3.3 Water Resources

This section describes the impacts on water resources that would result from the construction and operation of the proposed rail line. Water resources include surface waters, floodplains, wetlands, and groundwater. The subsections that follow describe the study areas, data sources, the methods used to analyze potential impacts, the affected environment, and the potential impacts of the proposed rail line on water resources.

3.3.1 Analysis Methods

This subsection identifies the study areas, data sources, and analysis methods OEA used to analyze surface waters, floodplains, wetlands, and groundwater.

3.3.1.1 Study Areas

OEA defined the study areas for water resources as a study area for the surface waters, floodplains, and wetlands analysis and a separate study area for the groundwater analysis.

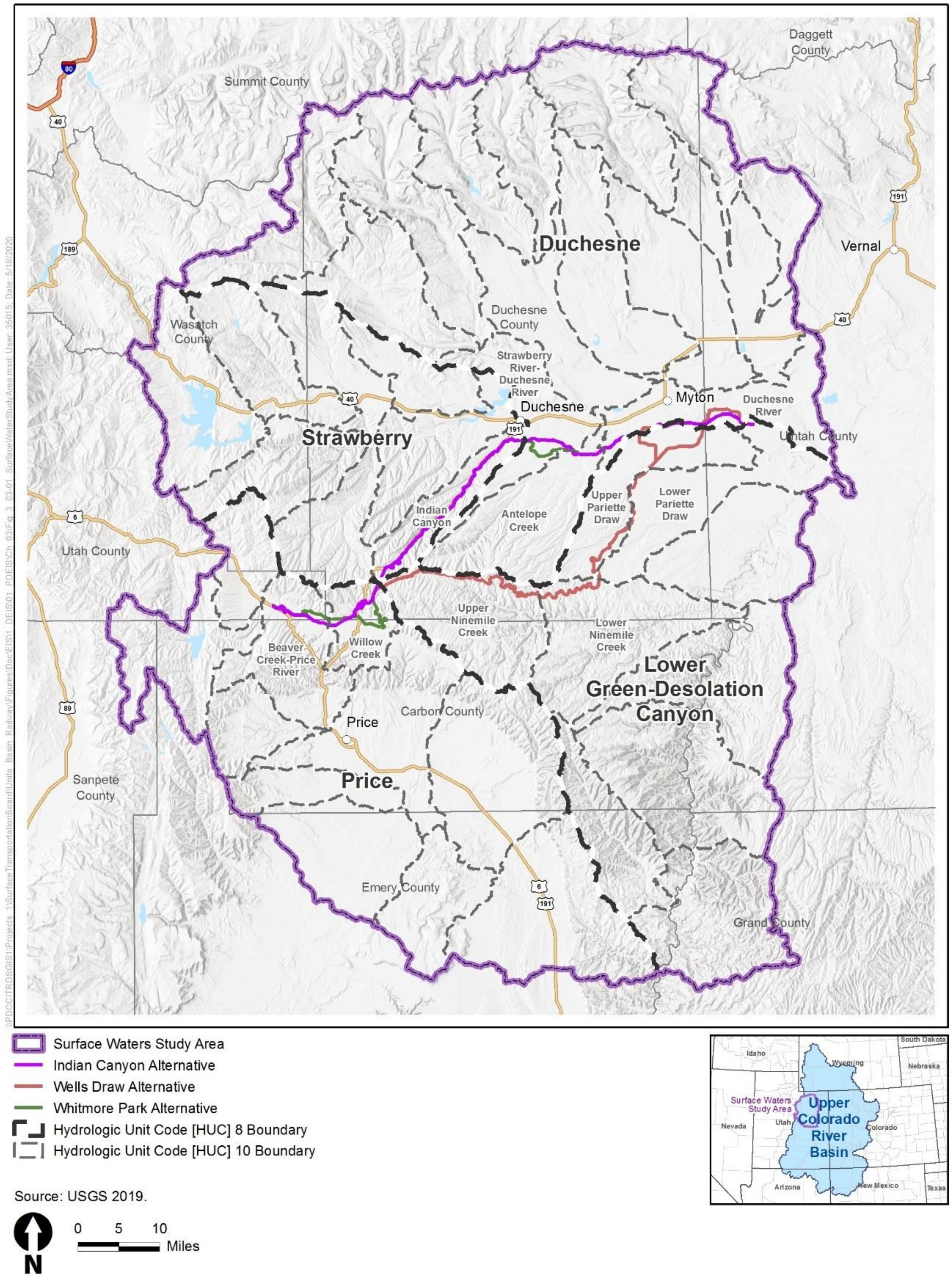
Surface Waters, Floodplains, and Wetlands

