Alternatives-Development and Screening Methodology Report

Uinta Basin Rail

Utah Department of Transportation
UDOT Project Number S-R399(169)

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1.0 Introduction

The purpose of this report is to describe the proposed alternatives-development and screening process that will be used for the Uinta Basin Railroad (UBRR) feasibility process. The process consisted of the following five basic phases:

1. Developing preliminary project railroad alternatives
2. Applying first-level (Level 1 – Purpose and Need) screening criteria, identifying alternatives that will move to the next level, and refining alternatives that pass the first-level screening
3. Applying second-level (Level 2 – Construction and Operation Feasibility) screening criteria based on initial desk-top review of constructability and rail operations feasibility to identify alternatives that pass level 2 screening and will be analyzed in level 3 screening (– Natural and Built Environment)
4. Applying third-level (Level 3 – Natural and Built Environment) screening criteria based on impacts to the natural and human environment to identify alternatives that would under go a final field verification constructability review.
5. Applying a field review (Level 4 -Alternative Feasibility) of the potential constructability of the alternatives to determine which alternatives are feasible and practicable and would be evaluated in detail in the EIS

The alternatives-development and screening process described in this report will provide critical information about how well an alternative satisfies the project's purpose and whether it is reasonable and feasible. The criteria used in the screening analyses will be used to generate measures that will let the lead agencies systematically and objectively identify reasonable alternatives and screen out unreasonable alternatives. The entire process will take place over several months.

2.0 Reasons Why Alternatives Might Be Eliminated

2.1 CEQ Regulations and Guidance

According to National Environmental Policy Act (NEPA) regulations and the Council of Environmental Quality (CEQ), 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 (Level 1 Screening).
2. The alternative is determined to be not practical or feasible from a technical and/or economic standpoint (Level 2 and 4 screening) .
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 (Level 3 screening).

2.2 Clean Water Act Requirements

Because the area of analysis for the project supports federally regulated wetlands, the project team will also consider the *Clean Water Act Section 404(b)(1) Guidelines for Specification of Disposal*

What is the area of analysis for the UBRR project?

The area of analysis is described in Section 4.1.1, Area of Analysis.

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 project 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:

4. 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;
5. 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.
6. 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.

2.3 Section 4(f)/Section 6(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).

Section 4(f) and Section 6(f) prohibit 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.

3.0 Overview of the Alternatives-Development and Screening Process

3.1 Alternatives-Development Phase

The alternatives-development phase consists of identifying preliminary alternatives (consisting of railroad corridors) that potentially meet the purpose of the project (see Section 3.2.1, Purpose of the Project, and Section 3.2.2, Need for the Project). In general, each alternative must provide economically useful railroad freight transportation service between the locations in the Uinta Basin that generate and receive substantial freight volumes and the national railroad network of the United States. Based on these requirements, the project team will develop several potential corridors. After the preliminary list of corridors is developed, the corridors will be put through the screening phases.

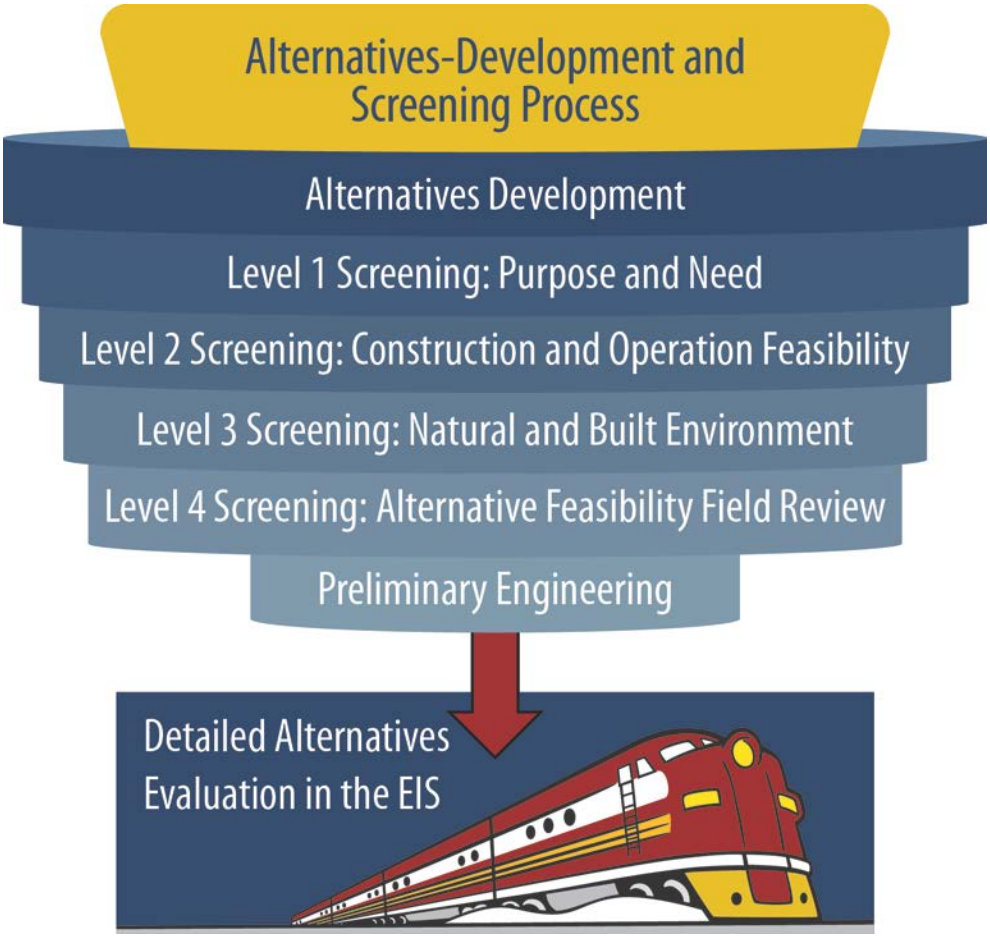
3.2 Alternatives-Screening Phases

The screening process tests each alternative using criteria that identify whether each alternative reasonably meets the project's purpose and is acceptable from technical, environmental, and logistical, and cost perspectives.

