APPENDIX E - VISUAL SIMULATIONS

VISUAL SIMULATIONS
RAY MINE TAILINGS STORAGE FACILITY

ASARCO LLC

Prepared for:

U.S. Army Corps of Engineers

Prepared by:

WestLand Resources, Inc.
Engineering and Environmental Consultants

4001 E. Paradise Falls Drive
Tucson, Arizona 85712

On behalf of:

ASARCO LLC- Ray Operations

Date July 23, 2014
Project No. 203.25

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1. INTRODUCTION

ASARCO LLC (Asarco) has identified the need for an additional tailings storage facility (TSF) to support ongoing mining operations at the Ray Mine in Pinal County, Arizona. It is anticipated that the construction of an additional tailings impoundment (the Project) would require the discharge of fill to surface drainage features that would be identified as waters of the United States by the U.S. Army Corps of Engineers (Corps).

An analysis of alternatives is required to demonstrate compliance with guidelines established under the Clean Water Act (CWA) Section 404(b)(1) (40 CFR §230) for avoidance and minimization of impacts to jurisdictional waters. Nine alternatives at six potential Project locations are currently being analyzed as part of the Clean Water Act Section 404 (b)(1) Alternatives Analysis prepared for the Project in accordance with the 404(b)(1) guidelines.

Of the six sites considered in the Alternatives Analysis, E Dam, Devils Canyon, West Dam, and Granite Mountain have been deemed impracticable and are not considered further in this investigation. The remaining two sites represent five alternatives, Ripsey Wash (Ripsey Wash Alternatives 1 to 3) and Hackberry Gulch (Hackberry Gulch Alternatives 1 and 2). Ripsey Wash Alternatives 1 and 2 and Hackberry Gulch Alternative 1 were dropped from further consideration because alternatives at these sites were developed that have fewer impacts to waters. Ripsey Wash Alternative 3 and Hackberry Gulch Alternative 2 are currently still being evaluated by Asarco. Asarco has identified Ripsey Wash Alternative 3 as its proposed action in its CWA Section 404 permit application to the Corps.

The Corps has identified visual resources as a topic that will need to be addressed in the Environmental Impact Statement (EIS) to be prepared for the Project in accordance with the requirements of the National Environmental Policy Act. The purpose of this report is to describe the methods used to prepare and present visual simulations of Ripsey Wash Alternative 3 and Hackberry Gulch Alternative 2. The information presented in this report will aid in the evaluation of visual impacts that would result from the construction of either of these alternatives.

2. METHODOLOGY

On December 2, 2013, Susan Corser of ECA Community Planning (ECA), as well as representatives from the Bureau of Land Management, the U.S. Forest Service and WestLand Resources, Inc. (WestLand), met in the field near the town of Kearny, Arizona, to review and discuss possible locations for visual simulations of the Ripsey Wash and Hackberry Gulch alternatives. Based on the findings of that field work and subsequent research performed by ECA, six Key Observation Points (KOP's) were identified (see ***Figure E-1***).

On February 5 and March 4, 2014, a representative from WestLand took photos from each of the KOP's and documented the location of each photograph using a Garmin Montana 650t handheld global positioning system (GPS) unit. The camera utilized for taking photographs was a Canon Rebel XT EOS digital camera with a Canon EFS 18–55 mm zoom lens. The lens was set at 33 mm. to compensate for a

crop factor of 1.6, thereby creating an equivalent focal length of 53 mm. (33 mm. lens setting x 1.6 crop factor = 52.8 mm. output view), which creates a frame that mimics the field of view of the human eye. From each KOP, a series of overlapping photographs was taken of the existing landscape that would be affected by the Project.

After downloading the digital images, WestLand "stitched" together the photographs from each photo point using Adobe Photoshop. This "stitching" was done by eye. The width of each panorama was dictated by the size of the visual impact that would result from the construction of the Project. Minor corrections for colors were made in order to correct for small variations between the three photos.

