

## 4.8 PALEONTOLOGY

### Summary

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Significant paleontological resources include vertebrate fossil remains identifiable to a scientifically useful level, and other remains that may be determined to be rare or of unusually good preservation. These resources are typically not eligible for the National Register of Historic Places or subject to the provisions of Section 106 of the National Historic Preservation Act of 1966, but are subject to consideration under the National Environmental Policy Act of 1969 and the provisions of the Historical, Prehistorical, and Archaeological Resources Act (Colorado Revised Statute 24-80-401ff).

### Affected Environment

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#### All Segments

Two significant paleontological localities (UCM 2004042 and UCM 2004045) were identified within the United States Highway 36 (US 36) corridor. The Big Dry Creek Locality (UCM 2004042) consists of an exposure of the Arapahoe Formation with turtle and ceratopsian (dinosaur) remains. The Westminster Hills Locality (UCM 2004045) consists of an exposure of the Denver Formation with dinosaur rib bones. Both of these localities are significant because it is rare for vertebrate remains to be found in these formations. Due to confidentiality requirements, the locations of these resources are not shown on a map or figure in this Final Environmental Impact Statement (FEIS).

*The literature review and fossil prospecting of the US 36 corridor resulted in the identification of 45 paleontological localities, of which two are considered significant.*

### Impact Evaluation

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Direct effects to paleontological resources were determined for each package based on conceptual design, including the proposed limits of construction.

#### Methodology

Significant paleontological resources were evaluated using a literature search; database searches at the Denver Museum of Nature & Science, the University of Colorado Museum of Natural History, and the U.S. Geological Survey (USGS); a pedestrian survey; and fossil prospecting. Results were obtained by considering the regional geology, the likelihood of significant fossils in the bedrock units, examining the bedrock exposures, and evaluating the significance of any fossil localities (Evanoff 2004). Significant paleontological localities adjacent to the US 36 corridor were plotted in geographic information system and the extent to which they would be impacted by each package was calculated.

#### Package 1: No Action

##### **Direct and Indirect Impacts**

##### **All Segments**

There would be no direct or indirect impacts to any known paleontological resources under Package 1.

### **Package 2: Managed Lanes/Bus Rapid Transit**

#### ***Direct Impacts***

##### **All Segments**

Approximately 6 percent of the Big Dry Creek Locality and 100 percent of the Westminster Hills Locality would be disturbed by this package. The direct impact would be the permanent loss of these paleontological resources at their original location. Impacts to these localities would be mitigated through construction monitoring by a qualified paleontologist, at which time significant fossils would be identified and collected, thus preserving their scientific value.

#### ***Indirect Impacts***

##### **All Segments**

Increasing population brings increasing development of lands and associated loss of fossils and/or access to them. Any encouragement to private land developers from public construction projects such as those proposed in this FEIS could have an indirect impact to paleontological resources.

### **Package 4: General-Purpose Lanes, High-Occupancy Vehicle, and Bus Rapid Transit**

#### ***Direct Impacts***

##### **All Segments**

Approximately 8 percent of the Big Dry Creek Locality and 100 percent of the Westminster Hills Locality would be disturbed by implementation of this package. The direct impact would be the permanent loss of these paleontological resources at their original location. Impacts to these localities would be mitigated through construction monitoring by a qualified paleontologist, at which time significant fossils would be identified and collected, thus preserving their scientific value.

#### ***Indirect Impacts***

##### **All Segments**

Indirect impacts, similar to those described in Package 2, would be expected under Package 4.

### **Combined Alternative Package (Preferred Alternative): Managed Lanes, Auxiliary Lanes, and Bus Rapid Transit**

#### ***Direct Impacts***

##### **All Segments**

Approximately 11 percent of the Big Dry Creek Locality would be disturbed by the Combined Alternative Package (Preferred Alternative). Impacts to the Westminster Hills Locality would be avoided. The direct impact to the Big Dry Creek Locality would be the permanent loss of these paleontological resources at their original location. Impacts to the Big Dry Creek Locality would be mitigated through construction monitoring by a qualified paleontologist, at which time significant fossils would be identified and collected, thus preserving their scientific value.

## **Indirect Impacts**

### **All Segments**

Indirect impacts, similar to those described in Packages 2 and 4, would be expected under the Combined Alternative Package (Preferred Alternative).

## **Mitigation**

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The two fossil locations discussed above are considered to be scientifically significant because they preserve relatively rare vertebrate fossil remains identifiable to a scientifically useful level. Impacts to these locations would be mitigated through construction monitoring by a qualified paleontologist. Mitigation through on-site monitoring includes collection of any scientifically important fossils and associated data uncovered during construction or materials excavation.

Construction excavation in the US 36 corridor may produce new exposures of the fossiliferous Laramie, Arapahoe, and Denver Formations. Once project designs are finalized for this project, the Colorado Department of Transportation (CDOT) staff paleontologist would examine them to estimate the scope of construction monitoring work required. A special condition requiring a paleontological monitor during construction along the US 36 corridor would be attached to the construction specifications of any future projects resulting from this FEIS, if final design plans indicate impacts to the Laramie, Arapahoe, and/or Denver Formation outcrops.

Excavation could also expose fossils in areas not being monitored by a qualified paleontologist during construction. If fossil materials were exposed during construction, work would stop in that area and the CDOT paleontologist would be notified. The CDOT paleontologist would be given the opportunity to assess the discovery and, if deemed necessary, complete appropriate mitigation measures prior to or following resumption of construction activities in that area, depending on the mitigation strategy adopted.

*Construction excavation may produce new exposures of the potentially fossiliferous Laramie, Arapahoe, and Denver Formations.*