The four phases of alternatives screening will be supported by technical analyses to help the project team refine alternatives and identify those options that meet the purpose of the project. This report explains how the process will occur and the criteria that will be applied. The results of the screening process will be fully documented in a report.

Beginning in Section 4.0 below, this report describes the information that will be developed in the alternatives-development and screening phases. Figure 1 below presents an overview of the alternatives-development and screening process. As shown in Figure 1, the project's purpose and need are the foundation of the alternatives-development and screening process.

Figure 1. Alternatives-Development and Screening Process



3.2.1 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 railroad system with direct access to the two western United States Class 1 railroads (BNSF and UP).

What are Class I and Class III railroads?

A Class I railroad is a railroad with annual operating revenues of $433.2 million or more. A Class III railroad, or a short line railroad, is a rail company with an annual operating revenue of less than $34.7 million.

3.2.2 Need for the Project

The Uinta Basin is a geographical area in east-central Utah that includes the communities of Vernal, Duchesne, Roosevelt, Altamont, Jensen, Naple, Ballard, Myton, 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 commodities benefit from being transported in large bulk shipments to market by rail, which provides more 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 rail service except with a lengthy intermediate truck or pipeline haulage between the basin and the national railroad 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 railroad network. In general, as transportation costs increase, economic competitiveness decreases, economic potential is reduced, and economic activity decreases. Freight rail service provides producers with cost-effective transportation, especially for heavy and bulky commodities.

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 a commodity 4.3 times farther by rail than by truck for the same cost.

What is a ton-mile?

A ton-mile a common transportation measure that equals 1 ton of freight moved 1 mile, 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 railroad 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.

3.3 Agency and Public Involvement

Before initiating the NEPA process for the UBRR EIS, the project team will use this screening report to determine potential railroad alignments that would connect the Uinta Basin to the national railroad network. The alternatives developed during the screening phase will be provided to the public for review and comment during the EIS scoping phase. As appropriate, the team will evaluate new alternatives suggested during the EIS process along with any suggested revisions to the screening criteria.

3.4 Tools Used

Geographic information system (GIS)–based information will be used during the screening analyses to help the project team understand the locations and extents of a number of resources. Some GIS data are managed by the State of Utah, Cities, or Counties and are readily available to the team.The data that will be checked regularly include layers that show streets, parcels, land ownership, parks, and land-use designations. The team will also use other layers available from the State that provide information such as the locations of rivers, streams, and water bodies; jurisdictional boundaries (such as city and county boundaries); wildlife habitats; and geology.

What is GIS software?

GIS software analyzes geographical data. A GIS file usually contains different sets of data, or layers, that can be overlaid onto a map.

4.0 Alternatives-Development and Screening Process

4.1 Alternatives Development

4.1.1 Area of Analysis

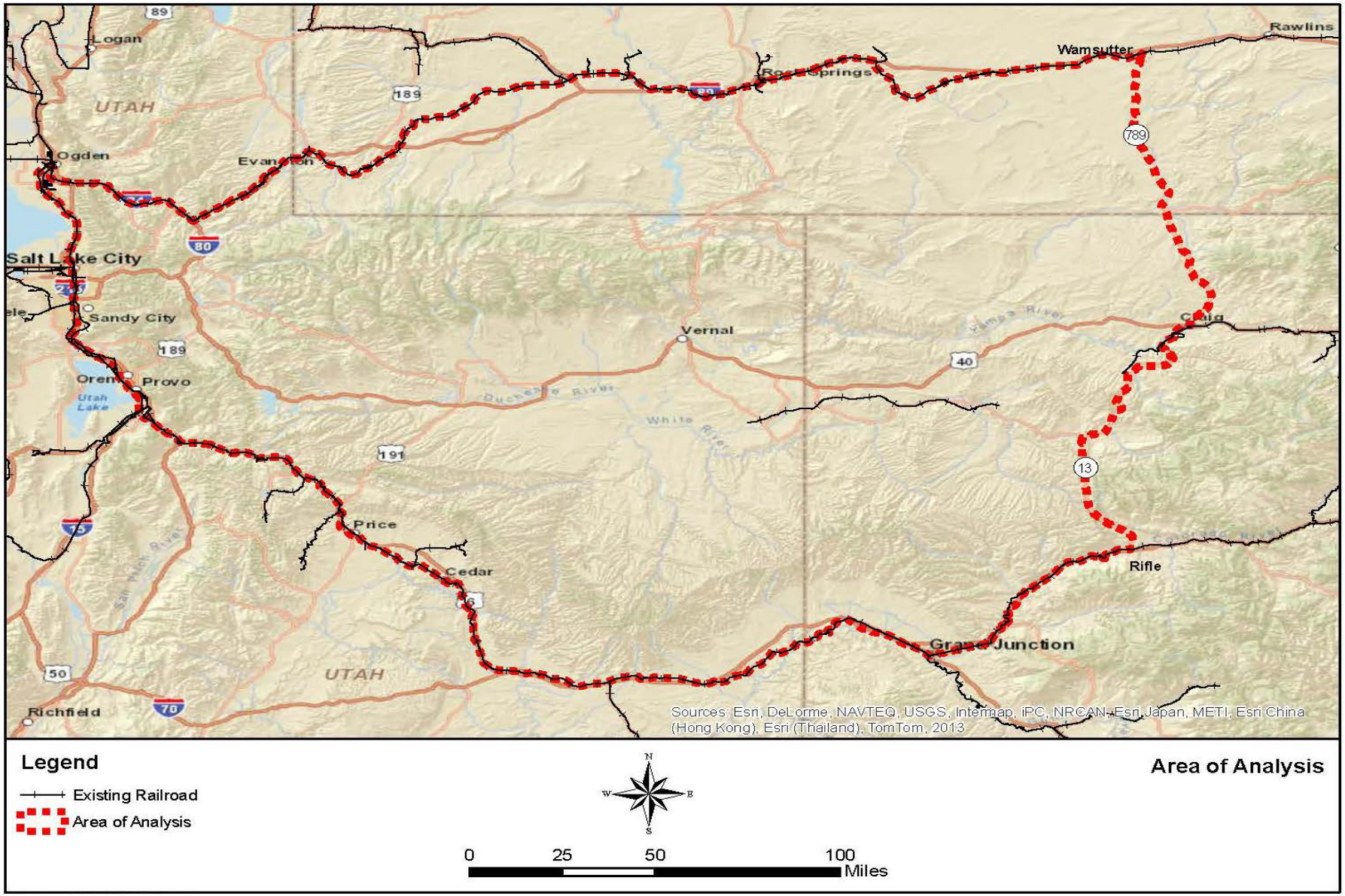
To develop the list of preliminary alternatives, the project team determined an area of analysis, which is the limits of possible alternative corridors suitable for constructing a commercially viable railroad connecting the communities and the major freight-generating and -consuming areas of the Uinta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

