flow conditions. The sediment-transport limited system is common in ephemeral streams, because of the flashy nature of these systems. A large precipitation event will create a pulse of water flowing down the creek. On the rising limb of the hydrograph, the water picks up more and larger particles of sediment and transports them downstream. However, the hydrograph is short. Typical hydrographs contain multiple peaks due to slugs of precipitation from different areas of the watershed (Reid, et al., 1996). The sediment is dropped out of suspension on the falling limb of the hydrograph. Sediment is transported downstream, but it is deposited a relatively short distance from the source. In a sediment-transport limited system, the bed material will be poorly sorted (i.e., all gradations are present). The bed material will be loose, and an armor layer will not be present (Hassan, et al., 2005).

Barrel Creek is a classic example of a sediment-transport limited system. It is ephemeral, which means that the water only flows occasionally and usually after a precipitation event. The flashy nature of the flows means that sediment is not transported on a regular basis. The bed is composed of a thick layer of unconsolidated sands, gravels, and cobbles. These types of sediment are readily transported during any significant flows within the creek, but the transport stops as quickly as it starts.

Evidence observed in the field confirming that Barrel Creek is a sediment-transport limited system includes the following:

- Deep, unconsolidated, poorly sorted bed material
- Angular particles
- Localized erosion that is not propagating upstream
- Deposited materials on top of bedrock and under bridge

The deep, unconsolidated, poorly sorted bed material also indicates that the system is dropping particles out of suspension in a relatively short time. If the tail of the hydrograph were long, the bed materials would be sorted with coarser material underlying the fine-grained sands. However, the material is just dropped out of suspension at roughly the same time as the water infiltrates into the substrate and quickly disappears. It is deep and unconsolidated, which indicates that it is readily transported with any significant flow. The system has the materials ready to be transported, but it is transport-limited because it is ephemeral.

The angular particles in the bed material indicate that the sediment is not being transported for long distances or for long periods of time. When sediment is transported, it rubs against the bed, bank, and other suspended particles. This will make each grain smoother and rounded. The presence of angular gravels and cobbles indicates that the system is only transporting materials for short times.

Localized erosion was observed in the field in a few locations (for example Photographs 8 and 12). However, this erosion is not propagating upstream. If the system were actively down cutting, the apron on the downstream side of the Barrel Creek Bridge would be severely undercut. But instead, there is a small drop indicating that sediment is not being actively eroded.

The loose sands being deposited on top of bedrock (Photograph 19) and under the bridge (Photograph 11) illustrate the deposition of material at the falling limb of the hydrograph. The grain size is small enough to be transported during any significant flow event. The system is sediment-transport limited.

2.2 Downstream Grade Controls

The second critical geomorphic observations made in the field are the downstream grade controls. A grade control is a critical component of a stream, because it limits the extent of any potential change in the stream gradient. The schematic in Figure 2 illustrates how a grade control limits the extent of erosion both upstream and downstream of the structure. The grade control will stop any upstream migration of head cuts. The grade control acts as a pivot point for the gradient of a river, so erosion upstream of the grade control is also limited.

During the field investigation, two grade controls were identified, as follows:

- Bridge at Barrel Creek (Photograph 9)
- Bedrock across river bottom (Photograph 23)

The upstream grade control is the bridge at Barrel Creek; it is a man-made structure. Because it is man-made, there is the potential that this structure may fail at some time in the future. The downstream grade control is made of bedrock that is erosion resistant, so it will continue to control the stream gradient for an extremely long time. These structures control the hydraulic gradient and therefore the stream power of the creek. The grade controls will limit the erosion capacity of the stream (Figure 2) and a control on depositional processes.

3.0 GEOMORPHIC IMPLICATIONS FOR DEVELOPMENT IN WATERSHED

Concerns have been expressed about the potential impact of the development of the proposed Rosemont Mine on the geomorphology of Barrel Creek and Davidson Canyon. Degradation of these channels, should it occur, could potentially affect the Outstanding Waters of Arizona located in lower Davidson

Canyon. The geomorphologic investigation that was conducted addresses this concern, indicating that the proposed mine development will have no significant impact on the geomorphology of either Barrel Creek or Davidson Canyon.

The geomorphology of fluvial systems is largely dependent on three factors: i.e., water flow, sediment characteristics and availability, and the geometry of stream channels. The justification for stating that the mine will not have a significant impact on Barrel Creek and Davidson Canyon can be formulated in terms of these three variables:

3.1 Sediment

- The area affected by the mine is roughly equal to about 13% of the entire catchment area upstream of the Outstanding Waters of Arizona, located in Davidson Creek (SWCA 2012). Changes in sediment load and runoff from such a small portion of the entire catchment will not have a significant impact on the fluvial geomorphology of the stream system.
- In the worst case, it is estimated that the impact of the mine on total sediment load upstream of the Outstanding Waters of Arizona will amount to a reduction of about 4% (SWCA 2012). This difference between current and predicted sediment load is within the statistical noise of the fluvial system. An estimated change of about a couple percent is therefore deemed insignificant.
- Abundant availability of loose sediment on the surface of the catchment surrounding Barrel Creek and Davidson Canyon will continue to supply directly sediment to the streams during rainstorm events, regardless of the presence of the mine. The amount of sediment thus supplied is greater than what the flowing water can carry, characterizing the transport-limited nature of the stream system.

3.2 Geometry

- The natural grade control that is characteristic of the stream system prevents riverbed degradation and will maintain the sediment transport capacity of the flowing water, regardless of the planned mine development. Maintaining the sediment transport capacity at historic levels and not significantly altering the sediment load to the stream will retain the current geomorphologic character of Barrel Creek and Davidson Canyon, regardless of mine development.

3.3 Water Flow

- It is uncommon for the catchment of Barrel Creek and Davidson Canyon to be subjected to large storm events covering the entire area. Instead, convective storms of limited size occur over portions of the catchment when it rains. The scattered nature of such storm events results in generation of sediment supply from diverse locations in the catchment at different points in time. It rarely happens that sediment would be generated simultaneously from the entire catchment. The nature of sediment supply based on the isolated nature of storms will remain and not be significantly impacted by the mine.
- The transport-limited nature of Barrel Creek and Davidson Canyon explains the non-degrading nature of the stream system. The nature of the stream system will remain unchanged because the change in sediment supply due to the presence of the mine is insignificant, and the sediment transport capacity of the water will essentially remain the same due to the presence of naturally occurring grade control features. It is therefore

reasonable to expect that the creek will not degrade; particularly not near the Outstanding Waters of Arizona in Davidson Canyon and beyond. The creek will remain in a state of quasi-equilibrium; expected from a semi-arid, ephemeral stream.

4.0 REFERENCES

Greenbaum, Noam, and Nathaniel Bergman. 2006. Formation and evacuation of a large gravel-bar deposited during a major flood in a Mediterranean ephemeral stream, Nhal Me'arot, NW Israel. Geomorphology 77, pp. 169-186.

Hasan, M.A., R. Egozi, and G. Parker. 2005. Experiments on the effect of hydrograph characteristics on vertical grain sorting in gravel bed rivers. Submitted to Water Resources Research. November 1, 2005.

Reid, I., J.B. Laronne, and D.M. Powell. 1998. Flash-flood and bedload dynamics of desert gravel-bed streams. Hydrological Processes. 12, pp. 543-557.

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U.S. Forest Service (USFS). 2011. Draft Environmental Impact Statement for the Rosemont Copper Project, a Proposed Mining Operation, Coronado National Forest, Pima County, Arizona. September. p. 303.

Yang, C.T. 1996. Sediment Transport Theory and Practice. McGraw-Hill, New York.