The study area for the surface waters, floodplains, and wetlands analysis consists of two areas:

- **Watershed study area.** This study area consists of the watersheds (Hydrologic Unit Code [HUC] 8) that the proposed rail line would cross. OEA used this study area for describing the general hydrologic context in the vicinity of the proposed rail line (Figure 3.3-1).
- **Field survey study area.** This study area corresponds to where the Coalition conducted field surveys for surface water and wetlands. The Coalition designed the field survey study area to encompass the rail line footprint and temporary footprint.[1] The field survey area consists of a 1,000-foot-wide corridor along much of the rail centerline (500 feet on either side of the centerline) for each Action Alternative (Appendix F, *Water Resources Figures*). Because the rail line footprint is less than 200 feet wide, on average, the field survey area includes a buffer of 800 feet or more beyond the edge of permanent disturbance in most locations. The field survey study area is wider than 1,000 feet in a few areas where permanent or temporary disturbance could extend further than 500 feet from the rail centerline due to large areas of cut and fill.

[1] The *rail line footprint* includes the area of the railbed, as well as the full width of the area cleared and cut or filled. The rail line footprint would also include other physical structures installed as part of the proposed rail line, such as fence lines, communications towers, siding tracks, relocated roads, and power distribution lines. The rail line footprint is the area where rail line operations and maintenance would occur. The area would be permanently disturbed. The *temporary footprint* is the area that could be temporarily disturbed during construction, including areas for temporary material laydown, staging, and logistics. Disturbed areas within the temporary footprint would be reclaimed and revegetated following construction. The *project footprint* is the combined area of the rail line footprint and temporary footprint, where construction and operations of the proposed rail line would occur.