What are trackage rights?

Trackage rights are an agreement between railroads in which the owner grants another railroad company use of its railroad line.

- To the north, a Union Pacific Railroad (UP) line runs east-west through southern Wyoming between Cheyenne, Wyoming, and Ogden, Utah. Interstate 80 (I-80) parallels this route.
- To the east, the Uinta Basin is approached by a UP branch line originating at Bond, Colorado, and terminating at Axial, Colorado, west of Craig, Colorado. (Although it is a branch line, this line is constructed and maintained to main track standards.) U.S. Highway 40 parallels this route between Steamboat Springs, Colorado, and Craig, Colorado.
- To the south, a UP line runs east-west through central Utah between Rifle, Colorado, Grand Junction, Colorado, and Provo, Utah. BNSF Railway has trackage rights on part of this line (between Denver, Colorado, and Stockton, California), which connects at either end with BNSF's own network. Utah Railway, a Class III (short-line) railroad, also has trackage rights on this line (Utah Railway owns one of the two main tracks between Provo, Utah, and Thistle, Utah). I-70 parallels this route between Grand Junction, Colorado, and Green River, Utah, and U.S. Highway 6 parallels this route between Green River, Utah, and Provo, Utah.
- To the west, a UP line runs north-south between Provo, Utah, and Ogden, Utah. BNSF has trackage rights on this line (Utah Railway operates some of the freight services on this line for BNSF as a contractor). Interstate 15 (I-15) parallels this route.

Figure 2. UBRR Area of Analysis



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 main track between Rifle, Colorado, and Provo, Utah.
- West border: The UP main track between Provo, Utah, and Ogden, Utah.

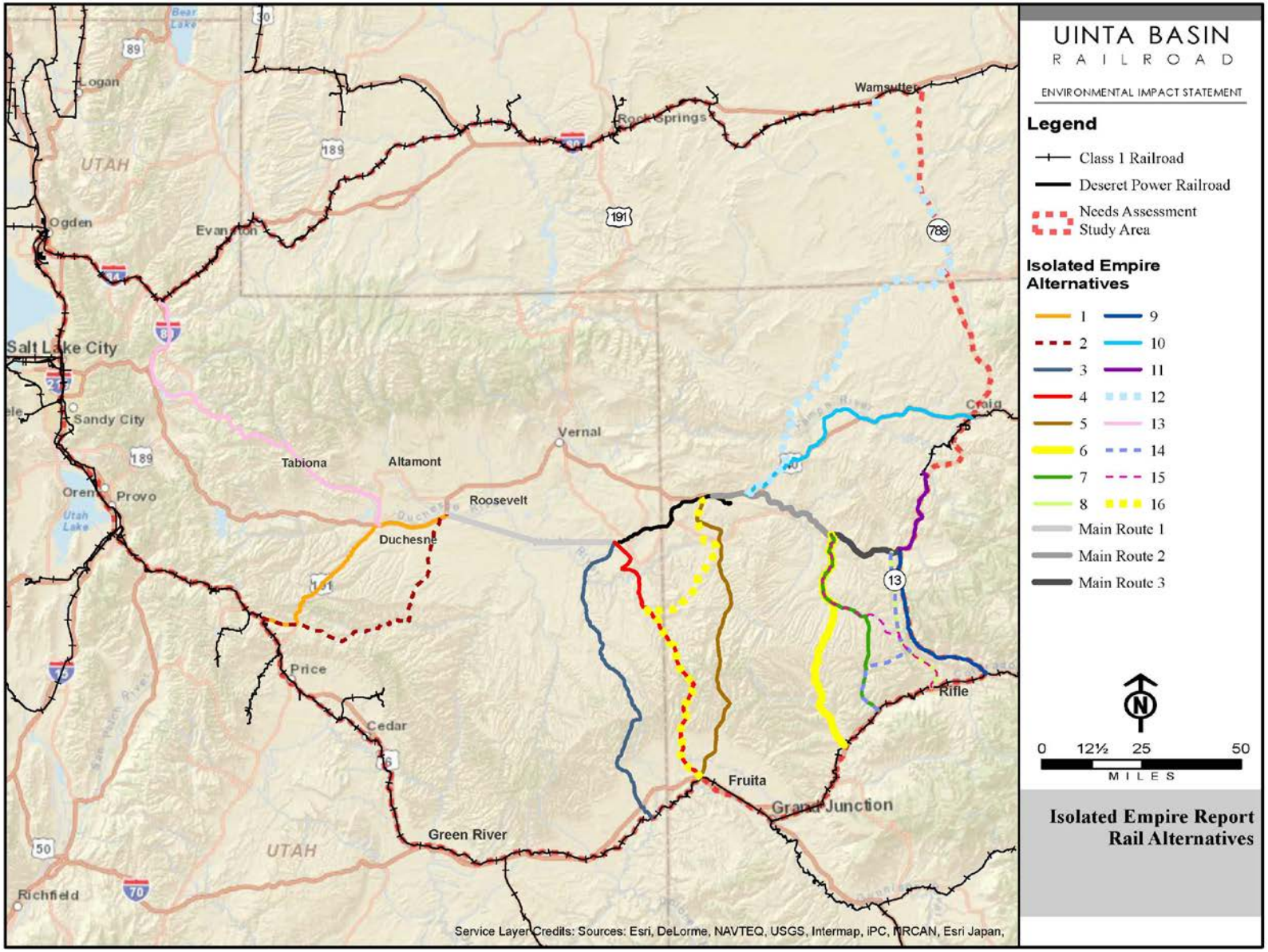
4.1.2 Development of Preliminary Alternatives

