Alternatives Feasibility Report

Uinta Basin Rail

Utah Department of Transportation
Duchesne and Uintah Counties
UDOT Project Number S-R399(169)

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Contents

Tables

Figures

Appendices

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1.0 Introduction

Uintah and Duchesne Counties (the Counties) are responsible for economic development in Utah's Uinta Basin. As part of that responsibility, the Counties consider opportunities to expand and improve infrastructure to support economic development. This alternatives analysis evaluates the Counties' options for building a freight rail line into the Uinta Basin from the existing Class 1 rail system. The Utah Department of Transportation (UDOT) is working with the Counties' to examine the feasibility of a new freight rail line serving the Uinta Basin.

1.1 Project Overview and Objectives

The purpose of the Uinta Basin Railroad (UBRR) is to reduce shipping costs and expand market access for commodities transported to and from the Uinta Basin by constructing a freight rail line that connects the Uinta Basin to the national common-carrier freight rail system with direct access to the two western United States Class 1 railroads (BNSF Railway [BNSF] and Union Pacific Railroad [UP]). The objectives of the project are to develop an alignment that would to the extent possible:

What are Class 1 railroads?

Class 1 railroads are carriers with annual carrier operating revenues of $433.2 million or more in 2011.

- Connect to an existing Class 1 rail line within the area of analysis in order to provide a connection to the national rail network.
- Meet basic topography requirements such as minimizing the need to traverse steep terrain.
- Reduce local truck travel distances to the rail line to the greatest degree economically practical with acknowledgement that future development could occur in different locations in the Uinta Basin.
- Provide a range of access across the basin to support the economic viability of the railroad for all commodities.
- Be designed and constructed to Class 1 railroad standards to be easily maintained.
- Enhance constructability by minimizing the route length and maximizing areas with favorable geotechnical conditions.
- Minimize impacts to privately owned land and local communities and, where practicable, avoid environmentally sensitive areas.

1.2 Project Setting

The Uinta Basin is in the northeast corner of Utah and is located almost entirely in Duchesne and Uintah Counties. The basin is rural and has a population of about 51,000, which is mostly in and around the communities of Duchesne, Roosevelt, and Vernal. These three communities are connected by the east-west, two-lane U.S. Highway 40 (U.S. 40).

The Uinta Basin is within the Colorado Plateau physiographic province. The basin is a bowl-shaped structural and sedimentary feature that trends roughly east to west, has a maximum width of about 115 miles, and covers an area of about 10,890 square miles. The basin is bounded on the north by the Uinta Mountains and on the east by the Douglas Creek Arch, with portions of the Wasatch Range and the Roan Cliffs forming its southern and western boundaries. The basin is a high desert with elevations that

range from about 4,632 feet in the eastern part near the Green River to about 6,867 feet in the southwestern part near Gilsonite Draw.

The vegetation in the basin consists of typical Intermountain Basin shrubland associations. This region mixes an array of geographic substrates, topographic features, climatic regimes, soil types, and other physical factors to produce a mosaic of floristic components and associated natural habitats. These communities are often mixed, transitional, or widely distributed (BLM 2013).

The Uinta Basin—known since pioneer times as the Isolated Empire—contains extensive deposits of economically valuable minerals including large deposits of soda ash and phosphate. Also found within this region are substantial deposits of crude oil, natural gas, oil shale, oil sands, gilsonite, natural asphalt, limestone, bentonite, heavy clay, aggregate materials, bauxite, and low-sulfur coal. Agriculture is also an important part of the Uinta Basin's economy and includes cattle, alfalfa, corn, potatoes, and other field and orchard crops.

1.3 Background

At present, the Uinta Basin is isolated from the national rail network. The existing transportation infrastructure consists of two-lane rural highways connecting the basin to the national highway network, natural gas and crude oil pipelines, and a phosphate ore slurry pipeline. The principal truck route connecting the Uinta Basin to the rest of the country is U.S. 40, a two-lane rural highway that provides access to Salt Lake City to the west and rural northwestern Colorado to the east. In addition, U.S. Highway 191 (U.S. 191), a rural two-lane highway, traverses the basin from north to south.

The Counties intend to reduce shipping costs for and expand the market reach of commodities transported to and from residents and businesses in the Uinta Basin by constructing a new rail line that connects the economic and potential shipping centers of the basin with the national common-carrier rail network. This rail connection would provide (1) a less expensive, safer, and more reliable freight transportation alternative to trucks and (2) flexibility of routing and capacity and the ability to transport all commodities produced within the basin that are not technically or economically feasible to transport by pipeline.

This proposed rail line, which is referred to as the Uinta Basin Railroad (UBRR), is intended to provide the residents and businesses in the Uinta Basin with the capacity, cost-effectiveness, and market reach that will enable the shipment of the commodities presently or anticipated in the future to be consumed in or produced in the Uinta Basin at a reduced transportation cost compared to truck shipments and with greater market reach and flexibility than pipeline shipments.

1.4 Report Objectives and Contents

The Counties and UDOT have prepared this report to identify and evaluate alignment alternatives for the UBRR. The objectives of the report are to (1) identify, develop, refine, and analyze feasible and practicable alignment alternatives and (2) propose alignment alternative(s) for consideration in an Environmental Impact Statement (EIS) that will likely be prepared by the Surface Transportation Board (STB) for the project. The STB would be the lead agency under the National Environmental Policy Act (NEPA) for preparing the EIS.

STB's Office of Environmental Analysis (OEA) is responsible for conducting the environmental review process and making recommendations to STB. OEA, together with any cooperating agencies, would decide which alternative(s) proposed in this report or suggested from other sources would be studied in the EIS and would independently verify the results of this feasibility report.

The process for identifying and evaluating alternative alignments consisted of the following five basic phases:

1. Develop preliminary rail alternatives.
2. Apply first-level (Level 1, Ability to Meet the Project's Purpose) screening criteria, identify alternatives that would move to the next level, and refine alternatives that pass the Level 1 screening.
3. Apply second-level (Level 2, Constructability and Operational Feasibility) screening criteria based on an initial "desktop" review of constructability and rail operations feasibility to identify alternatives that pass Level 2 screening and would be analyzed in Level 3 screening (impacts evaluation).
4. Apply third-level (Level 3, Natural and Built Environment) screening criteria based on impacts to the natural and human environment to identify alternatives that would undergo a final field verification constructability review.
5. Conduct a field review (Level 4, Alternative Feasibility Field Review) of the potential constructability of the alternatives to determine which alternatives are feasible and practicable and would be further refined.

The alternatives-development and screening process described in this report provides critical information about how well an alternative would satisfy the purpose of the UBRR project and whether an alternative would be feasible and practicable. The criteria used in the screening analyses generated measures that allowed the UBRR team to systematically and objectively identify feasible and practicable alternatives and screen out alternatives that were not feasible or practicable.

What is the UBRR team?

The UBRR team consists of Uintah and Duchesne Counties, the Utah Department of Transportation (UDOT) and the rail consultant.

1.5 Reasons Why Alternatives Might Be Eliminated

1.5.1 CEQ Regulations and Guidance

According to the Council on Environmental Quality (CEQ) and NEPA regulations, there are three primary reasons why an alternative might be determined to be not reasonable and eliminated from further consideration.

1. The alternative does not satisfy the purpose of the project.
2. The alternative is determined to be not practical or feasible from a technical and/or economic standpoint.
3. The alternative substantially duplicates another alternative; that is, it is otherwise reasonable but offers little or no advantage for satisfying the project's purpose, and it has impacts and/or costs that are similar to or greater than those of other, similar alternatives.

1.5.2 Clean Water Act Requirements

Because federally regulated wetlands and other waters of the United States are present within the area of analysis for the project, the UBRR team will also consider the *Clean Water Act Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material* and Executive Order 11990, Protection of Wetlands, during alternatives development. If an action alternative is ultimately selected and that alternative would discharge fill material to wetlands (which are classified as *special aquatic sites*), then the UBRR team would need to demonstrate that the selected alternative complies with Section 404(b)(1) of the Clean Water Act.

The Section 404(b)(1) guidelines state that "no discharge of dredged or fill material [to Section 404–regulated waters] shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences" [Section 230.10(a)]. This section of the guidelines further states that:

1. For the purpose of this requirement, practicable alternatives include but are not limited to:
    a. Activities which do not involve a discharge of dredged or fill material into the waters of the United States or ocean waters;
    b. Discharges of dredged or fill material at other locations in waters of the United States or ocean waters;
2. An alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes. If it is otherwise a practicable alternative, an area not presently owned by the applicant which could reasonably be obtained, utilized, expanded, or managed in order to fulfill the basic purpose of the proposed activity may be considered.
3. Where the activity associated with a discharge which is proposed for a special aquatic site (as defined in Subpart E of the guidelines) does not require access or proximity to or siting within the special aquatic site in question to fulfill its basic purpose (i.e., is not water dependent), practicable alternatives that do not involve special aquatic sites are presumed to be available, unless clearly demonstrated otherwise. In addition, where a discharge is proposed for a special aquatic site, all practicable alternatives to the proposed discharge which do not involve a discharge into a special aquatic site are presumed to have less adverse impact on the aquatic ecosystem, unless clearly demonstrated otherwise.

1.5.3 Section 4(f) Requirements

Section 4(f) (49 United States Code [USC] 303) of the Department of Transportation Act of 1966 applies to publicly owned parks, recreation areas, and wildlife and waterfowl refuges and publicly or privately owned significant historic properties. The requirements of Section 4(f) apply only to agencies within the U.S. Department of Transportation (USDOT) (for example, the Federal Railroad Administration). The requirements of Section 4(f) do not apply to STB.

For the UBRR project, the Counties might seek federal funds, loans, or grants from the Federal Railroad Administration. If this were to occur, Section 4(f) requirements would apply as part of the NEPA process, and the Federal Railroad Administration would serve as a cooperating agency in preparing the EIS.

Section 4(f) prohibits USDOT agencies from approving the use of any Section 4(f) land for a transportation project, except as follows:

- First, the USDOT agency can approve the use of Section 4(f) land by making a determination that (1) there is no prudent and feasible alternative that would avoid the use of the Section 4(f) resource *and* (2) the project includes all possible planning to minimize harm to that property.
- Second, the USDOT agency can approve the use of Section 4(f) property by making a finding of *de minimis* impact for that property.

An alternative that would have substantially more Section 4(f) impacts could be eliminated during the screening process.

What is a *de minimis* impact?

For publicly owned public parks, recreation areas, and wildlife and waterfowl refuges, a *de minimis* impact is one that would not adversely affect the activities, features, or attributes of the property. For historic sites, a finding of *de minimis* impact means the USDOT agency has determined that either the project would not affect the historic property or the project would have "no adverse effect" on the historic property.

1.5.4 Section 6(f) Requirements

Section 6(f) of the Land and Water Conservation Fund (LWCF) Act of 1965 (16 USC 4601-4 and subsequent sections) states that properties acquired or developed with LWCF funds cannot be converted to a use other than public outdoor recreation without the approval of the Secretary of the U.S. Department of the Interior. Section 6(f) requirements apply to all federal, state, and local agencies.

1.6 Summary of the Project's Purpose and Need

As shown in Figure 1 on page 7, the project's purpose and need are the foundation of the alternatives development and screening process.

Purpose of the Project. The purpose of the UBRR project is to reduce shipping costs and expand market access for commodities transported to and from the Uinta Basin by constructing a freight rail line that connects the Uinta Basin to the national common-carrier freight rail system with direct access to the two western United States Class 1 railroads (BNSF Railway [BNSF] and Union Pacific Railroad [UP]).

Need for the Project. The Uinta Basin is a geographical area in east-central Utah that includes the communities of Vernal, Duchesne, Roosevelt, Altamont, Myton, Ballard, Naples, and Tabiona as well as smaller, unincorporated communities. The basin contains extensive deposits of economically valuable minerals including large deposits of soda ash and phosphate. Also found within this region are substantial deposits of crude oil, natural gas, oil shale, oil sands, gilsonite, natural asphalt, limestone, bentonite, heavy clay, aggregate materials, bauxite, and low-sulfur coal. Agriculture is also an important part of the Uinta Basin's economy and includes cattle, alfalfa, corn, potatoes, and other field and orchard crops. The above types of commodities benefit from being transported in large bulk shipments to market by rail, which provides transportation efficiency and reduces cost.

The needs for the project are the need for reduced shipping rates for commodities transported to and from the Uinta Basin and the need for expanded market access for the commodities produced in the Uinta Basin. The Uinta Basin does not have access to rail service except via a lengthy intermediate truck or pipeline haulage between the basin and the national rail network beyond the basin. The cost of the intermediate truck haulage combined with the commodity, network, and capacity limitations of pipelines result in higher costs of transportation for commodities transported to and from the Uinta Basin and limit the access to markets for commodities produced in the basin (commodities such as oil, gilsonite, and grain) compared to the access that would be expected if the basin had direct access to the national rail

network. In general, as transportation costs increase, economic competitiveness decreases, economic potential is reduced, and economic activity decreases (Thisse 2009). Freight rail service provides producers with cost-effective transportation, especially for heavy and bulky commodities (AASHTO 2002).

The need for the project is summarized below.

- **No rail service.** There is no rail service to the Uinta Basin.
- **Higher cost to ship by truck.** Commodities are transported into and out of the basin primarily by truck. The average revenue per ton-mile for rail-hauled freight in the United States was $0.0376, whereas the average revenue per ton-mile for truck-hauled freight in the United States was $0.1654. The lower cost of rail transportation means that a producer can transport 4.3 times more commodity by rail than by truck for the same cost.

What is a ton-mile?

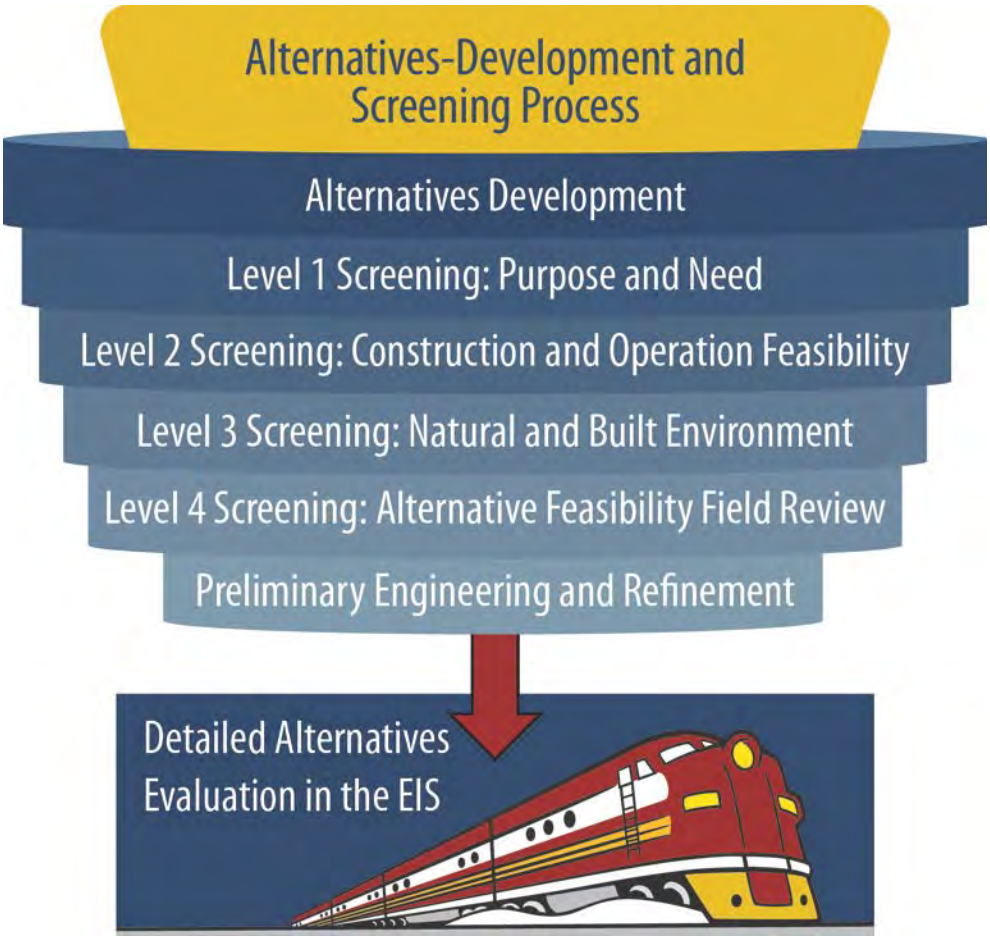
A ton-mile is a common transportation measure that equals 1 ton of freight moved 1 mile, thereby accounting for both the freight volume transported as well as the distance the freight is carried.

- **Distance to the national rail network.** Transportation of commodities that are not suitable for pipeline transportation between the Uinta Basin and national markets requires either a truck haul between the commodity's origin and destination or a truck haul for the portion of the commodity's route between the Uinta Basin and a transload facility on the national rail network. The nearest rail lines are between 112 and 154 miles on rural highways from Vernal, the largest city in the basin.
- **Limited ability for pipelines to ship all commodities.** Pipelines are not suitable for transporting the wide variety of commodities, such as aggregate and agricultural products, produced and consumed in the Uinta Basin. In addition, the capacity and market reach of the existing pipeline network is limited by having relatively fixed origins and destinations. Pipelines are technically limited in the variety of commodities they can carry.
- **Limited market access.** The use of trucks to ship many commodities into and out of the Uinta Basin limits large-scale access to the national market because of the higher transportation cost of trucks and the reduced technical ability to ship some commodities.
- **Limited capacity to ship by truck.** Truck shipments into and out of the basin are capacity-constrained to the size of the truck. This constraint can be overcome only by using more trucks to ship the commodity, which increases the transportation cost. A rail line would enable commodities to be moved without being subject to the same capacity constraints and at a reduced transportation cost.

2.0 Overview of the Alternatives-Development and Screening Process for Alternatives into the Uinta Basin

Figure 1 illustrates the alternative development and screening process.

Figure 1. Alternatives-Development and Screening Process



2.1 Alternatives-Development Process

The first phase in the alternatives-development and screening process was identifying a list of preliminary alternatives. To be considered a preliminary alternative, an alternative had to be applicable to the area of analysis for identifying preliminary alternatives (see page 8) and had to present a type of solution that could potentially meet the project's purpose and basic transportation needs. For example, an alternative had to be compatible with the area's topography, climate, and available technology and had to provide a connection to an existing Class 1 railroad. In general, each alternative must provide economically useful rail freight transportation service between the locations in the Uinta Basin that generate and receive substantial freight volumes and the national rail network of the United States. Based on these requirements, the UBRR team developed potential rail corridors.

2.1.1 Identification of Preliminary Alternatives

The UBRR team used several methods to identify and develop preliminary alternatives. In addition to suggestions from UBRR team members, alternatives were also identified from previous studies.

Area of Analysis for Identifying Preliminary Alternatives

To develop the list of preliminary alternatives, the UBRR team determined an area of analysis, which is the limits of possible alternative corridors suitable for constructing a commercially viable railroad connecting the communities and the major freight-generating and freight-consuming areas of the Uinta Basin with the national rail network. The team developed the area of analysis by studying the existing national rail network surrounding or approaching the Uinta Basin and the elements of this network that the proposed UBRR could connect to (see Figure 2 below). The area of analysis is defined as follows:

- **North border:** The UP main track between its intersection with Wyoming State Highway 789 and Ogden, Utah.
- **East border:** Wyoming State Highway 789 between its intersection with the UP main track east of Wamsutter, Wyoming, and the Colorado border, and Colorado State Highway 13 between the Wyoming border and its intersection with the UP main track near Rifle, Colorado.
- **South border:** The UP[1] main track between Rifle, Colorado, and Provo, Utah.
- **West border:** The UP main track between Provo, Utah, and Ogden, Utah.

Alternatives Identified by the UBRR Team

Early in the first phase of the alternatives-development and screening process, the UBRR team identified a list of potential alternatives. The team used the following criteria to develop the preliminary alternatives:

- The freight rail alternatives must connect to an existing rail line within the area of analysis in order to provide a connection to the national rail network.
- The freight rail alternatives must meet basic topography requirements such as minimizing the need to traverse steep terrain.
- The freight rail alternatives must reduce local truck travel distances to the rail line to the greatest degree economically practical with acknowledgement that future development could occur in different locations in the Uinta Basin. The alternative must also provide a range of access across the basin to support the economic viability of the railroad for all commodities.

Using these criteria, the UBRR team developed alternatives shown in Figure 3 below.