Figure 3.3-1. Surface Waters, Floodplains, and Wetlands—Watershed Study Area



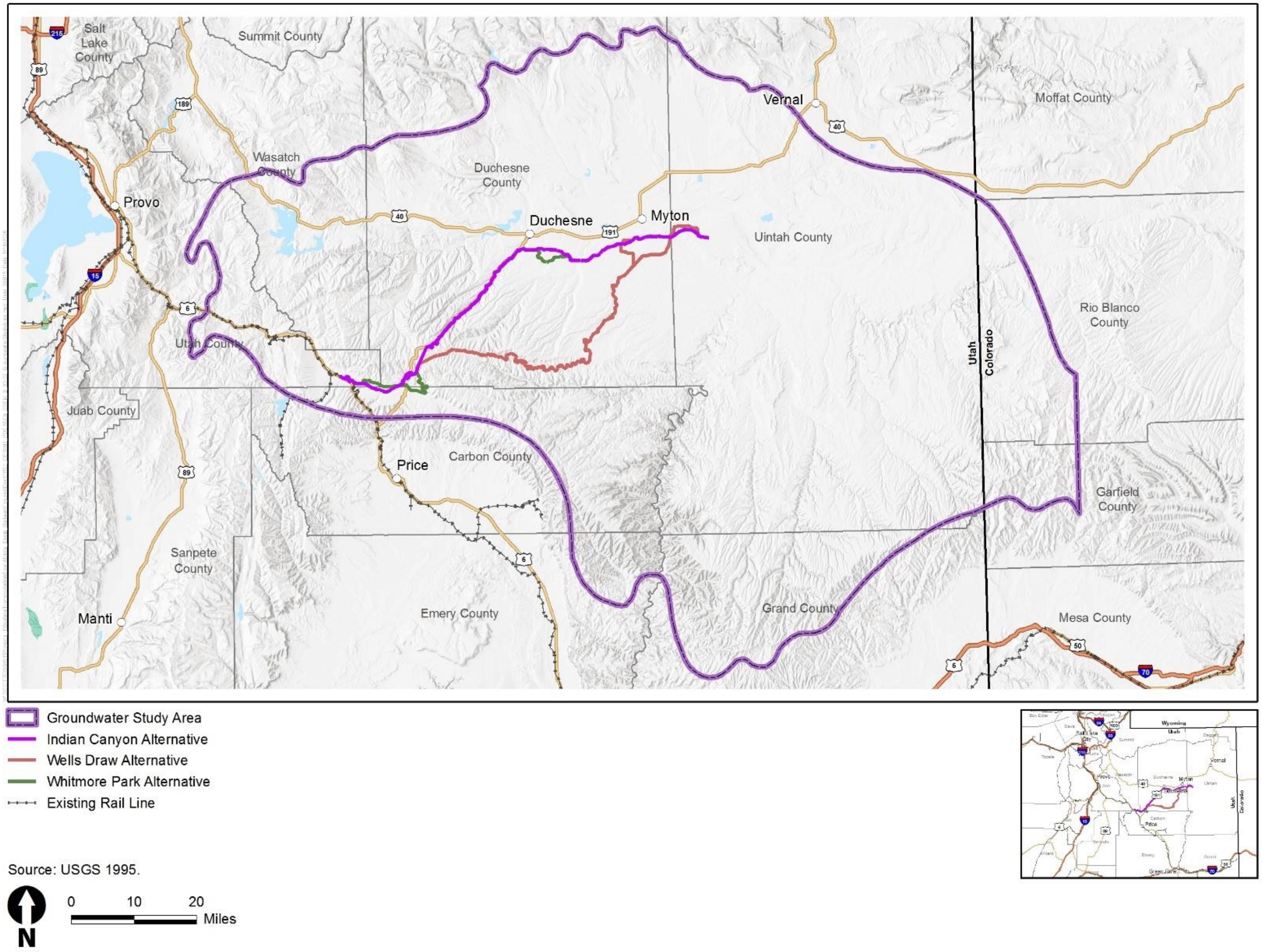
The exact locations of certain construction activities and the precise extent of the temporarily disturbed area are not known. If the Board were to authorize one of the Action Alternatives, then the Coalition would undertake final engineering and construction planning, taking into account topography, land access, and other considerations. In general, OEA expects that the Coalition would confine construction activities to the rail line footprint to the extent practicable to minimize the amount of land that would have to be accessed during construction. The Coalition has committed to limiting ground disturbance to only the areas necessary for project-related construction activities (VM-16). To account for the uncertainty in the construction area, the temporary footprint is conservative, meaning that it is likely much larger than the actual area that would be temporarily disturbed during construction. The field survey study area encompasses the entire temporary footprint and is considerably wider (200 feet or more) than both the rail footprint and the temporary footprint in most locations. Therefore, the field survey study area is sufficient for assessing potential impacts on water resources, including both direct and indirect impacts.

The field survey study area also includes a supplemental study area that is specific to communications towers and access roads outside of the field survey study area. The final locations of communications towers are not known at this stage of design because signal testing would have to be conducted before those towers are sited. If the Board were to authorize one of the Action Alternatives, then the Coalition would determine the final locations of communications towers and communications access roads based on the results of final engineering and signal testing. To account for the impact of communications towers on water resources, the Coalition provided OEA with estimated potential locations of communications towers, and OEA estimated the potential locations of communications access roads. The supplemental study area consists of a 1,000-foot-wide corridor along the communications access road centerlines and a 500-foot-wide buffer around communications towers. This supplemental study area makes up a small percent (approximately 2 percent or less) of the overall field survey study areas for the Action Alternatives.