Using ArcGIS 10.1 and 3D Analyst, WestLand merged the publically available USGS Digital Elevation Model (DEM) (10 meter) with three dimensional CAD data of the proposed projects provided by Asarco. The resulting DEM was then imported into AutoDesk InfoWorks (Version 2014) along with the locations of the photo points recorded by the GPS unit. WestLand rotated the DEM to correspond with each photo point location and captured that digital perspective as a DEM image. The horizontal angles of these images varied between 45 to 105 degrees. Depending on the location of the KOP in relation to the Project alternatives, images that incorporated wider angles allowed for more comprehensive simulations of that Project alternative.

For each photo point, the captured DEM perspective was imported into Photoshop along with the corresponding stitched panoramic image. Using recognizable existing landmarks visible in both, the DEM perspective was aligned with the panorama. The portions of the Project in the DEM image were then isolated and placed over the panoramic image. The DEM image of the Project was then rendered in Photoshop using the colors and textures that are expected to result from the Project.

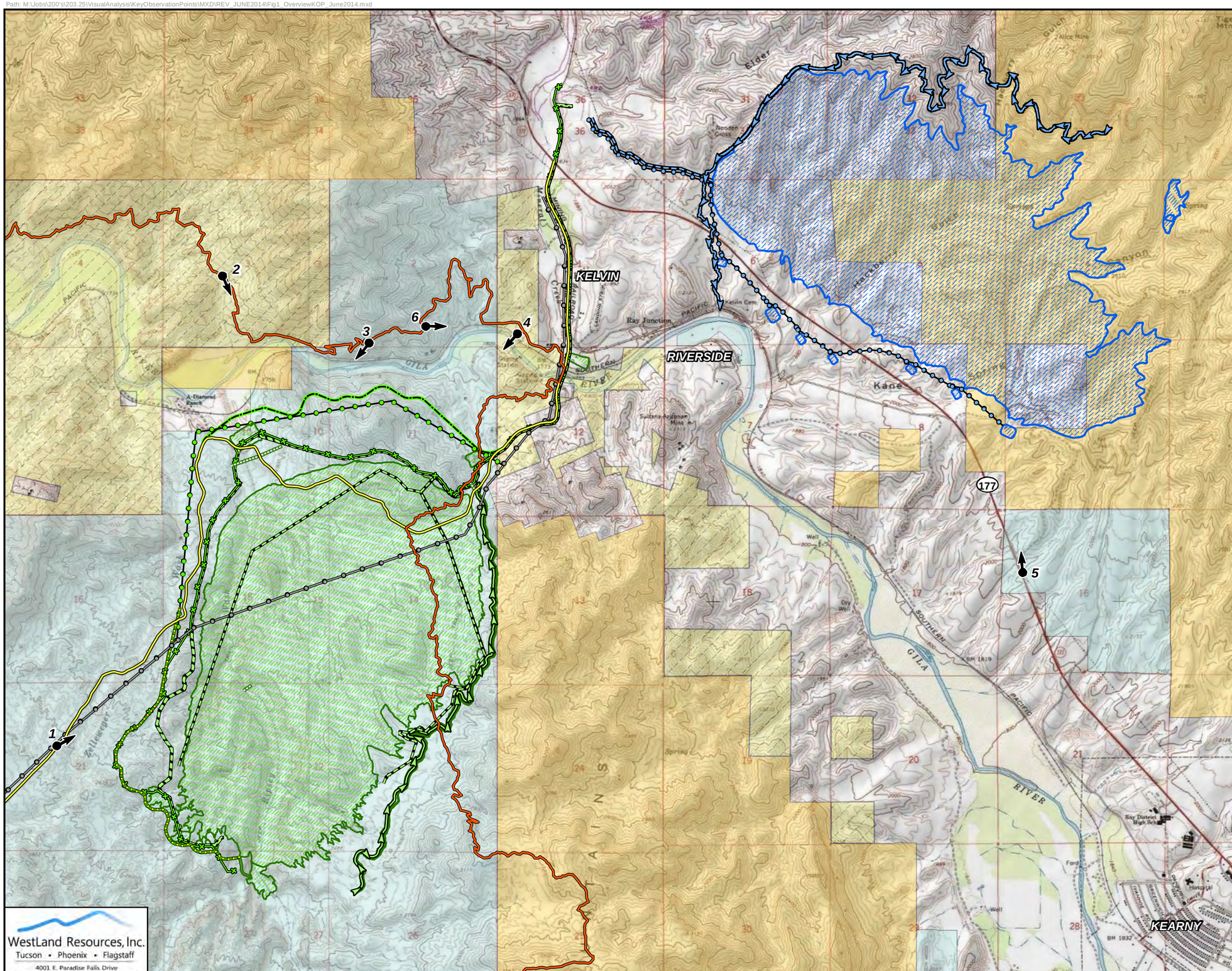
With respect to the printed size of the visual simulations, the simulated image was created with the intention that it be printed on 11" x 17" paper, to be included as a figure in the visual analysis.