Alternatives Developed in Previous Studies

In addition to the alternatives developed by the UBRR team, the UBRR team included the alternatives developed as part of the Isolated Empire Rail Project (DMJM Harris 2001). The purpose of this project was to review the feasibility of extending a heavy-duty commercial freight rail line to connect the remote areas of northwestern Colorado and northeastern Utah to the national rail network. The project evaluated 16 alignments, all of which were included in the alternatives-development and screening process for the UBRR project (see Figure 4 below).

[1] BNSF maintains track rights with the UP main track on the southern and western borders of the analysis area.

Figure 2. Area of Analysis

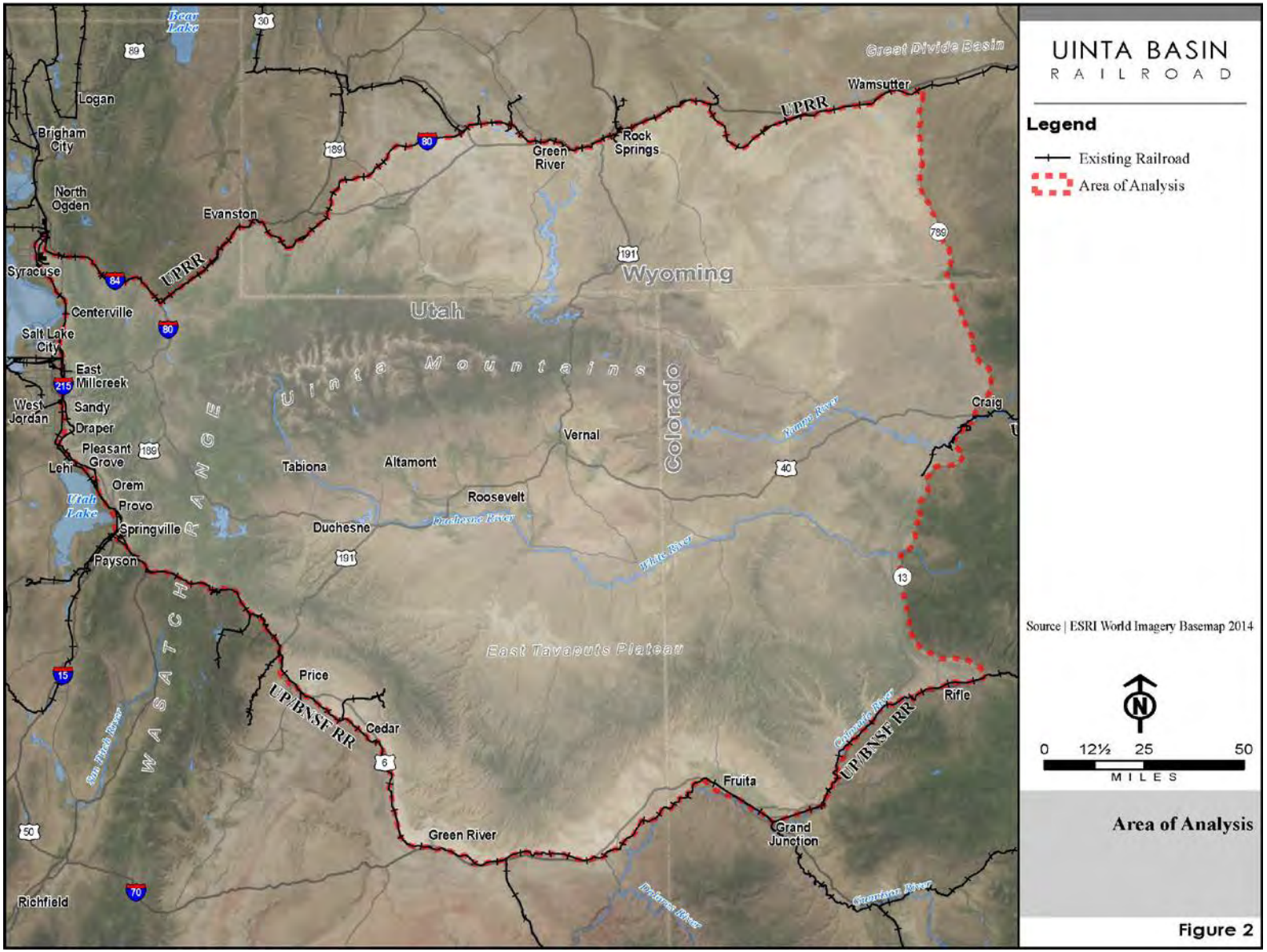


Figure 3. UBRR Team Alternatives

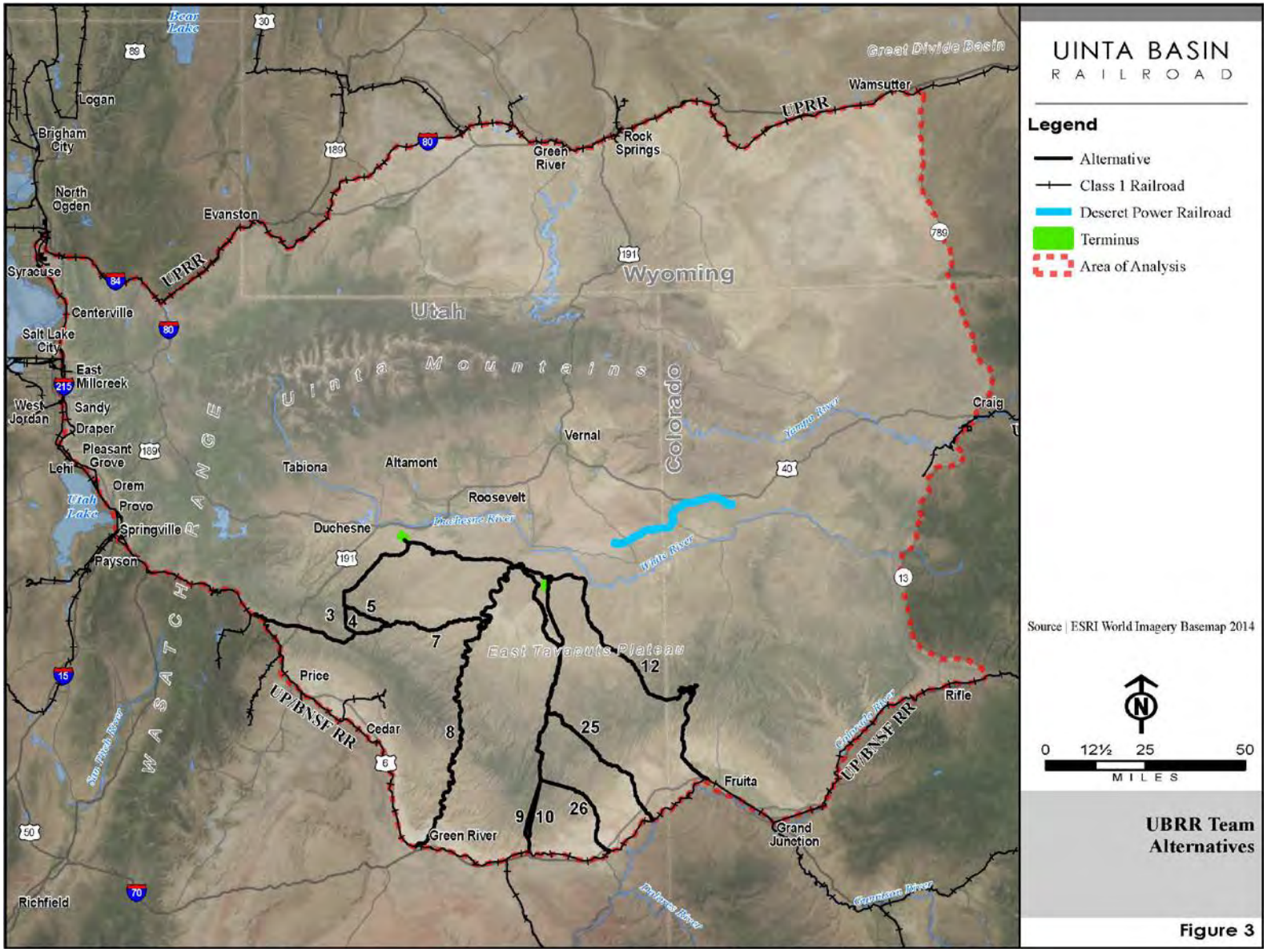
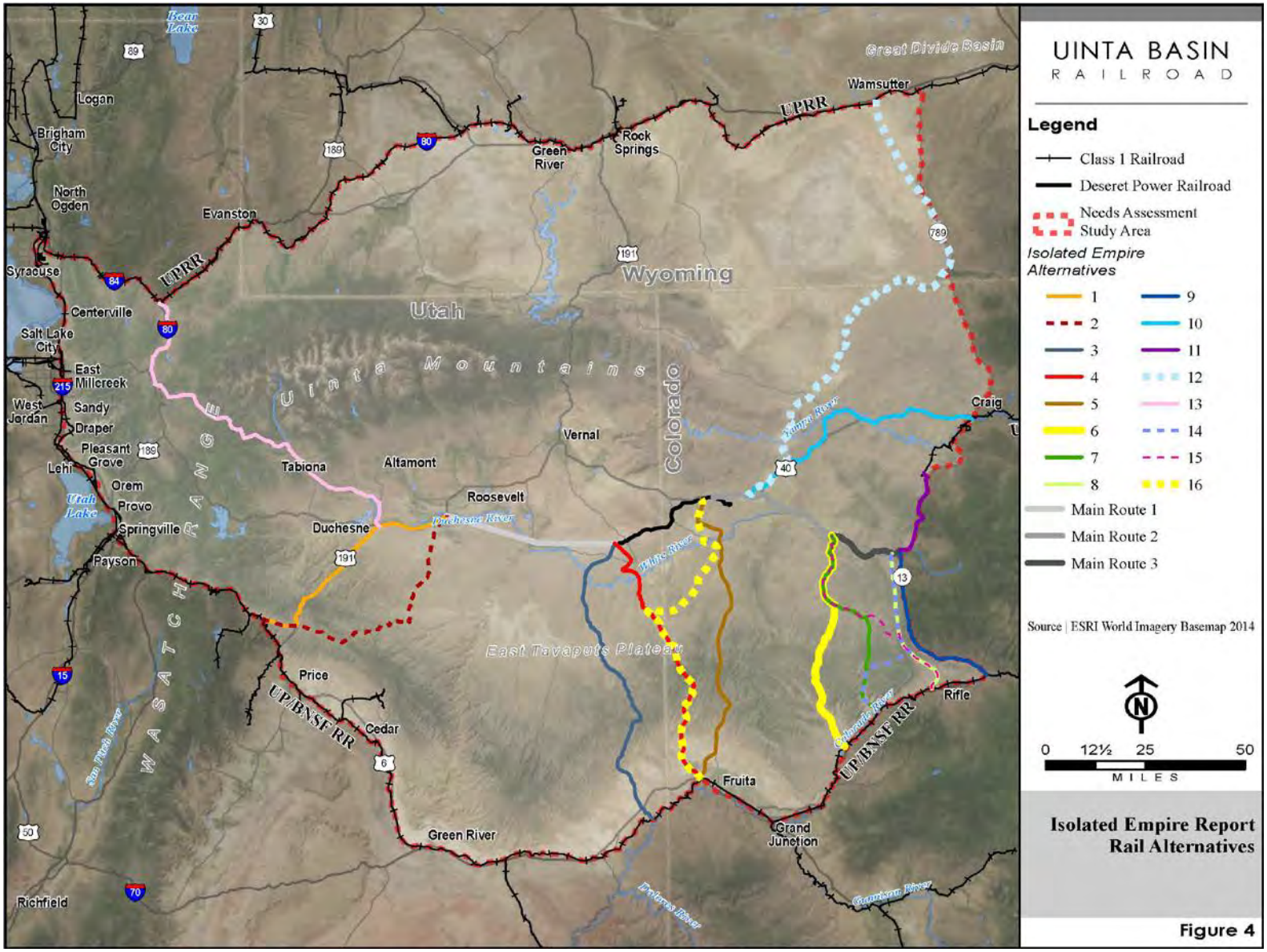


Figure 4. Isolated Empire Report Rail Alternatives



2.1.2 List of Preliminary Alternatives

Based on a previous study and input from the UBRR team, the team identified 26 preliminary alternatives. The 26 preliminary alternatives included various connections to existing rail lines surrounding the Uinta Basin that are served by Class 1 railroads.

The primary consideration in developing these preliminary alternatives was basic topography requirements. For example, the team avoided placing alternatives in steep canyons or on high mountain ranges with steep grades where rail operations would be impractical or impossible.

The preliminary alternatives are listed in Table 1 and shown in Figure 5 following the table. A detailed map of each alternative is provided in Appendix A, UBRR Alternative Maps. In Table 1, UP/BNSF means that UP owns the main track with BNSF having trackage rights.

Table 1. List of Preliminary Alternatives into the Uinta Basin

Alt.	Route Length (miles)	Tunnel(s) Length (miles)	Description
1	157	12.4	Alternative 1 starts at Echo, Utah, at the UP rail line and heads southeast through Kamas, Utah, paralleling the Provo River up the divide toward Wolf Creek Pass at an elevation of 9,000 feet (by the way on a single tunnel) and down the Duchesne River valley eastward to Duchesne, Utah. The alternative then heads east and terminates at Seep Ridge Road about 10 miles southeast of the Green River.
2	97	6.5	Alternative 2 starts in Kyune, Utah (southeast of Soldier Summit) at the UP/BNSF [a] rail lines adjacent to U.S. Highway 6 (U.S. 6). The alternative heads east along Emma Park Road to U.S. Highway 191 (U.S. 191) and then follows U.S. 191 north through Indian Canyon to Duchesne, Utah. One tunnel would be used to connect the alignment. The alternative then heads southeast and terminates at Seep Ridge Road about 10 miles southeast of the Green River.
3	104	9.1	Alternative 3 starts in Kyune, Utah (southeast of Soldier Summit) at the UP/BNSF rail lines adjacent to U.S. 6. The alternative heads east along Emma Park Road, crossing U.S. 191, then heads east on Whitmore Park Plateau just west of Nine Mile Canyon Road. Three tunnels connect the alternative to Sowers Canyon, where the alternative heads northeast to Antelope Canyon. From there, the alternative heads both west and east. The west segment heads west, terminating 6 miles southeast of Duchesne, Utah, and the east segment heads southeast, terminating at Seep Ridge Road about 10 miles southeast of the Green River.
4	112	7.0	Alternative 4 starts in Kyune, Utah (southeast of Soldier Summit) at the UP/BNSF rail lines adjacent to U.S. 6. The alternative heads east along Emma Park Road, crossing U.S. 191, then east on Whitmore Park Plateau to Nine Mile Canyon Road. The alternative then heads north up Nine Mile Canyon to Minnie Maud Canyon, then heads west along Minnie Maud Road for about 3 miles. Two tunnels connect the alternative to Sowers Canyon, where the alternative heads north to Antelope Canyon. From there, the alternative heads both west and east. The west segment heads west, terminating 6 miles southeast of Duchesne, Utah, and the east segment heads southeast, terminating at Seep Ridge Road about 10 miles southeast of the Green River.
5	125	2.4	Alternative 5 starts in Kyune, Utah (southeast of Soldier Summit) at the UP/BNSF rail lines adjacent to U.S. 6. The alternative heads east along Emma Park Road, crossing U.S. 191, then heads east on Whitmore Park Plateau to Nine Mile Canyon Road. The alternative then heads north up Nine Mile Canyon to Argyle Canyon, then heads west in the canyon for about 13 miles to a tunnel connecting the alternative to Sowers Canyon. From there, the alternative heads north to Antelope Canyon, where the alternative heads both west and east. The west segment heads west, terminating 6 miles southeast of Duchesne, Utah, and the east segment heads southeast, terminating at Seep Ridge Road about 10 miles southeast of the Green River.

Table 1. List of Preliminary Alternatives into the Uinta Basin

Alt.	Route Length (miles)	Tunnel(s) Length (miles)	Description
6	110	5.3	Alternative 6 starts in Kyune, Utah (southeast of Soldier Summit) at the UP/BNSF rail lines adjacent to U.S. 6. The alternative heads east along Emma Park Road, crossing U.S. 191, then heads east on Whitmore Park Plateau to Nine Mile Canyon Road. It then follows Nine Mile Canyon Road to Gate Canyon and then north up Gate Canyon to one tunnel, following Wells Draw Road to the South Myton Bench, where the alternative splits. One segment heads southeast, terminating at Seep Ridge Road about 10 miles southeast of the Green River, and the other segment heads west, terminating 6 miles southeast of Duchesne, Utah.
7	144	0.5	Alternative 7 starts in Kyune, Utah (southeast of Soldier Summit) at the UP/BNSF rail lines adjacent to U.S. 6. The alternative heads east along Emma Park Road, crossing U.S. 191, then heads east on Whitmore Park Plateau to Nine Mile Canyon Road, following Nine Mile Canyon Road to the Green River. The alternative heads north at the Green River to Wild Horse Bench, where this alternative splits both west and east. The west segment heads west, terminating 6 miles southeast of Duchesne, Utah, and the east segment heads southeast, terminating at Seep Ridge Road about 10 miles southeast of the Green River.
8	159	3.2	Alternative 8 starts near the junction of U.S. 6 and Interstate 70 (I-70) at the UP/BNSF rail lines. The alternative follows the Green River to Wild Horse Bench, where the alternative heads both west and east. The west segment heads west, terminating 6 miles southeast of Duchesne, Utah, and the east segment heads southeast, terminating at Seep Ridge Road about 10 miles southeast of the Green River.
9	120	12.3	Alternative 9 starts 6 miles east of Crescent Junction, Utah, at the UP/BNSF rail lines and heads north via Thompson Canyon, Bogart Canyon, and She Canyon, then generally follows Willow Creek. The alternative then heads west, crossing Seep Ridge Road about 6 miles southeast of the Green River and terminating 6 miles southeast of Duchesne, Utah.
10	120	11.3	Alternative 10 starts 6 miles east of Crescent Junction, Utah, at the UP/BNSF rail lines and heads north via Sego Canyon, Bogart Canyon, and She Canyon, then generally follows Willow Creek. The alternative then heads west, crossing Seep Ridge Road about 6 miles southeast of the Green River and terminating 6 miles southeast of Duchesne, Utah.
11	129	3.2	Alternative 11 starts 35 miles east of Crescent Junction, Utah, at the UP/BNSF rail lines at Agate Siding Road. The alternative heads up the Westwater Creek drainage along Book Cliffs Road. The alternative heads northeast along East Canyon and then follows Sweetwater Canyon northward to Middle Bitter Creek Road. The alternative follows Middle Bitter Creek Road to the Bitter Creek Drainage and north up the drainage, following Bitter Creek Road. Then the alternative heads west, crossing Seep Ridge Road about 6 miles southeast of the Green River and terminating 6 miles southeast of Duchesne, Utah.
12	145	5.0	Alternative 12 starts in Mack, Colorado, at the UP/BNSF rail lines and heads north via Baxter Pass Road to Railroad Canyon, where the alternative heads west to Bitter Creek Canyon. The alternative follows Bitter Creek to East Bench, then heads west, crossing Seep Ridge Road about 6 miles southeast of the Green River and terminating 6 miles southeast of Duchesne, Utah.
13	132	6.8	Alternative 13 starts in Mack, Colorado, at the UP/BNSF rail lines and heads north via Baxter Pass Road, generally following the abandoned Uintah Railway route. The alternative heads west, crossing Seep Ridge Road about 6 miles southeast of the Green River and terminating 6 miles southeast of Duchesne, Utah.