FIGURES

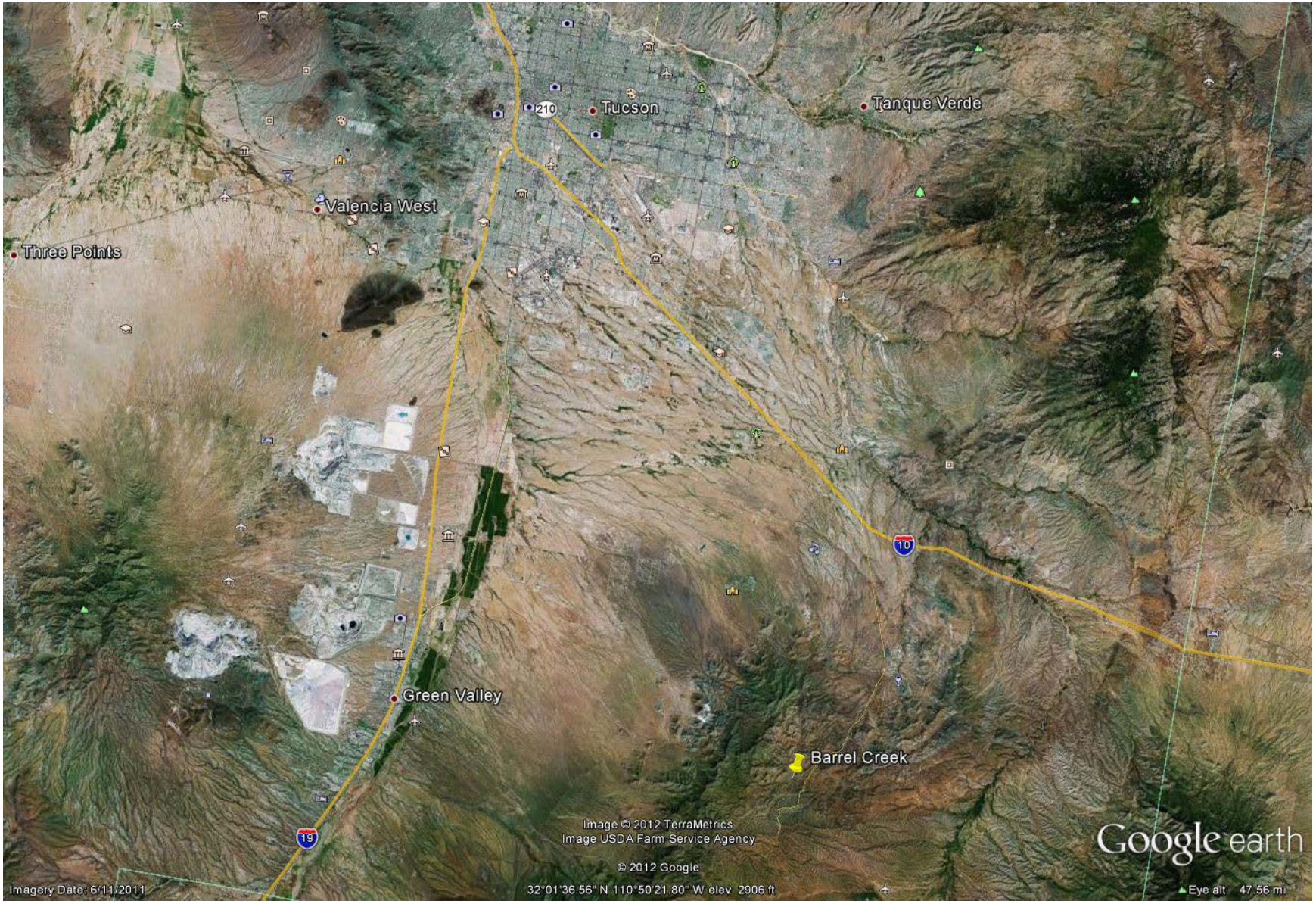


Figure 1 Site Location Map

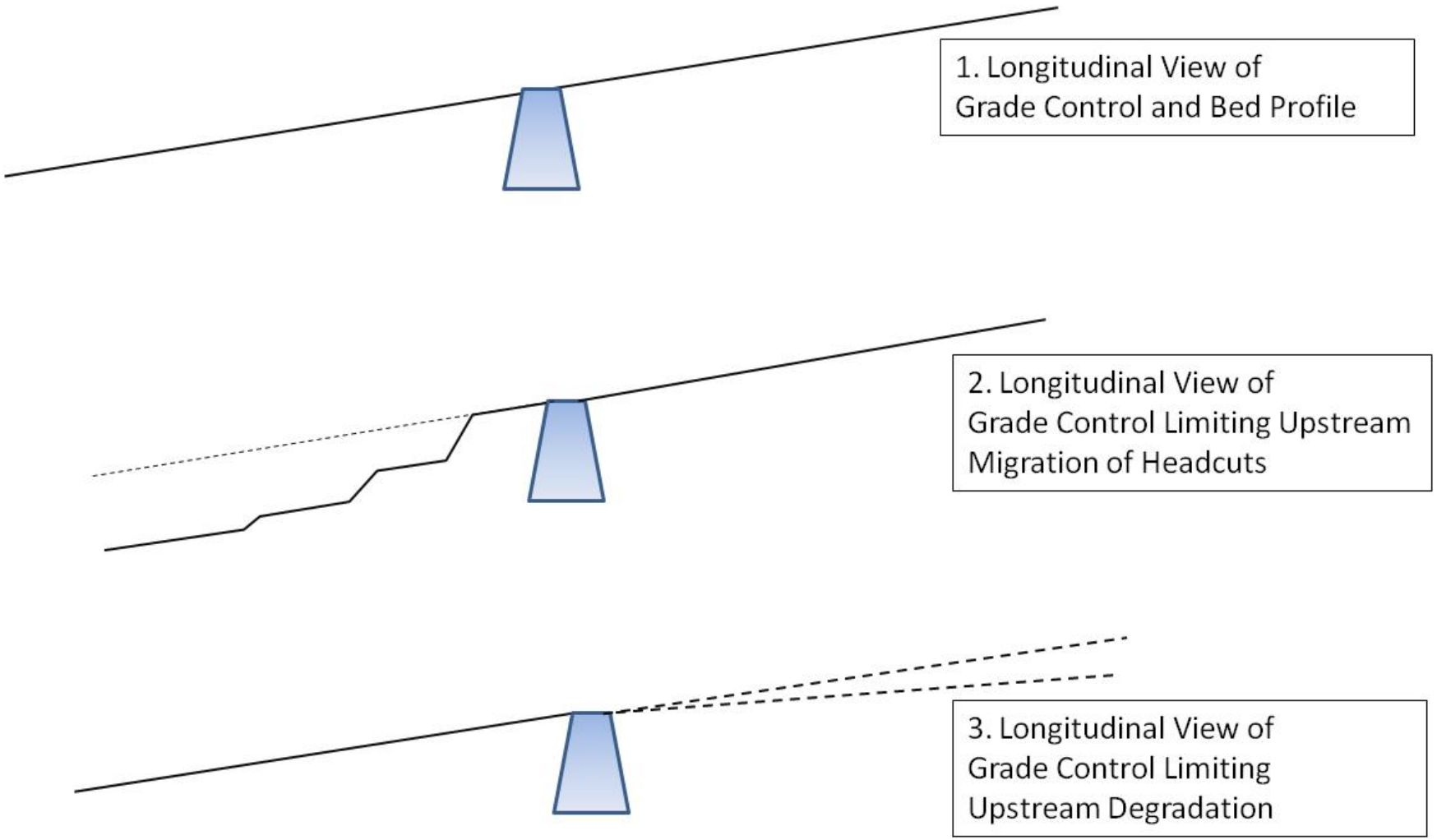


Figure 2 Schematic Illustrating Geomorphic Implications of a Grade Control Structure