3. RESULTS

The images of the existing landscapes associated with each KOP and the rendered simulations for Ripsey Wash Alternative 3 and Hackberry Gulch Alternative 2 are presented as figures following this text.

FIGURES

Path: M:\Jobs\200's\203.25\VisualAnalysis\KeyObservationPoints\MXD\REV_JUNE2014\Fig1_OverviewKOP_June2014.mxd



N

3,000 0 3,000 Feet

T4S, R13E, Portions of Sections 1-3, 12 & 21
T4S, R14E, Portions of Sections 16 & 27,
Pinal County, Arizona,
Grayback & Kearny USGS 7.5' Quadrangles

Land Ownership Provided by BLM

Project Line Work Provided by AMEC
Environment & Infrastructure

LEGEND

Key Observation Point and Direction

EXISTING FEATURES

- Florence-Kelvin Highway
- Overhead Electric
- Arizona National Scenic Trail

RIPSEY WASH ALTERNATIVE 3

- Ripsey Wash Alternative 3 Tailings Storage Facility Footprint
- Ripsey Wash Tailings Delivery and Reclaim Water Pipelines
- Stormwater Diversion Pipeline
- Cutoff Wall
- Surface Water Diversion Channel
- Realignment of Florence-Kelvin Highway
- Ripsey Wash Project Power Line
- SCIP Overhead Electric Realignment

HACKBERRY GULCH ALTERNATIVE 2

- Hackberry Gulch Alternative 2 Tailings Storage Facility Footprint
- Hackberry Gulch Tailings Delivery and Reclaim Water Pipelines
- Surface Water Diversion Channel
- Hackberry Gulch Route for Overhead Electric

LAND OWNERSHIP

- Bureau of Land Management
- Bureau of Reclamation
- Private Land (No Color)
- State Trust Land

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Ray Mine Tailings Storage Facility
Visual Simulations

Figure E-1

KEY OBSERVATION POINT (KOP) LOCATIONS

PHOTOGRAPHIC INFORMATION

Time of Photograph:	2:09 PM	Latitude:	33.07087
Date of Photograph:	03.04.2014	Longitude:	-111.026569
Weather Condition:	Mostly sunny	Elevation:	2545
Viewing Direction:	Northeast	Distance:	Not applicable

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Ray Mine Tailings Storage Facility

Visual Simulations

Figure E-2: KOP 1 – Florence-Kelvin Highway, Existing Condition

WestLand Resources, Inc.
Engineering and Environmental Consultants

PHOTOGRAPHIC INFORMATION

Time of Photograph:	2:09 PM	Latitude:	33.07087
Date of Photograph:	03.04.2014	Longitude:	-111.026569
Weather Condition:	Mostly sunny	Elevation:	2545
Viewing Direction:	Northeast	Distance:	0.76 miles to nearest portion of Ripsey Wash Alternative 3

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Ray Mine Tailings Storage Facility

Visual Simulations

Figure E-3: KOP 1 – Florence-Kelvin Highway, Ripsey Wash Alternative 3, Completion of Centerline Construction

Note: Simulation indicates impoundment at completion of centerline construction before reclamation with rock surfacing.

