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