Groundwater

Impacts on groundwater from construction and operation of the proposed rail line could affect groundwater in the Uinta-Animas aquifer, which is the nearest aquifer to the ground surface. Therefore, the study area for the groundwater analysis corresponds to the boundaries of the Uinta-Animas aquifer (Figure 3.3-2).

Figure 3.3-2. Groundwater Study Area



Source: USGS 1995.

3.3.1.2 Data Sources

OEA reviewed the following data sources to determine the potential impacts on water resources that could result from construction and operation of the proposed rail line.

- *Utah's Final 2016 Integrated Report* (UDWQ 2016).
- Federal Emergency Management Agency (FEMA) National Flood Hazard Layer geospatial database (FEMA 2020).
- U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) geospatial soils data (NRCS 2019a).
- National Wetland Inventory (USFWS 2019).
- NRCS *National Soil Survey Handbook Part 618* (NRCS 2019b).
- Utah State Water Plan: Uinta Basin (UDWR 1999).
- Utah State Water Plan: Uinta Basin (UDWR 2016).
- *Ground Water Atlas of the United States* (USGS 1995).
- Utah Points of Diversion database (UDWRi 2020).
- The National Hydrography Dataset (USGS 2019).
- The Coalition's *Waters of the United States Baseline Environment Technical Memorandum: Uinta Basin Railway* (Coalition 2020a).[2]
- *Uinta Basin Railway Bridge and Culvert Drainage Crossing Summary* (Coalition 2020b).[3]

3.3.1.3 Analysis Methods

This subsection describes the methods that OEA used to analyze impacts on water resources.

Surface Waters

OEA used the following methods, information, and assumptions to evaluate the impacts of construction and operation of the proposed rail line on surface waters.

- **OEA used the Coalition's field survey data and federal agency GIS data to describe surface waters in the field survey study area and supplemental field survey study area,**

[2] The Coalition conducted surface water and wetland field surveys along the Action Alternatives throughout the spring, summer, and fall of 2019. OEA independently verified the fieldwork and data collection by reviewing field methods, conducting site visits, observing fieldwork, and reviewing survey reports and the underlying data. Additional information on the surface water and wetlands identification and delineation methodology can be found in the *Waters of the United States Baseline Environment Technical Memorandum: Uinta Basin Railway* (Coalition 2020a), which is available to the public on the Board's website (www.stb.gov) and the Board-sponsored project website (www.uintabasinrailwayeis.com).

[3] Appendix A, *Action Alternatives Supporting Information* and Appendix F, *Water Resources Figures*, provide detailed information on surface water crossings, including culverts and bridges, associated with the proposed rail line. Submissions from the Coalition related to project design information are available to the public on the Board's website (www.stb.gov) and the Board-sponsored project website (www.uintabasinrailwayeis.com).

respectively. OEA used the Coalition's *Waters of the United States Baseline Environment Technical Memorandum: Uinta Basin Railway* (Coalition 2020a) report to describe surface waters in the field survey study area.

As discussed previously, OEA defined the supplemental field survey study area to include areas where communications towers and associated access roads could be constructed. The final locations of communications towers and access roads would be developed during the final design phase if the Board were to authorize one of the Action Alternatives. Because the locations of communications towers and access roads are estimated, the Coalition did not collect field data for those areas. Therefore, to describe surface waters in the supplemental field survey study area OEA used the USGS National Hydrography Dataset (USGS 2019). USGS data are subsumed by the Coalition's surface water data presented in Subsection 3.3.2, *Affected Environment*, and Subsection 3.3.3, *Environmental Consequences*. Although relying on the National Hydrography Dataset may not be appropriate for Section 404 permitting purposes, it is reasonably sufficient for comparing surface water impacts between the Action Alternatives under NEPA, given the uncertainty of the final communications tower and access road locations. Additional studies of impacts on surface waters from communications tower and communications access road construction may be required during the Section 404 permitting process (VM-25).