PHOTOGRAPHS

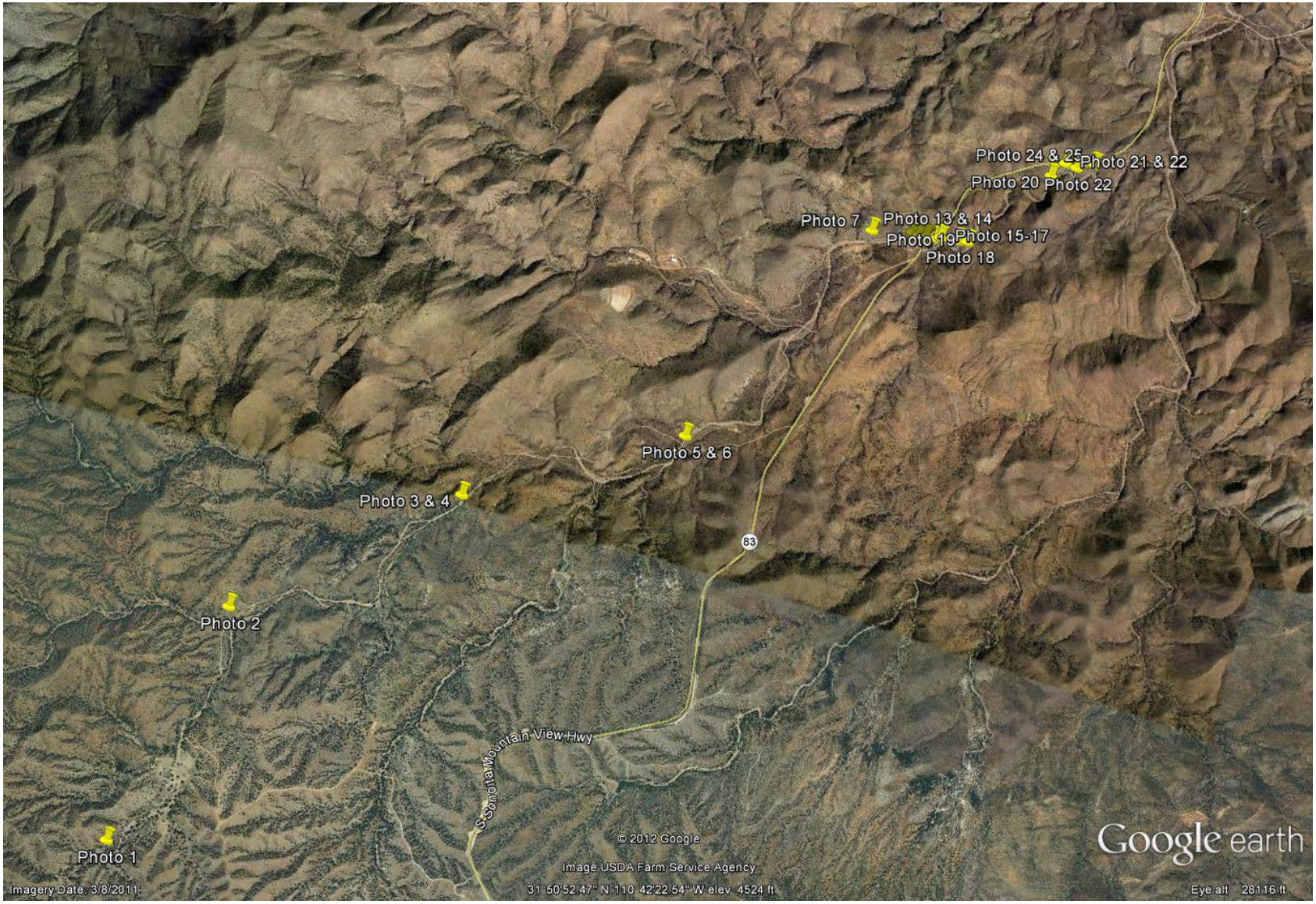


Photo 1 Photograph Locations

Photo 2 Bed material in Upper Barrel Creek. Note angularity of cobbles.

Photo 3 **Organics from flowing water caught in fence. These indicate that water levels were high in the recent past. However, there are fine-grained sands deposited at the same location. This indicates that the system is sediment-transport limited.**

Photo 4 **Barrel Creek looking upstream. Note the poorly sorted, unarmored bed material.**

Photo 5 **Bed material in Barrel Creek. Note the poorly sorted, angular sands and cobbles.**

Photo 6 **Barrel Creek looking downstream. Note the unarmored, thick layer of sands and cobbles.**

Photo 7 **Organics from flowing water caught in fence. This indicates that high water was flowing in the creek in the recent history.**

Photo 8 **Barrel Creek looking upstream. In this location, the bed material is composed of sands and cobbles. The floodplain contains angular cobbles and boulders.**

Photo 9 **Small tributary into Barrel Creek. The erosion of this tributary will continue during the next large storm event. However, the erosion will cease when water stops flowing.**

Photo 10 **Barrel Creek Bridge looking downstream. Sediment has been deposited on the upstream side of the bridge. The bridge is a local grade control.**

Photo 11 **USGS gauging station 09484580 Barrel Canyon Near Sonoita, Arizona**

Photo 12 **Sediment deposited under bridge at South Sonoita Highway. The concrete apron is a local grade control structure.**

Photo 13 **Erosion on downstream side of apron at South Sonoita Highway Bridge. The erosion is relatively small given the large flows that occur in Barrel Creek. This is another indication of a sediment-transport limited system.**

Photo 14 Deposition downstream of bridge. The water spreads out after flowing under the bridge, which decreases the transport capacity and deposits sediment.

Photo 15 Typical sandy bed material. This material will be readily transported during the next flow.

Photo 16 Typical colluvial, boulder-cobble bank material.

Photo 17 **Remnants of boulder bank material. Boulder was left hanging on the root while the smaller particle sizes were eroded.**

Photo 18 **Typical colluvial, boulder-cobble bank material.**

Photo 19 **Depositional, alluvial bank material. This deposition occurred on the downstream side of a large boulder.**

Photo 20 **Bedrock outcrop along bed and bank. The bedrock outcrop is covered with smaller-grained sands that fell out of transport during the falling limb of the hydrograph.**

Photo 21 **Bedrock outcrop along bed. Multiple drops are identified by people standing at different levels. These outcrops are a local grade control for the creek.**

Photo 22 Seep identified within Barrel Creek.

Photo 23 Seep produced moist soil right at the bed surface.

Photo 24 Bedrock grade control extending across entire width of channel.

Photo 25 **Sediment deposited upstream of pinch point. The pinch point in the stream is created by bedrock outcrops. A backwater effect happens during high flows, and sediment falls out of suspension on the upstream side.**

Photo 26 **Pinch point in stream indicating bedrock grade control.**

Table 1. Summary of Indirect Impacts to Waters of the U.S. Downstream of the Rosemont Project – Barrel Alternative

	Barrel Canyon			Davidson Canyon			
	Reach 1A (Waste Dump to McCleary Cyn)[1]	Reach 1B (McCleary Cyn to SR 83)[1]	Reach 2 (SR83 to Davidson Cyn)	Reach 2 (Barrel Cyn to Davidson Spg)	Reach 3 (Davidson Spg to Reach 2 Spg)	Reach 4 (Reach 2 Spg to Cienega Ck)	Total
Estimated Potential Waters of the U.S. (acres)	2.8	22	7.2	43.6	20.5	27.4	**123.5**
Operations (25-30 years)							
Reduction in Average Annual Volume of Stormwater Flow (percent)	100	36[2]	36[2]	26[3]	8[3]	8[3]	---
Peak Indirect Impacts to Offsite Waters during Operation[4] (acres)	2.8	7.9	2.6	11.3	1.6	2.2	**28.4**
Post-Mining							
Reduction in Average Annual Volume of Stormwater Flow (percent)	100	17	17	13	4	4	---
Peak Indirect Impacts to Offsite Waters post Mining[4] (acres)	2.8	3.7	1.2	5.7	0.8	1.1	**15.3**

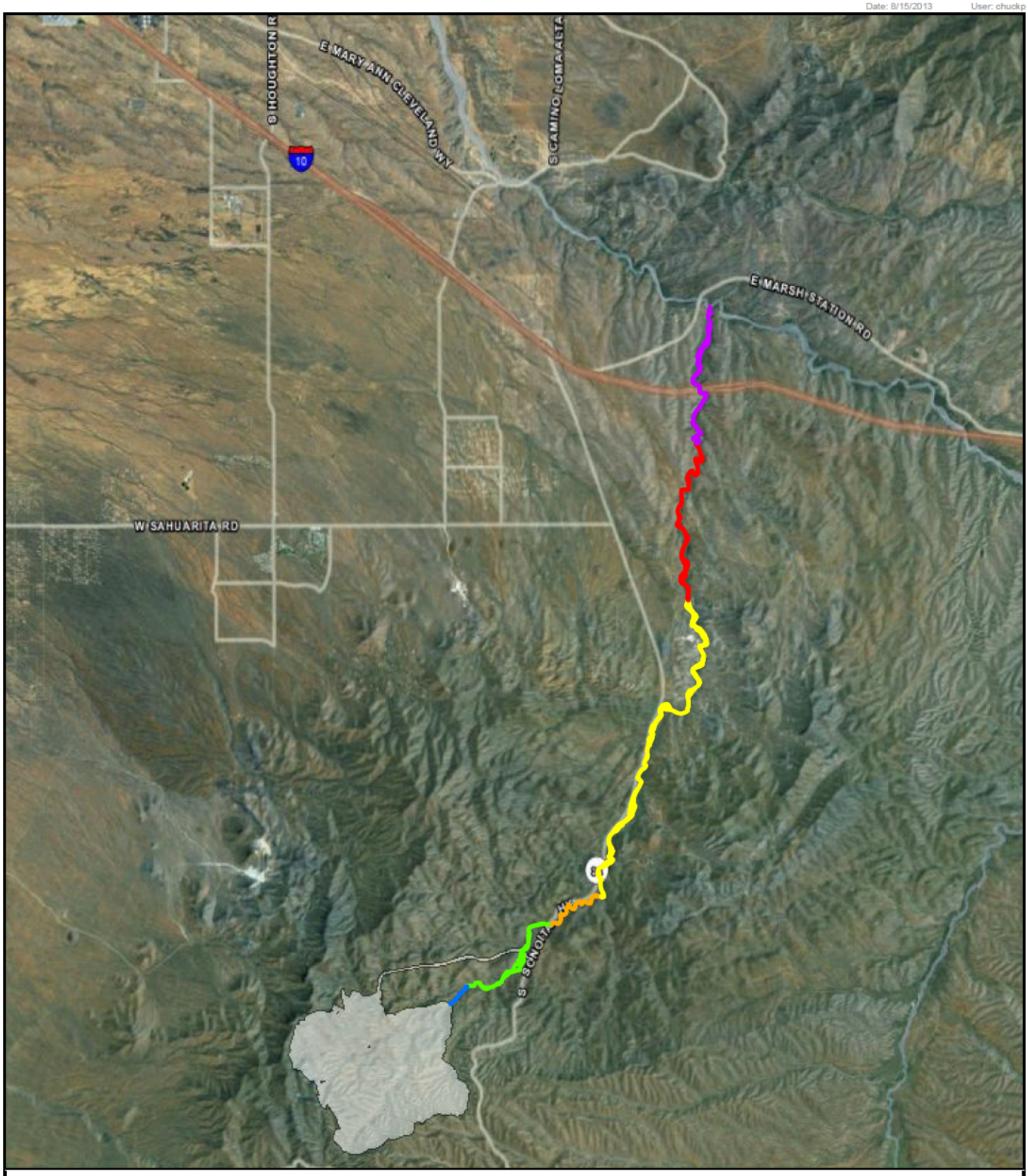
[1] This definition differs slightly from that within the EIS. Downstream losses within Barrel Canyon are already accounted for between the toe of the waste rock dump and McCleary Canyon in the CWA Section 404 permit application and associated documentation. Please see attached *Figure 1*.