WestLand Resources, Inc.
Engineering and Environmental Consultants

PHOTOGRAPHIC INFORMATION

Time of Photograph:	2:09 PM	Latitude:	33.07087
Date of Photograph:	03.04.2014	Longitude:	-111.026569
Weather Condition:	Mostly sunny	Elevation:	2545
Viewing Direction:	Northeast	Distance:	0.76 miles to nearest portion of Ripsey Wash Alternative 3

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Visual Simulations

Figure E-4: KOP 1 – Florence-Kelvin Highway, Ripsey Wash Alternative 3, Project Completion

Note: Simulation indicates impoundment at completion of the project before reclamation of the top 30 feet of tailings and surface of the tailings.

WestLand Resources, Inc.
Engineering and Environmental Consultants

PHOTOGRAPHIC INFORMATION

Time of Photograph:	3:58 PM	Latitude:	33.111533
Date of Photograph:	02.05.2014	Longitude:	-111.009503
Weather Condition:	Lightly overcast	Elevation:	1897
Viewing Direction:	South to southeast	Distance:	Not applicable

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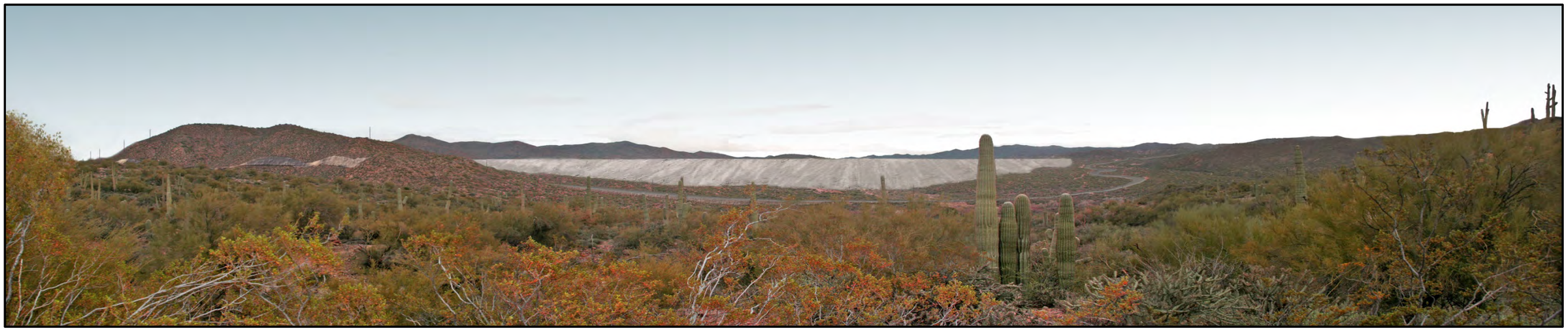
Visual Simulations

Figure E-5: KOP 2 – Arizona Trail, Mile 4.3, Existing Condition

WestLand Resources, Inc.
Engineering and Environmental Consultants



PHOTOGRAPHIC INFORMATION

Time of Photograph:	3:58 PM	Latitude:	33.111533
Date of Photograph:	02.05.2014	Longitude:	-111.009503
Weather Condition:	Lightly overcast	Elevation:	1897
Viewing Direction:	South to southeast	Distance:	1.28 miles to nearest portion of Ripsey Wash Alternative 3