- **OEA reviewed Coalition surface water crossings and conveyance structures information.** The Coalition conducted a hydrologic review of surface water data collected in the field, topographic maps, drainage areas maps, and surface water flow data to determine the placement and types of surface water crossing structures that would be required (Coalition 2020b). This process generated a preliminary list of culverts and bridges that would be needed for each Action Alternative. The water crossing structure locations, types, and sizes were based on the Coalition's preliminary hydrologic review. Conveyance structures include 36-inch corrugated metal pipe (CMP), 48-inch CMP, and 72-inch CMP culverts; 8-foot-by-8-foot concrete box culverts; and bridges. OEA reviewed the preliminary information provided by the Coalition and supplemented the list of culverts and bridges as needed (Appendix A, *Action Alternatives Supporting Information* and Appendix F, *Water Resources Figures*). If the Board were to authorize one of the Action Alternatives, the Coalition would determine the final design and placement of conveyance structures during the final permitting and design phase, in consultation with, and for development and permitting requirements of, the U.S. Army Corps of Engineers (Corps), the Utah State Engineer's office, local counties, and other appropriate agencies.
- **OEA determined potential stream realignment locations and impacts.** OEA used the results of the surface water data collected in the field to determine potential stream realignment locations. These stream realignments would occur in the rail line footprint where the proposed rail line would parallel a stream and topography, existing infrastructure (e.g., highways), or rail line design standards (e.g., curvature ratio) would make it impossible to avoid the stream. OEA determined the number of stream realignments for each Action Alternative by comparing the locations of streams to the rail line footprint, and calculated an estimate of the affected stream miles and requiring realignment using GIS methods.
- **OEA assessed impacts on surface water quality and hydrology.** OEA used the results of the hydrologic review and other data sources to analyze impacts on surface waters qualitatively. OEA's surface water impact analysis focused on water quality and hydrology, based on construction activities and conveyance structures proposed at each surface water crossing. The

primary factors for determining impacts on surface waters are the number of surface water crossings and conveyance structures. OEA determined the number of surface water crossings through desktop analysis and the surface waters field survey (Coalition 2020a). OEA's analysis of impacts from conveyance structures was informed by the bridge and culvert design information provided by the Coalition, including the following design criteria.

  - The Coalition would design the top invert of culverts and bottom soffits of bridges to clear the predicted 50-year flood event water elevation without causing a backwater increase.
  - The Coalition would design bridges and culverts so that the predicted 100-year flood event water elevation would be no more than 1 foot above the top invert of culverts or the bottom of soffits of bridges and would be below the top of embankment subgrade elevation. These structures would be designed so that the predicted 100-year flood event would cause no more than a 1-foot backwater increase.
  - The Coalition would design culverts and bridges located in FEMA-mapped floodplains to meet the required floodplain development regulations. Substructure units, piers, and bents for bridges and culverts could be placed within the ordinary high-water mark and would include openings sufficient to meet the standards described above. The Coalition does not anticipate constructing any clear span bridges.

- **OEA evaluated the potential for soil erosion to affect surface waters.** A secondary factor for assessing surface water impacts is the presence of highly erodible soils that could affect water quality during construction and operations. Subsection 3.5.2.2, *Soils*, provides information on soil erosion and slope characteristics for soils crossed by the proposed rail line.
- **OEA evaluated the potential for impacts on surface water due to water use during construction and operation.** The Coalition would obtain water needed for construction activities (i.e., for dust suppression and soil compaction) and operations through existing water rights near the proposed rail line. The Coalition does not intend to pursue new water rights. Because OEA anticipates that the Coalition would use water from existing state-approved water sources, including existing surface water sources, OEA did not assess impacts related to new surface water withdrawals.
- **OEA assessed impacts on surface waters adjacent to the project footprint.** OEA assessed indirect impacts on surface waters in the study area that are adjacent to the project footprint. Surface waters adjacent to the project footprint would not be filled, cleared, excavated, or touched at all during construction. Some surface waters are located both within and adjacent to the project footprint. While there would be no construction within surface waters or portions of surface waters adjacent to the project footprint, impacts from construction and operation could affect surface waters adjacent to the project footprint. OEA has quantified the area of surface waters adjacent to the project footprint that would be susceptible to potential indirect impacts and described the potential impacts.

