June 26, 2009

Mr. Rafael Cancino
Town of Sahuarita Engineer
14311-1 South Rancho Sahuarita Blvd
Sahuarita, AZ 85629

Re: Proposal for Initial Wildlife Permeability Assessment of Pima Mine Road, Old Nogales Highway, Nogales Highway, and Quail Creek Crossing Extension, Pima County, Arizona

Dear Rafael:

SWCA Environmental Consultants (SWCA) appreciates the opportunity to provide you with our scope of work and cost estimate for permeability analysis and wildlife linkage monitoring for the Pima Mine Road, Old Nogales Highway, Nogales Highway, and Quail Creek Crossing Extension projects. It is our understanding that this project will require initial assessments of Pima Mine Road, Old Nogales Highway, and Nogales Highway, methodologies which will be similar to those conducted for Sahuarita Road Phase I assessment. Methodologies for the Quail Creek Crossing Extension will be mirror those identified in the Phase II baseline monitoring study for Sahuarita Road; additional details are provided in this proposal.

The cost to complete these tasks, as described in the attached scope of work, is a **Time and Materials (Not-to-Exceed)** total of **$100,000.00**. Thank you for providing us with the opportunity to work with you. Please contact me at (520) 325-9194 if you have any questions regarding this proposal.

Sincerely,

Geoffrey Soroka
Biologist/Project Manager

Attachment

Scope of Work

INITIAL WILDLIFE PERMEABILITY ASSESSMENT OF PIMA MINE ROAD, OLD NOGALES HIGHWAY, NOGALES HIGHWAY, AND QUAIL CREEK CROSSING EXTENSION, PIMA COUNTY, ARIZONA

Task 1. Phase I Permeability Study: Pima Mine Road, Old Nogales Highway, and Nogales Highway

This task will serve as a preliminary step in identifying existing crossing locations (e.g. culverts, bridges); historical or potential wildlife distribution and activity based on previous data records and habitat type; land ownership, use, and management; and features that may enhance or impede wildlife movement. Such information will be valuable for several reasons: 1) it will identify locations along roads where immediate improvements can be made to facilitate safe wildlife passage (i.e. repair gaps in fencing, vegetation clearing, remove sediment from existing drainage structures); 2) it will provide transportation planners the preliminary locations, dimensions, and designs of suitable wildlife crossing structures that can be incorporated into the early stages of the Design Phase; 3) it will consider existing and future land uses that would be compatible or incompatible with potential wildlife crossing locations; 4) it will identify a suite of mitigation measures that could be investigated to ensure the long-term functionality of that particular linkage; and, 5) it will identify locations to conduct focused monitoring efforts to study wildlife movement patterns across these roadways (i.e. develop baseline monitoring analogous to Task I of this proposal). Furthermore, this process will incorporate results and findings of similar ongoing and proposed studies being funded by the RTA, including a potential County-wide linkage identification process, monitoring of structures to determine appropriate dimensions that facilitate species movement, and fencing configurations needed to direct wildlife to suitable crossing structures.

This task will be accomplished by 1) conducting an investigation of previous studies and databases that could provide information regarding the species that are either present along these transportation corridors or that have the potential to use these potential crossing areas; 2) determining the locations of potential wildlife crossing zones; and 3) determining monitoring locations and efforts to identify existing and potential wildlife crossing zones along these three road segments. Prioritization of crossing locations and associated mitigation measures and designs will accompany this study.

Task 1a. Literature Search and Data Synthesis, Focal Species Identification, and Site Assessment

- Synthesize and summarize previously identified wildlife crossing zones through studies, documents, or databases (focal species may include lesser long-nosed bat, mule deer, bobcat, and coyote, among others that will be determined as data are obtained). Sources may include Critical Habitat area maps from the U.S. Fish and Wildlife Service database; Pima Association of Governments planning maps; Sonoran Desert Conservation Plan, City of Tucson Habitat Conservation Plan (HCP), and Town of Marana HCP planning maps and conservation areas; existing data or studies that have investigated movement patterns or behavior relative to highways, habitat, and

other landscape features; and animal-vehicle collision (AVC) data from state, regional, and/or local accident reports, records, and databases;

- Characterize existing and potential wildlife crossing zones, including existing structures, fill slopes, and at-grade crossing areas (e.g., choke points, high-AVC areas); and
- Identify and assess multiple landscape and human-made features that may impede or encourage wildlife movement across these three roadways.

Task 1b. Crossing Location Prioritization and Design Recommendations

- Prioritize crossing locations based on the feasibility of installing a particular mitigation measure, the relative biological significance of that location, and the opportunity for the long-term success of the mitigation measure;
- Recommend mitigation measures and designs that would contribute to increasing the crossing success of the focal species across the roadway and which could be incorporated into preliminary design plans for each transportation corridor; and,
- Develop an appropriate baseline monitoring strategy to obtain baseline data on the distribution and frequency of wildlife movement across these roadways, including successful and unsuccessful at-grade crossings and use of existing drainage structures.

