# MEMORANDUM

Date: April 30, 2014

To: The Honorable Chair and Members
Pima County Board of Supervisors

From: C.H. Huckelberry
County Administrator

Re: **Mitigation Related to the Sierrita Pipeline Project of Kinder Morgan**

The academic basis associated with onsite restoration and offsite mitigation of the Kinder Morgan Sierrita natural gas pipeline through the Altar Valley has been largely ignored, and our concerns dismissed by some parties.

Attached is a professional analysis of needed onsite restoration and offsite mitigation associated with the Sierrita Pipeline project of Kinder Morgan. The needs and obligations are straightforward and founded in academic science.

I will be providing this information directly to the federal record associated with the pipeline approval process.

CHH/anc

Attachment

c: Linda Mayro, Director, Office of Conservation and Sustainability
Allen Fore, Director Public Affairs, Kinder Morgan Energy Partners

**Approaches to Mitigation for the Sierrita Pipeline Project**

**April 21, 2014**
**Brian Powell**
**Pima County Office of Sustainability and Conservation**

This memorandum is to address mitigation measures that the Kinder Morgan Corporation should undertake to offset or repair impacts resulting from the construction and maintenance of their proposed natural gas pipeline through the Altar Valley. Much has been written by the company, FERC, and Pima County staff regarding the impacts and proposed mitigation and restoration actions associated with the project. I will not repeat that information here. Instead, I draw on an extensive literature review and professional judgment to determine the type, amount, and location mitigation activities for a project of this size and geographic scope. Because goals are so important for any conservation action, here I assume that the goal of mitigation for this project is to achieve as close to no net loss natural resources elements (soil, species' habitat, native vegetation, water, etc.) as possible. Given the relatively unfragmented nature of the valley and its importance of the area for a host of wildlife species (noted as among the highest number of "species of greatest conservation need" according to HabiMap Arizona and by way of the number of acres of Important Riparian Area and Biological Core, as determined through Pima County's Conservation Land System map), no goal of no net loss is a prudent approach, and one that is advanced by federal (Corps of Engineers and Environmental Protection Agency 2008) and state (Arizona Game and Fish Department 1991, 1994a, b) agencies that are involved in mitigation of irreplaceable resources.

Mitigation is generally referred to as actions that compensate for loss of natural resource elements, such as ecosystem function, ecosystem services, or species' habitat. Two primary types of mitigation that relate to the Sierrita project are on-site restoration efforts and off-site mitigation (offsets) that occur away from the project site.

**The First Step in Mitigation: On-site Restoration**

The Sierrita pipeline project will cover a combined acreage of approximately 960 acres, but this linear features will likely impact tens of thousands of acres. The most significant impact will be to soils and hydrological processes of the valley because the pipeline will crosscut over 200 major washes. Further, successful revegetation of desert uplands following major disturbances has been problematic and spotty for projects of similar scale (Figure 1). Despite its difficulties, on-site mitigation must focus on the following outcomes:

1) Stop excessive erosion of washes. This will one of the most challenging aspects of this project, yet downcutting and excessive soil loss in washes poses a hazard to upstream features and to the pipeline itself. Methods to address impacts to wash crossing include repair of soil disturbances within washes and upstream


**Figure 1. Views of the Kinder Morgan pipeline near Cienega Creek. Constructed in 2007, erosion (top) and slow to no regrowth of vegetation (bottom) are evident in these photographs, which were taken in 2013.**

sites. Ensuring restoration success will take considerable time, most likely 10 years or more. Simply placing soil cement at pipeline crossings will not be a sufficient approach.

2) Ensure upland vegetation success. This restoration element has been a primary focus of Kinder Morgan's mitigation proposal. The County has criticized the project's vegetation objectives, lack of appropriate monitoring measures, and short evaluation time frames to achieve the success criteria. Kinder Morgan has shown no examples of successful revegetation and erosion control along their other pipeline projects in southern Arizona.

One of the most important considerations in on-site restoration efforts is the general lack of success for similar types of restoration efforts. A review by Maron (2012) found that despite concerted efforts and good intentions, as few as 6% of restoration projects they reviewed could be considered successful. In a paper with similar conclusions, Suding (2011) noted that "...although restoration is often possible and results in net positive benefits, it often does not go as well as planned. The inability to meet set criteria in many projects occurs at a high enough frequency to bring into question our ability to set realistic goals and our confidence in meeting these goals''. The challenges

in restoring desert systems is even greater because of the complexity of the systems (e.g., Bestelmeyer et. al. 2006) and periodic drought that threaten vegetation recovery. I have not seen anything in the FERC or company documents that lead me to believe that they understand the challenges of achieving on-site restoration goals. Figure 1 (from Maron 2012) provides additional cause for questioning the validity of their on-site mitigation in the face of uncertainty, time lags, and inability to measure outcomes given that the the Sierrita project represents a "high risk". Therefore, the most appropriate conservation approach is to pursue on-site restoration coupled with off-site setasides.