In the first phase of the alternatives-development and screening process, the project team will identify a list of potential alternatives. All of the initial alternatives must be applicable to the area of analysis and must present a type of solution that could meet the project purpose and basic need for a new freight railroad. For example, the alternatives must be compatible with the area's topography, climate, and available technology and must be capable of addressing the basic need of providing a freight railroad that connects to another existing railroad. Therefore, the project team will use the following criteria to develop the preliminary alternatives:

- The freight railroad alternatives must connect to an existing railroad within the area of analysis in order to provide a connection to the national railroad network.
- The freight railroad alternatives must meet basic topography requirements such as avoiding steep terrain or large spans.
- The freight railroad alternatives must reduce local truck travel to the railroad to the greatest degree economically practical with acknowledgement that future development may 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.

In addition to reviewing the criteria used to develop new alignments, the project team reviewed a previous study, *Feasibility Report for the Isolated Empire Rail Project* (DMJM Harris 2001), for potential railroad alignments to evaluate in the UBRR EIS. As defined in this study, the purpose of the Isolated Empire Rail 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 railroad network. The study evaluated 16 alignments, which will be re-evaluated in the UBRR EIS (see Figure 3 below).

Figure 3. Isolated Empire Report Rail Alternatives



4.2 Alternatives Screening

4.2.1 Level 1 Screening – Ability to Meet the Project's Purpose

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

What is the purpose of Level 1 screening?

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

Level 1 alternative screening is the first major decision point at which alternatives can be eliminated based on specific screening criteria. During Level 1 screening, the preliminary alternatives will be screened against the following purpose criteria:

- The alternative must connect the Uinta Basin to existing railroad alignments served by both UP and BNSF in order to reduce shipping costs (through 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 single connection 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 railroad 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 railroad 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 potentially reducing truck travel from the shippers across the basin on local, state, and federal roads to the railroad 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 railroad, thus increasing economic competition in the basin for goods and commodities consumed or produced in the basin.

The preliminary alternatives that are not eliminated during Level 1 screening will be further refined to identify a more specific alignment and then evaluated in the Level 2 screening process.

4.2.2 Level 2 Screening –Construction and Operation Feasibility

The purpose of Level 2 screening is to determine which of the alternatives are feasible and practicable; that is, which rail alignments can be feasibly and practicably constructed and operated. During Level 2 screening, the project team will first determine which alternatives that passed Level 1 screening are feasible alternatives under NEPA and will then evaluate the same group of alternatives that passed Level 1 screening to determine whether they are practicable under the Section 404(b)(1) guidelines.

What is the purpose of Level 2 screening?

The purpose of Level 2 screening is to determine which of the alternatives are feasible and practicable; that is, which rail alignments can be feasibly and practicably constructed and operated.

Level 2 screening will be conducted by reviewing the topography of the alignments and aerial images of the alignments. The following specific process will be used:

1. The project team will develop basic alignments and footprints using a standard right-of-way width (100 feet) for the alternatives carried forward from Level 1 screening. During this step, the team will attempt to minimize impacts to natural resources and the built environment. (Alternatives that pass the screening will go through additional refinement during the engineering process for the EIS.)
2. Project engineers will review the alignments and area topography to make sure they meet basic requirements for railroad design. Preliminary engineering will be performed during Level 2 screening to ensure that railroad alternatives meet basic engineering geometric requirements. During the development of the alternatives, the locations of tunnels will be identified in areas with steep topography.
3. The alternatives' footprints will be rendered as digital GIS files, and a GIS analysis will be performed to determine the amount of the railroad grade and the length of the railroad line.
4. The project team will create segments for each unique alignment for the alternatives considered in Level 2 screening. Because some alternatives might have common segments, the team might be able to combine the segments to determine the total Level 2 screening impacts for each alternative. When developing the segments for the new alignments, the team will use 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 will then be screened against the Level 2 criteria as follows:
    - Trains of up to 150 cars must be operable. The alternative must be able to haul all commodities and goods that are currently commonly hauled by the national railroad network and must have the capability to expand its capacity to serve likely potential future freight volumes generated in the basin. To operate a train of 150 cars the rail grade can't exceed 2.4%.
    - As many as 24 trains per day must be operable. To operate 24 trains a day the rail grade can't exceed 3%.
    - Average train speeds between terminals, exclusive of meet and pass events, must be at least 30 miles per hour (mph). To maintain a speed of 30 mph the rail grade can't exceed 2.4%.

- The alternative must not be impractical to construct due to high canyon walls, high water flow that fills the canyon floor, or a lack of continuous bench or beach for a railroad line.
- Railroad grades must not exceed 2.4%.

What is a ruling grade?

A ruling grade is the grade that is the sustained grade on a railway line, ascending or descending, which defines the maximum tonnage of train that can be economically and safely operated over that railway line.