Table 1. List of Preliminary Alternatives into the Uinta Basin

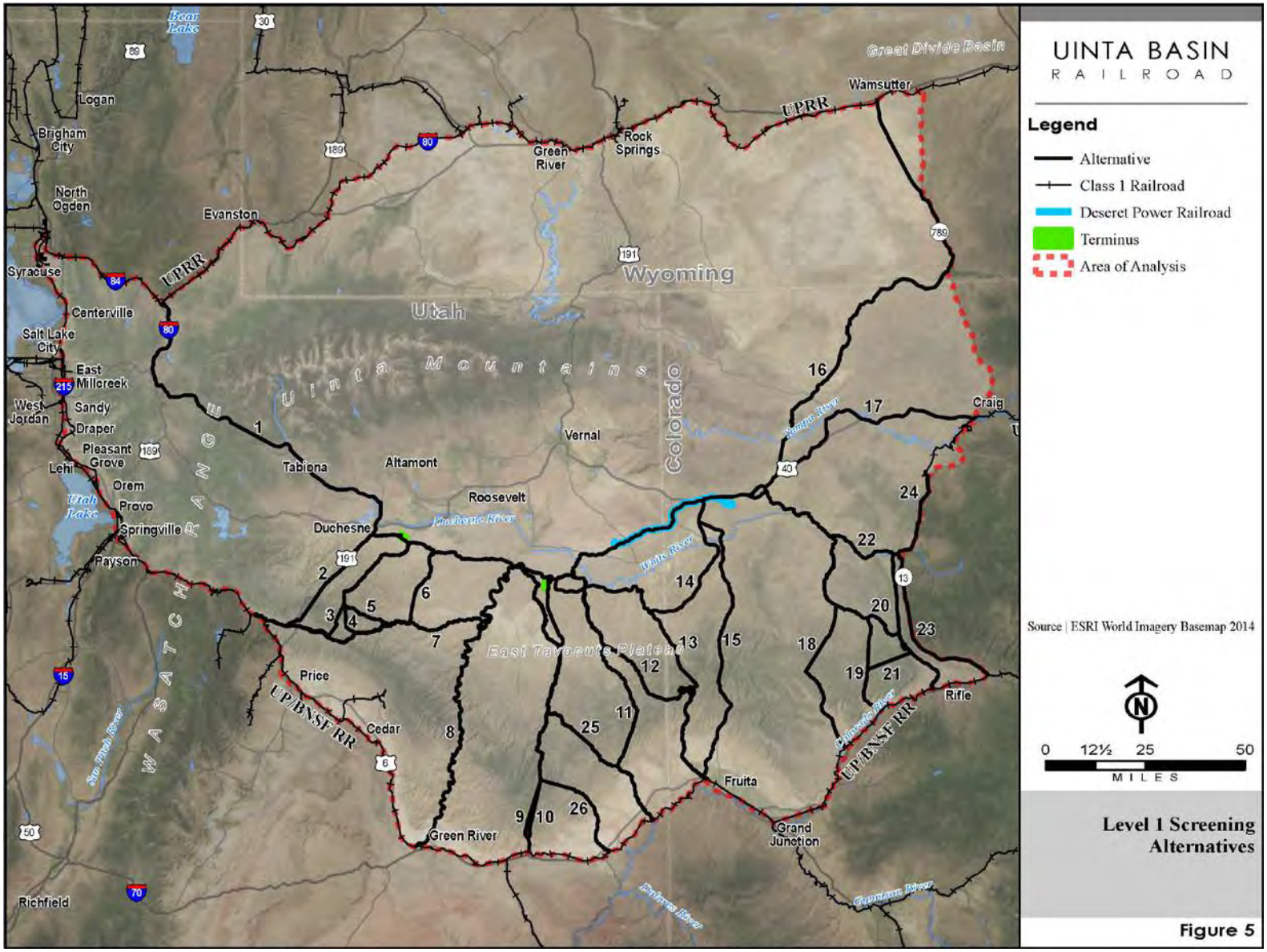
Alt.	Route Length (miles)	Tunnel(s) Length (miles)	Description
14	190	4.8	Alternative 14 starts in Mack, Colorado, at the UP/BNSF rail lines and heads north via Baxter Pass, generally following the abandoned Uintah Railway route. North of the pass, the alternative travels along Evacuation Creek, then heads northeast along Rio Blanco County Highway 23 to Rangely, Colorado. West of Rangely, the alternative runs along the Blue Mountain Highway to the Desert Western Railroad. The alternative then heads west, crossing Seep Ridge Road about 6 miles southeast of the Green River and terminating 6 miles southeast of Duchesne, Utah.
15	178	3.2	Alternative 15 starts in Mack, Colorado, at the UP/BNSF rail lines and heads north via Douglas Pass, following Colorado State Highway 139 to Rangely, Colorado. The alternative continues north to a point immediately south of Coal Oil Rim, heads west to Blue Mountain Road, heads north following Blue Mountain Road to the Desert Western Railroad, then heads west, crossing Seep Ridge Road about 6 miles southeast of the Green River and terminating 6 miles southeast of Duchesne, Utah.
16	248	8.0	Alternative 16 starts in Wamsutter, Wyoming, at the UP rail line and heads south along Wamsutter Road to Wyoming State Highway 789 to Baggs, Wyoming. The alternative follows the Little Snake River to the confluence with the Yampa River, crossing the Yampa River just west of the junction of Park Service Road and County Road 143. The alternative follows County Road 143 to U.S. Highway 40 (U.S. 40), then connects to the Desert Western Railroad. The alternative then heads southwest, crossing Seep Ridge Road about 6 miles southeast of the Green River and terminating 6 miles southeast of Duchesne, Utah.
17	181	4.7	Alternative 17 starts in Craig, Colorado, at the UP rail line and heads southwest along U.S. 40 to Maybell, Colorado, where the alternative follows the Yampa River to Cedar Springs Draw, then heads south back to U.S. 40 to connect to the Desert Western Railroad. The alternative then heads southwest, crossing Seep Ridge Road about 6 miles southeast of the Green River and terminating 6 miles southeast of Duchesne, Utah.
18	200	9.1	Alternative 18 starts in DeBeque, Colorado, at the UP/BNSF rail lines and heads north up Roan Creek following County Road 204 to Clear Creek Road, then heads north along Clear Creek Road to Tom Creek, following Tom Creek north to the Book Cliffs. At the Book Cliffs, the alternative heads north to West Willow Creek. The alternative follows West Willow Creek to Willow Creek, then follows Willow Creek to Piceance Creek. The alternative follows Piceance Creek to Highway 64, then heads north to connect to the Desert Western Railroad. The alternative then heads west, crossing Seep Ridge Road about 6 miles southeast of the Green River and terminating 6 miles southeast of Duchesne, Utah.
19	194	8.8	Alternative 19 starts in Parachute, Colorado, at the UP/BNSF rail lines, extending the existing American Soda Rail Spur northward along County Road 215 to Schutte Creek, then north to Piceance Creek. The alternative follows Piceance Creek to Colorado State Highway 64, then heads north to connect to the Desert Western Railroad. The alternative then heads west, crossing Seep Ridge Road about 6 miles southeast of the Green River and terminating 6 miles southeast of Duchesne, Utah.
20	202	0.0	Alternative 20 starts in Rifle, Colorado, at the UP/BNSF rail lines and heads north following Colorado State Highway 13 to Piceance Creek. The alternative then follows Piceance Creek west and north to Colorado State Highway 64, then heads north to connect to the Desert Western Railroad. The alternative then heads west, crossing Seep Ridge Road about 6 miles southeast of the Green River and terminating 6 miles southeast of Duchesne, Utah.

Table 1. List of Preliminary Alternatives into the Uinta Basin

Alt.	Route Length (miles)	Tunnel(s) Length (miles)	Description
21	174	12.0	Alternative 21 starts in Parachute, Colorado, at the UP/BNSF rail lines, extending the existing American Soda Rail Spur northward along County Road 215 to the East Middle Fork Parachute Creek, where the alternative heads northeast to Colorado State Highway 13. The alternative follows State Highway 13 north to the connection with Colorado State Highway 64 near Meeker, Colorado. Near Meeker, the alternative heads west along State Highway 64 to connect to the Desert Western Railroad. The alternative then heads west, crossing Seep Ridge Road about 6 miles southeast of the Green River and terminating 6 miles southeast of Duchesne, Utah.
22	200	0.0	Alternative 22 starts in Rifle, Colorado, at the UP/BNSF rail lines and heads north following Colorado State Highway 13 to the connection with Colorado State Highway 64 near Meeker, Colorado. Near Meeker, the alternative heads west along State Highway 64 to connect to the Desert Western Railroad. The alternative then heads west, crossing Seep Ridge Road about 6 miles southeast of the Green River and terminating 6 miles southeast of Duchesne, Utah.
23	203	8.3	Alternative 23 starts in Newcastle, Colorado, at the UP/BNSF rail lines and heads northwest along Elk Creek, then west past Rifle Gap State Park. The alternative heads along West Rifle Creek adjacent to County Road 252, then north to Piceance Creek toward Meeker, Colorado, along Flag Creek. The alternative heads west along State Colorado Highway 64 to connect to the Desert Western Railroad. The alternative then heads west, crossing Seep Ridge Road about 6 miles southeast of the Green River and terminating 6 miles southeast of Duchesne, Utah.
24	183	4.7	Alternative 24 starts in Axial, Colorado, at the UP rail line at the ColoWyo Mine and heads southward along Colorado State Highway 13 to Meeker, Colorado. The alternative heads west along Colorado State Highway 64 to connect to the Desert Western Railroad. The alternative then heads west, crossing Seep Ridge Road about 6 miles southeast of the Green River and terminating 6 miles southeast of Duchesne, Utah.
25	134	7.9	Alternative 25 starts 35 miles east of Crescent Junction, Utah, at the UP/BNSF rail lines at Agate Siding Road. The alternative heads up the Westwater Creek drainage along Book Cliffs Road. At Preacher Canyon, the alternative enters a tunnel heading northwest to Rock Springs Canyon, then to Kelly Canyon to Willow Creek. The alternative heads along Willow Creek, then splits. One segment heads east to Seep Ridge Road about 6 miles southeast of the Green River, and the other segment heads west to a point 6 miles southeast of Duchesne, Utah.
26	141	9.9	Alternative 26 starts 27 miles east of Crescent Junction, Utah, at the UP/BNSF rail lines and heads north adjacent to Cisco Springs Road and then enters Cottonwood Canyon. At the intersection of Cottonwood and Upper Cottonwood Canyons, the alternative enters a tunnel heading northwest to She Canyon, then heads north to Willow Creek. The alternative splits, with one segment heading east to Seep Ridge Road about 6 miles southeast of the Green River and the other segment heading west to a point 6 miles southeast of Duchesne, Utah.

[a] In this table, UP/BNSF means that UP owns the main track with BNSF having trackage rights.

Figure 5. Level 1 Screening Alternatives



2.2 Screening Process

The primary purpose of alternatives screening was to determine whether feasible and practicable rail alternatives were available that could connect to existing rail lines outside the Uinta Basin that are served by Class 1 railroads.

What was the purpose of alternatives screening?

The primary purpose of alternatives screening was to determine whether feasible and practicable rail alternatives were available that could connect to existing rail lines outside the Uinta Basin that are served by Class 1 railroads.

The UBRR team developed a common alignment for the proposed alternatives in the basin that would be used by all the 26 alternatives to allow an equal comparison of the alternatives (see Figure 6 on page 20). The common alignment has a western end point southeast of Duchesne, Utah, and an eastern end point about 10 miles south of Ouray, Utah, which is adjacent to the Green River.

After determining the feasible and practicable alternatives (see Section 7.0, Results of Preliminary Screening for Alternatives into the Uinta Basin) into the basin from the existing rail network, the UBRR team evaluated several alternatives within the basin that would provide a reasonable and practicable alignment to connect to the alternatives into the basin. Section 8.0, Overview of the Alternatives-Development and Screening Process for Alternatives within the Uinta Basin, describes the screening process for these alignments.

3.0 Level 1 Screening: Ability to Meet the Project's Purpose

The purpose of Level 1 screening was to identify alternatives that meet the purpose of the project. Alternatives that were determined to not meet the purpose of the project were considered unreasonable for NEPA purposes and not practicable for Clean Water Act Section 404(b)(1) purposes and were not carried forward for further analysis in Level 2 screening.

What was the purpose of Level 1 screening?

The purpose of Level 1 screening was to identify alternatives that meet the purpose of the project.

3.1 Level 1 Screening Criteria

Level 1 screening was the first major decision point at which alternatives were eliminated based on specific screening criteria. During Level 1 screening, the preliminary alternatives were screened against the following purpose criteria:

- The alternative must provide the Uinta Basin with two carrier access by connecting to existing rail lines served by both UP and BNSF in order to provide the opportunity for competitive pricing between railroads by providing competitive freight transportation services to the shippers and receivers in the Uinta Basin.

  Providing a connection to only one of these railroads' systems could result in higher transportation costs than what could be realized if producers had competitive pricing from two Class 1 railroads. A connection to a single Class 1 railroad could increase net prices for commodities extracted, harvested, or manufactured in the basin or increase consumer prices for commodities consumed in the basin.

- The alternative must reduce truck travel distance on local, state, and federal roads to the rail line within the basin by providing a range of access points for all commodities. Providing multiple access points will also support the economic viability of the UBRR by providing access to more commodities to ship.

  Providing a range of access points across the basin would allow more direct connections to transload facilities, thereby reducing truck travel from the shippers across the basin on local, state, and federal roads to the rail line. Providing a range of access points would reduce truck transportation cost and related road congestion. This would also provide shippers and receivers in the basin with an equal opportunity to share in the reduced transportation cost of the UBRR, thus increasing economic competition in the basin for goods and commodities consumed or produced in the basin.

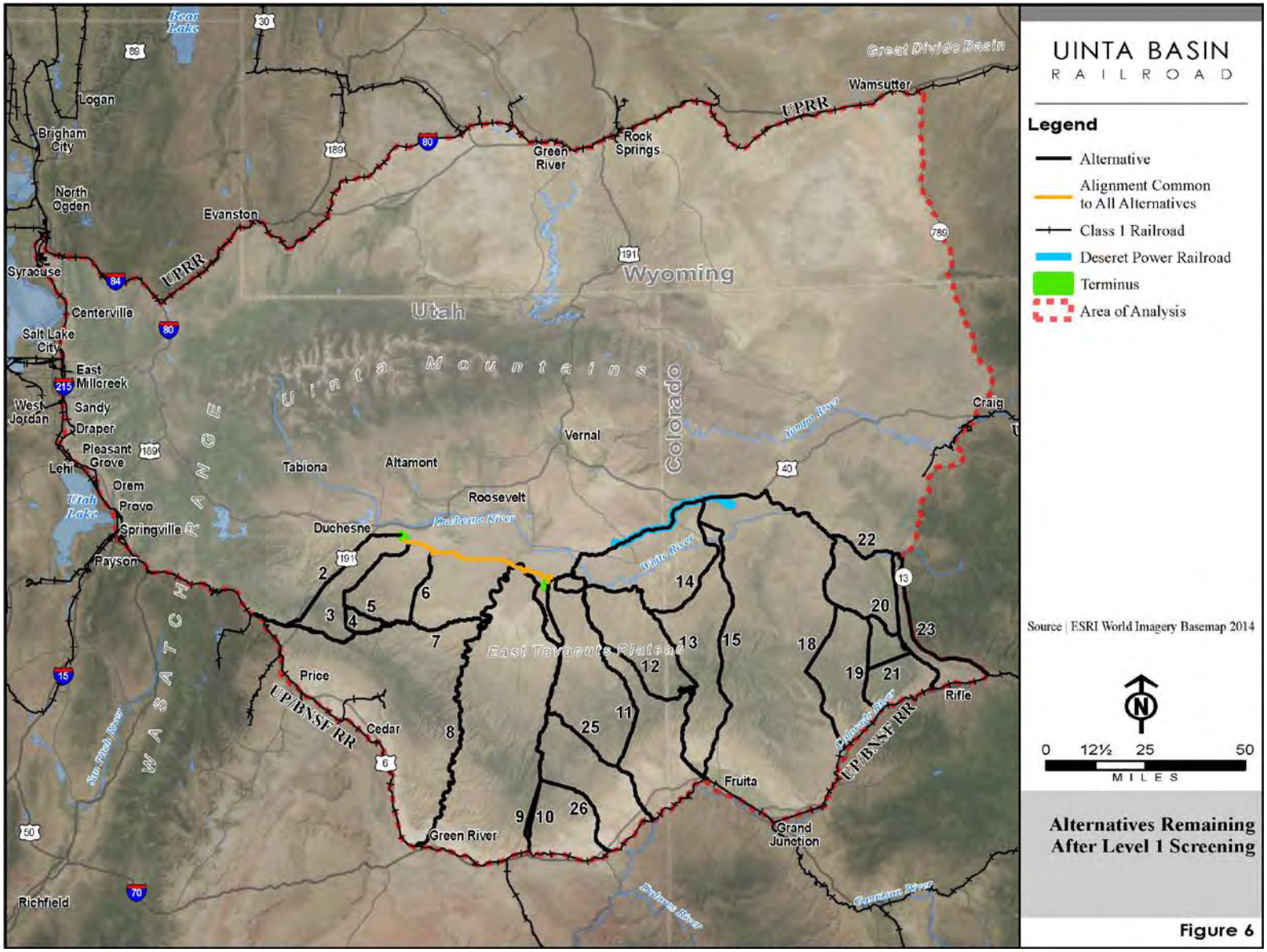
3.2 Level 1 Screening Results

The Level 1 screening results are summarized in Table 2 below. Of the 26 preliminary alternatives, Alternatives 1, 16, 17, and 24 did not pass Level 1 screening. These alternatives were eliminated because they did not provide a connection to rail lines served by the two Class 1 railroads (UP and BNSF) south and west of the Uinta Basin. The eliminated alternatives provided access to the UP rail line only. As a result of the Level 1 screening, the remaining 22 alternatives were advanced to Level 2 screening (see Figure 6 following the table).

Table 2. Level 1 Screening Results: Ability to Meet the Project's Purpose

Alt.	Level 1 Screening Criteria	
	Does the Alternative Connect to Both the UP and BNSF Rail Lines?	Does the Alternative Reduce Truck Travel Distance on Local, State, and Federal Roads to the Rail Line?
1	No	Yes
2	Yes	Yes
3	Yes	Yes
4	Yes	Yes
5	Yes	Yes
6	Yes	Yes
7	Yes	Yes
8	Yes	Yes
9	Yes	Yes
10	Yes	Yes
11	Yes	Yes
12	Yes	Yes
13	Yes	Yes
14	Yes	Yes
15	Yes	Yes
16	No	Yes
17	No	Yes
18	Yes	Yes
19	Yes	Yes
20	Yes	Yes
21	Yes	Yes
22	Yes	Yes
23	Yes	Yes
24	No	Yes
25	Yes	Yes
26	Yes	Yes

Figure 6. Alternatives Remaining after Level 1 Screening



4.0 Level 2 Screening: Constructability and Operational Feasibility

The purpose of Level 2 screening was to determine which alternatives are feasible and practicable based on their constructability and operational feasibility. The UPRR team made this determination by reviewing topography and aerial images.

What was the purpose of Level 2 screening?

The purpose of Level 2 screening was to determine which alternatives are feasible and practicable based on their constructability and operational feasibility.

4.1 Methodology

As described in the *Alternatives-Development and Screening Methodology Report*, the UBRR team used the following process to evaluate the 22 alternatives advanced from Level 1 screening:

1. The team developed basic alignments and footprints, based on a 100 foot right-of-way width, for the alternatives carried forward from Level 1 screening. During this step, the team attempted to minimize impacts to natural resources and the built environment.
2. Project engineers reviewed the alignments and the topography of the surrounding area to make sure that they met basic requirements for rail design. Preliminary engineering was performed during Level 2 screening to ensure that rail alternatives met basic engineering geometric requirements. During the development of the alternatives, the project engineers also identified the locations of tunnels in areas of steep topography.
3. The alternatives' footprints were rendered as digital GIS (geographic information system) files, and a GIS analysis was performed to determine the amount of the track grade and the length of the rail line.
4. The team created segments for each unique alignment for the alternatives considered in Level 2 screening. When developing the segments for the new alignments, the team used GIS data to show the locations of resources in order to minimize impacts to the natural and built environment where reasonably possible.
5. The alternatives were then screened against the Level 2 criteria listed in Table 3 on page 23.

4.2 Level 2 Screening Criteria

The main criterion used in Level 2 screening to determine whether an alternative was feasible and/or practicable was track grade, since the grade affects how and whether a train can operate. Grade is the factor that determines the number of cars that can be used per train, the number of trains that can operate per day, and a train's average speed.

For the UBRR project, the criterion for the grade is 2.4%. For mainline railways in North America intended for heavy and frequent trains, a grade of 2.4% has historically been considered the steepest grade that is economically and safely operable. The *de facto* standard limiting grade in the United States is slightly less, at 2.2%. (For more information, see the *Alternatives-Development and Screening Methodology Report*.)

Therefore, any alternative that exceeded 2.4% grade was determined not to be feasible and/or not practicable. In addition, an alternative was considered impractical to construct if it would be constructed in a canyon with high canyon walls, a high water flow that fills canyon floor, or a lack of continuous bench or beach for a rail line.

4.3 Level 2 Screening Results

Of the 22 alternatives considered in Level 2 screening, 13 alternatives (Alternatives 6, 9, 10, 11, 13, 14, 15, 19, 20, 21, 22, 23, and 26) were eliminated because the grade of the alternative exceeded 2.4%. Two alternatives (Alternatives 7 and 8) were eliminated because they were located in the Green River Canyon, where it would be impractical to construct a rail line because of the height of canyon walls, a high water flow that fills canyon floor, or a lack of continuous bench or beach for a rail line. The alternatives that passed Level 2 screening were advanced for Level 3 screening (impacts to the natural and human environment; see Figure 7 following Table 3 below).