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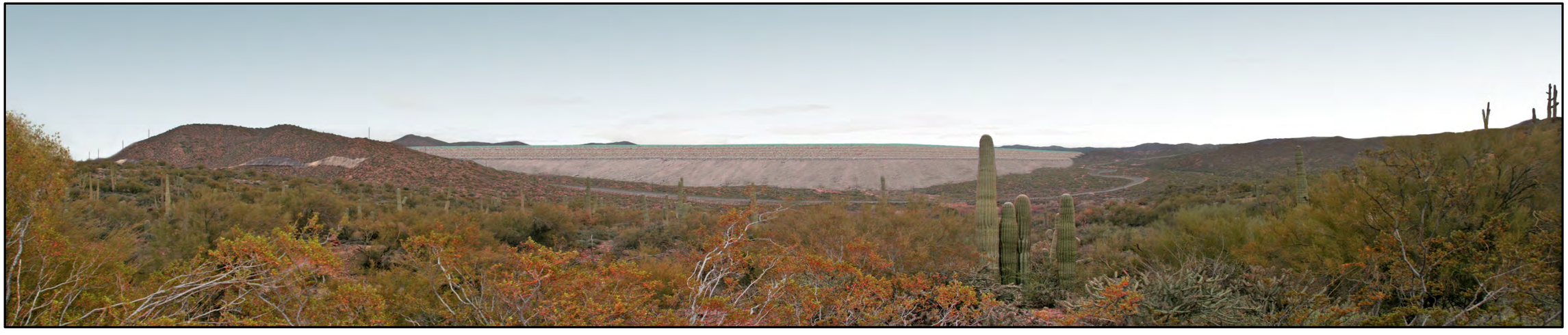
Ray Mine Tailings Storage Facility

Visual Simulations

Figure E-6: KOP 2 – Arizona Trail, Mile 4.3, Ripsey Wash Alternative 3, Completion of Centerline Construction

Note: Simulation indicates tailings impoundment at completion of centerline construction before reclamation with rock surfacing.

WestLand Resources, Inc.
Engineering and Environmental Consultants



PHOTOGRAPHIC INFORMATION

Time of Photograph:	3:58 PM	Latitude:	33.111533
Date of Photograph:	02.05.2014	Longitude:	-111.009503
Weather Condition:	Lightly overcast	Elevation:	1897
Viewing Direction:	South to southeast	Distance:	1.28 miles to nearest portion of Ripsey Wash Alternative 3

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Ray Mine Tailings Storage Facility

Visual Simulations

Figure E-7: KOP 2 – Arizona Trail, Mile 4.3, Ripsey Wash Alternative 3, Project Completion

Note: Simulation indicates tailings impoundment at completion of the project before reclamation of the top 30 feet of tailings.

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Engineering and Environmental Consultants

PHOTOGRAPHIC INFORMATION

Time of Photograph:	1:57 PM	Latitude:	33.1057
Date of Photograph:	02.05.2014	Longitude:	-110.994414
Weather Condition:	Lightly overcast	Elevation:	2128
Viewing Direction:	South to southwest	Distance:	Not applicable

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Visual Simulations

Figure E-8: KOP 3 – Arizona Trail, Jake's Overlook, Existing Condition

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PHOTOGRAPHIC INFORMATION

Time of Photograph:	1:57 PM	Latitude:	33.1057
Date of Photograph:	02.05.2014	Longitude:	-110.994414
Weather Condition:	Lightly overcast	Elevation:	2128
Viewing Direction:	South to southwest	Distance:	0.27 miles to nearest feature of relocated highway

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Visual Simulations

Figure E-9: KOP 3 – Arizona Trail, Jake's Overlook, Relocated Florence-Kelvin Highway (uncolored retaining walls) & SCIP Transmission Line

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PHOTOGRAPHIC INFORMATION

Time of Photograph:	1:57 PM	Latitude:	33.1057
Date of Photograph:	02.05.2014	Longitude:	-110.994414
Weather Condition:	Lightly overcast	Elevation:	2128
Viewing Direction:	South to southwest	Distance:	0.27 miles to nearest feature of relocated highway

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Visual Simulations

Figure E-10: KOP 3 – Arizona Trail, Jake's Overlook, Relocated Florence-Kelvin Highway (colored retaining walls) & SCIP Transmission Line

Note: Simulation is intended to demonstrate the effectiveness of the use of colored concrete as a proposed mitigation measure.