For Level 2 screening, the main criterion for determining whether an alternative is practicable will be the railroad grade (ruling grade). The ruling grade on a railway line is established by comparing trains of the maximum tonnage and length that is expected to be operated on that line on a regular basis, with the characteristics of grade and curvature of that railway line. In broad terms, a ruling grade is the average ascending grade over enough of a distance on an ascent that a train cannot overcome it by momentum, and that establishes the amount of braking horsepower that is required to safely descend. A ruling grade might not necessarily be the maximum grade on a railway line, if it is much shorter than the length of a typical train.

For the UBRR project, the criterion for the ruling grade is 2.4%. Main-track railways in North America that are intended for heavy and frequent trains have historically had a ruling grade of 2.4% as the steepest grade that is economically and safely operable. In fact, the *de facto* standard ruling grade in the United States is slightly less, at 2.2%. A 2.4% ruling grade is at present encountered on only two major rail lines in the United States: eastward on UP's ascent of Donner Pass in California, which lies on UP's main track between northern California and Chicago, and westward on UP's ascent of Soldier Summit in Utah, which lies on UP's main track between Denver and Salt Lake City via Grand Junction, Colorado.

Railways that were intended for light traffic, light trains, or temporary operation often used steeper grades, and railways that were built in the frontier West prior to 1900 sometimes used steeper grades with the idea that a permanent route with lesser grades would be established once traffic levels increased as a result of permanent settlement and industry. Notably, railways with steeper grades have been bypassed, closed, or reduced to local or irregular traffic since 1900.

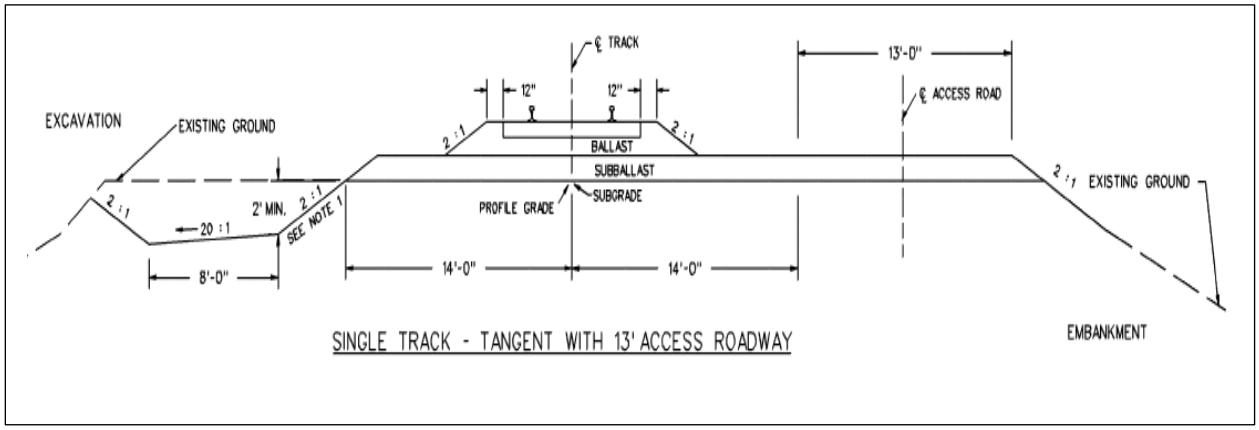
- In 1994, Southern Pacific sold its Siskiyou Summit route in California, with 3.0% grades ascending in both directions to its summit, to a short-line railroad, which subsequently closed it to through traffic in 2008.
- In 1996, UP closed its Tennessee Pass route in Colorado, which had a 3.0% grade ascending eastward.
- In 2009, BNSF Railway removed all freight traffic from its Raton Pass route in Colorado and New Mexico, which had up to 3.3% grades ascending in both directions to its summit.

At present, the only railway line in the United States that is used for freight service and that exceeds a 2.4% ruling grade is BNSF Railway's Main Track #3, which ascends eastward on Cajon Pass in California. This track is used only for descending trains with very high braking horsepower per ton, not for ascending trains or bulk (unit) freight trains such as would be operated on the UBRR. Since Cajon Pass is at a low altitude in a warm climate, air brake performance is not degraded as it is at high altitudes and very cold climates, as would be experienced on the UBRR. (In the winter, trains descending Soldier Summit in Utah are often limited in train length or separated in two to reduce difficulties in braking that would be experienced with full-length trains.)

Screening-Level Right-of-Way Widths

Part of the first step in determining an alternative's impacts is determining its right-of-way width. The right-of-way that will be used in Level 2 and 3 screening 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 will be sufficient for constructing, operating, and maintaining the rail line. In a few areas, a wider right-of-way might be required for cuts and fills. Figure 4 shows the proposed right-of-way widths that will be used for screening.

Figure 4. UBRR Cross-Section



4.2.3 Level 3 Screening – Natural and Built Environment

The purpose of Level 3 screening is to determine which of the alternatives advanced from Level 2 screening are reasonable and will be evaluated in Level 4 screening (alternative feasibility field review). The reasonable alternatives will be determined by collectively evaluating the alternatives that were found to meet the purpose of the project in Level 1 screening while considering the impacts to the natural and built environment, the estimated project costs, logistical considerations, and overall feasibility.

What is the purpose of Level 3 screening?

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

Level 3 Screening Criteria and Analysis

During Level 3 screening, the potential alternatives will be measured against the criteria in Table 1 below. The screening will focus on how well each alternative meets the purpose of the project, the alternative's impacts to the natural and built environments, and estimated project costs. Alternatives that are not eliminated during Level 3 screening will be carried forward into Level 4 screening.

Table 1. 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, 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 affected (for example, historic and archaeological resources).[e] • Number of existing water and commodity wells/sites affected.

[a] Cost is based on relative cost to the lowest 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, unknown eligibility, and sites on the National Register of Historic Places.