Table 3. Level 2 Screening Results: Constructability and Operational Feasibility

Alternatives-Screening Criterion	2	3	4	5	6	7	8	9	10	11	12	13	14	15	18	19	20	21	22	23	25	26
Constructability/Operations																						
Trains of up to 150 cars must be operable (yes/no) (**No** = grades exceed 2.4%)	Yes	Yes	Yes	Yes	No	Yes	Yes	No	No	No	Yes	No	No	No	Yes	No	No	No	No	No	Yes	No
As many as 24 trains per day must be operable (yes/no) (**No** = grades exceed 3%)	Yes	Yes	Yes	Yes	No	Yes	Yes	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Average train speeds between terminals, exclusive of meet and pass events, must be at least 30 miles per hour (mph) (yes/no) (**No** = grades exceed 2.4%)	Yes	Yes	Yes	Yes	No	Yes	Yes	No	No	No	Yes	No	No	No	Yes	No	No	No	No	No	Yes	No
Grades are at or below 2.4% (**No** = grades exceed 2.4%)	Yes (2.4%)	Yes (2.0%)	Yes (2.0%)	Yes (2.2%)	No (3.5%)	Yes (2.0%)	Yes (1.5%)	No (4.0%)	No (3.8%)	No (4.2%)	Yes (2.2%)	No (2.7%)	No (2.7%)	No (4.0%)	Yes (2.4%)	No (2.5%)	No (2.5%)	No (2.5%)	No (2.5%)	No (2.8%)	Yes (2.4%)	No (4.0%)
Impractical to construct due to height of canyon walls, high water flow that fills canyon floor, and lack of continuous bench or beach for a rail line (yes/no) (**Yes** = the alternative is impractical to construct)	No	No	No	No	No	Yes – Alternative follows Green River. Impractical to construct due to height of canyon walls, high water flow that fills canyon floor, and lack of continuous bench or beach for a rail line.	Yes – Alternative follows Green River. Deep canyon walls and river floodplain prohibit construction of a rail line.	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No

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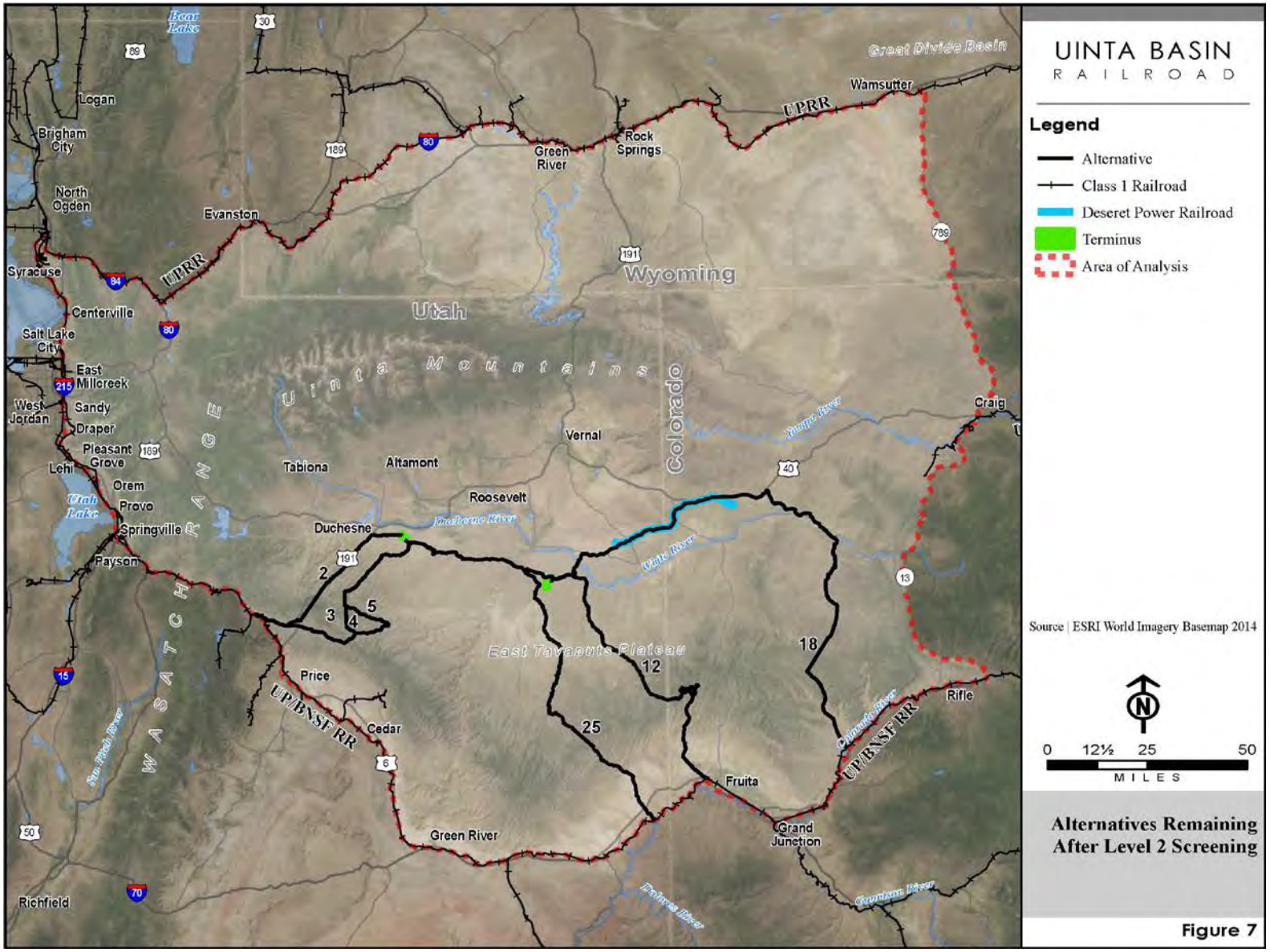
Figure 7. Alternatives Remaining after Level 2 Screening



5.0 Level 3 Screening: Natural and Built Environment

What was the purpose of Level 3 screening?

The purpose of Level 3 screening was to determine which of the alternatives advanced from Level 2 screening are evaluated in Level 4 screening (alternative feasibility field review).

The purpose of Level 3 screening was to determine which of the alternatives advanced from Level 2 screening are evaluated in Level 4 screening (alternative feasibility field review). The alternatives carried forward into Level 4 screening were determined by collectively evaluating their impacts to the natural and built environment and their estimated project costs. Table 4 on page 28 lists the Level 3 screening criteria.

During the Level 3 screening process, the UBRR team found that none of the alternatives would avoid affecting the natural and built environment. The UBRR area of analysis contains suburban areas, resource-development infrastructure (such as oil pads, pipelines, and roads), farmland, sensitive wildlife and plant species, cultural resources, rivers and streams, wildlife habitat, and wetlands. Because of the high density of these community and natural resources, the team found that, in all situations, avoiding or minimizing impacts to one resource would cause additional impacts to other resources.

Since no alternatives would avoid affecting the natural and built environment, the UBRR team collectively evaluated each of the alternatives to determine which alternatives would best meet the purpose of the project with the lowest overall levels of impacts to the natural and built environment while still meeting the requirements of Section 404(b)(1) of the Clean Water Act and Section 4(f) of the Department of Transportation Act of 1966.

5.1 Methodology

As described in the *Alternatives-Development and Screening Methodology Report*, the UBRR team used the following process to evaluate the eight alternatives that were advanced from Level 2 screening:

1. The alternatives' footprints were rendered as digital GIS files, and a GIS analysis was performed to determine the amount of impacts for each alternative. Because many alternatives had common segments, the UBRR team was able to combine the segments to calculate the total Level 3 screening impacts for each alternative. When developing the segments the UBRR team used GIS data to show the locations of resources in order to minimize impacts to the natural and built environment where reasonably possible.
2. The alternatives' effects on the resources listed in Table 4 on page 28 were compared to determine the reasonable alternatives to be advanced to Level 4 screening.

During Level 3 screening, the UBRR team collectively evaluated the alternatives advanced from Level 2 screening for their ability to meet the project's purpose as well as their impacts and costs. If an alternative was similar to another alternative and was determined to have substantially higher impacts or costs without having substantially higher benefits, it was considered unreasonable for NEPA purposes and was not carried forward into Level 4 screening.

The alternatives that passed Level 3 screening were advanced into Level 4 screening.

5.2 Assumptions

The *Alternatives-Development and Screening Methodology Report* explains the Level 3 screening process and methodologies. To summarize, during Level 3 screening, the UBRR team used available resource data from local, state, and Federal agencies (see Appendix D) and GIS software to estimate how each alternative would affect the resources listed in Table 4 on page 28. The team used GIS analysis to estimate how each alternative might affect resources such as wetlands, waters of the U.S., wildlife habitat, farmland, existing and planned parks and trail systems, cultural resources, and community facilities (such as schools, senior centers, fire stations, and community gathering places). No field studies were conducted as part of gathering Level 3 screening data.

The UBRR team also used GIS analysis to identify the expected number of impacts to homes and businesses, potential property acquisitions, and potential community impacts. Using aerial photographs from 2012, the team reviewed the structures within or adjacent to the alternative alignments as represented in a data layer in a GIS file. If a structure was not within an alternative's right-of-way, the team concluded that the associated property would not need to be acquired.

5.2.1 Right-of-Way Widths

The amount of impacts to the resources listed in Table 4 on page 28 was determined based on the estimated right-of-way width and the typical cross-section of the rail alignment. In the Level 3 screening process, the right-of-way that the UBRR team assumed would be required is based on a 100-foot-wide right-of-way for main tracks between terminals and on actual footprints for freight terminals. In general, this right-of-way width would be sufficient for constructing, operating, and maintaining the rail line.

5.2.2 Costs

To summarize, the UBRR team used construction costs from representative and recent rail construction projects to estimate the costs per mile for the UBRR. Based on these projects, the team assumed a construction cost estimate of $8 million per mile for a new rail alignment inclusive of earthwork, track, drainage structures, signal and communications, and maintenance access roads but exclusive of land acquisition, relocation of existing land uses, and environmental mitigation.

The team found few representative rail projects, since new rail construction on new alignments in the United States has been rare since the 1920s, and rail projects are highly variable in terms of topography, anticipated rail traffic levels, and requirements for grade-crossing signaling, grade-crossing structures, and terminal trackage. Nonetheless, the UBRR team used the following to calculate project costs:

- **Construction Costs.** The construction costs were based on the length of each facility included with each alternative. An estimated cost per mile ($8 million per mile) for each facility type was used for the construction cost estimates.
- **Tunnel Costs.** Tunnel costs were based on an estimated cost of $100 million per mile.
- **Relocation Costs.** Relocation costs were estimated by multiplying the number of estimated relocations by the estimated relocation cost for each category of relocation (residential, agricultural, commercial, industrial, institutional, and utility).
- **Right-of-Way Costs.** The right-of-way costs were estimated by multiplying the number of acres of each type of land use by the estimated right-of-way cost for each type of land use. The land-use acreages were calculated by overlaying the footprint of each alternative onto the land-use data layer in the GIS file.

- **Wetland Mitigation Costs.** Wetland mitigation costs were estimated by assuming a cost of $250,000 per acre of affected wetland. This cost was based on a recently completed Utah Department of Transportation (UDOT) wetland mitigation bank, where the cost of creating 1 acre of wetland was estimated to be $125,000. Mitigation ratios for wetland impacts generally range from 1:1 to 3:1 (meaning that 1 to 3 acres of new wetlands are created for every 1 acre affected; Johnson 2011). The mitigation ratio depends on the type, quality, and jurisdictional status of the affected wetlands. Because these variables were not known during the alternatives screening process, the UBRR team assumed a mitigation ratio of 2:1 to conservatively estimate the costs.

5.3 Level 3 Screening Criteria

The screening criteria used in Level 3 screening are listed in Table 4.

Table 4. Level 3 Screening Criteria

Criterion	Measure
Cost	• Estimated project cost (general).[a]
Impacts to natural resources	• Acres of wetlands and other waters of the U.S. affected.[b] • Acres of sensitive wildlife habitat affected. • Number of drainage crossings (includes streams, canals, or ditches). • Number and acres of Agriculture Protection Areas affected. • Acres of irrigated prime or unique farmland affected.[c] • Acres of floodplain affected. • Acres of wilderness areas or wilderness study areas affected (areas of critical environmental concern, recreation management area, etc.).
Impacts to the built environment	• Number and area of parks and trails affected. • Acres of open recreation areas affected (U.S. Forest Service, Bureau of Land Management [BLM], tribal, state, county, or local). • Number of community facilities affected. • Number of potential property acquisitions, including residential, business, and utility acquisitions. • Number of Section 4(f)/Section 6(f) uses.[d] • Number of cultural resources (for example, historic and archaeological resources) affected. [e] • Number of existing water and commodity wells/sites affected.

[a] Cost is based on an alternatives' cost relative to that of the lowest-cost alternative.

[b] Based on Clean Water Act requirements, an alternative with a substantially greater number of wetland impacts could be eliminated from detailed study.

[c] This metric estimates the effects on soils identified by the U.S. Department of Agriculture as being prime or unique that are irrigated and actively farmed.

d Based on the requirements of Section 4(f) of the Department of Transportation Act of 1966 and Section 6(f) of the Land and Water Conservation Fund Act, an alternative with a substantially greater number of Section 4(f) or Section 6(f) impacts could be eliminated from detailed study.

e Sites include eligible sites, sites with unknown eligibility, and sites on the National Register of Historic Places.

5.4 Level 3 Screening Results

Table 5 below shows the results of Level 3 screening for each of the alternatives advanced to Level 3 screening. Appendix B, Level 3 Screening Results, provides a graphical depiction of the resources evaluated in Table 5. Based on the Level 3 screening evaluation, of the seven alternatives advanced to Level 3 screening, Alternatives 2, 3, 12, and 25 were carried forward into Level 4 screening (see Figure 8 following Table 5) and Alternatives 4, 5, and 18 were eliminated from further study.

5.4.1 Level 3 Screening Evaluation

This section explains why each alternative that advanced to Level 3 screening was eliminated during Level 3 screening or was advanced to Level 4 screening. This section also includes a description of the alternative's impacts and a determination for each alternative evaluated in Level 3 screening.

To evaluate the alternatives, the UBRR team grouped them into western and eastern alternatives based on their location relative to the Green River. Alternatives 2, 3, 4, and 5 are west of the Green River, and Alternatives 12, 18, and 25 are east of the Green River. Figure 7 on page 25 shows these alternatives; detailed maps of each alternative are provided in Appendix A, UBRR Alternative Maps.

If an alternative shared a similar alignment as another alternative and was determined by the team to have substantially higher impacts or costs without having substantially higher benefits, it was considered unreasonable for NEPA purposes. The team also considered Clean Water Act compliance by evaluating the alternatives' impacts to wetlands.

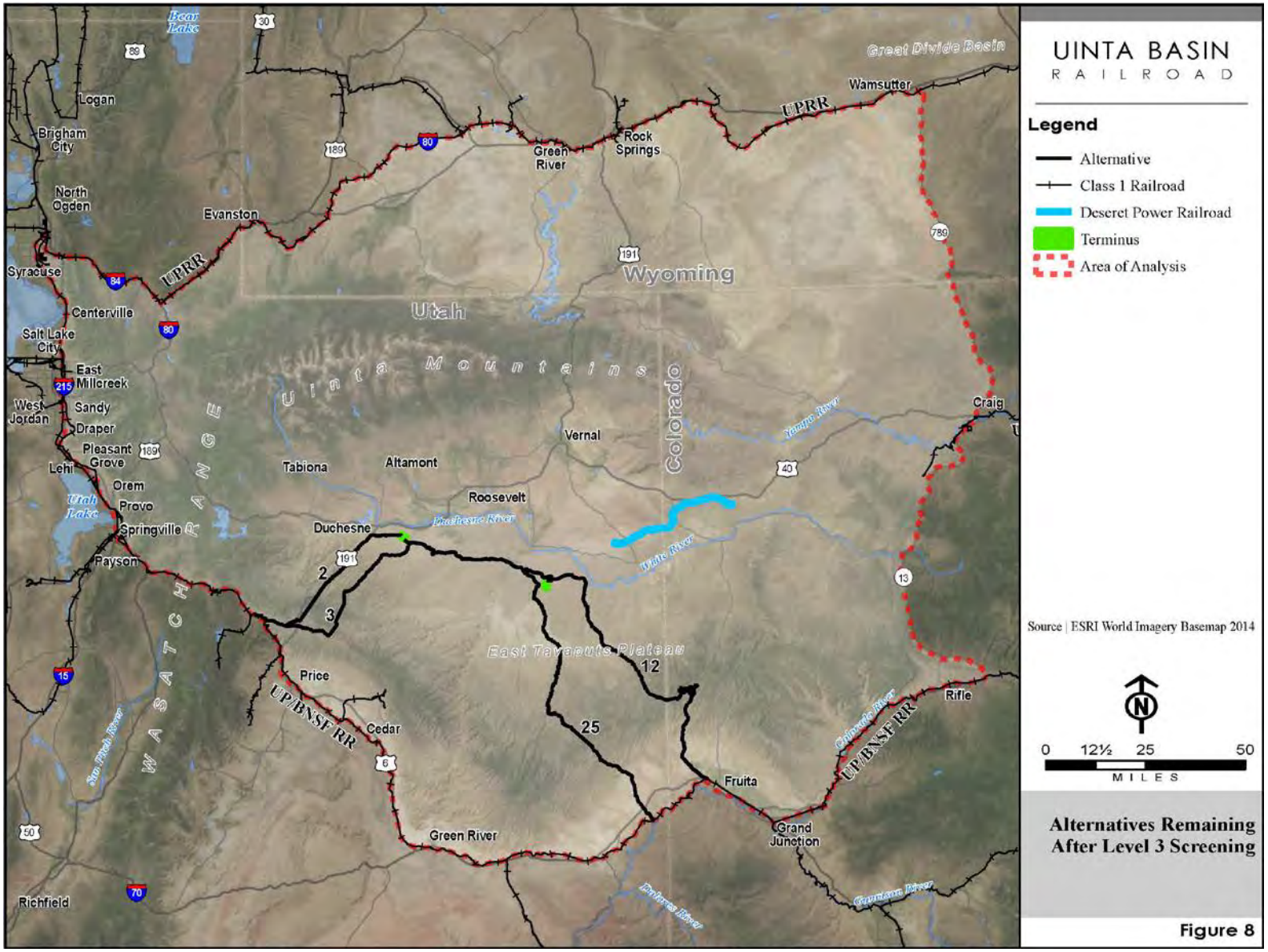
During the Level 3 screening evaluation, the team decided not to use floodplains as a screening factor because the completeness of floodplain data varied between alternatives. Therefore, the analysis would not accurately indicate the alternatives' impacts on floodplains.

As a result of the Level 3 screening evaluation, of the seven alternatives advanced to Level 3 screening, Alternatives 2, 3, 12, and 25 were carried forward into Level 4 screening (see Figure 8 following Table 5) and Alternatives 4, 5, and 18 were eliminated from further study.

Table 5. Level 3 Screening Results: Natural and Built Environment

Screening Criterion	Alternative						
	2	3	4	5	12	18	25
Cost, Technology, and Logistics							
Estimated project cost (general)	1.22	1.28	1.20	1.00	1.32	1.71	1.43
Impacts to Natural Resources							
Acres of wetlands and other waters of the U.S. affected	12.5	25.9	26.4	34.7	43.5	52.1	38.5
Acres of sensitive wildlife habitat affected	1,358	1,409	1,490	1480	1,618	2,300	1,481
Linear feet of drainage crossings (includes streams, canals, or ditches)	100,898	102,273	109,786	122,701	114,829	135,937	112,370
Number and acres of Agriculture Protection Areas affected	0	0	0	0	0	0	0
Acres of irrigated prime or unique farmland affected	6	15	39	38	11	247	57
Acres of wilderness areas or wilderness study areas affected (areas of critical environmental concern, recreation management area, etc.)	42	42	42	95	42	62	60
Impacts to the Built Environment							
Number and area of parks and trails affected	0	0	0	0	0	0	0
Number of community facilities affected	0	0	0	0	0	0	0
Number of potential property acquisitions, including residential, business, and utility acquisitions	15	15	16	15	18	18	14
Number of Section 4(f)/Section 6(f) uses	1	1	1	1	1	2	1
Number of cultural resources (for example, historic and archaeological resources) affected	21	22	28	52	40	46	99
Number of existing water and commodity wells/ sites affected	1	1	1	1	1	9	1

Figure 8. Alternatives Remaining after Level 3 Screening



Western Alternatives (West of the Green River)

Alternatives 2, 3, 4, and 5 are west of the Green River. Of these, Alternatives 3, 4, and 5 are similar alternatives that start in Kyune, Utah, and share a common alignment in Sowers Canyon.