[2] Data provided by SWCA (2013) and estimated from the proportion of watershed acreage lost during operation. The proportion of watershed lost during operation peaks at 36 percent but is much less both before and after this peak during initial construction and following concurrent reclamation. Therefore, assuming 36 percent loss of watershed acreage is a very conservative estimate and likely overstates the actual amount of stormwater flow volume lost.

[3] Data extrapolated from Preliminary Administrative Draft FEIS – Cooperator Review July 2013 and SWCA (2013).

[4] Indirect impacts to offsite waters calculated by multiplying the acres of waters of the U.S. in each drainage reach (Barrel or Davidson Canyons only) by the modeled or extrapolated percent reduction in average annual volume of stormwater flow of that reach. These estimates are considered conservative, as loss of function of these ephemeral reaches of Barrel and Davidson canyons are not anticipated to be significant (no significant change to stream geomorphology, minor loss of aquifer recharge, dominant xeroriparian habitat supported by local storm runoff rather than stream flow).

Date: 8/15/2013 User: chuckp



Barrel Reach 1A
Barrel Reach 1B
Barrel Canyon Reach 2
Davidson Canyon Reach 2
Davidson Canyon Reach 3
Davidson Canyon Reach 4
Barrel Alternative

N

0 2 4 Miles

ROSEMONT PROJECT
PERMIT NO. SPL-2008-00816-MB

Stream Reaches Downstream
of Rosemont Project

Figure 1

From: Goldmann, Elizabeth []
To: Blaine, Marjorie E SPL [(b)(6)]
CC: Jessop, Carter [JESSOP.CARTER@EPA.GOV]
Subject: FW: US EPA Comments on the Rosemont Copper Mine PAFEIS
Sent:

From: Goforth, Kathleen
Sent: Thursday, August 15, 2013 3:02 PM
To: msvogel@fs.fed.us
Cc: Jessop, Carter; Goldmann, Elizabeth; Leidy, Robert; McKaughan, Colleen; Brush, Jason; Rivera, Shirley; Herrera, Angeles
Subject: US EPA Comments on the Rosemont Copper Mine PAFEIS

Ms. Vogel,

(b)(5)

Thank you.

Kathleen Goforth

Kathleen Martyn Goforth, Manager

Environmental Review Office (CED-2)

U.S. EPA, Region IX

75 Hawthorne Street

San Francisco, CA 94105

415-972-3521

From: Goldmann, Elizabeth []
To: Blaine, Marjorie E SPL [redacted] (b)(6)
CC:
Subject: Helvetia, Fullerton and Questa
Sent:

Hi Marjorie

[redacted] (b)(5)

Thanks!

From: Goldmann, Elizabeth []
To: Diebolt, Sallie SPL [(b)(6)
CC:
Subject: RE: Draft agenda for SPL-EPA discussion on Rosemont 9.10.13, 3:00-5:00 pm in SF (UNCLASSIFIED)
Sent:

Hi Sallie

(b)(5)

Thanks!

Elizabeth

-----Original Message-----
From: Diebolt, Sallie SPL [(b)(6)
Sent: Monday, September 09, 2013 12:09 PM
To: Goldmann, Elizabeth
Subject: RE: Draft agenda for SPL-EPA discussion on Rosemont 9.10.13, 3:00-5:00 pm in SF (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Hi Elizabeth,

(b)(5)

Thank you!

See you tomorrow.

Sallie

-----Original Message-----
From: Goldmann, Elizabeth [mailto:Goldmann.Elizabeth@epa.gov]
Sent: Monday, September 09, 2013 11:19 AM
To: Brush, Jason; Diebolt, Sallie SPL
Cc: Leidy, Robert
Subject: [EXTERNAL] RE: Draft agenda for SPL-EPA discussion on Rosemont 9.10.13, 3:00-5:00 pm in SF (UNCLASSIFIED)

Hi Sallie

Can you be more specific in what you need? Do you need video conferencing capability or web access? We don't have a call-in number yet. We have reserved two rooms, but want to make sure we find a room that has the right teleconferencing capabilities for our meeting.

Thanks, Elizabeth

-----Original Message-----
From: Brush, Jason
Sent: Monday, September 09, 2013 9:32 AM
To: Sallie Diebolt
Cc: Goldmann, Elizabeth; Leidy, Robert
Subject: Re: Draft agenda for SPL-EPA discussion on Rosemont 9.10.13, 3:00-5:00 pm in SF (UNCLASSIFIED)

Ok. Elizabeth and/or Rob - would you please see to the facilities issues as I'm out of office today? Thanks -Jason

_____
From: Diebolt, Sallie SPL <Sallie.Diebolt@usace.army.mil>
Sent: Monday, September 09, 2013 9:21:36 AM
To: Brush, Jason
Subject: RE: Draft agenda for SPL-EPA discussion on Rosemont 9.10.13, 3:00-5:00 pm in SF (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Jason,

Thank you. Will there be a webmeeting set up? This would be best for Marjorie and/or Dave to use during the meeting. Please let me know and also the teleconference call-in number so I can make sure Marjorie has it.

Thanks! See you tomorrow.

Sallie

-----Original Message-----
From: Brush, Jason [mailto:Brush.Jason@epa.gov]
Sent: Thursday, September 05, 2013 6:18 PM
To: Castanon, David J SPL; Diebolt, Sallie SPL
Cc: Bose, Laura; Goldmann, Elizabeth; Leidy, Robert; Jessop, Carter; Goforth, Kathleen
Subject: [EXTERNAL] Draft agenda for SPL-EPA discussion on Rosemont 9.10.13, 3:00-5:00 pm in SF