SWCA will provide the following deliverable under this scope of work for the Town of Sahuarita.

- A Wildlife Linkage Assessment Report for the Town of Sahuarita will provide, at minimum, a landscape description ("Ecological Overview") of each roadway; a list of target or focal species; a summary of field survey results and evaluations; a roadway assessment; large, detailed fold-out maps of the area; and mitigation recommendations that can be incorporated into initial design plans associated with road upgrade/widening projects.

In addition, we would like to note that initial site assessments may not detect the variety of species present along this stretch of road. Therefore, to follow up on our initial site assessment, we could provide additional tasks that may refine our knowledge of the species that have the potential to use any identified linkages along these roads. Furthermore, based on our findings, we may provide a detailed report summarizing effective strategies to maintain and possibly enhance the safe movement of wildlife species across this stretch of roadway, including providing detailed design criteria for species and preliminary costs and developing species-specific site restoration plans to enhance existing and proposed crossing locations. Finally, we could provide recommendations to conduct effectiveness monitoring to ensure that recommended mitigation measures provide for continued species movement across these roadways. This would aid in ensuring that the functionality of recommended mitigation measures is maintained over time.

Not-to-Exceed Cost to complete the initial permeability analyses: $35,000

Task 2. Phase I Permeability Analysis and Monitoring Study: Quail Creek Crossing Extension

The proposed Quail Creek Crossing Extension component of this proposal incorporates a new element into the incorporation of wildlife crossing infrastructure into the transportation planning process. Unlike the other road projects discussed above, the Quail Creek project involves building a new road in a location where a road does not exist. Therefore, a different approach

to incorporating wildlife crossing measures into this project is needed. We propose a coordinated effort to collect wildlife crossing-related datasets that will contribute to species distribution and frequency along this proposed road corridor. Such an effort will include track bed surveys, scat surveys, remotely-triggered camera surveys, and small mammal/herpetofauna sampling. Data obtained from these surveys, which will occur for a minimum of one year, will serve to identify distribution and movement patterns of wildlife along this proposed transportation corridor, in addition to serving as baseline information for which to gauge the impacts of the new roadway and wildlife crossing structures on the local wildlife population. The combination of these multiple survey techniques will serve to refine knowledge of where species have the greatest potential to cross the proposed roadway, thus identifying appropriate mitigation strategies which can be incorporated into design plans for the purposes of providing wildlife movement across the new roadway. Tasks will include:

1. Conducting focused monitoring, including track, scat, and camera surveys consistent with the methodologies used for the Sahuarita Road Phase II study (see Appendix A below), along the proposed transportation corridor route to prioritize locations along that route that would facilitate future wildlife movement, taking into account future landscape and land use modifications that could impede or encourage wildlife movement in relation to the road project and associated development; thus, these studies will direct where future crossings and road design features suited to accommodate wildlife movement will be located; and
2. Developing a report that will provide a summary of preliminary locations and types of wildlife connectivity-related mitigation measures along the proposed Quail Creek Road corridor. In addition, the report will identify pre- and post-construction monitoring strategies that would ensure recommended mitigation strategies are achieving pre-established goals.

A Wildlife Linkage Assessment Report for the Town will be developed and will provide, at minimum, a landscape description ("Ecological Overview") of the study area; a list of target or focal species; and a summary of field survey results and evaluations, including all data collected for the Quail Creek Road extension project for the purposes of identifying baseline wildlife distribution along the proposed road corridor. Also included will be recommendations on wildlife crossing infrastructure to incorporate into the design plans for this highway project; recommendations will be based on findings from the one-year monitoring study.

Not-to-Exceed Cost to complete the initial permeability analyses and monitoring study: $65,000

Appendix A. Sampling strategies for Quail Creek Crossing Extension

Track bed surveys

The rationale behind conducting track bed surveys along the proposed road corridor is to determine the distribution and abundance of various wildlife species that need to be addressed in order to design a roadway that will have minimum impacts on wildlife. This information will be used to either identify locations where road avoidance is necessary or locations that may require some type of mitigation element in the preliminary road design. Perhaps the biggest issue in establishing a sampling design that can adequately determine whether at-grade crossing rates change after installation of wildlife connectivity mitigation measures is to sample a large enough stretch of roadway. Prior to any sampling, a power analysis would be conducted to determine what sampling effort would be needed in order to detect such changes.