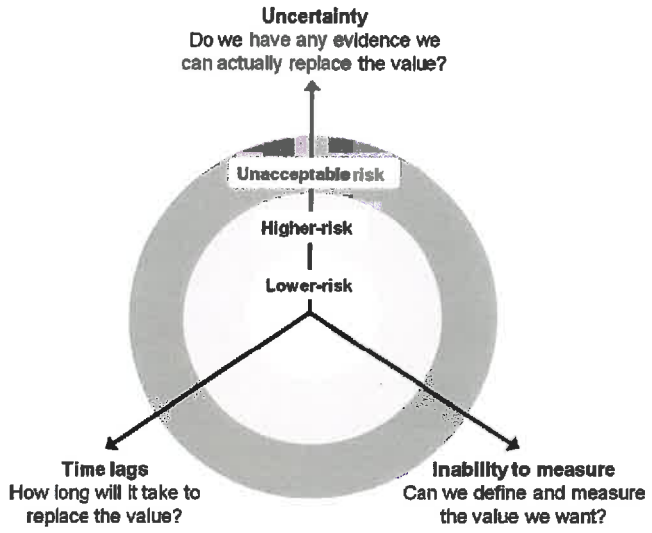


Fig. 1. Conceptual diagram representing three main factors (axes) that limit the technical effectiveness of biodiversity offsets. Axes represent: increasing uncertainty over our ability to restore; increasingly long expected time lags; and decreasing ability to define and measure the biodiversity value to be offset. As a proposed biodiversity offset moves along any one of these axes from the centre, it shifts from a domain within which there can be reasonable confidence in its success, through a domain in which offsetting entails a higher risk of failure and should trigger risk management responses, and finally to the range of values for which a successful offset outcome is highly unlikely, thus rendering offsetting inappropriate as a response to potential loss of that value. A given offset proposal may rank differently on each of the three axes.

**Figure 2. Diagram from Maron et al. (2012) showing that if time lags, inability to measure, and uncertainty are high, then the risk of a project impacts are also high, even unacceptable. All three factors are high for the Sierrita project.**

### Off-site Mitigation: Set asides

The amount and location of off-site mitigation is one that requires considerable deliberations. Getting back to the goal of the mitigation effort for the Sierrita project, the FERC and project proponents have not acknowledged that the project will have impacts beyond the narrow project (i.e., disturbance) boundaries. This is a false assumption that has been pointed out repeatedly by the County and others. Therefore, assuming that off-site mitigation must make up for the entirety of project impacts, a one-to-one mitigation ratio (acres of disturbance:acres of long-term conservation) for a

project like this will not be sufficient because the offsets must equal to the impact (Bull et. al. 2013).

Acre of off-site mitigation. To determine the true area of impact and the conservation needed, two measures can be instructive. Pima County has received a GIS shapefile of the project boundary, which included a 100-foot wide disturbance corridor. The total disturbance is 960 acres. Next, we can look at the location of these disturbances in relation to the CLS and calculate mitigation ratios according to the CLS impacts that are asked of the private development community. The CLS is an industry standard that is especially important in situations such as the Sierrita pipeline where there is so much uncertainty about project impacts and the efficacy of on-site mitigation measure (as noted above) (Maron et al. 2012). Table 1 shows the results of this calculation to be 2,510 acres of off-site mitigation.

**Table 1. Impacts and mitigation according to the CLS mitigation ratios for private development activities. Numbers are rounded to the nearest whole number.**

| CLS Category | Impacts (acres) | Mitigation Ratio Mitigation:Impacts | Mitigation (acres) |
|---|---|---|---|
| Important Riparian Area | 64 | 4:1 | 256 |
| Biological Core | 340 | 4:1 | 1,360 |
| Multiple Use | 447 | 2:1 | 894 |
| Outside the CLS | 109 | 0 | 0 |
| Total | 960 | | 2,510 |

Location and configuration of mitigation. The location of off-site mitigation should be in an area with similar or better environmental assets as the area being impacted (Bull et al. 2013). But how is this determined on a linear pipeline feature such as the Sierrita project that stretches from lower-quality shrublands with a heavy infestation of buffelgrass on the north end of the valley to unfragmented grasslands with a significant component of native perennial grasses on the south end of the valley?

The decision about where to locate off-site mitigation has been the subject of much debate, particularly in the field of wildlife ecology, including the Single Large of Several Small (SLOSS) debate (Wilcox and Murphy 1985) that asks if conserving a few large tracts of land is better than conserving small tracts of land for reducing extinction rates. More recently, a host of new, GIS-based analytical tools have been developed to aid in the decision process (Thorne et. al. 2009; Huber et. al. 2010). The general consensus about off-site mitigation is that it: 1) should be of equal or greater value as the area being impacted (with value based on the environmental attributes of interest) (Pressey et. al. 2003; Kiesecker et. al. 2010; Bull et al. 2013) and 2) should be located in a geographic area that is as near as possible to those lands being impacted (McKenney and Kiesecker 2010). (Note, there is often a balance between these two elements, which has been the topic of discussion for the County's Multi-species Conservation Plan).