Hi Dave and Sallie,

[redacted]

o [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

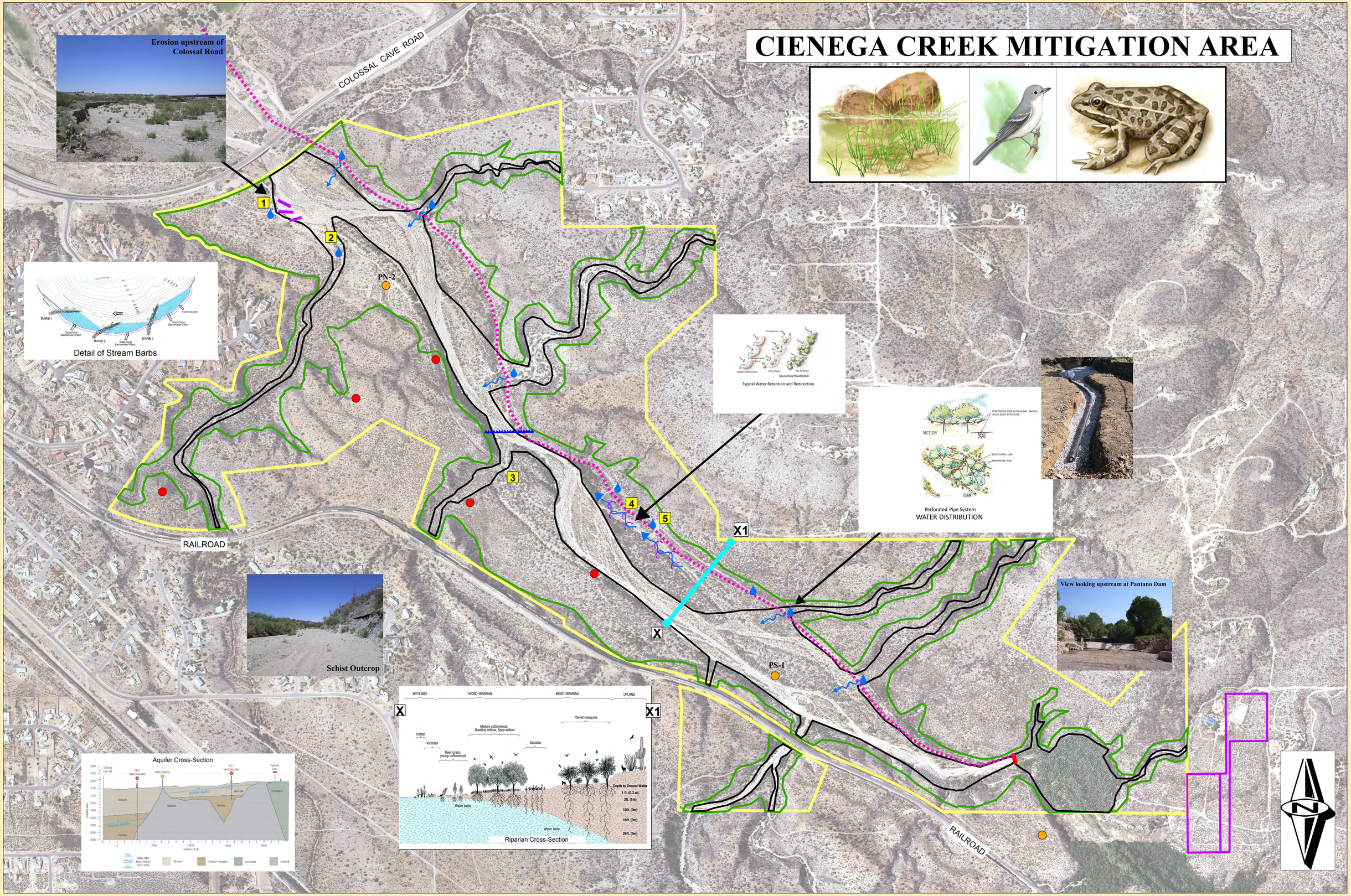
[redacted]

[redacted]

[redacted] UNCLASSIFIED
Caveats: NONE

Classification: UNCLASSIFIED
Caveats: NONE

CIENEGA CREEK MITIGATION AREA



Pima County Regional FLOOD CONTROL DISTRICT

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Tucson, Arizona 85701-1207
(520) 243-1800, FAX: (520)243-1821
http://www.rfcd.pima.gov

- Proposed Monitoring Wells
- Water Distribution
- Headcut
- Existing Wells
- Riparian Cross Section
- Stream Barbs
- Schist Outcrop
- Pipeline / Maintenance Road
- Dam and Spillway
- Stream Restoration & Preservation Area (91 acres)
- Active Restoration Area Floodplain/Riparian (159 acres)
- Buffer (231 acres)
- Proposed Acquisitions for Access Control
- Rock / Earthen Berm
- General Flowpath

1 inch = 250 feet

0 250 500 1,000 1,500 2,000 Feet

Date: 9/3/2013

The information depicted on this display is the result of digital analyses performed on a variety of databases provided and maintained by several governmental agencies. The accuracy of the information presented is limited to the collective accuracy of these databases on the date of the analysis. The Pima County Regional Flood Control District makes no claims regarding the accuracy of the information depicted herein.

This product is subject to the GIS Division Disclaimer and Use Restrictions.

THE SEAL OF PIMA COUNTY ARIZONA

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Pima County Regional
FLOOD CONTROL
DISTRICT

97 E. Congress
Tucson, Arizona 85701
520-724-4600

Suzanne Shields P.E.
Director and Chief Engineer

In – Lieu Fee Mitigation Program

TUCSON
AUDUBON
SOCIETY

300 E. University Blvd., #120
Tucson, Arizona 85705
520-209-1801

Dr. Paul Green
Executive Director

July 31, 2013

Ms. Marjorie Blaine
U. S. Army Corps of Engineers
5205 E. Comanche Street
Davis-Monthan AFB, Arizona 85707

Subject: Potential In-Lieu Fee Mitigation Site for Cienega Creek

Dear Ms. Blaine:

This letter follows our June 19, 2013 presentation and meeting with you and the EPA concerning the feasibility of developing an In-Lieu Fee (ILF) Mitigation site along Cienega Creek downstream of the Pantano Dam in accordance with Section 404 of the Clean Water Act. As you know, the District/Audubon conceptual design for developing this ILF Mitigation site is completely dependent on the long-term availability of "wet water" in order to be able to mitigate "like-for-like" for impacts to perennial and intermittent sources of "wet water" such as streams, seeps, and springs within the watershed.

The plan for the Cienega Creek ILF Mitigation site is currently at the concept level and we have not yet had an opportunity to fully evaluate detailed water requirements or the level of restoration that would be feasible and sustainable. It is critical that any design and performance standards that we develop be flexible given the uncertainty in water availability, intensity of flooding, and other site characteristics which are beyond our control as Program Sponsors. Based on our due diligence to date, we have concluded that significant uncertainty exists regarding our ability to mitigate for streams, seeps, and springs based on approximately 20 years of data documenting progressively declining surface water within Cienega Creek and questions regarding legal access to the surface water. These issues will determine the volume of water physically and legally available to develop a sustainable ILF Mitigation site along Cienega Creek.

Focus: Measurements of Base Flow and Prospects for Habitat Restoration
As we assess the viability of a proposed ILF mitigation project at this site, we call your attention to the recent United States Geological Survey (USGS) measurements of base flow which indicate that the total available wet water at the Pantano Dam is only an average of 360 Acre Feet per Year (AFY) (see exhibits). Even if all water rights at the Pantano Dam were available

to the project, 360 AFY is the actual volume that might be reasonably assumed to be available for mitigation and restoration. This limited base flow is insufficient to implement 22 acres of effective stream restoration with obligate hydro-riparian species, as are found upstream of the dam along perennial and intermittent streams, seeps and springs.

We estimate that approximately 700 AFY are needed to sustainably raise the groundwater level downstream of the dam to a level that would support hydro-riparian species without continued surface irrigation. The current base flow is insufficient and may actually decrease if the downward trend in surface water quantity continues. Ongoing irrigation is not a sustainable strategy for the long-term survival of hydro-riparian species nor does it meet the conditions of the 2008 404 Mitigation Rule. Use of xero-riparian species might increase the long-term chances of project success, but some xero-riparian species do not tolerate regular flooding and could die, leaving primarily ruderal annuals and short-lived perennials.

Restoration and enhancement of overbank xero-riparian vegetation would also require some level of irrigation for an establishment period of five to seven years. The amount of overbank mitigation possible may have to be reduced significantly from our conceptual estimate of 178 AFY if wet water availability continues to diminish.

In our presentation on June 19th, we stressed that the availability of wet water is THE limiting factor in determining the quantity and quality of potential mitigation that might be provided at this site. The availability of wet water also dictates how we would need to stage the implementation of restoration in channel as well as in the overbank. We would need to manage and control ALL of the available wet water, in a timely fashion, to most effectively irrigate those areas and maximize our rate of vegetation establishment within the proscriptions of the 2008 404 Mitigation Rule.

The diminishing base flows in Cienega Creek, from studies conducted for over 20 years and most recently by the Pima Association of Governments, is a trend that is expected to continue into the future. It is possible that, under the best of circumstances, there may only be enough surface flow to maintain the existing riparian vegetation upstream of the dam in the future, if that.