Transects will be situated along the proposed road corridor and consist of multiple track stations (sample size will be dependant on access and configuration of the proposed road). Transects will be established perpendicular to the proposed road, with the midpoint of these transects corresponding to the proposed centerline of the Quail Creek Extension. These track transects will be established along dirt roads and wildlife trails throughout the study area. Scent stations will occur at approximately 250 m intervals; each scent station will consist of a 1 m^2 plot of finely sifted gypsum powder and a rock, placed in the middle of the station, baited with two artificial scent lures every other day (Russ Carman's Pro Choice and Canine Call). Stations will be checked for visitation for five consecutive mornings. If an animal visits a station, tracks will be identified to species and the station will be cleared and resifted. Scent stations will be operated for at least one round of sampling (5 days) at least every season, including July/August, October/November, January/February, and April/May. For each visit to the track station, we will record the following data: previous precipitation levels, ambient air temperature, track bed condition, species leaving a track, certainty of track, and direction of track relative to the proposed roadway.

To obtain an index of relative abundance, the number of visits by each species is divided by the total sampling effort. This index is calculated using the following equation:

$$I = \{v_j/(s_j n_j)\}$$

where, I = index of species activity at transect j
v_j = number of stations visited by species at transect j
s_j = number of stations in transect j
n_j = number of nights that stations were active in transect j

Any scent station in which tracks were too difficult to read will be omitted from the sampling night. Thus, the true sampling effort will be:

$$\{s_j n_j\} - o_j$$

where, o_j = number of omits in transect j

This index does not provide data on the absolute number of individuals. Instead, the index is used to compare relative abundance of species across space and time. Track indices will be pooled across seasons to derive a single track index per transect for each individual species,

thus providing information on species activity along the project corridor, which, in turn will allow for recommendations on where appropriate crossing structures could be located.

Scat Surveys

Scat surveys, relative to track surveys, have received little attention as a useful technique for documenting wildlife abundance. Surveys will target medium- and large-bodied mammals, and will be co-located along track transects. Scat will be initially cleared during a day that track stations are active; additional collections will occur at 2 and 4 weeks after the initial clearing. Each scat will be identified to species and ranked on a confidence scale of 1 to 3, with 3 being the highest confidence level of species identification. Relative abundance of scat will be analyzed similarly to that of the track transects.

Camera Surveys

Remotely triggered cameras have increasingly become a useful tool in recording activity of various wildlife species. Cameras provide a relatively low-maintenance means of surveying wildlife populations because visitations to the units are only made to change film and batteries. Cuddeback cameras will be used to complement track and scat surveys. Cameras will be placed at the midpoint of scat and track transects (centerline of proposed road corridor) and will be secured by installing a 2m tall metal post (Telspar) into the ground. The camera will be secured to the upper meter of the Telspar post in a metal lockbox that will prevent the camera from being stolen. Each pass of an animal by the infrared sensor triggers the camera. Date of pass and time of day are recorded on each print, thus allowing investigations into the temporal variations of activity by a species at a particular location. Relative abundance of wildlife species detected by cameras stations will be analyzed similarly to that of track and scat transects.

Small mammal and herpetofauna surveys

Small mammal trapping grids have been widely used to obtain data on small mammal distribution and abundance. Each trapping grid will consist of 16 Sherman traps spaced at 10-m intervals, creating a 30m x 30m grid of 4 rows and 4 columns. Several small mammal species are likely to avoid capture in Sherman traps. This is due in part to behavior (a burrowing animal) or body size (an animal being too large for the trap). We will utilize at least two methods to capture these groups of species. For burrowing animals, we will utilize herpetofauna pitfall arrays (see discussion below). These methods are successful in capturing pocket gophers, shrews, and voles. For small mammal species that may be too large to be captured by Sherman traps (ground squirrels, and rabbits), we will use track station visits to obtain an index of abundance for each of these species.

Pit-fall trap arrays have been widely used to obtain data on a variety of arthropods, amphibians, reptiles, and small mammals. Each array consists of seven 5-gallon buckets built into the ground so that the top of the bucket is flush with the soil; buckets will be connected by shade cloth drift-fences. From a center bucket three arms of drift fence extend out 15 m, thus forming a Y. In addition to the center bucket, each arm of the Y has a bucket placed in the middle and at the end. A meter long hardware cloth funnel trap is placed along each of the three arms for capturing large snakes and lizards.

Small mammal trapping grids and pitfall arrays will be established at the same locations along the proposed road corridor as the track and scat transects, with a grid/array occurring at the

midpoint of the transect (at the proposed centerline for Quail Creek Extension) in addition to an grid/array on each side of the proposed road alignment (endpoints of transects). This will provide important information as to which species are located along a transect and how they are distributed along the proposed road corridor. This data will ultimately provide invaluable information on whether species distribution and movement between arrays is maintained after the road is constructed, and provide insight to the responses of small mammal and herpetofauna responses to appropriate roadway infrastructure aimed at maintaining those movements after roadway construction.

Small mammal trapping grids and pitfall arrays will be operated for at least one round of sampling (5 days) at least every season, including July/August, October/November, January/February, and April/May; traps will be removed (Sherman traps) or kept closed (pitfall arrays) between the sampling periods. Captured small mammals and herpetofauna will be weighed and marked following approved capture protocols.