

APPENDIX E
VISUAL SIMULATIONS

**VISUAL SIMULATIONS
RAY MINE TAILINGS STORAGE FACILITY
ASARCO LLC**

Prepared for:



U.S. Army Corps of Engineers
3636 N Central Ave, Phoenix, Arizona 85012

Project Number: 203.51

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WestLand Resources

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I. 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. The construction of an additional tailings impoundment (the Project) would require the discharge of fill to surface drainage features that have been 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 were 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 were 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 (**Figure E-1**). Asarco has identified Ripsey Wash Alternative 3 as its proposed action in its CWA Section 404 permit application to the Corps (Corps File No. SPL-2011-1005-MWL).

The Corps identified visual resources as a topic that needed to be addressed in the Draft Environmental Impact Statement (EIS) that was released by the Corps on January 29, 2016 in accordance with the requirements of the National Environmental Policy Act. This report was initially provided July 23, 2014 to aid in the evaluation of visual impacts that would result from the construction of Ripsey Wash Alternative 3 and Hackberry Gulch Alternative 2. Asarco proposes minor changes to select project elements in response to comments on the Draft EIS. Proposed changes include the following:

- Realignment of the Tailings Delivery, Reclaimed Water, and Fresh Water Pipelines and Project Powerline Corridor to Reduce Greenhouse Gas Emissions
- Adjustment to the Florence-Kelvin Highway Realignment to Reduce Visual Impacts to the Arizona Trail
- Adjustment of the Relocation of the San Carlos Irrigation Project (SCIP) 64 kV Powerline Realignment to Reduce Visual Impacts to the Arizona Trail

- Paving Portion of the Florence Kelvin Highway West of the Proposed TSF to Reduce Dust Emissions
- Slight Realignment of the Arizona National Scenic Trail (Arizona Trail) Relocation East of the Proposed TSF to Reduce Switchbacks to make the Trail More Sustainable and Reduce Maintenance Requirements

This report also incorporates a new visual analysis point located along the proposed Arizona Trail realignment that was added per the Corps' request, and presented in a supplemental visual simulation report on August 23, 2017. The information presented in this report includes a description of the methods used to prepare and present visual simulations, as well as the results of the visual simulations.

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 (KOPs 1-6) were identified (**Figure E-1**). An additional KOP along the proposed realignment of the Arizona Trail was identified by the Corps for review in June 2017 (KOP 7, **Figure E-1**).

On February 5, 2014, March 4, 2014, and June 13, 2017, 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 publicly 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.