To conduct Level 3 screening, the project team will use GIS software to estimate how each alternative would affect the resources identified in Table 1 above. The amount of impacts will be determined based on the right-of-way needed for each potential alternative (see the section titled Screening-Level Right-of-Way Widths on page 14). The following process will be used:

1. The alternatives' footprints will be rendered as digital GIS files, and a GIS analysis will be performed to determine the amount of impacts from each alternative,
2. The alternatives' effects on the resources listed in Table 1 above will be compared to determine the reasonable alternatives to be advanced to Level 4 screening.

GIS analysis will also be used to determine property impacts. Residential and commercial properties adjacent to alternatives will be digitized. If the right-of-way for an alternative would go over a property structure, the impact will be considered a relocation. If no structure would be affected and only undeveloped property would be within an alternative's right-of-way, the impact will not be considered a relocation. To ensure consistency, a quality control (QC) check will be conducted by reviewing the alternatives' footprints using Google Earth imagery.

What is a relocation?

A relocation occurs when constructing an alternative would require purchasing an occupied structure, such as a home or business. The residents or business would need to relocate.

The project team will collectively evaluate the alternatives for their ability to meet the project's purpose as well as their impacts, costs, and so on. If an alternative is determined to have substantially higher impacts or costs without having substantially higher benefits, it will be considered unreasonable for NEPA purposes and will not be carried forward for detailed analysis in the EIS. Similarly, alternatives that have substantially higher costs, logistical difficulties, technical issues, or other substantial adverse impacts to waters of the U.S. will be considered not practicable for Clean Water Act Section 404(b)(1) purposes and will not be carried forward. Alternatives with substantial Section 4(f) uses could be eliminated on a similar basis. Appendix A provides the methodology for developing the screening-level cost estimates.

The alternatives that pass Level 3 screening will be further evaluated in Level 4 screening.

4.2.4 Level 4 Screening – Alternative Feasibility Field Review

The initial review of each alternative for constructability and the feasibility of rail operations will be conducted as part of Level 2 screening. This Level 2 evaluation will be a "desktop" review using aerial photographs and topographic maps to determine any initial fatal flaws regarding the constructability of an alternative.

What is the purpose of Level 4 screening?

The purpose of Level 4 screening is to conduct a field review to determine whether an alternative can be constructed.

The alternatives that pass Levels 1, 2, and 3 screening will be reviewed in the field as part of Level 4 screening to determine, based on field observations, whether the alternative can be constructed. The field review will include items such as topography, water courses, slope stability, wetlands and other natural environment features, existing infrastructure (roads, electrical lines, pipelines, etc.), community facilities, and existing buildings. Based on the field observations, the project team will conduct an evaluation of each alternative to determine whether the alternative is feasible.

The alternatives that pass Level 4 screening will advanced for detailed study in the Draft EIS. The alternatives considered in detail in the Draft EIS will go through additional engineering design and further refinement to optimize their performance and reduce their impacts.

The final results of the screening process will be presented in a report that also describes the process and outcomes of each phase.

4.2.5 Screening Results: Alternatives Carried Forward for Detailed Study in the EIS

The alternatives that are not eliminated during the screening process will be further refined through preliminary engineering before detailed impact analyses begin for the EIS. This preliminary engineering will include details such as horizontal and vertical alignments; railroad siding locations; bridge types and locations; transload facilities and freight terminals such as unit train loading loops, railroad communications, and train-control systems; railroad utility power lines; and construction, operation, and maintenance access roads. Each alternative will be designed to a similar level of detail. Once the preliminary design work is complete, the expected effects of the alternatives will be identified and compared at an equal level of detail as required by NEPA.

The screening process is designed to be dynamic throughout the EIS process. If a new alternative or refinement of an alternative is developed or arises later in the process, it will be subject to the same screening process as all of the other alternatives as described in this report.

Appendix A. Screening-Level Cost Estimates Methods

1.0 Introduction

The purpose of this appendix is to document the process used to develop preliminary cost estimates for the alternatives analyzed during the Uinta Basin Railroad (UBRR) Level 2 screening process. The cost estimates will be used to assist the project team in the screening process and to develop a better understanding of the magnitude of the differences among the alternatives. The cost estimates in this appendix are preliminary and are based on other similar and recent railroad construction projects.

During Level 3 screening, it was not possible for the project team to include every possible cost of the project, since only geographic information system (GIS) alignments were developed, and many details that would be determined with additional engineering design were unknown. However, the estimates were calculated the same way for each alternative and provided a reasonable, relative comparison in costs between the alternatives. More-detailed cost estimates will be developed for the alternatives evaluated in detail in the Environmental Impact Statement (EIS) and will be based on a more-detailed level of preliminary engineering.

2.0 General Assumptions

The construction costs in this appendix have been developed based on similar railroad projects. These costs were based on actual construction costs and are intended to be used to compare the UBRR Level 3 screening alternatives.

Railroad construction costs per mile in Level 3 screening do not include detailed right-of-way (ROW) acquisition costs, major structures, or development of freight terminals, transload facilities, or unit-train loading loops. Items included in the costs per mile include engineering, mobilization, earthwork, track, typical drainage structures, train-control and communications systems, and maintenance access roads.

A basic right-of-way width of 100 feet was used to develop costs for the alternatives.

3.0 Right-of-Way and Railroad Construction Cost Estimates

3.1 Residential and Agricultural Relocation Cost Estimate

In Level 3 screening, the number of structures affected by the alternatives' ROW was calculated using GIS software. To determine the cost of residential or agricultural structures, local property information was used. Table 3-1 shows the median property values in 2009 and the average sales values in the third quarter of 2013 for the counties in the UBRR area of analysis.

Table 3-1. Property and Sales Values in the UBRR Area of Analysis

County	2009 Median Property Value[a]	3rd Quarter 2013 Median Sales Value[b]
Duchesne	$156,675	$190,000
Uintah	$183,345	$199,800

[a] Source: City-data.com, no date
[b] Source: Utah Realtors, no date

For the Level 3 screening cost estimate, the average third-quarter 2013 sales information was used. Based on these data, the average cost of a residential property in the UBRR area of analysis was $194,900. The project team used a value of $200,000 for each residential property for the screening cost estimate. Additionally, a value of $35,000 for relocation costs was assumed for each affected residential parcel as part of the screening cost estimate.