The wetted length of the Cienega Creek continues to decrease, closely mirroring the trend of the surface water quantities observed at the dam (see exhibits). While there are seasonal and event-based variations in flow, a significant observable decline in flow at the Pantano Dam has been documented over the past 20 years; it would therefore be prudent to assume a continued decline in base flow as we design any potential ILF Mitigation site.

Water Rights

Legally, the right to use the surface water flows at the Pantano Dam are tied to three water rights: one from 1908 for 597.755 AFY, one from 1933 for 477.545 AFY and a 1935 right for 46.455 AFY. All these water rights are currently held by the owner of Del Lago Golf LLC. We understand that the Applicant has indicated that they have an option to acquire these water rights.

We have recently received three draft Letters of Intent (LOI) from the Applicant's consultants, WestLand Resources, that outline the concepts for possible commitments of water and water rights which they propose to apply to the potential Cienega Creek ILF Mitigation site. Enclosed are these three letters, and their Pantano Creek Water Allocation Summary, which can be summarized as follows:

- A pilot project to begin release of wet water below the Pantano Dam in the late first or early second quarter of 2014 and continue through 2014 (up to the maximum of 46 AFY (1935 right). This would continue through calendar year 2015 (up to an additional 46 AFY). At the end of the project, it is proposed that District/Audubon and the Applicant will cooperate to develop a final analysis of the results of the pilot project.

- Transfer of water rights for only 413 AFY specifically committed to the potential Cienega Creek ILF Mitigation site, all of which will come from the 1908 priority right to be acquired by the Applicant.

- The Applicant would retain 184.755 AFY of the 1908 water right, and 227.545 AFY of the 1933 right which would go into a Managed Underground Storage Facility (MUSF), located generally in the area between Pantano Dam and Colossal Cave Road.

While the pilot project wet water is not identified as being dedicated to, or a part of, the ILF Program, we note that the 46.455 AFY from the 1935 right has not been available for some years and question if it will be available in 2014 or 2015. We also wonder if and how the MUSF can be co-located with the ILF Mitigation site and what would happen if there is less wet water than anticipated – how would the 1908 Water Right wet water be split and applied between the MUSF and the ILF Project? What would be the impact(s) of the Applicant's proposed recovery well on the groundwater levels essential to the potential ILF Mitigation site?

District/Audubon ILF Program Requirements for a Viable Cienega Creek Mitigation Site
Key components that can be controlled and that are therefore required for establishment of a Cienega Creek ILF Mitigation site include:

- Water Rights Transfer: All of the water rights, for which the Applicant has reportedly acquired a purchase option, should be severed and transferred to the District/Audubon ILF Program and restricted for use of the Cienega Creek ILF Mitigation site. Additional storm water flows would benefit the ILF Mitigation site but not be credited to the ILF or elsewhere.

- MUSF: An agreement that water loss from evaporation and transpiration attributable to the proposed Managed Underground Storage Facility will not count towards the water used by ILF restoration.

- Vail Water Company Well Site: The existing well at the Pantano Dam has a pump capacity of 840 gallons per minute. The well site needs to be acquired by the Applicant and ownership passed to the District. The well will have a conservation easement

restricting use to prevent further reduction in stream flow and groundwater levels that would occur if this well was ever utilized for residential water supply. It may be used for monitoring.

- Certainty on Maintenance of Dam/Infrastructure: At minimum, an easement will be needed to provide for maintenance of the dam, spillway, pipeline, inlet, and 2 acre in holding. Outright ownership of, and additional funding for, those assets would be preferable, as the ILF Sponsors specifically do not wish to assume liability for the 100 + year old structure and associated facilities without such assurances.

- ILF Performance Standards: Flexibility on ILF performance standards and the implementation schedule will be necessary due to factors that are beyond our control:

    - Uncertainty regarding the subsurface geology which impacts both sustainable groundwater levels and the distance downstream of the dam where water may flow in stream.
    - Uncertainty regarding the base flow across and into the ILF Mitigation site.
    - Uncertainty regarding the intensity of future flooding.
    - Uncertainty regarding the area groundwater due to upstream disturbance and changes to groundwater in the watershed.
    - Obligation for Del Lago Golf LLC to continue to receive surface water. Thus, any release of water would need to be planned in incremental stages.
    - Timing uncertainty on the construction of the Vail Water Company pipeline to service the Del Lago golf course.
    - Supplemental Funding for Monitoring and Maintenance activities.
      While the LOIs we have received from WestLand articulate some progress in resolving some issues, there remains much more work to be done to further reduce the uncertainties, as described in this letter.

BACKGROUND

Climate Change, Drought, and Available Water

It is widely accepted that the Sonoran ecoregion is currently in the throes of a profound drought and that these types of drought have occurred historically in the region. On June 23, 1999, the Arizona Division of Emergency Management declared a statewide Drought Emergency Declaration (PCA99006) which remains in effect as a "current open disaster". A Drought Declaration for the State (Executive Order 2007-10) was issued in May of 2007. The Governor's Drought Interagency Coordinating Group has recommended, as recently as May 20, 2013, continuing both declarations based on projections of warmer temperatures and increased wildfire risk. All counties in Arizona currently have a disaster designation from the US Department of Agriculture due to impacts of ongoing drought, high winds, and wildfires. http://www.azwater.gov/AzDWR/StatewidePlanning/Drought/ICG.htm.

New findings appear to indicate that the ongoing drought may be exacerbated beyond the negative impacts of previous climate patterns. Extreme drought conditions are likely to become more common. University of Arizona (U of A) climate models document current, and predict future, above average warming trends in the Sonoran Desert ecoregion which may exacerbate the extremes of previous precipitation patterns. Jonathon Overpeck, co-director of the U of A's Institute for the Study of Planet Earth, stated, "The climate in the Southwest is changing faster than anywhere else in the U.S." "The implications of climate change have already started in Arizona. We'll have to deal with warmer temperatures, less precipitation and more drought..." "These temperature changes that are coming are huge, will demand a lot of water and will make the droughts of the past look pale because they will be so much hotter," he testified before a US House of Representatives Science and Technology Committee hearing on water supply challenges for the 21st century (AZ Daily Star 5/15/2008).

Published May 2008, the *Synthesis and Assessment Product 4.3 (SAP 4.3): The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity in the United States* (http://www.sap43.ucar.edu/) is one of the most extensive examinations of the potential impacts of climate change on important US ecosystems undertaken to date. It concludes that, in arid region ecosystems that have not co-evolved with a fire cycle, the probability of loss of iconic, charismatic mega flora such as saguaro cacti and Joshua trees will greatly increase and that:

- Climate change is already affecting US water resources, agriculture, land resources, and biodiversity, and will continue to do so.

- Forests in the interior West, the Southwest, and Alaska are already being affected by climate change with increases in the size and frequency of forest fires, insect outbreaks and tree mortality. These changes are expected to continue.

- While much of the US has experienced higher precipitation and stream flow over the 20th century, the West and Southwest are notable exceptions. Increased drought conditions have occurred in these regions.

- There is a trend toward reduced mountain snowpack and earlier spring snowmelt runoff in the Western US.

- Weeds grow more rapidly under elevated atmospheric CO2. Under projections reported in the assessment, weeds migrate northward and are less sensitive to herbicide applications.

- Invasion by exotic grass species into arid lands will result, causing an increase fire frequency. Rivers and riparian systems in arid lands will be negatively impacted.

Regional models predict a 10% to 20% reduction in precipitation in the Southwestern US and northern Mexico in the next 75 years (Christensen *et al.* 2007), with most reductions in precipitation during winter months when circulation patterns over the Pacific Ocean prevent

moisture from entering the region through a movement of the storm track to the north (Powell, *Inventory and Status of Unsupplemented and Perennial Surface Water on Pima County Open-space Properties*, 2011).

Seager examined a total of 49 individual projections conducted with 19 climate models and found, even as early as the 2021–2040 period, only three projections show a shift to a wetter climate. In the multi-model ensemble mean, there is a transition to a sustained drier climate that begins in the late 20th and early 21st centuries in the southwestern US and parts of northern Mexico. In general, the American Southwest experiences a severe drying.

Seager explains this drying is unlike any climate state we have seen in the instrumental record. It is also distinct from the multi-decadal mega-droughts that afflicted the American Southwest during Medieval times. The most severe future droughts will still occur during persistent La Niña events, but they will be worse than any since the Medieval period, because the La Niña conditions will be perturbing a base state that is drier than any state experienced recently (Seager *et al.* 2007, Science, 25 May 2007, Vol. 316, pp. 1181-1184).