Alternative 2 (Indian Canyon Option)

Description

Alternative 2 starts in Kyune, Utah (southeast of Soldier Summit) at the UP/BNSF rail lines adjacent to U.S. 6. The alternative heads east along Emma Park Road to U.S. 191 and then follows U.S. 191 north through Indian Canyon to Duchesne, Utah, and then heads southeast and terminates at Seep Ridge Road about 10 miles southeast of the Green River.

Determination

Alternative 2 was advanced to Level 4 screening because it would have the lowest overall impact on wetlands, the lowest impact on sensitive wildlife habitat, the lowest amount of streams impacted, the lowest amount of prime or unique farmland impacted, only one Section 4(f) resource impacted, the fewest number of cultural resources impacted, and the third-lowest overall cost of the Level 3 alternatives.

Cost. Alternative 2 would have the third-lowest cost of the seven alternatives considered in Level 3 screening.

Wetlands. Alternative 2 would have the lowest amount of wetlands impacted at 12.5 acres.

Sensitive Wildlife Habitat. Alternative 2 would have the lowest amount of sensitive wildlife habitat impacted at 1,358 acres. Of that habitat, the two types of habitat with the greatest impacts would be greater sage grouse habitat (1,190 acres) and the black-footed ferret habitat (122 acres).

Wilderness Areas. Alternative 2 would impact 42 acres of two Bureau of Land Management (BLM) Areas of Critical Environmental Concern (ACEC), which was the lowest impact along with Alternatives 3, 4, and 12.

Streams. Alternative 2 would have the lowest number of drainage crossings at 100,898 linear feet.

Prime and Unique Farmland. Alternative 2 would have the lowest amount of irrigated prime and unique farmland impacted at 6 acres.

Section 4(f) uses. Alternative 2 would use 3 acres of one Section 4(f) resource (a wildlife refuge), which was the lowest impact along with Alternatives 3, 4, 5, 12, and 25.

Cultural Resources. Alternative 2 would have the fewest number of cultural resources impacted (21 sites).

Property Acquisitions. Alternative 2 would have the second-fewest property acquisitions (15 businesses consisting of oil production sites).

Alternatives 3, 4, and 5 (Sowers Canyon Options)

Alternatives 3, 4, and 5 are similar alternatives that start in Kyune, Utah, and share a common alignment in Sowers Canyon. Since the three alternatives have three areas with a common alignment and would provide similar operational benefits, the UBRR team decided to evaluate these alternatives as a group to determine which were reasonable under NEPA and practicable under the Clean Water Act Section 404(b)(1) guidelines.

Descriptions

Alternatives 3, 4, and 5 start in Kyune, Utah (southeast of Soldier Summit) at the UP/BNSF rail lines adjacent to U.S. 6. The alternatives head east along Emma Park Road to U.S. 191, then head east on Whitmore Park Plateau. The only variation of these alternatives is in how they connect to Sowers Canyon.

- **Alternative 3.** Just west of Nine Mile Canyon Road, three tunnels connect the alternative to Sowers Canyon.
- **Alternative 4.** The alternative enters Nine Mile Canyon along Nine Mile Canyon Road. The alternative heads north up Nine Mile Canyon to Minnie Maud Canyon, then heads west along Minnie Maud Road for about 3 miles. Two tunnels connect the alignment to Sowers Canyon.
- **Alternative 5.** The alternative enters Nine Mile Canyon along Nine Mile Canyon Road. The alternative heads north up Nine Mile Canyon to Argyle Canyon, then heads west in the canyon for about 13 miles to a tunnel that connects the alternative to Sowers Canyon.

Once in Sowers Canyon, all three alternatives head north to Antelope Canyon, where the alternatives head both west and east. The west segment heads west, terminating 6 miles southeast of Duchesne, Utah, and the east segment heads southeast, terminating at Seep Ridge Road about 10 miles southeast of the Green River.

Determination

Of the three Sower Canyon alternatives, Alternative 3 was advanced to Level 4 screening for having the lowest overall impact on wetlands, the lowest impact on sensitive wildlife habitat, the lowest amount of streams impacted, the lowest amount of prime or unique farmland impacted, only one Section 4(f) resource impacted, and the fewest number of cultural resources impacted. Overall, Alternative 3 would have the fewest impacts to the natural and cultural environment compared to Alternatives 4 and 5 and would provide similar benefits in terms of meeting the project's purpose.

Cost. Of the three alternatives, Alternative 5 would have the lowest cost because it would require only a single tunnel. Alternative 3 would have the highest cost because it would require three tunnels.

Wetlands. Of the three alternatives, Alternative 3 would have the lowest impacts (25.9 acres) followed by Alternative 4 (26.4 acres) and Alternative 5 (34.7 acres).

Sensitive Wildlife Habitat. Of the three alternatives, Alternative 3 would have the lowest impacts (1,409 acres, of which the two types of habitat with the greatest impacts would be greater sage grouse habitat [1,256 acres] and black-footed ferret habitat [122 acres]) followed by Alternative 5 (1,480 acres, of which the two types of habitat with the greatest impacts would be greater sage grouse habitat [1,328 acres] and black-footed ferret habitat [122 acres]) and Alternative 4 (1,490 acres, of which the two habitat types with the greatest impacts would be greater sage grouse habitat [1,338 acres] and black-footed ferret habitat [122 acres]).

Wilderness Areas. Of the three alternatives, Alternatives 3 and 4 would have the same impact on wilderness areas (42 acres of two BLM ACECs) followed by Alternative 5 (95 acres of four BLM ACECs).

Streams. Of the three alternatives, Alternative 3 would have the lowest impacts (102,273 linear feet) of drainage crossings followed by Alternative 4 (109,787 linear feet) and Alternative 5 (122,701 linear feet).

Prime and Unique Farmland. Of the three alternatives, Alternative 3 would have the lowest impacts (15 acres) followed by Alternative 5 (38 acres) and Alternative 4 (39 acres).

Section 4(f) uses. All three alternatives would use 3 acres of one Section 4(f) resource (a wildlife refuge).

Cultural Resources. Of the three alternatives, Alternative 3 would have the lowest impacts (22 sites) followed by Alternative 4 (28 sites) and Alternative 5 (52 sites).

Property Acquisitions. Of the three alternatives, Alternatives 3 and 5 would have the lowest impacts (15 businesses) followed by Alternative 4 (16 businesses consisting of oil production sites).

During the development of alternatives, the initial alternative in the area of Nine Mile Canyon was Alternative 6, which followed the existing Nine Mile Canyon Road. Nine Mile Canyon is known for its extensive rock art and other cultural resources created by the Fremont culture and the Ute people. Because of the sensitive nature of this canyon, the UBRR team developed Alternatives 3, 4, and 5 to minimize or avoid impacts to these sensitive cultural resources. Of the three alternatives, only Alternative 3 completely avoids Nine Mile Canyon.

Eastern Alternatives (East of the Green River)

Alternatives 12, 18, and 25

Descriptions

- **Alternative 12.** Alternative 12 starts in Mack, Colorado, at the UP/BNSF rail lines and heads north via Baxter Pass Road to Railroad Canyon, where the alternative heads west to Bitter Creek Canyon. The alternative follows Bitter Creek to East Bench, then heads west, crossing Seep Ridge Road about 6 miles southeast of the Green River and terminating 6 miles southeast of Duchesne, Utah.
- **Alternative 18.** Alternative 18 starts in DeBeque, Colorado, at the UP/BNSF rail lines and heads north up Roan Creek following County Road 204 to Clear Creek Road, then heads north along Clear Creek Road to Tom Creek, following Tom Creek north. At the Book Cliffs, the alternative heads north to West Willow Creek. The alternative follows West Willow Creek to Willow Creek, then follows Willow Creek to Piceance Creek. The alternative follows Piceance Creek to Highway 64, then heads north to connect to the Desert Western Railroad. The alternative then heads west, crossing Seep Ridge Road about 6 miles southeast of the Green River and terminating 6 miles southeast of Duchesne, Utah.
- **Alternative 25.** Alternative 25 starts 35 miles east of Crescent Junction, Utah, at the UP/BNSF rail lines at Agate Siding Road. The alternative heads up the Westwater Creek drainage along Book Cliffs Road. At Preacher Canyon, the alternative enters a tunnel heading northwest to Rock Springs Canyon, then to Kelly Canyon to Willow Creek. The alternative heads along Willow Creek, then splits. One segment heads east to Seep Ridge Road about 6 miles southeast of the Green River, and the other segment heads west to a point 6 miles southeast of Duchesne, Utah.

Determination

Of the three eastern alternatives, Alternatives 12 and 25 were advanced to Level 4 screening. Alternative 18 was eliminated from consideration in Level 4 screening for having the greatest wetland impacts, the greatest impacts on sensitive wildlife habitat, the greatest impacts to irrigated prime and unique farmland, the highest amount of streams impacted, the greatest impact to wilderness areas, the only alternative that would be within 100 meters (328 feet) of two schools, the most Section 4(f) resources used, and the highest cost of any of the seven Level 3 alternatives. Overall, Alternative 18 would have the most impacts to the natural and human environment of any of the Level 3 alternatives without providing any additional benefit in terms of meeting project's purpose.

Cost. Of the three alternatives, Alternative 12 would have the lowest cost.

Wetlands. Of the three alternatives, Alternative 25 would have the lowest impacts (38.5 acres) followed by Alternative 12 (43.5 acres) and Alternative 18 (52.1 acres).

Sensitive Wildlife Habitat. Of the three alternatives, Alternative 25 would have the fewest impacts (1,481 acres, of which the two types of habitat with the greatest impacts would be greater sage grouse habitat [1,170 acres] and black-footed ferret habitat [310 acres]) followed by Alternative 12 (1,618 acres, of which the two types of habitat with the greatest impacts would be greater sage grouse habitat [1,030 acres] and black-footed ferret habitat [578 acres]) and Alternative 18 (2,300 acres, of which the two types of habitat with the greatest impacts would be greater sage grouse habitat [1,491 acres] and black-footed ferret habitat [770 acres]).

Wilderness Areas. Of the three alternatives, Alternative 12 would have the fewest impacts on wilderness areas (42 acres of three BLM ACECs) followed by Alternative 25 (42 acres of two BLM ACECs and 18 acres of two Wilderness Study Areas) and Alternative 18 (62 acres of five BLM ACECs).

Streams. Of the three alternatives, Alternative 25 would have the fewest impacts on drainage crossings (112,370 linear feet) followed by Alternative 12 (114,829 linear feet) and Alternative 18 (135,937 linear feet).

Prime and Unique Farmland. Of the three alternatives, Alternative 12 would have the lowest impacts (11 acres) followed by Alternative 25 (57 acres) and Alternative 18 (246 acres).

Section 4(f) uses. Of the three alternatives, Alternatives 12 and 25 would use 3 acres of one Section 4(f) resource (a wildlife refuge), and Alternatives 18 would use 27 acres of two Section 4(f) resources (federal and state wildlife refuge/areas).

Cultural Resources. Of the three alternatives, Alternative 12 would have the lowest impacts (40 sites) followed by Alternative 18 (46 sites) and Alternative 25 (99 sites).

Property Acquisitions. Of the three alternatives, Alternatives 25 would have the lowest impacts (14 businesses) followed by Alternative 12 (three homes and 15 businesses) and Alternative 18 (one home and 17 businesses). The business impacts are direct takes of oil production sites.

5.4.2 Level 3 Screening Section 404(b)(1) Practicability Review

Seven alternatives were evaluated as part of Level 3 screening.

Alternative 18 would have the highest acres of wetland impacts (52.1 acres) of any of the seven alternatives.

Alternative 4 (26.4 acres) and Alternative 5 (34.7 acres) would have fewer acres of wetland impacts than would Alternative 25 (38.5 acres) and Alternative 12 (43.5 acres). However, because Alternatives 4 and 5 would be located within the sensitive cultural area of Nine Mile Canyon and could impact the cultural resources in this canyon, they were determined to be not practicable under Section 404(b)(1).

Alternatives 4, 5, and 18 were eliminated from further study in Level 3 screening. Alternative 2 (12.5 acres) and Alternative 3 (25.9 acres) would have the lowest wetland impacts of any of the seven Level 3 alternatives and so were advanced to Level 4 screening, along with Alternatives 12 and 25.

6.0 Level 4 Screening: Alternative Feasibility Field Review

6.1 Level 4 Screening Criteria

From February 24 to February 26, 2014, the UBRR team conducted Level 4 screening (alternative feasibility field review) on the four alternatives (Alternatives 2, 3, 12, and 25) that passed Level 3 screening. The purpose of Level 4 screening was to determine, based on field observations, whether an alternative could be constructed. The field review included items such as topography, water courses, slope stability, wetlands and other natural environment features, existing infrastructure (roads, electrical lines, pipelines, and so on), community facilities, and existing buildings.

What was the purpose of Level 4 screening?

The purpose of Level 4 screening was to determine, based on field observations, whether an alternative could be constructed.

6.2 Level 4 Screening Results

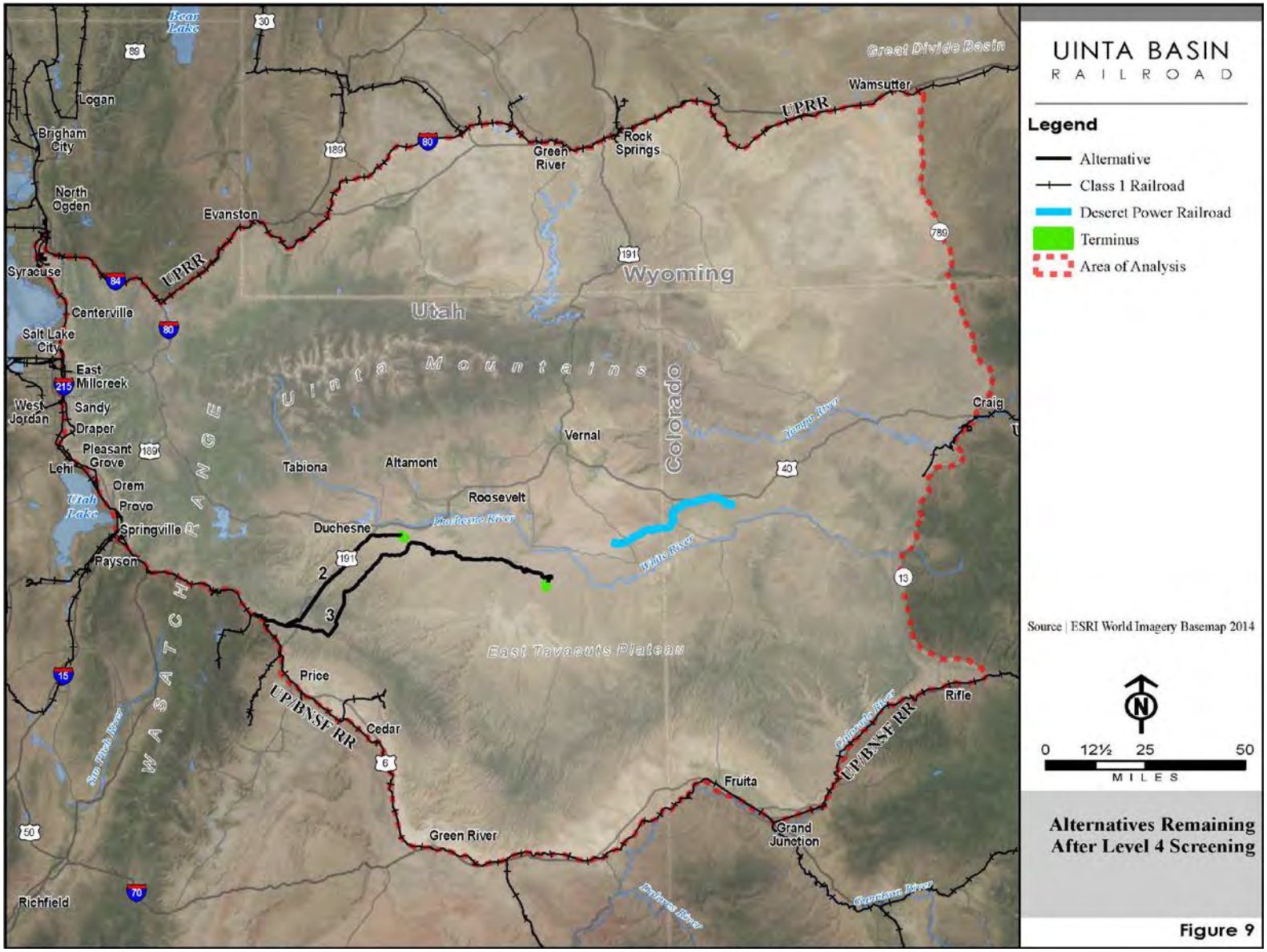
Appendix C, Level 4 Screening Field Review, provides the detailed field review report for Level 4 screening.

After the field review, the team developed more-refined digital maps and determined that Alternative 25 would have a grade of 2.8%. This grade would not pass the Level 2 grade criterion of 2.4%, so Alternative 25 was eliminated. Also, Alternative 25 would be built in Willow Creek Canyon. Based on the field review, the team determined that the canyon was narrow, the canyon had numerous curves, and the valley floor had a high likelihood of flooding.

After reviewing Alternative 12, the team determined that the steep slopes and loose material in the Baxter pass area would make construction and operation of a rail line not feasible or practicable. The team determined that, given the steep slopes, it would not be possible to build the main rail line along with sidings and the area would be susceptible to rock slides, thereby making long-term operation difficult.

Based on the feasibility field review, the UBRR team determined that Alternatives 2 and 3 would be feasible to construct based on field observations and that Alternatives 12 and 25 would not be feasible or practicable to construct (see Figure 9 below).

Figure 9. Alternatives Remaining after Level 4 Screening



7.0 Results of Preliminary Screening for Alternatives into the Uinta Basin

Using the four-level screening process, the UBRR team determined that Alternatives 2 and 3 are both feasible and practicable alternatives and would be evaluated further (see Section 10.0, Alternatives Refinement and Evaluation). Of the seven alternatives that met both the purpose and 2.4%-grade requirements from Level 1 and 2 screening, Alternatives 2 and 3 would have the least amount of impacts to wetlands, sensitive wildlife habitat, drainages, wilderness areas, Section 4(f) resources, and cultural resources. These two alternatives will undergo additional engineering refinement to further avoid natural and human resources (see Section 10.0).

8.0 Overview of the Alternatives-Development and Screening Process for Alternatives within the Uinta Basin

As described in Section 7.0, Results of Preliminary Screening for Alternatives into the Uinta Basin, based on the screening criteria, the UBRR team determined that Alternatives 2 and 3 were reasonable and practicable alternatives to construct a rail line into the Uinta Basin. This section evaluates alternatives to connect to Alternatives 2 and 3 inside the basin.

8.1 Screening Process for Alternatives within the Uinta Basin

8.1.1 Screening Criteria

To evaluate the alternatives within the Uinta Basin, the UBRR team streamlined the screening criteria, since the need to connect to both Class 1 railroads had been addressed with the south connection points of Alternatives 2 and 3. The screening criteria were divided into three categories: (1) transportation connections, (2) constructability and operational feasibility (see Section 4.0, Level 2 Screening: Constructability and Operational Feasibility), and (3) impacts to the natural and built environment (see Section 5.0, Level 3 Screening: Natural and Built Environment). The screening criteria for constructability and operational feasibility and for impacts to the natural and built environment are the same as those described in Sections 4.0 and 5.0.

Part of the project purpose is to reducing shipping costs. Within the basin, the rail line, including transload facilities, should be located in an area near major transportation corridors that can be readily accessed by trucks and personnel from the main industrial, population, and resource-development centers.

To help the UBRR team better understand the transportation needs in the basin, the team conducted interviews with potential rail users in April 2014. For the rail line to be commercially viable, potential rail users asked that the selected alternative be located in an area that will be readily used by potential shippers and receivers. The potential users interviewed said that they would benefit from two different types of rail terminals:

- An outbound terminal where they could truck resources for loading into rail cars
- An inbound terminal to receive materials required for drilling new wells and construction projects, materials such as drill stems, well casings, collection pipes, fracturing sand, cement, drilling fluids, and lumber

Potential users said that a site in the western area of the basin that is readily accessible to U.S. 40 and U.S. 191 at Duchesne, and that is reached from Duchesne, would be a preferred location for transloading outbound shipments. Potential users who were asked about a potential southern location in the Seep Ridge Road area south of the Green River said that the location is probably too far from the bases of operation for the producers and the trucking companies.