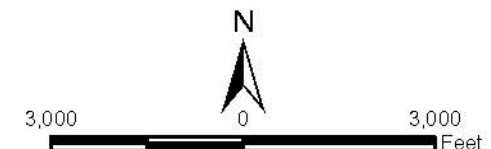
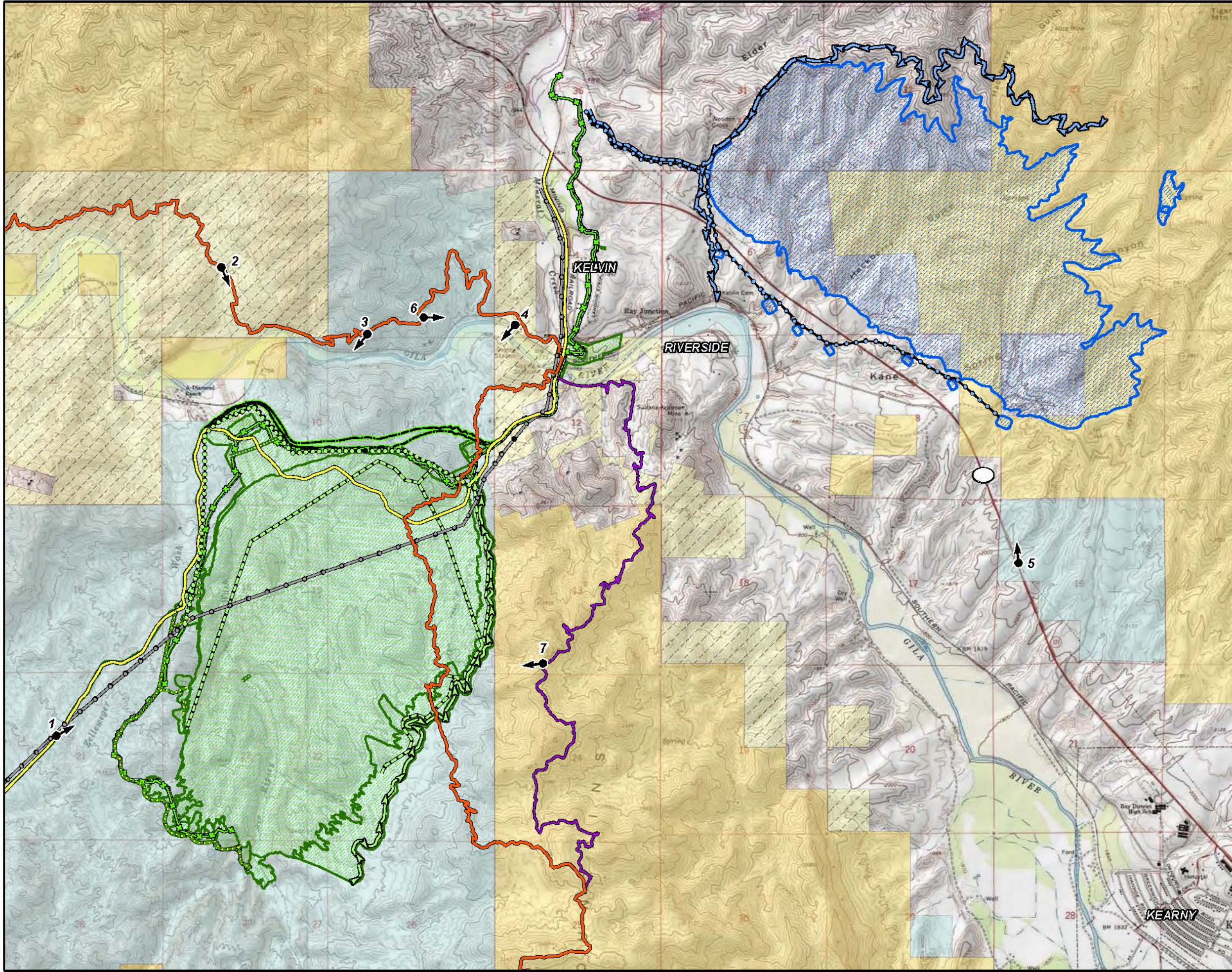
With respect to the printed size of the visual simulations, the simulated image was created with the intention that it be printed on 11- x 17-inch paper, to be included as a figure in the visual analysis.

Visual simulations from KOPs 1, 2, 3, 4 and 7 were modified to show the adjusted Florence-Kelvin Highway realignment and adjusted SCIP powerline alignment as part of Ripsey Wash Alternative 3 as currently proposed by Asarco.

3. RESULTS

Images of the existing landscapes, rendered simulations for Ripsey Wash Alternative 3 upon completion of the centerline construction and project completion, and the rendered simulations for Hackberry Gulch Alternative 2 upon project completion are presented as **Figures E-2** through **E-18** following this text.

FIGURES



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
- Existing Arizona National Scenic Trail
- Proposed Arizona Trail Realignment

RIPSEY WASH ALTERNATIVE 3

- Ripsey Wash TSF Footprint
- Ripsey Wash Tailings Delivery and Reclaim Water Pipelines
- Stormwater Diversion Pipeline
- Cutoff Wall
- Surface Water Diversion Channel
- Ripsey Wash Project Powerline
- Proposed SCIP 69KV Powerline Relocation
- Proposed Florence-Kelvin Highway Relocation

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

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 Visual Simulations - Revised

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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Visual Simulations - Revised

Figure E-2

KOP 1 – Florence-Kelvin Highway
Existing Condition



Original Visual Simulation: 08.23.2017



Revised Visual Simulation: 02.26.2018

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 Tailings Storage Facility



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Visual Simulations – Revised

