Chapter 3. Affected Environment and Environmental Consequences

Chapter 3 presents the affected environment for the 20 action alternatives and the No Action alternative described in Chapter 2, Description and Comparison of Alternatives, as well as the environmental consequences of each alternative. The Affected Environment sections include issues to be addressed and describe the current conditions of each resource and relevant characteristics that may be subjected to impacts from the alternatives. The Environmental Consequences sections present the direct and indirect impacts from each alternative as related to each resource. Cumulative impacts are discussed in Chapter 4, Cumulative Impacts Analysis.

Assessment approaches and methods and impact tables are provided in Appendix A, Environmental Analysis and Data. Other appendices that support the contents of this chapter include the following: F, Biological Resources and Wetlands Documentation; G, Water Resources; H, Fisheries; I, Regulated Materials and Historic Mining; J, Social and Economic Values; K, Overview of Water Availability and Growth, and Forest Service Land Management; L, Visual Resources; M, Recreation Properties; N, Historic Property Survey, Native American Consultation, and Paleontological Resources; O, Section 4(f) and 6(f) Evaluation – Coordination; and P, Public and Agency Involvement. Resource maps are located under a separate tab.

The resources inventoried and described in this chapter include the following:

Context of Resource Evaluations

Figure 3-1 shows the diverse context of each alternative, including four life zones, four watersheds, nine geologic domains, two national forests, five counties (Garfield, Eagle, Summit, Clear Creek, and Jefferson), and 27 scenery analysis units. Zones, watersheds, domains, or jurisdiction, as appropriate, as shown on Figure 3-1, organize the resources.

Issues

Resource issues have been identified to focus the PEIS environmental impact assessment process. CEQ regulations on implementing NEPA provide direction to focus the assessment criteria (40 CFR 1500.1). Highlights from section 1500.1 (b) and (c) state that "Most important, NEPA documents must concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail" and that "Ultimately it is not better documents, of course, but better decisions that count." It is the policy of NEPA (40 CFR 1500.2 (b)) "…to emphasize real environmental issues and alternatives." NEPA also emphasizes reducing paperwork (40 CFR 1500.4 (f) and (g)) by "Emphasizing the portions of the environmental impact statement that are useful to decision makers and the public" and "narrowing the scope of the environmental impact statement process…."

Chapter 2 introduces key federal and state regulations for the protection of specific resources, and Chapter 3 provides the details to support the evaluation.

The sections for each environmental resource are introduced with the specific issues to be addressed, which are tracked through the documentation of the affected environment and environmental consequences of alternatives. Chapter 6 documents the process of public and agency involvement in the development of issues.

Approach

Chapter 3 presents direct and indirect impacts (defined below) on environmental and community values resources. Chapter 4 presents cumulative impacts on these resources.

Supporting Documentation
- Appendix A, Environmental Analysis and Data
- Appendix J, Social and Economic Values
- Appendix M, Recreation Resources

Direct Impact Assessment Techniques

Direct impacts are defined as impacts that are:

- Caused by the action
- Occur at the same time and place (40 CFR 1508.8)

Issues associated with the direct impacts of the alternatives are assessed at the Tier 1 level of analysis by various techniques, including GIS resource mapping, footprint and construction disturbance zone GIS overlay analysis, alternative design interpretation, and modeling. It is important to note that alternative designs at Tier 1 are conceptual. While project alternatives have been developed to provide as much footprint-related detail as possible, assessment techniques are most useful in the comparison of project alternatives and do not necessarily reflect ultimate resource impacts for specific alternatives. Direct impact assessment techniques are discussed below.

GIS Resource Mapping. The first step in the assessment was to compile data and mapping of environmental resources and to develop an extensive GIS database. This included geologic hazards, regulated materials and mine-related waste, surface water, wetlands, fisheries, vegetation, wildlife habitats, wildlife linkage zones, developed lands, zoning classes, land use parcels, I-70 right-of-way, noise contours, recreation sites, 4(f) properties, US Forest Service (USFS) management prescriptions, land jurisdiction, historic and archaeological resources, viewsheds from sensitive viewpoints, and USFS visual resource management classifications. Specific issues were identified from project scoping and public involvement, which are being used to focus the assessment of environmental impacts. Resource maps can be found in the Resource Maps section located under a separate tab.

GIS Overlay Analysis. Direct impacts on land use, 4(f) properties, wildlife habitat, vegetation, and water resources were analyzed through a GIS overlay process. This involved the overlay of project alternatives onto GIS resource inventory maps through the following steps:

1. **Conceptual design of alternatives.** The conceptual design of alternatives has established the footprint for Transit, Highway, and Combination alternatives. A specific alignment and template have been established for each alternative to optimize the performance of the alternative, while minimizing the disturbance beyond the existing I-70. At Tier 1, the footprint for the Minimal Action alternative components has been more generally defined for interchanges and auxiliary lanes but will be refined during Tier 2 analysis. The quantification of Minimal Action footprints includes auxiliary lanes, curve safety modifications, and conceptually defined interchange modifications. It is important to note that these interchange areas are design estimations at the Tier 1 level, and it is expected that design refinement (to avoid and minimize impacts) during Tier 2 studies might result in a reduction of environmental and community resource impacts.