Potential users suggested several potential locations for a terminal that could receive inbound shipments of fracturing sand, tubular steel, cement, etc. Some preferred a location on the basin's west side, near Duchesne, while others expressed interest in a location on the basin's east side that would be readily accessible from Roosevelt, Vernal, or both along U.S. 40. Potential users said that terminals must be near major infrastructure and roads, must have good truck access, and must be easily reached from urban areas such as Vernal, Duchesne, and Roosevelt. Based on the interviews, the UBRR team developed the following criteria for determining transload locations:

- **Are the transload facilities for the alternative inside the basin near U.S. 40, the major transportation facility?** Transload facilities near U.S. 40 would reduce trucking distances because the highway provides a centrally located trucking route between existing businesses in Duchesne, Roosevelt, and Vernal and the resource-development areas north and south of the highway.
- **Are the transload facilities and connecting alternatives located near the cities of Duchesne, Roosevelt, and Vernal?** Potential users said that a site in the western area of the basin that is readily accessible to U.S. 40 and U.S. 191 at Duchesne, and that is reached from Duchesne, would be a preferred location for transloading outbound shipments. Potential users suggested several potential locations for a terminal that could receive inbound shipments of fracturing sand, tubular steel, cement, etc. Some preferred a location on the basin's west side, near Duchesne, while others expressed interest in a location on the basin's east side that would be readily accessible from Roosevelt, Vernal, or both.

8.1.2 Alternatives-Development Process

Three potential alternatives within the basin were developed based on topography and proximity to cities and existing road networks. All three alternatives connect to Alternatives 2 and 3 and head east across the basin between the cities of Duchesne and Vernal. These alternatives are shown in Figure 10 below and described in Table 6 following the figure.

Figure 10. Alternatives within the Uinta Basin

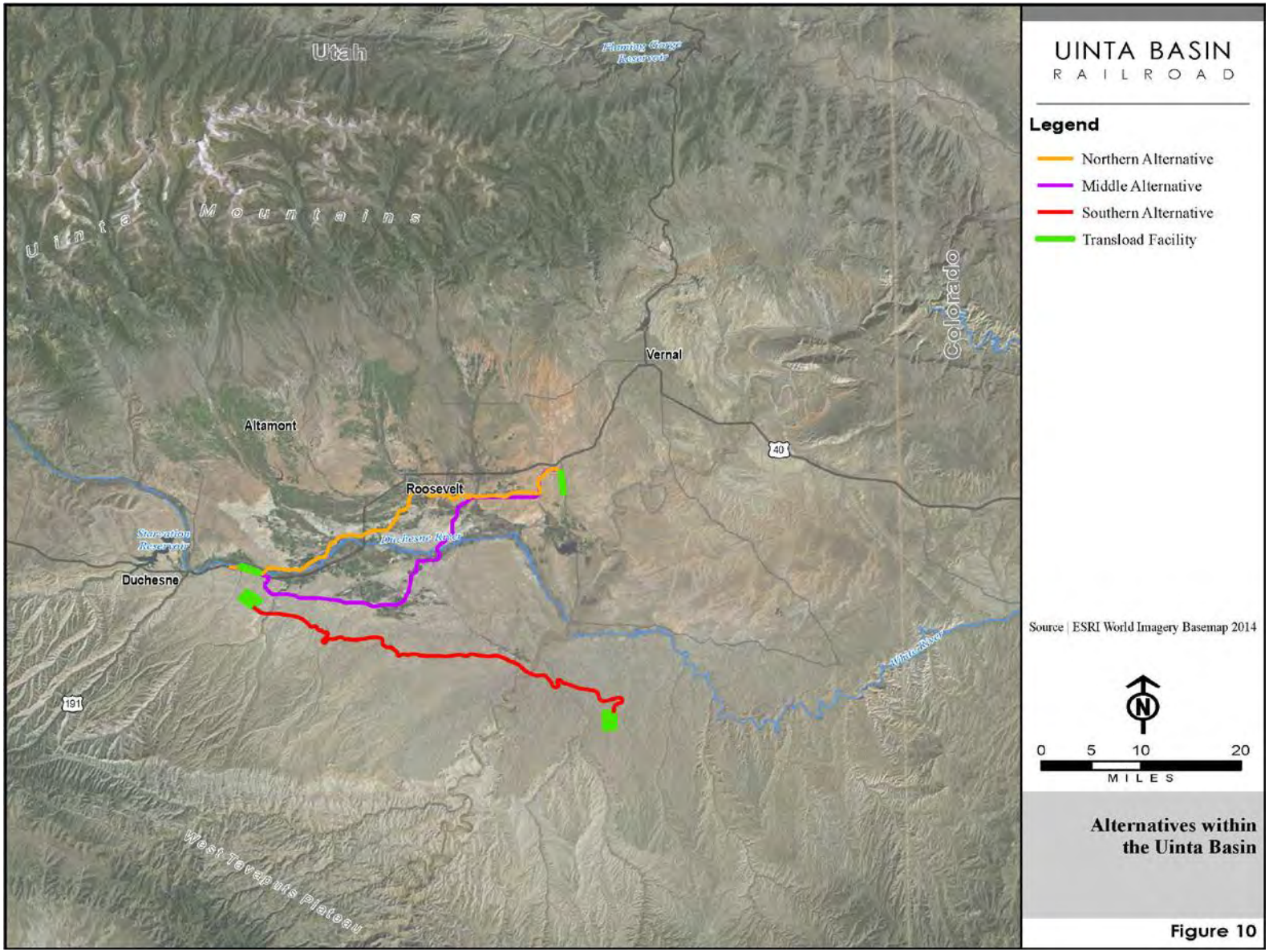


Table 6. List of Preliminary Alternatives within the Uinta Basin

Alt.	Route Length (miles)	Description
North	43	The west transload facility is about 3 miles east of Duchesne, Utah, immediately south of U.S. 40. From the transload facility, the alignment crosses U.S. 40 and the Duchesne River to the north about 1 mile west of Bridgeland, Utah. The alignment follows the Duchesne River to the east on the bench above the river and crosses U.S. 40 again about 1 mile north of Myton, Utah. From the crossing, the alignment heads east south of U.S. 40 to the second transload facility at the junction of U.S. 40 and state Route (SR) 88.
Middle	50	The west transload facility is about 3 miles east of Duchesne, Utah, immediately south of U.S. 40. From the transload facility, the alignment heads southeast onto the bluff about 2 miles south of Bridgeland, Utah, and then heads east. The alignment crosses 5880 West about 5.5 miles south of Myton, Utah, then heads northeast to the second transload facility at the junction of U.S. 40 and SR 88.
South	46	The west transload facility is about 5 miles east of Duchesne, Utah, and about 3 miles south of U.S. 40. From the transload facility, the alignment heads east southeast and crosses the Green River about 7 miles south of Ouray, Utah, and connects to the second transload facility just east of SR 88 about 10 miles south of the Green River.

8.1.3 Transportation Connection Screening

As discussed in Section 8.1.1, Screening Criteria, potential rail users said that a transload facility in the western area of the basin that is readily accessible to U.S. 40 and U.S. 191 at Duchesne, and that is reached from Duchesne, would be a preferred location for transloading outbound shipments. Potential users also said that terminals must be near major infrastructure and roads, must have good truck access, and must be easily reached from urban areas such as Vernal, Duchesne, and Roosevelt along U.S. 40.

As shown in Table 7, only the North and Middle Alternatives meet the transportation connection criteria, since their transload facilities and rail alignment would be located near Duchesne, near U.S. 40, and close to both Roosevelt and Vernal, Utah. Both of these alternatives' transload facilities would be immediately adjacent to U.S. 40, thereby providing excellent truck and personnel access from the cities in the basin.

Table 7. Transportation Connection Screening Results

Alternatives-Screening Criterion	North Alternative	Middle Alternative	South Alternative
Are the transload facilities and the alternative alignment near U.S. 40, the major transportation facility?	Yes	Yes	No
Are the transload facilities and alternative alignments located near the cities of Duchesne, Roosevelt, and Vernal?	Yes	Yes	No

The South Alternative's western transload facility would be about 5 miles east of Duchesne and 3 miles south of U.S. 40, and its eastern transload facility would be about 26 miles south of the junction of U.S. 40 and SR 88 (10 miles south of the Green River). Although these locations would benefit resource development on the south side of the basin, they would require long travel distances from resource-development areas north of U.S. 40 and from the cities in the basin, thus increasing the amount of truck travel for all resources and materials developed and used in the basin compared to the North and Middle Alternatives.

In addition, the west transload facility for the South Alternative would require a new hard-surface road to be built from U.S. 40, while the other transload facilities for the North and Middle Alternatives are immediately adjacent to existing paved roads. The South Alternative would also require a major bridge crossing of the Green River (about 900 feet long) and would cross a BLM-designated Area of Critical Environmental Concern associated with the Green River floodplain that was established to protect sensitive species in this riparian floodplain area.

None of the proposed transload facilities would be adjacent to urban population centers, so they would minimize land-use and operational conflicts with communities.

8.1.4 Constructability and Operational Feasibility Screening

The North and Middle Alternatives meet all constructability and feasibility screening criteria.

8.1.5 Natural and Built Environment Screening

Table 8 below shows the results of the natural and built environment screening for the North and Middle Alternatives. Of the two alternatives, the Middle Alternative was considered feasible and practicable because it would have fewer wetland impacts (19 acres less), fewer linear feet of stream crossings, fewer acres of prime farmland affected, no property acquisitions, and fewer cultural resources affected.

Because of the proximity of the North Alternative to developed areas, it would have 27 homes within 100 feet of the rail alignment, while the Middle Alternative would have seven. The Middle Alternative would affect more acres of sensitive wildlife habitat (183 acres), of which 178 acres are greater sage grouse habitat and 5 acres are black-footed ferret habitat. The North Alternative would affect 146 acres of greater sage grouse habitat and 1 acre of black-footed ferret habitat.

Overall, the North Alternative would have more impacts on the natural and human environment than would the Middle Alternative without providing any additional benefit in terms of meeting the project's purpose. Therefore, the North Alternative was eliminated from detailed consideration.

8.1.6 Section 404(b)(1) Practicability Review for Alternatives within the Uinta Basin

Of the two alternatives evaluated for impacts to the natural and built environment, the Middle Alternative would have fewer impacts on wetlands (3 acres) than the North Alternative (22 acres). The North Alternative was eliminated because of its higher impacts on most resources than the Middle Alternative.

Table 8. Alternatives within the Basin Screening Results: Natural and Built Environment

Screening Criterion	Alternative	
	North	Middle
Cost, Technology, and Logistics		
Estimated project cost (general)	Lowest	Highest
Impacts to Natural Resources		
Acres of wetlands and other waters of the U.S. affected	22	3
Acres of sensitive wildlife habitat affected	183	147
Linear feet of drainage crossings (includes streams, canals, or ditches)	16,982	26,636
Number and acres of Agriculture Protection Areas affected	0	0
Acres of irrigated prime or unique farmland affected	17	30
Acres of wilderness areas or wilderness study areas affected (areas of critical environmental concern, recreation management area, etc.)	0	0
Impacts to the Built Environment		
Number and area of parks and trails affected	0	0
Number of community facilities affected	0	0
Number of potential property acquisitions, including residential, business, and utility acquisitions	0	6
Number of Section 4(f)/Section 6(f) uses	0	0
Number of cultural resources (for example, historic and archaeological resources) affected	14	19
Number of existing water and commodity wells/ sites affected	0	0

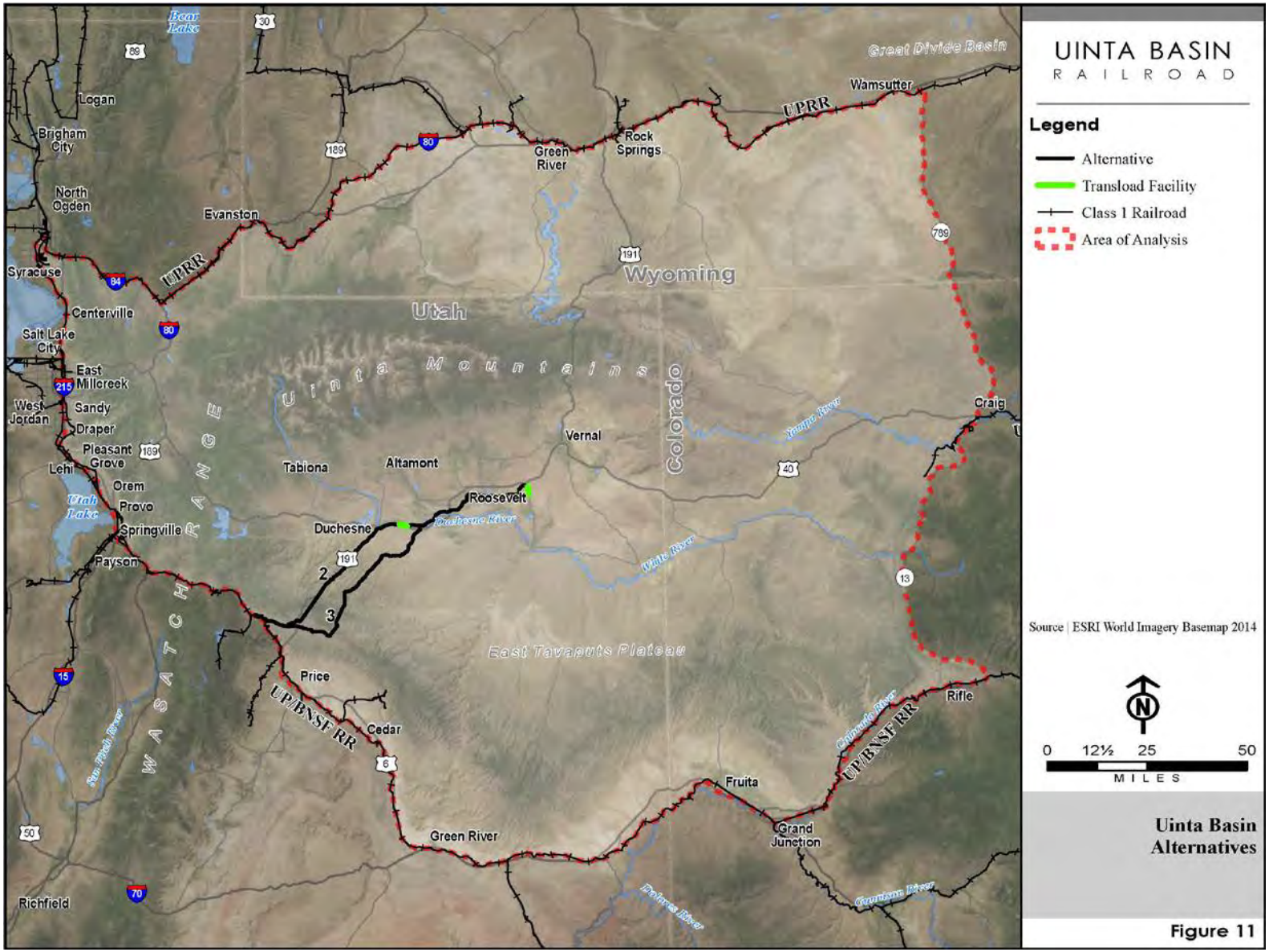
8.1.7 Results of Screening for Alternatives within the Uinta Basin

Using the screening process, **the UBRR team determined that the Middle Alternative is both feasible and practicable.** Of the three alternatives within the Uinta Basin, the Middle Alternative met the transportation connection requirements and would have the least amount of impacts to wetlands, drainages, wilderness areas, and cultural resources. The Middle Alternative will undergo additional engineering refinement to further avoid natural and human resources (see Section 10.0, Alternatives Refinement and Evaluation).

9.0 Results of Preliminary Screening

Using the screening process, the UBRR team determined that Alternatives 2 and 3 were both feasible and practicable alternatives for a rail alignment into the Uinta Basin and that each alternative would connect to the Middle Alternative inside the Uinta Basin. Figure 11 below shows the results of the screening process.

Figure 11. Uinta Basin Alternatives



10.0 Alternatives Refinement and Evaluation

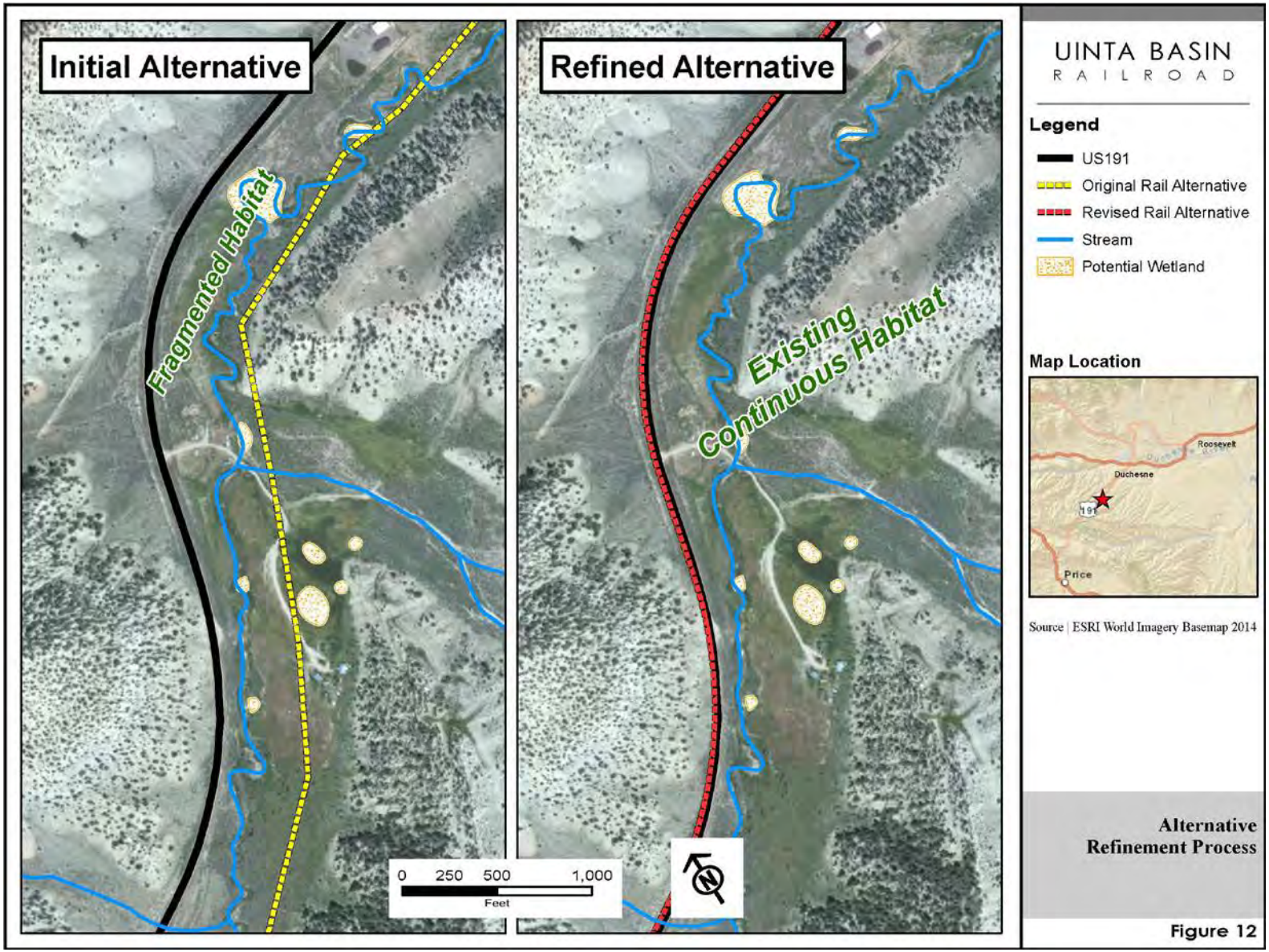
10.1 Refinement Process

The UBRR team further developed Alternatives 2 and 3 to improve their operational feasibility and avoid and minimize impacts to the natural and built environment. The evaluation process included the following steps:

- Perform more-refined engineering to ensure operational feasibility
- Determine basic locations of sidings and terminal facilities
- Refine local road access locations across the proposed rail line
- Refine alternatives to avoid and minimize impacts to the natural and built environment.

To avoid and minimize impacts to the natural and built environment, the UBRR team looked at opportunities to co-locate the proposed rail line with existing transportation facilities (highways and local roads). By locating impacts from the rail line where there were already impacts (such has habitat fragmentation, impacts to habitat for sensitive species, wetland and stream impacts, and divisions of agricultural land and other private property) from existing roads and highways, impacts from the rail line could be avoided and/or minimized where possible. Figure 12, Alternative Refinement Process, provides an example of the refinement process.

Figure 12. Alternatives-Refinement Process



10.2 Evaluation Process

10.2.1 Natural and Built Environment

Table 9 shows the results of the refinement process for Alternatives 2 and 3.