Overall, experts predict that the climate of Pima County will be hotter and dryer with more extreme periods of high temperatures and extreme weather events. To make things worse, higher average temperatures will have the effect of lowering effective rainfall because of greater evaporation and evapotranspiration. Recent work by The Nature Conservancy indicates that moisture stress (annual evaporation minus precipitation) on plants from 1970 – 2006 led to an effective decrease in precipitation of approximately 1/3 inches over much of Pima County (Rob Marshall, unpublished data) (Powell 2011).

Pima County has been in drought conditions for some time resulting in declining base flows in Cienega Creek (see enclosed graph). The USGS measurements of base flow in recent years indicate that the available wet water at the Pantano Dam is only about 360 AFY. This pattern of reduced available wet water at the Pantano Dam is expected to continue and is critical to the feasibility of our proposed Cienega Creek ILF Mitigation site and is beyond our control.

SUMMARY

The essential points indicate that it is distinctly possible that insufficient wet water is available for our proposed project in real and in legal terms:

- The proposed Cienega Creek ILF Mitigation site would require a minimum of 700 AFY of wet water to establish meaningful habitat restoration.

  The Applicant has an option to acquire the right to purchase approximately 1,122 AFY of surface water rights held by the Del Lago Golf Course to enhance aquatic habitat values in the Cienega Creek watershed.

- The acquirable rights are: 1908 Right of 597.755 AFY, 1933 Right of 477.545 AFY, and 1935 Right of 46.455 AFY.

- USGS measurements of base flow in recent years indicate that the available wet water at the Pantano Dam is only about 360 AFY and declining.

- Additional storm or flood flows do occur on occasion but those flows are completely unpredictable. The ILF cannot capture or utilize these flows without storage facilities. Also, such flood flows only provide a transitory rise in the groundwater levels.

- Ergo, no dependable wet water exists for 40% of the 1908 water right, and perhaps none at all for the 1933 and 1935 water rights; nevertheless,

    - The Applicant intends to transfer only 413 AFY of the 597.755 AFY 1908 water rights to the potential Cienega Creek ILF Project, far short of the identified minimum amount necessary for our proposed project.
    - The Applicant simultaneously intends approximately 825 AFY will be used for aquifer recharge via a managed underground storage facility (MUSF) below Pantano Dam, after the golf course has obtained another source of water for irrigation.
    - The Applicant anticipates that the District/Audubon ILF Program may develop a project that relies upon the waters discharged to the MUSF in excess of the benefits expected to support the Applicant's CWA Section 404 mitigation requirements.

- The District/Audubon ILF Program is concerned that the potential transfer of the water rights may be delayed until January 1, 2016 at the earliest. It is anticipated that it will take a minimum of two years for the Arizona Department of Water Resources (ADWR) to review and approve the application to sever 250 acre-feet of the 1933 water right and all of the 1935 water right and transfer the place of diversion and beneficial use to the Cienega Creek watershed. It is possible that irrigation districts and other water rights holders will object to the severance and transfer application, which could cause ADWR to deny the application. This adds considerable uncertainty to the viability of the proposed Cienega Creek ILF Mitigation site.

We reiterate that as we continue to study this site and attempt to plan a potential ILF Project, the dramatic nature of the base water flow decreases and associated uncertainties for future surface water flows, factors completely beyond our control, have become much more evident and relevant.

If we are to continue to proceed with planning for a Cienega Creek ILF Mitigation site, it will be critical that the Corps includes flexibility in developing mitigation site performance standards, with incremental implementation in direct accordance with wet water availability, and that the necessity for implementation of adaptive management at this site be stipulated in advance.

Nonetheless, at this point in time, the uncertainties attached to the long-term provision of wet water to this site lead us to question its viability.

We appreciate your understanding of the complex issues associated with the feasibility of developing a potential ILF mitigation site at Cienega Creek and appreciate your cooperation in facilitating the elements necessary, if you wish for us to continue to proceed with the development of a potential site plan. To that end, and for clarity of communication, we respectfully request that any and all future communication regarding this issue be conducted through and with you and only you.

Please do not hesitate to contact us should you have questions or concerns.

Sincerely,

Suzanne Shields, P.E.
Director and Chief Engineer
Regional Flood Control District

Dr. Green
Executive Director
Tucson Audubon Society

SS/PG/tj

Enclosures

c: Elizabeth Goldmann, Environmental Protection Agency

From: Goldmann, Elizabeth []
To: Diebolt, Sallie SPL [Sallie.Diebolt@usace.army.mil]; Blaine, Marjorie E SPL [Marjorie.E.Blaine@usace.army.mil]; David.J.Castonon@usace.army.mil [David.J.Castonon@usace.army.mil]
CC: Brush, Jason [Brush.Jason@epa.gov]; Leidy, Robert [Leidy.Robert@epa.gov]; Jessop, Carter [JESSOP.CARTER@EPA.GOV]
Subject: RE: Meeting with Corps and EPA on Rosemont Copper Mine
Sent:

Hi Sallie, Marjorie and Dave,

For our meeting tomorrow, I have attached Pima County and Tucson Audubon's the latest ILF proposal for Cienega Creek below Pantano Dam. In addition, I have attached Pima's letter dated July 31, 2013 regarding the potential for establishing an ILF site for Cienega.

Please let me know if these do not transmit and I will send them separately.

Thanks,

Elizabeth

From: Blaine, Marjorie E SPL [redacted] (b)(6)
To: Leidy, Robert [Leidy.Robert@epa.gov]
CC: Goldmann, Elizabeth [Goldmann.Elizabeth@epa.gov]; Brush, Jason [Brush.Jason@epa.gov]; Jessop, Carter [JESSOP.CARTER@EPA.GOV]; David.J.Castonon@usace.army.mil [David.J.Castonon@usace.army.mil]; Diebolt, Sallie SPL [Sallie.Diebolt@usace.army.mil]
Subject: RE: RE: Mulberry Canyon parcel - suitability as mitigation (UNCLASSIFIED)
Sent: 18 Sep 2013 22:47:59 +0000

Classification: UNCLASSIFIED
Caveats: NONE

Rob

[redacted] corps equity [redacted]

[redacted]

Marjorie
Assist us in better serving you!
You are invited to complete our customer survey, located at the following link:
http://www.spl.usace.army.mil/Missions/Regulatory.aspx
Note: If the link is not active, copy and paste it into your internet browser.

-----Original Message-----
From: Leidy, Robert [mailto:Leidy.Robert@epa.gov]
Sent: Monday, September 16, 2013 2:36 PM
To: Blaine, Marjorie E SPL
Cc: Goldmann, Elizabeth; Brush, Jason; Jessop, Carter; David.J.Castonon@usace.army.mil; Diebolt, Sallie SPL
Subject: [EXTERNAL] RE: Mulberry Canyon parcel - suitability as mitigation

Hi Marjorie,

[redacted] (b)(5) [redacted]

[redacted]

[redacted]

Best,

Rob

Robert A. Leidy, Ph.D.

U.S. Environmental Protection Agency

Wetlands Office (WTR-8)

75 Hawthorne Street

San Francisco, CA 94105

(415) 972-3463

Classification: UNCLASSIFIED
Caveats: NONE

From: Blaine, Marjorie E SPL [redacted] (b)(6)
To: Goldmann, Elizabeth [Goldmann.Elizabeth@epa.gov]
CC:
Subject: RE: Rosemont Copper (UNCLASSIFIED)
Sent: 24 Jul 2013 22:12:20 +0000

Classification: UNCLASSIFIED
Caveats: NONE

Elizabeth

Yes, we would appreciate your comments. Thank you.

Marjorie
Assist us in better serving you!
You are invited to complete our customer survey, located at the following link:
http://www.spl.usace.army.mil/Missions/Regulatory.aspx
Note: If the link is not active, copy and paste it into your internet browser.

-----Original Message-----
From: Goldmann, Elizabeth [mailto:Goldmann.Elizabeth@epa.gov]
Sent: Tuesday, July 23, 2013 1:55 PM
To: Blaine, Marjorie E SPL
Cc: Leidy, Robert; Brush, Jason
Subject: Rosemont Copper

Hi Marjorie

[redacted] (b)(5)

[redacted]

[redacted]

[redacted]

Thanks,

Elizabeth

Classification: UNCLASSIFIED
Caveats: NONE

From: Blaine, Marjorie E SPL [redacted] (b)(6)
To: Goldmann, Elizabeth [Goldmann.Elizabeth@epa.gov]; Diebolt, Sallie SPL [redacted]
David.J.Castonon@usace.army.mil [[redacted]]
CC: Brush, Jason [Brush.Jason@epa.gov]; Leidy, Robert [Leidy.Robert@epa.gov]
Subject: RE: follow up questions on RM (UNCLASSIFIED)
Sent: 11 Sep 2013 19:22:39 +0000

Classification: UNCLASSIFIED
Caveats: NONE

[redacted] corps equity [redacted]

Thanks, Liz.