2. **Resource mapping.** Available digital mapping was collected for resources. Resource maps are provided along with appendices in Volume II. Appendix A provides information on the source and scale of resource mapping used in the I-70 PEIS.
3. **Quantification of impacts.** The project alternatives were overlaid on resource maps to quantify the area, or linear distance, of new disturbance. The quantification of impacts focused on select resources beyond the existing roadway and existing disturbed zone. This included the area within the alternative footprint of the alternative, as well as a 15-foot construction disturbance zone for all resources, and a 15-foot sensitivity zone for relevant resources. The 15-foot sensitivity zone is used to indicate impacts to resources such as wildlife habitat and riparian areas that might occur beyond the construction disturbance zone. The sensitivity zone is an area immediately adjacent to the construction disturbance zone and is only intended to indicate such impacts, not to encompass the totality of long-term or indirect impacts that are addressed separately by resource. Results are provided in Appendix A. It is important to note that the specific analysis techniques vary for each resource and are further defined in the appropriate resource sections of Chapter 3.

Alternative Design Interpretation. In addition to the footprint overlay, alternatives were analyzed for their physical components and their potential to result in either a barrier to wildlife or a visual contrast to the setting. This was determined through a study of necessary elements associated with project alternatives such as retaining walls, barriers, and elevated structures, which could result in a barrier to wildlife or a contrast to setting.

The assessment of visual impacts included the following steps:

- Identification of the anticipated level of change in landform, vegetation, and structures associated with project alternatives
- Identification of sensitive views
- Identification of the visual influence of I-70 through viewshed mapping
- Production of photo-realistic simulations and three-dimensional animation of select Transit and Highway alternatives

The assessment of impacts on wildlife involved the following:

- Analysis of effects of alternatives on wildlife movement in coordination with the ALIVE committee, an interagency group that focusing on wildlife crossings for the Corridor.
- Prioritization of treatment options (such as new crossing structures or fencing) for wildlife linkage interference zones identified along I-70, where there are existing or projected future conflicts with established wildlife movement patterns. The effectiveness of proposed wildlife treatment options was evaluated for each alternative.

Modeling. The assessment of direct impacts also included the application of the following models:

- **Air Quality – EPA MOBILE6.** Changes in carbon monoxide were evaluated through the application of the EPA MOBILE6 model to identify emissions for a 24-hour period. This has been supplemented with local hotspot analyses in selected locations.
- **Stormwater Runoff – FHWA stormwater runoff model (Driscoll).** The increased area of impervious surface that is subject to stormwater runoff was calculated for each alternative. Through the application of the FHWA Storm Water Runoff Model, the change in stormwater runoff (and change to Corridor stream water quality parameters) was calculated for each alternative.
- **Noise – STAMINA II model.** Future noise levels and increases in noise levels over existing noise levels for the loudest hour were predicted using STAMINA II model and traffic volumes and speeds for alternatives in 2025.

Indirect Impact Analysis Techniques

Indirect impacts are defined as impacts that:

- Are caused by the action
- Are later in time or farther removed in distance
- Are reasonably foreseeable
- May include growth-inducing effects, and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on air and water and other natural systems, including ecosystems (40 CFR 1508.8)

Modeling and Quantitative Techniques

The assessment of indirect impacts focused on the effects of induced or suppressed travel demand from alternatives on land use and growth. The following models were used to assess the indirect impacts of induced growth to water quality and social and economic values:

- **Social and Economic Values – Possible Induced Population Growth.** Statistical techniques were used to determine relationships between Corridor growth and I-70 traffic. Induced growth is predicted by project alternative based on past trends. Appendix J, Social and Economic Values, contains a full description of the methodology used.
- **Social and Economic Values – REMI model.** The assessment of the long-term impacts of the project alternatives to tourist spending used the Regional Economic Models, Inc. (REMI) model of the nine-county region of the Corridor. The REMI model consists of an econometrically derived set of equations that predict the directions an economic area will take over time in response to specified disturbances and combines it with an input-output model of inter-industry transactions that generates estimates of multiplier effects.
- **Land Use – Possible Induced Development.** Possible induced development from project alternatives is based on induced population growth predictions and land use assumptions by alternative (see section 3.10, Land Use).
- **Recreation Resources – Possible Increased Visitation to National Forests.** Possible increased visitation to the Arapaho and Roosevelt National Forests and the White River National Forest is estimated based on project alternative predictions for recreational trips and predicted induced growth associated with alternatives. Appendix M, Recreation Resources, includes a detailed discussion of the methodology used.