3.2 Business Relocations Cost Estimate

For the different business relocation categories, costs per relocation/acquisition were determined by using costs from previous EIS projects and samplings of property values taken from www.utahrealestate.com.

3.2.1 Agricultural

The relocation/acquisition of agricultural businesses was estimated based on an analysis of GIS data. The cost estimate used a value of $750,000 for each agricultural relocation/acquisition. Additionally, a value of $35,000 for relocation costs was assumed for each affected agricultural parcel as part of the screening cost estimate.

Table 3-2. Cost Estimate for Farm/Ranch Acquisitions

Sample	County	Price[a]
Sample 1	Uintah	$395,000
Sample 2	Uintah	$995,000
Sample 3	Duchesne	$220,000
Sample 4	Duchesne	$334,900
Sample 5	Duchesne	$550,000
Sample 6	Duchesne	$889,000
Sample 7	Duchesne	$1,200,000
Sample 8	Duchesne	$1,295,000
Average		**$734,862**

The cost estimate used a value of $750,000 for each agricultural acquisition.

[a] Prices obtained from www.utahrealestate.com.

3.2.2 Commercial or Industrial

Table 3-3. Cost Estimate for Industrial Business Acquisitions

Sample	County	Price[a]
Sample 1	Duchesne	$149,900
Sample 2	Duchesne	$165,000
Sample 3	Duchesne	$194,000
Sample 4	Duchesne	$220,000
Sample 5	Duchesne	$240,000
Sample 6	Duchesne	$389,900
Sample 7	Duchesne	$399,000
Sample 8	Duchesne	$400,000
Sample 9	Duchesne	$659,000
Sample 10	Uintah	$181,900
Sample 11	Uintah	$210,000
Sample 12	Uintah	$265,000
Sample 13	Uintah	$279,900
Sample 14	Uintah	$299,900
Sample 15	Uintah	$399,000
Sample 16	Uintah	$445,000
Sample 17	Uintah	$534,900
Sample 18	Uintah	$549,900
Sample 19	Uintah	$762,300
Sample 20	Uintah	$795,000
Sample 21	Uintah	$799,000
Sample 22	Uintah	$895,000
Sample 23	Uintah	$899,900
Sample 24	Uintah	$990,000
Sample 25	Uintah	$1,200,000
Sample 26	Uintah	$1,200,000
Sample 27	Uintah	$1,200,000
Average		**$566,288**

The cost estimate used a value of $575,000 for each industrial acquisition.

[a] Prices obtained from www.utahrealestate.com.

Additionally, a value of $35,000 for relocation costs was assumed for each affected industrial parcel as part of the screening cost estimate.

3.2.3 Utility

The utility relocation cost estimate used the same value as the industrial relocation/acquisition value. The cost estimate used a value of $500,000 for each utility relocation/acquisition.

3.2.4 Institutional

The institutional relocation/acquisition cost estimate used the same value as the commercial or industrial relocation/acquisition value, which was $575,000. The cost estimate used a value of $575,000 for each institutional property relocation/acquisition. Additionally, a value of $35,000 for relocation costs was assumed for each affected institutional parcel as part of the screening cost estimate.

3.2.5 Oil and Gas Industrial

The oil and gas industrial relocation/acquisition cost estimate for a relocated oil well was assumed at $2,000,000 per oil well. A pad can have a single or multiple oil wells. For example, a pad with two wells would have a relocation cost of $4,000,000.

3.3 Land Value Cost Estimate

For the various land-use categories identified in Level 2 screening using GIS data, unit costs per square foot of land type were estimated by taking a sampling of listed properties for each category from www.landandfarm.com. The price, acreage, and cost per square foot are shown in Table 3-4 through Table 3-7. Where listings could not be found for certain categories (Institutional, Open Space, and Protection Area), the project team evaluated GIS data and determined that these land-use categories had similar attributes to other land-use categories that would likely cause them to be valued similarly. This is described more in the following sections.

3.3.1 Agricultural

Table 3-4. Cost Estimate for Agricultural Land Value

Sample	Price	Acres	Cost per Square Foot
Sample 1	$1,050,000	200.0	$0.12
Sample 2	$905,000	160.0	$0.13
Sample 3	$910,000	180.0	$0.12
Sample 4	$185,000	37.13	$0.11
Sample 5	$389,000	54.26	$0.16
Sample 6	$39,000	6.4	$0.14
Sample 7	$219,000	240.0	$0.02
Average	**$528,143**	**125**	**$0.12**

The cost estimate used a value of $0.25 per square foot for agricultural property.

3.3.2 Commercial or Industrial

Table 3-5. Cost Estimate for Commercial or Industrial Land Value

Sample	Price	Acres	Cost per Square Foot
Sample 1	$315,000	45.0	$0.16
Sample 2	$140,000	20.0	$0.16
Sample 3	$762,300	1.71	$10.23
Sample 4	$1,947,500	18.91	$2.36
Sample 5	$3,950,000	43.86	$2.07
Sample 6	$762,300	3.75	$4.67
Sample 7	$2,911,986	13.37	$5.00
Sample 8	$2,090,880	8.0	$6.00
Sample 9	$1,474,000	5.64	$6.00
Sample 10	$160,000	4.25	$0.86
Average	**$1,451,396**	**16.45**	**$3.75**

The cost estimate used a value of $5.00 per square foot for commercial property.

3.3.3 Institutional

Evaluation of GIS data indicates that institutional land uses would have attributes similar to those of commercial or industrial land uses. The cost estimate used a value of $5.00 per square foot for institutional property.