And we appreciate everyone's time yesterday.

Marjorie
Assist us in better serving you!
You are invited to complete our customer survey, located at the following link:
http://www.spl.usace.army.mil/Missions/Regulatory.aspx
Note: If the link is not active, copy and paste it into your internet browser.

-----Original Message-----
From: Goldmann, Elizabeth [mailto:Goldmann.Elizabeth@epa.gov]
Sent: Wednesday, September 11, 2013 8:36 AM
To: Diebolt, Sallie SPL; [redacted] (b)(6) Blaine, Marjorie E SPL
Cc: Brush, Jason; Leidy, Robert
Subject: [EXTERNAL] FW: follow up questions on RM (UNCLASSIFIED)

Hi Dave, Sallie and Marjorie

[redacted] (b)(5) [redacted]

[redacted]

[redacted]

[redacted]

Thanks, Elizabeth

From: Blaine, Marjorie E SPL [redacted] b6
Sent: Wednesday, August 14, 2013 3:29 PM
To: Goldmann, Elizabeth
Subject: RE: follow up questions on RM (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE

Liz

Response below in red but you will need to view in rich text to see.

Marjorie

Assist us in better serving you!

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http://www.spl.usace.army.mil/Missions/Regulatory.aspx

Note: If the link is not active, copy and paste it into your internet browser.

-----Original Message-----
From: Goldmann, Elizabeth [mailto:Goldmann.Elizabeth@epa.gov]
Sent: Monday, August 12, 2013 2:34 PM
To: Blaine, Marjorie E SPL
Subject: [EXTERNAL] follow up questions on RM

Hi Marjorie

[redacted]

(b)(5)

(b)(5)

(b)(5)

[redacted]r, [redacted]

Thanks!

You're welcome!

Elizabeth

[redacted]

Classification: UNCLASSIFIED

Caveats: NONE

Classification: UNCLASSIFIED
Caveats: NONE

From: Goldmann, Elizabeth []
To: Blaine, Marjorie E SPL [B(6)
CC:
Subject: RE: 1 follow up questions on RM (UNCLASSIFIED)
Sent:

Hi Marjorie

Thanks for your email.

E.

-----Original Message-----
From: Blaine, Marjorie E SPL [b(6)
Sent: Wednesday, September 11, 2013 12:23 PM
To: Goldmann, Elizabeth; Diebolt, Sallie SPL; b(6)
Cc: Brush, Jason; Leidy, Robert
Subject: RE: follow up questions on RM (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

corps equity

Thanks, Liz.

And we appreciate everyone's time yesterday.

Marjorie
Assist us in better serving you!
You are invited to complete our customer survey, located at the following link:
http://www.spl.usace.army.mil/Missions/Regulatory.aspx
Note: If the link is not active, copy and paste it into your internet browser.

-----Original Message-----
From: Goldmann, Elizabeth [mailto:Goldmann.Elizabeth@epa.gov]
Sent: Wednesday, September 11, 2013 8:36 AM
To: Diebolt, Sallie SPL; David.J.Castonon@usace.army.mil; Blaine, Marjorie E SPL
Cc: Brush, Jason; Leidy, Robert
Subject: [EXTERNAL] FW: follow up questions on RM (UNCLASSIFIED)

Hi Dave, Sallie and Marjorie

b(5)

Thanks, Elizabeth

From: Blaine, Marjorie E SPL b(6)
Sent: Wednesday, August 14, 2015 3:29 PM
To: Goldmann, Elizabeth
Subject: RE: follow up questions on RM (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE

Liz

Response below in red but you will need to view in rich text to see.

Marjorie

Assist us in better serving you!

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http://www.spl.usace.army.mil/Missions/Regulatory.aspx

Note: If the link is not active, copy and paste it into your internet browser.

-----Original Message-----
From: Goldmann, Elizabeth [mailto:Goldmann.Elizabeth@epa.gov]
Sent: Monday, August 12, 2013 2:34 PM
To: Blaine, Marjorie E SPL
Subject: [EXTERNAL] follow up questions on RM

Hi Marjorie

b(5)

Thanks!

You're welcome!

Elizabeth

Classification: UNCLASSIFIED

Caveats: NONE

Classification: UNCLASSIFIED
Caveats: NONE

From: Goldmann, Elizabeth []
To: Brush, Jason [Brush.Jason@epa.gov]; Sallie Diebolt [b(6)
CC: Leidy, Robert [Leidy.Robert@epa.gov]
Subject: RE: 1Draft agenda for SPL-EPA discussion on Rosemont 9.10.13, 3:00-5:00 pm in SF (UNCLASSIFIED)
Sent:

Hi Sallie

Can you be more specific in what you need? Do you need video conferencing capability or web access? We don't have a call-in number yet. We have reserved two rooms, but want to make sure we find a room that has the right teleconferencing capabilities for our meeting.

Thanks, Elizabeth

-----Original Message-----
From: Brush, Jason
Sent: Monday, September 09, 2013 9:32 AM
To: Sallie Diebolt
Cc: Goldmann, Elizabeth; Leidy, Robert
Subject: Re: Draft agenda for SPL-EPA discussion on Rosemont 9.10.13, 3:00-5:00 pm in SF (UNCLASSIFIED)

Ok. Elizabeth and/or Rob - would you please see to the facilities issues as I'm out of office today? Thanks -Jason

_____
From: Diebolt, Sallie SPL <[b(6)
Sent: Monday, September 09, 2013 9:21:36 AM
To: Brush, Jason
Subject: RE: Draft agenda for SPL-EPA discussion on Rosemont 9.10.13, 3:00-5:00 pm in SF (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Jason,

Thank you. Will there be a webmeeting set up? This would be best for Marjorie and/or Dave to use during the meeting. Please let me know and also the teleconference call-in number so I can make sure Marjorie has it.

Thanks! See you tomorrow.

Sallie

-----Original Message-----
From: Brush, Jason [mailto:Brush.Jason@epa.gov]
Sent: Thursday, September 05, 2013 6:18 PM
To: Castanon, David J SPL; Diebolt, Sallie SPL
Cc: Bose, Laura; Goldmann, Elizabeth; Leidy, Robert; Jessop, Carter; Goforth, Kathleen
Subject: [EXTERNAL] Draft agenda for SPL-EPA discussion on Rosemont 9.10.13, 3:00-5:00 pm in SF

Hi Dave and Sallie,

b(5)

-Jason

Agenda

7. Adjourn

Classification: UNCLASSIFIED
Caveats: NONE

From: Goldmann, Elizabeth []
To: Blaine, Marjorie E SPL [redacted] b(6)
CC: Leidy, Robert [Leidy.Robert@epa.gov]
Subject: RE: effects of groundwater drawdown on surface water
Sent:

Hi Marjorie

[redacted] (b)(5) [redacted]

[redacted]

Please call or email me if you have any questions.

-Elizabeth

Chapter 3, Seeps, Springs and Riparian Areas

Outstanding Arizona Waters

[redacted] b(5) [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

From: Blaine, Marjorie E SPL [b(6) [redacted]
Sent: Wednesday, August 14, 2013 3:29 PM
To: Goldmann, Elizabeth
Subject: RE: follow up questions on RM (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE

Liz

Response below in red but you will need to view in rich text to see.

Marjorie

Assist us in better serving you!

You are invited to complete our customer survey, located at the following link:

http://www.spl.usace.army.mil/Missions/Regulatory.aspx

Note: If the link is not active, copy and paste it into your internet browser.

[redacted]

-----Original Message-----
From: Goldmann, Elizabeth [mailto:Goldmann.Elizabeth@epa.gov]
Sent: Monday, August 12, 2013 2:34 PM
To: Blaine, Marjorie E SPL
Subject: [EXTERNAL] follow up questions on RM

Hi Marjorie

[redacted]

[redacted]

b(5)

[redacted]

[redacted]

[redacted]

[redacted]

Thanks!

You're welcome!

Elizabeth

Classification: UNCLASSIFIED

Caveats: NONE

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[1] Earman, S. and M. Dettinger. 2011. Potential impacts of climate change on groundwater resources – a global review. Journal of Water and Climate Change 24: 213-229.

[redacted]