Figure E-3

KOP 1 – Florence-Kelvin Highway,
Ripsey Wash Tailings Storage Facility, Completion of Centerline Construction

*KOP 1 visual simulation revised February 26, 2018 to reflect changes to proposed project alignment
Note: Simulation indicates impoundment at completion of centerline construction before reclamation with rock surfacing.*



Original Visual Simulation: 08.23.2017



Revised Visual Simulation: 02.26.2018

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 Tailings Storage Facility



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Visual Simulations Revised

Figure E-4. KOP 1 – Florence-Kelvin Highway Ripsey Wash Tailings Storage Facility, Project Completion

*KOP 1 visual simulation revised February 26, 2018 to reflect changes to proposed project alignment
 Note: Simulation indicates impoundment at completion of the project before reclamation of the top 30 feet of tailings and surface of the tailings.*



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 – Revised

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



Original Visual Simulation: 07.23.2014



Revised Visual Simulation: 02.26.2017

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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Visual Simulations – Revised

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

*KOP 2 visual simulation revised February 26, 2018 to reflect changes to proposed project alignment
Note: Simulation indicates tailings impoundment at completion of centerline construction before reclamation with rock surfacing.*



Original Visual Simulation: 07.23.2014



Revised Visual Simulation: 02.26.2017

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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Visual Simulations – Revised

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

*KOP 2 visual simulation revised February 26, 2018 to reflect changes to proposed project alignment
Note: Simulation indicates tailings impoundment at completion of the project before reclamation
of the top 30 feet of tailings.*



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



Original Visual Simulation: 07.23.2014



Revised Visual Simulation: 02.26.2017

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 – Revised

Figure E-9: KOP 3 – Arizona Trail, Jake’s Overlook, Relocated Florence-Kelvin Highway & SCIP Transmission Line

KOP 3 visual simulation revised February 26, 2018 to reflect changes to proposed project alignment





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 – Revised
Figure E-10: KOP 4 – Kelvin Trail Access,
Existing Condition



Original Visual Simulation: 07.23.2014



Revised Visual Simulation: 02.26.2018

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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Visual Simulations – Revised

Figure E-11: KOP 4 – Kelvin Trial Access, Relocated Florence-Kelvin Highway & SCIP Transmission Line

KOP 4 visual simulation revised February 26, 2018 to reflect changes to proposed project alignment



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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Visual Simulations – Revised

Figure E-12: KOP 5 – State Route 177
Existing Condition



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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Visual Simulations

Figure E-13: 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.*



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



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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Ray Mine Tailings Storage Facility

Visual Simulations – Revised
Figure E-15: 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.



PHOTOGRAPHIC INFORMATION

Time of Photograph:	9:42 AM	Latitude:	33.077113
Date of Photograph:	06.13.17	Longitude:	- 110.976332
Weather Condition:	Mostly sunny	Elevation:	2992
Viewing Direction:	West	Distance:	Not applicable



PHOTOGRAPHIC INFORMATION

Time of Photograph:	9:42 AM	Latitude:	33.077113
Date of Photograph:	06.13.17	Longitude:	-110.976332
Weather Condition:	Mostly sunny	Elevation:	2992
Viewing Direction:	West	Distance:	0.40 miles to nearest portion of Ripsey Wash Tailings Storage Facility



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Visual Simulations – Revised

**Figure E-17. KOP 7 – Proposed AZ Trail Realignment
Ripsey Wash Tailings Storage Facility, Completion of Centerline Construction**

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



PHOTOGRAPHIC INFORMATION

Time of Photograph:	9:42 AM	Latitude:	33.077113
Date of Photograph:	06.13.17	Longitude:	- 110.976332
Weather Condition:	Mostly sunny	Elevation:	2992
Viewing Direction:	West	Distance:	0.40 miles to nearest portion of Ripsey Wash Tailings Storage Facility



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Visual Simulations – Revised

**Figure E-18. KOP 7 – Proposed AZ Trail Realignment
Ripsey Wash Tailings Storage Facility, 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.*