Mitigation Planning

A key role of the PEIS is to develop programs and strategies to avoid or minimize environmental impacts. Corridor programs have been established to address the broad environmental concerns associated with wildlife movement, sediment control, and stream and wetland ecology. Corridor-wide I-70 mitigation strategies have been developed at the Tier 1 level, and mitigation measures have been identified that could address the impacts of alternatives. At the Tier 1 level, specific mitigation measures are discussed to address the feasibility of alternative implementation.

PEIS screening steps included initial consideration of alternate routes. However, such routes have been screened from further consideration to avoid impacts on environmental and community resources. All project alternatives analyzed in this document would use the existing highway alignment, with the exception of curve safety modifications and new tunnels in the Minimal Action and Highway alternatives. In addition, efforts to avoid and minimize impacts have included close coordination with agencies and other concerned parties. These efforts have included alteration of designs to avoid impacts such as highway realignment and structural adjustments, as well as elevated highway segments in critical areas such as Idaho Springs.

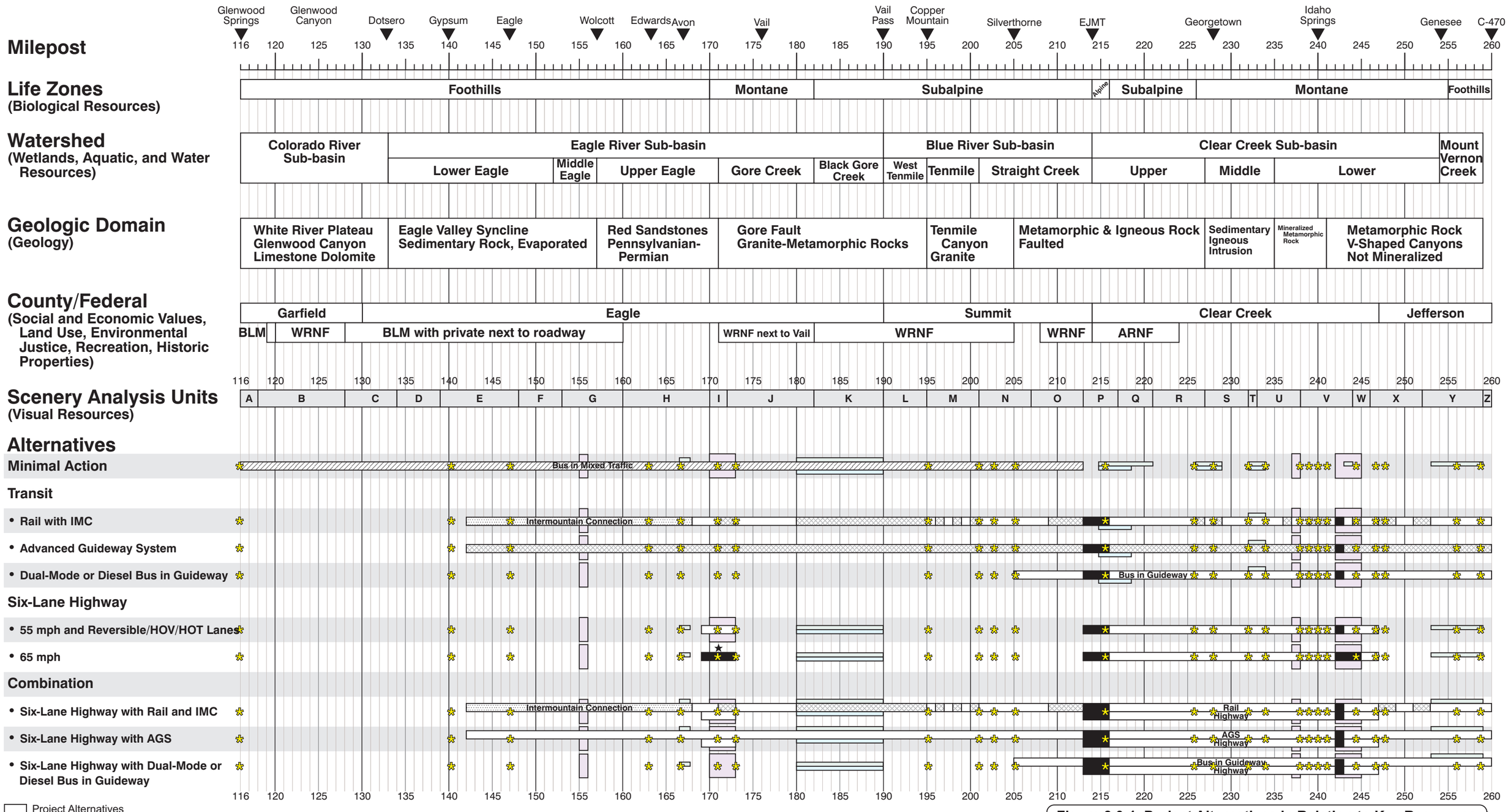

Figure 3.0-1. Project Alternatives in Relation to Key Resources, Jurisdictional and Watershed Boundaries

This page intentionally left blank.