Floodplains

OEA used the following methods, information, and assumptions to evaluate the impacts of construction and operation of the proposed rail line on floodplains.

- **OEA identified floodplains that could be affected by the proposed rail line.** OEA identified floodplains in the watershed study area and field survey study area based on the most current

FEMA National Flood Hazard Layer geospatial database and NRCS soil geospatial data (FEMA 2020; NRCS 2019a). OEA used the NRCS data to estimate floodplain areas where FEMA has not mapped floodplains by identifying soil types that are susceptible to flooding.[4] The five NRCS flood frequency classifications for mapped soils are very rare, rare, occasional, frequent, and very frequent. These flood classifications range from a 0.2 to less than 1 percent chance of flooding in any year (very rare) to flooding with more than a 50 percent chance in all months of any year (very frequent). The NRCS *National Soil Survey Handbook Part 618* (NRCS 2019b) provides full definitions for each NRCS flood classification.

- **OEA used GIS methods to quantify floodplain impacts in disturbed areas.** Construction activities within the project footprint would consist of clearing, excavation, and placement of fill material. Areas where fill placement would occur would be likely to experience greater impact on floodplains and floodplain functions than areas where excavation or vegetation removal would occur because the placement of fill can result in permanent loss of floodplain area. OEA assumed that rail line construction would meet local (i.e., county/city) floodplain development ordinances and permitting requirements (Appendix B, *Applicable Regulations*) and that features related to the proposed rail line that would be located in FEMA-mapped floodplains would be designed to meet the required federal and local ~~(i.e., county/city)~~ floodplain development regulations. Design criteria for bridges and culverts, which can affect floodwater conveyance, are listed above for surface waters.

Wetlands

OEA used the following methods, information, and assumptions to evaluate the impacts of construction and operation of the Action Alternatives on wetlands.

- **OEA used the Coalition's field survey data and federal agency GIS data to describe wetlands in the field survey study area and supplemental field survey study area, respectively.** OEA used the Coalition's *Waters of the United States Baseline Environment Technical Memorandum: Uinta Basin Railway* (Coalition 2020a) report to describe wetlands in the field survey study area. Where the Coalition's wetland biologists were granted access to properties, the Coalition identified and delineated wetlands in the field in accordance with the *Corps of Engineers Wetlands Delineation Manual* (Corps 1987), *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys and Coast* (Version 2.0) (Corps 2010), and *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Version 2.0) (Corps 2008). In areas where access was not granted or in unsafe areas (e.g., steep terrain), wetland biologists conducted a desktop evaluation to map approximate wetland locations and types. OEA verified the fieldwork and data collection by reviewing field methods, conducting site visits, observing fieldwork, and reviewing survey reports and the underlying data.

  As discussed previously, OEA defined the supplemental field survey study area to include areas where communications towers and associated access roads could be constructed. The final locations of communications towers and access roads would be developed during the final design phase if the Board were to authorize one of the Action Alternatives. The supplemental

[4] Some floodplains in communities that participate in the National Flood Insurance Program (NFIP) may not be mapped because they are located in areas that are undeveloped and do not have any structures to insure under NFIP. For this reason, a large portion of the study area has not been mapped by FEMA, mostly due to Duchesne County having not been mapped.

field survey study area makes up approximately 2 percent or less of the field survey study area, depending on the Action Alternative. Because the locations of communications towers and access roads are estimated, the Coalition did not collect field data for those areas. Therefore, to describe wetlands in the supplemental field survey study area OEA used the National Wetland Inventory (NWI) dataset (USFWS 2019). Although relying on NWI data may not be appropriate for Section 404 permitting purposes, it is reasonably sufficient for comparing wetland impacts between the Action Alternatives under NEPA, given the uncertainty of the final communications towers and access road locations. Additional studies of impacts on wetlands from communications tower and access road construction may be required during the Section 404 permitting process (VM-25).