3.3.4 Open Space

Evaluation of GIS data indicates that open-space land uses would have attributes similar to those of agricultural land uses. The cost estimate used a value of $0.25 per square foot for open-space property.

3.3.5 Protection Area

Evaluation of GIS data indicates that protection-area land uses would have attributes similar to those of agricultural land uses. The cost estimate used a value of $0.25 per square foot for protection-area property.

3.3.6 Recreational or Dispersed Residential

Table 3-6. Cost Estimate for Recreational or Dispersed Residential Land Value

Sample	Price	Acres	Cost per Square Foot
Sample 1	$29,900	5.0	$0.14
Sample 2	$74,900	5.6	$0.31
Sample 3	$29,900	25.7	$0.03
Sample 4	$59,900	10.0	$0.14
Sample 5	$32,900	10.0	$0.08
Sample 6	$19,900	10.0	$0.05
Sample 7	$34,900	20.0	$0.04
Sample 8	$39,900	10.0	$0.09
Sample 9	$27,900	10.0	$0.06
Sample 10	$75,000	24.0	$0.07
Sample 11	$50,000	5.0	$0.23
Sample 12	$4,500	0.25	$0.41
Sample 13	$1,290,000	42.78	$0.69
Sample 14	$49,000	120.0	$0.01
Sample 15	$18,000	40.0	$0.01
Sample 16	$20,000	40.0	$0.01
Sample 17	$15,000	40.0	$0.01
Sample 18	$315,000	45.0	$0.16
Sample 19	$140,000	20.0	$0.16
Sample 20	$187,000	5.0	$0.86
Sample 21	$142,500	10.0	$0.33
Sample 22	$25,000	5.0	$0.11
Sample 23	$190,000	36.54	$0.12
Sample 24	$38,000	0.79	$1.10
Sample 25	$4,000,000	213.27	$0.43
Sample 26	$54,000	1.4	$0.89
Average	**$267,812**	**29**	**$0.25**

The cost estimate used a value of $0.25 per square foot for recreational or dispersed residential property. Data from www.landandfarm.com.

3.3.7 Residential

Table 3-7. Cost Estimate for Residential Land Value

Sample	Price	Acres	Cost per Square Foot
Uintah County average	$202,058	9.88	$2.06

The cost estimate used a value of $2.00 per square foot for residential property. This is for platted residential lots. Data from Utah multiple listing service.

3.4 Railroad Cost Estimate

Construction costs from representative and recent railroad construction projects were used to estimate the costs per mile for the UBRR. Based on these projects, a capital cost estimate of $8 million per mile for a new railroad alignment and $100 million per mile for a tunnel is assumed, 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. Representative projects are few as new railroad construction on new alignments in the U.S. has been rare since the 1920s, and railroad projects are highly variable in terms of topography, anticipated railroad traffic levels, and requirements for grade crossing signaling, grade crossing structures, and terminal trackage. The UBRR project would require extensive earthwork because of the area topography.

3.4.1 Yucca Mountain Railroad

The proposed Yucca Mountain Railway Draft Environmental Statement compared several alignments connecting the proposed Yucca Mountain nuclear waste storage facility with the national railroad network. The railroad would be a single-track railroad with sidings for train meet/pass events, and equipped with a Centralized Traffic Control signaling system. Terminal facilities were relatively limited. The alignment costs ranged from $4.8 to $13 million per mile in 2013 dollars, depending upon the alignment chosen and the amount of excavation required. The alignments with greater excavation had the highest cost per mile

3.4.2 Ely Energy Center Railroad

A 97-mile new railroad, parallel to the abandoned Nevada Northern Railway, between Shafter, Nevada, and the proposed Ely Energy Center near Ely, Nevada, was proposed in 2006. The railroad would be a single-track railroad with sidings for train meet/pass events, and equipped with a Centralized Traffic Control signaling system. Terminal facilities were relatively modest. The estimated cost of the railroad's main track was $3.2 million per mile in 2013 dollars. The proposed alignment had only minor drainage structures and minor earthwork.

3.4.3 DM&E Railroad, Powder River Basin Extension

A 260-mile extension of the Dakota, Minnesota & Eastern Railroad from Wall, South Dakota, to the Powder River Basin Coal Field in Wyoming, was proposed in 2001. The cost of construction of the new-build alignment including 600 miles of rehabilitation of the existing DM&E was $3.0 million/mile. The proposed new-build alignment had more than 20 major structures and moderate earthwork.

3.4.4 Estimated Railroad Costs

Due to the mountainous topography between the national railroad network and the Uinta Basin, and the anticipated requirement for grade-separation of paved public roadways and signaling of private and low-traffic public roadways, an initial estimate of cost of the UBRR is $8 million/mile for the railroad and $100 million/mile for a tunnel.

3.4.5 Structures over Local Roads

The project team also assumed a cost of $1,512,000 for the cost of structures over the railroad alignment. The team based this cost assumption on each structure having a width of 84 feet and a length of 100 feet. The cost per square foot was assumed to be $180 per square foot for structures over local roads. Therefore, 8,400 square feet × $180/square foot = $1,512,000 per structure.

3.5 Wetland Mitigation Cost

The project team contacted the UDOT wetland specialist regarding wetland mitigation costs in Utah. UDOT recently calculated the cost per acre for the Utah County Wetland Mitigation Bank, which was constructed in 2009. Including design, land cost, monitoring, and construction, the estimated cost was $125,000 per acre. According to UDOT, the cost per acre was high because this mitigation bank is in an urban area. UDOT stated that mitigation costs would likely be less in the UBRR area of analysis because land costs are lower in rural areas such as the area of analysis. Land cost is the largest factor in the overall cost of wetland mitigation sites (Johnson 2011).

For the Level 2 screening cost analysis, the project team assumed a cost of $125,000 per acre at a mitigation ratio of 2:1, meaning that, for every acre of wetland affected, the mitigation costs would be $250,000.

4.0 References

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.