The off-site mitigation situation in the Altar Valley is complicated because acquisition of land has a lot to do with willing sellers and in the Altar Valley the opportunities for acquisition are very limited, and in this situation, conservation easements on privately-held ranchlands within the valley may be the best approach.

Leaving aside the availability of land for acquisition or easement, the Habitat Protection Priorities map (Figure 3) provides some guidance about where to locate acquisitions or easements. Private properties along Highway 286 (and Altar Wash) south of Diamond Bell Ranch and other private lands west of the highway likely add the greatest opportunities (note, "Highest Priority Private" and "Secondary Priority Private"). The Marley Ranch parcels can also be considered for this, but acquisition of Marley parcels should be in the same watershed as the impacts.

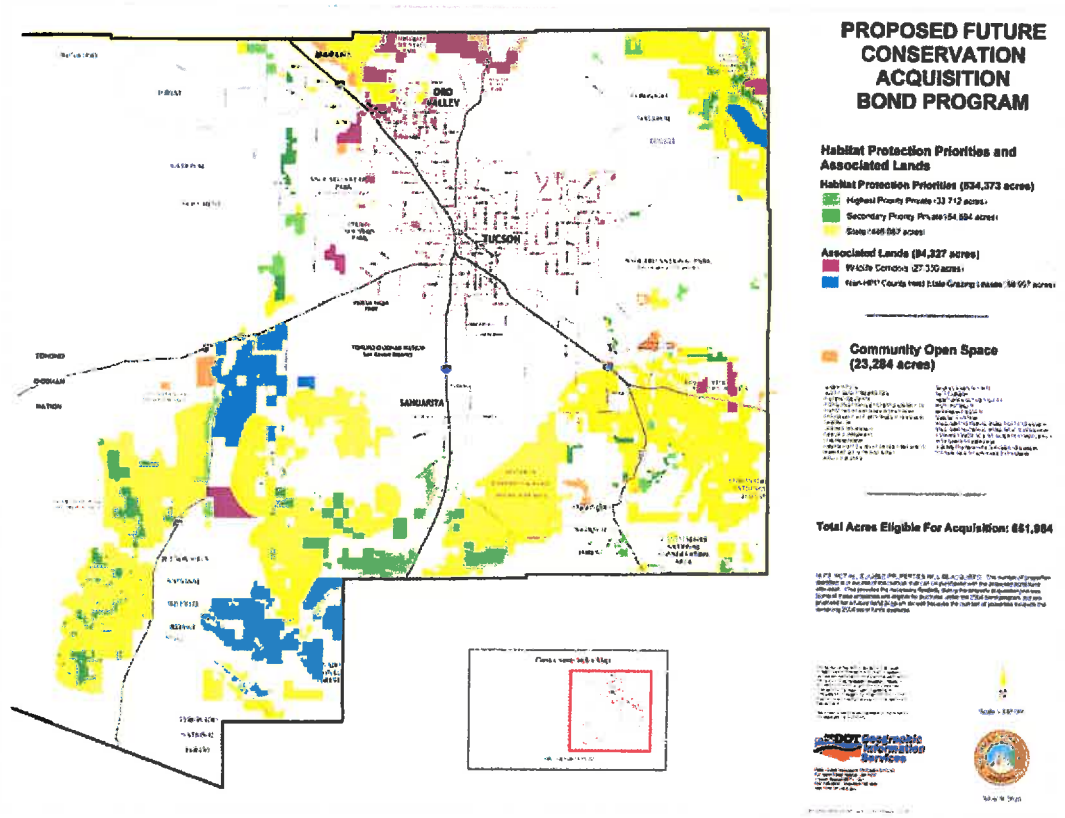


**Figure 3. Habitat Protection Priorities in eastern Pima County.**

Given the linear nature of the impacts, the location of mitigation lands can follow a number of approaches. One approach would be to separate the impact area into zones (e.g., north, middle, and south zones) based on vegetation, topographic, or soils and acquire mitigation lands within each zone. As noted earlier, it is ideal for acquisitions to take place as close to the impact area as possible, but this requirement could vary by zone. For example in the south and middle zones (relatively unfragmented lands), this would be a defensible approach, but in the north zone where this is more fragmentation

and other threats, acquisitions would be best placed in key areas such as undeveloped blocks of vegetation, ecologically unique areas, key wildlife corridors, or in areas that would buffer sprawl from the Three Points area.

An alternative approach is to acquire (or place in conservation easement) lands within one location in the valley. This has the advantage of reducing potential fragmentation in that one area, but likely suffers from a lack of representation.

Regardless of the approach used, to be truly effective, mitigation should take place within the same major watershed as the impacts.

**Final Thoughts**

It is clear that the Sierrita pipeline project will not result in no-net loss of soil, wildlife, vegetation, and other key elements. On-site mitigation is the "first line of defense" and towards this end, Kinder Morgan should be held to a very high standard. However, results (success or failure) will not be known for years to come. Therefore, off-site mitigation, located within the Altar Valley, and according to the industry standard for Pima County (i.e., the CLS) should also be a requirement.

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