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PHOTOGRAPHIC INFORMATION

Time of Photograph:	11:55 AM	Latitude:	33.106491
Date of Photograph:	02.05.2014	Longitude:	-110.979205
Weather Condition:	Lightly overcast	Elevation:	1795
Viewing Direction:	Southwest	Distance:	Not applicable

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Visual Simulations

Figure E-11: KOP 4 – Arizona Trail Access, Existing Condition

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PHOTOGRAPHIC INFORMATION

Time of Photograph:	11:55 AM	Latitude:	33.106491
Date of Photograph:	02.05.2014	Longitude:	-110.979205
Weather Condition:	Lightly overcast	Elevation:	1795
Viewing Direction:	Southwest	Distance:	0.71 miles to nearest visible section of relocated highway

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Ray Mine Tailings Storage Facility

Visual Simulations

Figure E-12: KOP 4 – Arizona Trial Access, Relocated Florence-Kelvin Highway (uncolored retaining walls) & SCIP Transmission Line

WestLand Resources, Inc.
Engineering and Environmental Consultants

PHOTOGRAPHIC INFORMATION

Time of Photograph:	11:55 AM	Latitude:	33.106491
Date of Photograph:	02.05.2014	Longitude:	-110.979205
Weather Condition:	Lightly overcast	Elevation:	1795
Viewing Direction:	Southwest	Distance:	0.71 miles to nearest visible section of relocated highway

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Ray Mine Tailings Storage Facility

Visual Simulations

Figure E-13: KOP 4 – Arizona Trail Access, Relocated Florence-Kelvin Highway (colored retaining walls) & SCIP Transmission Line

Note: Simulation is intended to demonstrate the effectiveness of the use of colored concrete as a proposed mitigation measure.

WestLand Resources, Inc.
Engineering and Environmental Consultants

PHOTOGRAPHIC INFORMATION

Time of Photograph:	12.01 PM	Latitude:	33.085821
Date of Photograph:	03.04.2014	Longitude:	-110.92717
Weather Condition:	Lightly overcast	Elevation:	2030
Viewing Direction:	North	Distance:	Not applicable

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Ray Mine Tailings Storage Facility

Visual Simulations

Figure E-14: KOP 5 – State Route 177, Existing Condition

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PHOTOGRAPHIC INFORMATION

Time of Photograph:	12.01 PM	Latitude:	33.085821
Date of Photograph:	03.04.2014	Longitude:	-110.92717
Weather Condition:	Lightly overcast	Elevation:	2030
Viewing Direction:	North	Distance:	0.85 miles to nearest portion of Hackberry Gulch Alternative 2

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Ray Mine Tailings Storage Facility

Visual Simulations

Figure E-15: KOP 5 – State Route 177, Hackberry Gulch Alternative 2, Project Completion

Note: Simulation indicates tailings impoundment at completion of the project before reclamation of the top 30 feet of the tailings.

WestLand Resources, Inc.
Engineering and Environmental Consultants

PHOTOGRAPHIC INFORMATION

Time of Photograph:	1:21 PM	Latitude:	33.107156
Date of Photograph:	02.05.2014	Longitude:	-110.988557
Weather Condition:	Lightly overcast	Elevation:	2037
Viewing Direction:	East	Distance:	Not applicable

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Ray Mine Tailings Storage Facility

Visual Simulations

Figure E-16: KOP 6 – Arizona Trail, Mile 2, Existing Condition

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PHOTOGRAPHIC INFORMATION

Time of Photograph:	1:21 PM	Latitude:	33.107156
Date of Photograph:	02.05.2014	Longitude:	-110.988557
Weather Condition:	Lightly overcast	Elevation:	2037
Viewing Direction:	East	Distance:	1.87 miles to nearest portion of Hackberry Gulch Alternative 2

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Visual Simulations

Figure E-17: KOP 6 – Arizona Trail, Mile 2, Hackberry Gulch Alternative 2, Project Completion

Note: Simulation indicates tailings impoundment at completion of the project before reclamation of the top 30 feet of the tailings.

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