Table 9. Alternatives 2 and 3 Refinement Results – Natural and Built Environment

Screening Criterion	Alternative	
	2	3
Impacts to Natural Resources		
Acres of wetlands and other waters of the U.S. affected	3	12
Acres of sensitive wildlife habitat affected	1,110	1,324
Linear feet of drainage crossings (includes streams, canals, or ditches)	58,922	55,137
Number and acres of Agriculture Protection Areas affected	0	0
Acres of irrigated prime or unique farmland affected	17	18
Acres of wilderness areas or wilderness study areas affected (areas of critical environmental concern, recreation management area, etc.)	0	0
Impacts to the Built Environment		
Number and area of parks and trails affected	0	0
Number of community facilities affected	0	0
Number of potential property acquisitions, including residential, business, and utility acquisitions	7 [a]	6 [a]
Number of Section 4(f)/Section 6(f) uses	1 [b]	1 [b]
Number of cultural resources (for example, historic and archaeological resources) affected	26	29
Number of existing water and commodity wells/ sites affected	0	0

[a] Acquired properties would be existing or abandoned oil pads.

[b] Alternative would cross a state Wildlife Management Area. Property ownership and wildlife management status would need to be verified during the environmental process to determine the property's Section 4(f) status.

As shown in Table 9 above, Alternative 2 would have less wetland, sensitive species habitat, and cultural resources impacts than Alternative 3. Although it is not shown by the numbers in the table, the most substantial difference between Alternatives 2 and 3 is the location. Alternative 2 would be located in Indian Canyon adjacent to U.S. Highway 191 (US 191), an existing two-lane highway. By combining the rail and highway facilities in a canyon that is already affected by an existing highway and associated vehicle traffic, Alternative 2 would fragment less habitat and overall disturb less wildlife than would

Alternative 3. Alternative 3 in Sowers Canyon would be a new transportation facility in a canyon that does not have a high-traffic paved road (see Figure 13). Thus, Alternative 3 would have a greater potential to fragment wildlife habitat and disturb wildlife than would Alternative 2.

Figure 13. Photograph Comparison of Alternatives 2 and 3 in Canyons

Alternative 2 – US 191 in Indian Canyon

Alternative 3 – Sowers Canyon

10.2.2 Land Ownership

As shown in Table 10, both alternatives would cross federal, state, tribal, and private land. Alternative 2 would affect about 196 acres less land than would Alternative 3.

Table 10. Status of Land Affected by Alternatives 2 and 3

in acres

Land Status Type	Alternative 2	Alternative 3
Bureau of Land Management	702	726
U.S. Forest Service	163	138
Ute Tribe	<1 [a]	111
State of Utah	454	39
Private	1,312	1,414
Total	**2,232**	**2,428**

[a] Alternative 2 crosses Ute Tribe land in Indian Canyon; however, UDOT owns the right-of-way for U.S. 191 in Indian Canyon, and the alternative would be within the UDOT-owned right-of-way. This alternative would probably not affect land managed by the Ute Tribe.

10.3 Alternatives-Refinement and Evaluation Results

Using the four-level screening process, the UBRR team determined that Alternatives 2 and 3 were the only feasible and practicable alternatives of the original 26 alternatives evaluated. Based on the alternatives-refinement process, the UBRR team recommends that Alternative 2 be carried forward for consideration under NEPA and that Alternative 3 be eliminated from detailed consideration based on the additional impacts to the natural environment and the alternative's higher cost as shown in Table 5, Level

3 Screening Results: Natural and Built Environment. Both alternatives use similar alignments except for the portions in Indian Canyon and Sowers Canyon and provide the same operational benefits; however, Alternative 3 would have greater impacts to wetlands (9 more acres), sensitive wildlife habitat (214 acres), and cultural resources (one more site). In addition, Alternative 3 would involve developing a new transportation facility in a relatively undisturbed canyon, whereas Alternative 2 would be built in a canyon with an existing highway that already causes transportation-related impacts to the natural environment. Finally, Alternative 2 would affect about 196 acres less of federal, state, tribal, and private land.

11.0 UBRR's Proposed Alternative Alignment

For this feasibility report, the activities included completing preliminary engineering and evaluation of about 3,700 miles of new rail. The objective of the work completed to date has been to identify a set of reasonable, feasible, and practicable corridor alternatives for consideration in the EIS that will likely be prepared by STB's Office of Environmental Analysis (OEA) under NEPA.

Based on the information in this feasibility report, the UBRR team believes that Alternative 2 meets the team's objectives for this project and recommends that Alternative 2 be carried forward for detailed evaluation in the NEPA process. The UBRR team recognizes that STB may, at its discretion, decide to study the presented alignment, recommend modifications to the presented alignment, or recommend additional or different alignments for study. The UBRR team also recognizes that the technical studies to support the EIS are ongoing and that other impacts or engineering issues might be discovered along any of the proposed alignments.

12.0 References

[AASHTO] American Association of State Highway and Transportation Officials

2002 Freight Rail Bottom-Line Report.

[BLM] Bureau of Land Management

2013 Draft Environmental Impact Statement for Newfield Exploration Corporation Monument Butte Oil and Gas Development Project in Uintah and Duchesne Counties, Utah. December.

DMJM Harris

2001 Feasibility Report for the Isolated Empire Rail Project. Prepared for the Utah Department of Community and Economic Development.

Johnson, Terry

2011 Personal communication between Terry Johnson, UDOT Senior Landscape Architect, and Vince Izzo of HDR regarding wetland mitigation costs. April 7.

Thisse, Jacques-François

2009 How Transport Costs Shape the Spatial Pattern of Economic Activity. www.internationaltransportforum.org/jtrc/discussionpapers/DP200913.pdf. Accessed December 23, 2013.

Appendix A. UBBR Alternative Maps

Appendix B. Level 3 Screening Results

Appendix C. Level 4 Screening Field Review

Introduction

From February 24 to February 26, 2014, Level 4 screening (alternative feasibility field review) was conducted on the four alternatives (Alternatives 2, 3, 25, and 12) that passed Level 3 screening. The purpose of Level 4 screening was to determine, based on field observations and professional judgment, whether an alternative could be constructed.

What was the purpose of Level 4 screening?

The purpose of Level 4 screening was to determine, based on field observations, whether an alternative could be constructed.

The field review included observations of factors that influence the feasible and practicable construction, operation, and maintenance of a rail line, factors such as topography; water courses; slope stability; wetlands and other natural environment features; existing linear infrastructure such as roads, electrical transmission lines, and pipelines; community facilities; and existing buildings and land uses such as agriculture and natural resource extraction and processing.

This appendix provides the results of the field review of each alternative to determine whether the alternative was feasible and practicable. Note that the information in this appendix is based on field observations. As additional engineering, surveys, and geotechnical investigations are conducted, that new information might change the results of this field review.

Field Review Team

During the 3-day field review, the field review team consisted of four consultants and three UDOT staff. The primary evaluation of the alternatives was conducted by the consultants based on their experience in railroad engineering and construction, railroad operations, and environmental analysis. The experience of the staff is listed below.

Railroad Operations – Mark Hemphill, HDR, Inc. Mark Hemphill has 31 years of experience in the railroad industry in train operations, strategic planning, commercial and economic analysis, capacity analysis and service design, train control and communications systems, and rolling stock selection, procurement, and maintenance. He has developed the functional design and led the planning for proposed new railroads in Nevada, Oregon, Alaska, and the Middle East. During the field review, he provided input on the operations, functional feasibility, and practicality of each alternative.

Railroad Engineering and Construction – Donald McCammon, HDR, Inc. Don McCammon has 32 years of experience in railroad engineering and construction and an additional 6½ years in highway construction. His background includes site reconnaissance of potential rail alignments including observations of geotechnical, roadway interaction, railroad bridges and drainage structures, constructability and construction access, and environmental impacts such as channel shifts and wetlands crossed (including potential suggestions for realignments to reduce or avoid impacted areas). He has performed this work in the United States, Mexico, Colombia, and the Middle East. He also has an extensive background as a consultant to railroads and public agencies providing railroad-related engineering services from planning to construction management. As a former railroad employee, he has performed track and bridge construction from initial clearing and grubbing through grading to opening the new track for trains, and with this knowledge he looks at the feasibility of potential corridors for contractor access, material laydown areas, and construction methodologies.

Environmental Analysis – Vince Izzo, HDR, Inc. Vince Izzo has 23 years of experience preparing environmental analysis and NEPA reviews for transportation projects. His specialty is linear projects on new alignments, including managing over 100 miles of new freeway alignments in Utah in environments similar to the Uinta Basin. During his career, he has managed wetland delineations, cultural resource surveys, wildlife habitat reviews, and community surveys.

Geographical Information Systems – Shawn Frye, HDR, Inc. Shawn Frye has 15 years of experience in GIS analysis and environmental reviews. During the field review, Shawn assisted the team with using tablet computers, taking notes and pictures, and locating routes.

In addition to the consultant team, the following UDOT staff attended the 3-day field review:

- John Thomas, project manager
- Craig Hancock, project engineer
- Brandon Weston, environmental manager

Field Equipment

Prior to the field review, the team had developed base maps for each alternative using aerial images and digital terrain data. These initial alternatives were general. The alternatives were loaded onto tablet computers with GPS (global positioning system) locators. This technology helped the team determine their location in relationship to the alternatives and provided the following base information that the team used during their field review:

- Centerline of the alternatives
- Grades and curves of the alternatives
- Constructability, operability, and maintainability of the alternatives
- Land ownership and land uses
- Topographic maps
- Aerial maps
- Wetlands
- Existing infrastructure and utilities, such as electrical transmission lines, pipelines, oil and natural gas well pads, oil and gas production and processing facilities, and roads

In addition to the tablet computers, the field team used hard-copy maps depicting the proposed alternatives. These maps included preliminary milepost (MP) locations for each alternative. During the review, the team used the tablets to take photographs of various features of each of the reviewed alternatives. These photographs, as well as photographs taken with digital cameras, could be referenced using GPS to the location on each alternative. Field notes were also taken on the tablets and hard-copy maps. This information was used to develop this appendix.

Field Conditions

Field conditions were good during the field review, with above-normal temperatures (60 degrees Fahrenheit) and clear skies. The alternative alignments were free of snow and road conditions were generally dry at elevations up to about 8,000 feet, which enabled the team to access the lower-elevation parts of each alternative. Unimproved roads at higher elevations were still snow packed and/or muddy, making these parts of the alternatives inaccessible. As a result, the team was not able to review these parts of the alternatives. However, the areas that were accessed and the visual proximity to the inaccessible parts provided a good indication of the feasibility and practicability of the alternative for construction, operation, and maintenance.

Review of Alternatives

Alternative 2

The field team reviewed Alternative 2 on February 24, 2014. The alignment was generally followed from its origin about 10 miles east of Soldier Summit, Utah, to its termination near Duchesne, Utah, using county-maintained roads and U.S. 191.

The review began at the location where Alternative 2 would connect to the existing UP main track between Denver, Colorado, and Salt Lake City, Utah, adjacent to U.S. 6 east of Soldier Summit, Utah. This location is about MP 642 on UP's Provo Subdivision; the nearest railroad timetable station is Kyune, Utah. The UP line between Helper, Utah, and Provo, Utah, consists of two main tracks that use centralized traffic control as their method of operation; trains operate in either direction on each track as determined by the train dispatcher. BNSF has trackage rights on this main track between Denver Colorado, and Salt Lake City, Utah.

At this location, the UP main tracks ascend westward on an approximately 0.5% grade and use a series of mostly 6-degree reverse curves to follow the Price River in a narrow valley. The field team observed that the UP main tracks would likely need to be realigned at the location where they connect to the UBRR in order to introduce tangents into the main tracks for the turnouts required for the connection. The general location of the proposed connection is shown in Photo C-1.

The initial general alignment cut across several steep slopes directly above the Price River and the UP main tracks. The team determined that the alignment would be improved by modifying it from what was shown on the initial general alignment. This modification would shift the alignment about 0.5 mile farther east after it leaves the UP connection. The alignment would then remain on a bench above the Price River canyon until it enters the Emma Park area at about MP 3.0 of the alignment.

Photo C-1. UP Connection Point, MP 0.0 of Alternative 2, near Kyune, Utah. *UP main track in foreground. Red line illustrates approximate location of UBRR.*

The team generally followed Alternative 2 using Kyune Pass and Emma Park Road to the road's junction with U.S. 191, then followed U.S. 191 to a point near the proposed railroad-west (geographic south) portal of an 8.6-mile-long tunnel that would route the UBRR under the main ridge separating the Price River and Green River drainages. At this point, U.S. 191 climbs over the main ridge. The team rejoined Alternative 2 near the proposed railroad-east (geographic north) portal of the tunnel near the headwaters of Indian Creek. This location would be about MP 22 of Alternative 2. Photo C-2 illustrates this location.

Photo C-2. Approximate Location of Railroad-East (Geographic-North) Tunnel Portal, MP 22 of Alternative 2.

From the railroad-east tunnel portal of Alternative 2, the alignment descends in Indian Creek Canyon to a location about 2 miles south of Duchesne, Utah. At this point, the alignment turns eastward, departs the canyon, and ends at the location of a proposed railroad terminal facility. The canyon is also occupied by U.S. 191.

Numerous gas and oil production well pads are located in the canyon. Oil and natural gas liquids appear to be collected from these production well pads by truck. Photo C-3 illustrates one of the well pads and the trucks being used to service the well.

Some areas of the canyon floor are used as pastureland and for growing hay. Several residences and cattle corrals are located in conjunction with the pastureland and hay-growing areas.

Photo C-3. Typical Oil Well Pad near MP 32 of Alternative 2. *Red line indicates approximate location of Alternative 2.*

Photos C-3 through C-6 show general conditions in Indian Creek Canyon along Alternative 2. Grades, curvature, and topography appeared to be acceptable along Alternative 2 with generally enough space to place the rail line to avoid undercutting steep slopes. Such undercutting could result in future landslides. Based on the team's observations, neither U.S. 191 nor oil and gas production facilities and pipelines would need to be extensively relocated. Note that, with Alternative 2, additional engineering will need to be conducted to verify that U.S. 191, utilities, oil well production facilities and associated pipelines, and steep slopes can be avoided.

Given the narrow nature of parts of the canyon, the stream channel would likely need to be shifted or the channel relocated, and some impacts to wetlands are likely to occur in order to avoid undercutting canyon walls, avoid passing through oil well production facilities, and limit impacts on agricultural and grazing land and residences.

The team observed that U.S. 191 would provide access for construction equipment during the construction of the rail line. Construction will need to consider sight distances for construction access roads from U.S. 191 due to the curvature and grade of the highway. The team does not know at this time whether additional access would be needed for tunnel construction headings and vertical ventilation shafts along the proposed tunnel alignment.

Based on field observations, the team determined that Alternative 2 is feasible and practicable to construct, operate, and maintain, provided that (1) gradients not greater than 2.4% can be achieved, (2) the rail line can be located a sufficient distance from the canyon walls in Indian Creek Canyon to avoid the potential for rockslides and landslides, and (3) the proposed 8.6-mile-long tunnel is also feasible and practicable to construct.

Photo C-4. Looking North (Railroad-East) in Indian Creek Canyon near MP 21 of Alternative 2.

Photo C-5. Looking North (Railroad-East) in Indian Creek Canyon near MP 36 of Alternative 2.

Photo C-6. Looking South (Railroad-West) in Indian Creek Canyon near MP 24 of Alternative 2.

Alternative 3

The field team reviewed Alternative 3 on February 24 and 25, 2014. The alignment was generally followed from its origin about 10 miles east of Soldier Summit, Utah, to its termination near Duchesne, Utah, using county-maintained roads and U.S. 191.

Alternative 3 uses the same connection point to the UP main track as Alternative 2 and shares a common alignment with Alternative 2 until the vicinity of the location where Alternative 2 crosses U.S. 191. The observations and comments in the Alternative 2 section apply to Alternative 3 from the connection point with the UP main track to the U.S. 191 crossing.

Alternative 3 was reviewed starting on February 24 at its connection to the existing UP main track adjacent to U.S. 6 east of Soldier Summit, Utah, and continuing to the approximate location of the south portal of the first of one or more tunnels that would route Alternative 3 under the main ridge dividing the Price River and Green River drainages (see Photo C-7).

Photo C-7. Alignment and Railroad-West (Geographic-South) Portal of Tunnel 1 near MP 21.5 of Alternative 3.

On February 25, the review continued from a starting point about 4 miles south of County Road 12000 West/Sowers Canyon Road and its intersection with U.S. 40 and continuing south along the alignment in Sowers Canyon and onto U.S. Forest Service (USFS) Road 152 beyond the Ashley National Forest boundary to the approximate location of the north tunnel portal of the tunnel(s) that would pass under the main ridge near MP 33 of Alternative 3. Sowers Canyon Road would provide access for construction equipment during the construction of the rail line. The road is currently used by heavy trucks that serve the oil and gas industry in the canyon.

Photo C-8 shows the approximate location of the proposed railroad-east (geographic-north) tunnel portal area in a side canyon of Sowers Canyon. The team identified several additional potential locations for the railroad-east tunnel portal near the headwaters of Sowers Canyon.

Photo C-8. Alignment and Railroad-East (Geographic-North) Portal of Tunnel 3 near MP 33 of Alternative 3.

Photos C-9 and C-10 show the general conditions along Alternative 3. Grades, curvature, and topography appeared to be acceptable along Alternative 3, with sufficient space to place the rail line to avoid undercutting steep slopes. Such undercutting could result in future rockslides or landslides onto the rail alignment. Overall, Sowers Canyon has a broad and open floor that would allow the alignment to be located to avoid some of the wetlands, streams, and oil and gas production infrastructure in the canyon. An overhead electric transmission line would likely need to be relocated.

Given the meandering nature of the stream channel, which was dry during the team's visit, segments of the stream channel would need to be shifted and potentially relocated to fit the rail line within the valley bottom lands. Wetlands were also observed along the route. These wetlands might be impacted by the rail line, although avoidance might be possible in certain locations by slightly shifting the alignment from its initial general location. There would likely be some impacts on land currently used for farming and grazing.

Based on field observations, the team determined that Alternative 3 is feasible and practicable to construct, operate, and maintain, provided that (1) gradients not greater than 2.4% can be achieved, (2) the rail line can be located a sufficient distance from the canyon walls in Sowers Canyon to avoid the potential for rockslides and landslides, and (3) the proposed 9.1-mile-long tunnel(s) is (are) also feasible and practicable to construct.

Photo C-9. Sowers Canyon, MP 36±, looking Geographic-North (Railroad-East). *Photo shows general characteristics of canyon floor and side walls of canyon.*

Photo C-10. Sowers Canyon, MP36±, looking Geographic-South (Railroad-West) toward Upper Canyon near Headwaters. *Photo shows general characteristics of canyon floor, incised stream channel, and side walls of canyon.*

Alternative 25

The field team reviewed Alternative 25 on February 25, 2014. The alignment was followed generally, and only in the Willow Creek drainage, starting about 9.25 miles south of Ouray, Utah, where the alignment would leave the proposed eastern terminal of the rail line and ending at the junction of Uintah County roads 5120 (Willow Creek) and Buck Gulch. The existing road in the canyon could provide appropriate access for construction equipment during construction, since parts of the road are maintained by the County and are used by heavy trucks that serve the oil and gas industry in the area.

Photos C-11 and C-12 show the general conditions along Alternative 25 in Willow Creek Canyon. The grades and topography in the lower part of the canyon (MP 63 to 87) appeared acceptable, with enough space to place the rail line to avoid undercutting most steep slopes. Such undercutting could result in landslides or falling rocks.

Similar to the streams in Indian Creek Canyon (Alternative 2) and Sowers Canyon (Alternative 3), some segments of the stream channel in Willow Creek Canyon would need to be shifted and relocated. However, the stream in Willow Creek Canyon is much more deeply incised, meanders from side to side of the canyon to a greater extent, and appears to carry a much larger volume of water. Flowing water was observed at the locations where the county road crossed or was adjacent to the stream.

Photo C-11. Willow Creek Canyon, MP 79±, looking Geographic-South (Railroad-West) in Lower Canyon.
Photo shows general characteristics of deeply incised stream channel meandering from side to side of canyon.

Photo C-12. Willow Creek Canyon, MP 61, looking Geographic-South (Railroad-West) in the Vicinity of Buck Gulch. *Photo shows constriction of canyon at this point.*

As the team passed Buck Gulch, MP 62±, the canyon became narrow, with numerous tight meanders making it difficult to avoid the stream and the canyon walls. This constriction is illustrated in Photo C-12. Constructing a rail alignment south of Buck Canyon's confluence with Willow Creek Canyon would require cutting through this section of Willow Creek Canyon's steep walls between meanders, thereby causing many shifts in the stream channel and requiring a succession of deep cuts, stream crossings, and tunnels. Even with the incorporation of these engineering features, the rail alignment would have a large number of high-degree curves, which are not desirable from the standpoints of operating and future maintenance costs.

Additionally, the narrow canyon and channel south of Buck Gulch appear to be prone to floods that fill the canyon bottom with water and cause the channel to shift, making sustainable operation and maintenance of a rail line difficult. Wetlands were also observed along the alignment. These wetlands might be affected, although avoidance might be possible in certain locations. Willow Creek Canyon also has natural gas pipelines, oil and gas production facilities, and land used for farming and grazing that would likely be impacted.

After the field review, the team obtained digital terrain maps and applied them to the general alignment used in the field review. The team determined that the ruling grade for Alternative 25 would be 2.8%, which exceeds the 2.4% maximum grade screening criterion for operation of the rail line. Accordingly, Alternative 25 was eliminated from further consideration.

Alternative 12

The field team reviewed Alternative 12 on February 26, 2014. The alternative was generally followed from its origin at Mack, Colorado, to the former site of Atchee, Colorado, at the base of Baxter Pass using Mesa County Road 4 from Mack to the Garfield County border, and from there on Garfield County Road 201 to Atchee. This alternative crosses the Grand Valley from Mack to the base of the Book Cliffs about 10 miles north of Mack, then uses West Salt Creek Canyon to the point where the canyon begins to rise steeply above Atchee. From Atchee, Alternative 12 would climb the canyon walls using shelf construction, tunnels through ridges, and viaducts over ravines. The alternative would climb from an elevation of 6,400 feet at Atchee to an elevation of 8,400 feet at Baxter Pass, where Alternative 12 would cross the main ridge separating the Colorado River and Green River drainages. At Atchee, the road was too muddy for the team to further review Alternative 12.

The review began at the location where Alternative 12 would connect to the existing UP main track between Denver, Colorado, and Salt Lake City, Utah, near Mack. This location is about MP 469.5 on UP's Green River Subdivision and is between the east and west control points of the Mack siding. The UP main track between Grand Junction, Colorado, and Helper, Utah, consists of one main track with controlled sidings at approximately 8-mile-long intervals and uses centralized traffic control as its method of operation. BNSF has trackage rights on this main track between Denver and Salt Lake City.

At this location, the UP main track descends westward on an approximately 0.8% grade. The main track curves to the south through 44 degrees on a 1-degree, 52-foot curve at this location; a connection wye would need to straddle to the east and west of this curve. Photo C-13 shows the location of the proposed connection to the UP line.

Photo C-13. UP Connection Point, MP 0.0 of Alternative 2 at Mack, Colorado. *UP main track is in background. Looking railroad-west toward the entrance to Ruby Canyon and the Colorado River.*

The existing road between Mack and Atchee could provide access during construction. The road is maintained by the Counties and is used by heavy trucks that serve the oil and gas industry in the area.

Alternative 12 crosses open, rolling desert between Mack and the entrance to Salt Creek Canyon. The alignment generally follows the former roadbed of the Uintah Railway, a narrow-gauge (3 feet between the rails) railroad abandoned in 1939. This alignment would likely have some impacts on agricultural land uses and potentially impacts on residences nearby. Numerous natural gas and natural gas liquids pipelines follow and cross the alignment between Mack and Atchee. Some segments of these lines would likely need to be relocated.

Photo C-14 illustrates general conditions along Alternative 12 in West Salt Creek Canyon. From the entrance of the canyon, the grades and topography appeared to be acceptable along Alternative 12, with sufficient space in the lower part of the canyon to place the rail line to avoid most steep slopes that could result in landslides. Similar to Alternatives 2, 3, and 25, the stream in the canyon would need to be shifted in some locations and relocated, and wetlands would be impacted. Elk were also seen in the canyon.

Photo C-14. West Salt Creek Canyon, MP 23±, looking Geographic-North (Railroad-West). *Photo shows steep canyon side walls.*

For the first 28 miles of Alternative 12 from Mack, MP 0, to Atchee, MP 28, the grades and curvature would be moderate. At Atchee, Alternative 12 would need to climb out of the canyon to a summit tunnel near Baxter Pass. The old Uintah Railway used a narrow gage, a 7.5% ruling grade, and 66-degree curves to surmount Baxter Pass. To maintain the maximum acceptable ruling grade of 2.4% and the maximum curvature of 10 degrees, this segment of Alternative 12 would use a series of loops that would enable the

alignment to switch back and would follow the side canyon to reach the railroad-east (geographic-south) portal of the summit tunnel. A single, long tunnel from the vicinity of Atchee to a point north of Baxter Pass would not be feasible or practicable, since the tunnel would be more than 20 miles long. Photos C-15 and C-16 illustrate the general geologic and topographic characteristics of this area.

The canyon walls generally consist of interspersed shale and sandstone layers that are at their angle of repose, with large blocks of broken sandstone perched on the shale slopes. The sandstone formations are fractured and weathered and are highly susceptible to block failure. The shale layers are loose and unconsolidated and have a high potential for landslides. Construction would require benching into the canyon walls with breakout upward to the ridge lines and with very large amounts of spoil cast downward. There would be an extremely high risk of continual landslides which would have a high potential for carrying away large portions of the rail line, causing lengthy disruption to train service and greatly increasing maintenance costs. In addition, to operate the rail line on the long, ascending grade from Atchee to the summit tunnel, at least one siding for trains to meet and pass would be required mid-climb, and another would be required at the summit tunnel.

Photo C-15. Baxter Pass above Atchee, Colorado, MP 28.5±, Looking Geographic West. *The alignment of the old Uintah Railway is visible crossing the face of the ridge, ascending from right to left using a 7.5% grade. Note the large landslide area crossing the Uintah Railway grade that has broken out to the ridge line near the middle of the photograph. The hummocky area below the old Uintah Railway grade appears to be a sizeable landslide.*

Photo C-16. Cliff Faces above Atchee, MP 29.5±. *Alternative 12 would cross this cliff face about mid-height (red line). Note weathered sandstone outcroppings and interspersed shale layers.*

The steep slopes and sheer sandstone formations would make construction of the widened bench needed for a siding extremely difficult without extreme cuts, large double-track viaducts, and massive rock and soil stabilization efforts. These geological features are not feasible or practicable for construction, maintenance, and operation of a rail line. Based on field observations, the team concluded that Alternative 12 would not be feasible or practicable to construct and operate.

Common Segment Review

The Common Segment is proposed to run in a generally east-west direction from endpoints near Ouray, Utah, and Duchesne, Utah. A freight terminal would be located at both ends of the Common Segment. The terminals would be the transfer points for freight between the UBRR and trucks, industries, and storage facilities. Portions of the Common Segment between Duchesne and Ouray were field reviewed on February 24 and 25, 2014.

The west end terminus and proposed yard location is about 3 miles southeast of Duchesne and at the north end of Alternatives 2 and 3. It appears to be located in a feasible and constructible location and has good access to U.S. 40 and the commercial and industrial activity centered on Duchesne. About 30 feet of earth would be cut on the south side of the terminal area and 30 feet of earth fill on the north side of the terminal area. As the Common Segment leaves the terminal area and heads east, it crosses the valley of Sowers Canyon on an approximately 50-foot-high embankment. Additional work is needed to identify a roadway alignment to provide access to this terminal area that is feasible and practical for freight shippers and receivers.

The east end terminus is about 10 miles southeast of Ouray in an area of relatively rough terrain with numerous oil and gas wells within the terminal footprint. This location is distant from the industrial and commercial activity centered at Roosevelt and Vernal. Other than well drilling and production, there is no

industrial and commercial activity in the vicinity of the east end terminus. The field team observed that a more feasible and practical location for this terminus, one with flatter terrain and fewer oil and gas wells, would be about 5 miles directly north.

Although Utah State Route 88 provides direct access to both the originally proposed east end terminal location and the location farther north, the team noted that the east end terminus location is 25 miles from U.S. 40 and so might not be the best location for potential shippers. A location closer to Roosevelt and Vernal might be preferable. The UBRR team will be obtaining additional user and shipper information in order to determine the appropriate location for an east end terminus to serve the Uinta Basin.

Photo C-17. Common Segment MP 1.0 Crossing Sowers Road. *View is looking south on Sowers Canyon Road. Red shaded area shows approximate height of railroad embankment.*

Summary

Alternatives 2 and 3 appear to be reasonable and practicable based on the field review. Alternative 12 appears to be not reasonable and not practicable between Atchee and Baxter Pass based on the field review. The segment of Alternative 25 north of Buck Canyon that was reviewed in the field was reasonable and practicable, but the segment south of Buck Canyon does not appear to be reasonable and practical. Further, the maximum ruling grades on Alternative 25 would be in excess of 2.4%, so this alternative is not feasible on that basis.

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Appendix D. Environmental Screening Data Sources

Utah Planning and Environmental Linkages (uPEL) data was used for the Utah portions of the Uinta Basin study area. For Colorado, an area not covered by uPEL data, and for some environmental topics not covered in uPEL (i.e., potential property acquisitions) new geographic Information Systems (GIS) data was identified and compiled, and created for the study area.

All data downloaded or created for the screening analysis were formatted by BIO-WEST, Inc. Data required manipulation to obtain coverage study-wide and to describe the features identified for analysis. The datasets were reprojected to UTM NAD83 Zone 12N, clipped to the study boundary, merged with related datasets to obtain full coverage, and attributes were added to describe the data in more detail when necessary and to identify sources. Spatially redundant features were removed when data were merged to avoid the double counting of features.

Once the data was formatted an overlay analysis was performed that calculated the acreage of features intersected by the buffered alignments. Buffered alignment data provided to BIO-WEST were used for the analysis. The acreage and characteristics of the features intersected was then entered into the Screening Matrix, and uPEL reports were created for the Utah alignments. The following tables detail some information about each dataset used in the screening analysis, including uPEL data. Please see the uPEL user guide for more detailed information on uPEL data.

Topic	Data Sources						
	Source	Data Name	Contact Information	State	Link	Download Date	Publication Date
Archeological / Cultural Resources	Colorado Office of Archeology and Historic Preservation	Spreadsheet of site intersections	oahp@state.co.us	CO	N/A	1/29/1014	1/29/2013
	Utah Division of State History	Archeological and cultural sites	Arie Leeflang, (801) 245-7245	UT	N/A	12/3/2013	12/3/2013
Digitizing Notes:	*For Colorado, BIO-WEST sent the buffered alignments to the Office of Archaeology and Historic Preservation, and the Office returned a spreadsheet detailing the number of site intersections by alignment and the eligibility status of those sites.*						
Community Facilities	U.S. Geological Survey, United States Board on Geographic Names	Geographic Names Information System (GNIS) query	gnis_manager@usgs.gov	CO, UT	Source	1/22/2014	8/13/2013
Digitizing Notes:	*The point locations for community facilities were digitized, merged, and buffered by 100 meters. School locations were buffered by 500 meters. The following facility types were included: airports, ambulance services, cemeteries, churches, city/county buildings, fire departments, hospitals, museums, police stations, post offices, schools, trailheads, and other features of local importance.*						
Drainages / Streams / Rivers	U.S. Geological Survey	National Hydrography Dataset	ask@usgs.gov	CO, UT	Source	12/5/2013	UT 12/23/2013 CO 8/29/2013
Digitizing Notes:	*Intersections are broken down by feature type: artificial path, canal, stream, river, etc. Artificial Paths refer to rivers and streams that are too wide or unconstrained to determine a true center line, i.e., where rivers travel through reservoirs or other wide corridors.*						
Floodplains	Federal Emergency Management Agency	Special Flood Hazard Areas – High Risk	N/A	Limited	N/A	1/14/2014	6/13/2012
Digitizing Notes:	*Limited extent of data in study area.*						
Lakes / Waterbodies	U.S. Geological Survey	National Hydrography Dataset	ask@usgs.gov	CO, UT	Source	12/5/2013	UT 12/23/2013 CO 8/29/2013
Digitizing Notes:	*Intersections are broken down by feature type.*						
Landownership	Bureau of Land Management (BLM)	Statewide Landownership	N/A	CO	Source	12/9/2013	1/16/2013
	Bureau of Land Management, State of Utah School and Institutional Trust Lands Administration (SITLA)	Landownership	TLA-GIS@utah.gov, http://trustlands.utah.gov	UT	Source	9/16/2011	9/16/2011
Digitizing Notes:	*SITLA and BLM data were used to define landownership for the study area.*						

Topic	Data Sources						
	Source	Data Name	Contact Information	State	Link	Download Date	Publication Date
Parks / Recreation Areas (Section 4(f) and 6(f) properties)	Colorado Parks and Wildlife	Public Access Properties	N/A	CO	Source	1/14/2014	10/29/2013
	Garfield County CO	Park and Recreation Areas	N/A	CO	Source	1/14/2014	4/14/2008
	Mesa County CO	Parks	N/A	CO	Source	1/14/2014	1/14/2014
	Mesa County CO	Parcels (extraction of recreation properties)	N/A	CO	Source	1/14/2014	1/14/2014
	Federal Highway Administration	Section 4(f) Overview	N/A	U.S.	Source	1/14/2014	1/14/2014
	National Parks Service – Land and Water Conservation Fund	Land and Water Conservation Fund (LWCF)	N/A	U.S.	Source	1/21/2014	1/21/2014
	Automated Geographic Reference Center	Local Parks	N/A	UT	Source	9/16/2011	9/16/2011
	BLM, SITLA, Duchesne County	State and National Parks (Landownership data)	N/A	CO, UT	N/A	2011–2013	N/A
Digitizing Notes:	*Data used to depict parks in the Colorado portion of the Uinta Basin study area are a compilation of four data sources. Duplicate park locations were identified by name, visually confirmed, and manually removed. Section 4(f) and Section 6(f) determinations were made based on property type and LWCF funding.*						
Population Characteristics	U.S. Census Bureau	American Community Survey (2007–2011)	N/A	CO, UT	Source	1/22/2014	1/22/2014
Digitizing Notes:	*Full block groups intersected by the study area were extracted from the original data. The area in square miles and the density per square mile for each block group were calculated by BIO-WEST.*						
Potential Property Acquisitions	BIO-WEST	Property Points; Homes/Structures, Oil Pads/wells, Power Transmission Structures	N/A	CO, UT	N/A	Ongoing	Ongoing
Digitizing Notes:	*Buildings, homes, farm structures, oil well pads, and major power line structures were identified along all potential routes using 1-foot aerial photographs from the ESRI World Imagery Service. Images in the service were taken in 2010 and 2011. The dates of images vary by location. All features observed within 150 meters of the routes were digitized within the GIS software using points. Features were then buffered with a 100-meter buffer. Overlay analysis was performed manually using the select by location tool. Results were tabulated in the screening matrix.*						

Topic	Data Sources						
	Source	Data Name	Contact Information	State	Link	Download Date	Publication Date
Prime Farmland	Natural Resources Conservation Service	gSSURGO	N/A	CO, UT	Source	1/15/2014	UT 11/12/2012 CO 11/20/2012
	U.S. Department of Agriculture	National Land Cover Dataset (NLCD)	N/A	CO	Source	1/15/2014	2001
	Utah Division of Water Resources	Water Related Land Use	Eric Edgley (801) 538-7274	UT	Source	1/15/2014	1/7/2014
	Uintah County	Agriculture Protection Areas	Community Development (435) 781-5336	UT	N/A	1/15/2014	1/15/2014
Digitizing Notes:	*Prime and important farmland soil types were extracted from the SSURGO datasets for Colorado and Utah and were clipped to the study area. The Colorado soils were then constrained to the agricultural areas identified in the NLCD. The Utah soils were constrained to the agricultural areas identified in the Water Related Land Use data. A dataset of prime and important farmland soils types in the areas of existing agriculture was produced. Agriculture Protection Areas do not exist in Colorado within the study area boundary or in Duchesne County, Utah.*						
Water Wells / Source Protection	Colorado Division of Water Resources	Well locations	Office of the State Engineer	CO	Source	1/14/2014	1/14/2014
	Utah Division of Drinking Water	Source Protection Zones	N/A	UT	N/A	2010	2010
	Utah Division of Water Rights	Well data extraction	Mark Jensen and Rich Emerson, Department of Environmental Quality	UT	Source	1/30/2014	1/30/2014
Digitizing Notes:	*Data were clipped to the study area boundary and merged.*						
Wetlands	U.S. Fish and Wildlife Service	National Wetlands Inventory Data (existing digital data)	N/A	CO	Source	1/22/2014	Sept. 2012
	U.S. Fish and Wildlife Service	National Wetlands Inventory Data (existing digital data)	N/A	UT	N/A	9/21/2011	10/1/2010
	U.S. Fish and Wildlife Service (via AGRC)	Manually Digitized NWI Scanned data	N/A	UT	N/A	9/21/2011	4/29/2009
	BIO-WEST	Wetlands	BIO-WEST	CO, UT	N/A	Ongoing	Ongoing
Digitizing Notes:	*The two National Wetlands Inventory (NWI) Datasets were clipped and merged for the study area. Where data coverage was absent along the 50 feet of right-of-way for the eight designated alignments (dated January 21, 2014), BIO-WEST manually digitized the wetlands from NWI scanned maps at a scale of 1:5,000. Scanned map data were accessed through the NWI ArcGIS map service. Wetland class attributes were also added based on notes in the scanned maps.*						

Topic	Data Sources						
	Source	Data Name	Contact Information	State	Link	Download Date	Publication Date
Wilderness Areas	Bureau of Land Management	Wilderness Study Areas	N/A	CO, UT	ArcGIS Online Service	1/29/2014	May 2012
	Bureau of Land Management	Area of Critical Environmental Concern	N/A	CO, UT	ArcGIS Online Service	1/29/2014	May 2012
	Utah AGRC, BLM, U.S. Forest Service and SITLA	Wilderness Areas	N/A	UT	Source	1/29/2014	2000
Digitizing Notes:	*Data were clipped to the study area boundary and merged.*						
Wildlife Habitat (ESA Species)	Colorado Division of Wildlife (via the Colorado Oil and Gas Conservation Commission)	Wildlife Habitat Data	N/A	CO	Source	11/25/2013	10/24/2013
	Colorado Parks and Wildlife	Species Activity Mapping (SAM) Data	N/A	CO	Source	1/14/2014	10/24/2013
	Southwest Regional Gap	Animal Habitat Model Data	N/A	CO, UT	Source	1/24/2014	2007
	U.S. Fish and Wildlife Service	Critical Habitat Data	N/A	CO, UT	Source	1/14/2014	3/27/2012
	Utah Division of Wildlife Resources	Wildlife Habitat Data	N/A	UT	Source	1/24/2014	7/1/2006
	Colorado Parks and Wildlife	Colorado Endangered Species List		CO	Source	1/24/2014	1/24/2014
	U.S. Fish and Wildlife Service	County Species List Search Page	N/A	CO, UT	Source	1/24/2014	1/24/2014
	Utah Division of Wildlife Resources	Utah Sensitive Species List by County	N/A	UT	Source	1/24/2014	3/29/2011
Digitizing Notes:	*Habitat data were compiled for Endangered Species Act (ESA) wildlife species for the study area. Redundant habitat locations for individual species were removed when multiple data sources were compiled. Data could not be found for the June sucker and least chub; however, the fish species do not appear to reside in the study area, please see distribution map links. Colorado habitat data include the following species: Mexican spotted owl, greater sage grouse, Gunnison sage grouse, western yellow-billed cuckoo, bonytail, razorback sucker, humpback chub, Colorado pikeminnow, greenback cutthroat trout, black-footed ferret, lynx, wolverine, river otter, and kit fox. Utah habitat data include the following species: Mexican spotted owl, greater sage grouse, western yellow-billed cuckoo, bonytail, razorback sucker, humpback chub, Colorado pikeminnow, black-footed ferret, and lynx.*						

Topic	Data Sources						
	Source	Data Name	Contact Information	State	Link	Download Date	Publication Date
Wildlife Species Occurrence (ESA Species)	Utah Natural Heritage Program	Species Occurrence Data	N/A	UT	N/A	12/23/2013	12/23/2013
	Utah Division of Wildlife	Threatened and Endangered Species by Quad	N/A	UT	Source	1/24/2014	5/10/2013
	Colorado Natural Heritage Program	Species Occurrence Data	N/A	CO	Pending	Pending	Pending
Digitizing Notes:	*Colorado Data request pending budget approval and data-sharing agreement.*						
Wildlife Refuges (Section 4(f) Property Type)	U.S. Fish and Wildlife Service	Wildlife Refuges	N/A	UT, CO	Source	12/11/2013	
Digitizing Notes:	*Data were clipped to the study area boundary.*						

1