- **OEA qualitatively described wetland functions.** Based on the Coalition's wetland field biologists' consultations with the Corps to discuss wetland field delineations and methods, the Corps confirmed that an approved quantitative functional assessment model currently does not exist for Utah. The Corps stated that it would be appropriate to describe general functions and conditions of wetlands and other aquatic resources qualitatively (Coalition 2020a).

- **OEA used GIS to quantify wetland impacts in disturbed areas.** Construction activities within the project footprint would consist of clearing, excavation, and placement of fill material. Some areas would be permanently disturbed (i.e., rail line footprint) and some areas would be temporarily disturbed (e.g., construction staging areas). Areas of permanent fill placement are likely to have a greater impact on wetlands and wetlands functions than wetlands cleared of vegetation because fill would result in loss of wetland.

- **OEA assessed impacts on wetlands adjacent to the project footprint.** OEA assessed indirect impacts on wetlands in the study area that are adjacent to the project footprint. Wetlands adjacent to the project footprint would not be filled, cleared, excavated, or touched in any other way during construction. Some wetlands are located both within and adjacent to the project footprint. While there would be no construction in wetlands or portions of wetlands adjacent to the project footprint, impacts from construction and operation could affect wetlands adjacent to the project footprint. OEA has quantified the area of wetland adjacent to the project footprint that would be susceptible to potential indirect impacts and describes the potential impacts. ~~However, it is not possible to determine the extent of, nor to quantify, the actual impact on these adjacent wetlands because there is no way to predict how a wetland adjacent to the project footprint would react to construction or operation.~~

Groundwater

OEA used the following methods, information and assumptions to evaluate the impacts of construction and operation of the proposed rail line on groundwater.

- **OEA identified groundwater well/spring locations in the study area.** OEA obtained GIS groundwater well and spring location data from the Utah Division of Water Rights (2020) to determine the number of wells and springs in the study area. In addition, OEA identified additional springs in the field survey study area based on the surface water and wetland ground surveys conducted along the Action Alternatives in 2019 (Coalition 2020a).

- **OEA used GIS to determine potential impacts on groundwater resources.** OEA overlaid the rail line footprint and temporary footprint GIS data layers with the groundwater well and spring GIS data layers (UDWRi 2020; Coalition 2020a) to determine the number of groundwater wells and springs that would be directly affected by construction and operation of the proposed rail line. OEA assumed that groundwater wells and springs in the rail line footprint that would be permanently affected would no longer be useable. OEA assumed that groundwater wells and springs within the temporary footprint would be temporarily affected during construction. OEA also qualitatively assessed potential construction and operation impacts on groundwater recharge, groundwater quality, and interruption of shallow groundwater flow in localized stream channel aquifers.

- **OEA evaluated the potential for impacts on groundwater due to water use during construction and operation.** As stated for surface waters, the Coalition would not pursue new water rights for construction or operations. Because water sources (which could include groundwater) are anticipated to be from a previous state-approved water rights source, OEA's analysis did not include impacts related to groundwater use (i.e., supply or drawdown).

3.3.2 Affected Environment

This subsection identifies the existing environmental conditions related to surface waters, floodplains, wetlands, and groundwater in the study areas.

3.3.2.1 Surface Water

The Action Alternatives are located in the Price River, Duchesne River, Strawberry River, and Lower Green-Desolation Canyon HUC 8 watersheds (Table 3.3-1; Figure 3.3-1), which are all part of the Upper Colorado River Basin. Major streams in these watersheds include Nine Mile Creek, Duchesne River, Strawberry River, and Price River. All of these streams flow to the Green River, which is a major tributary to the Colorado River. Combined, the four HUC 8 watersheds total 7,677 square miles (mi^2). The largest watershed is the Duchesne River watershed (2,679 mi^2), followed by the Lower Green-Desolation Canyon watershed (1,946 mi^2), the Price River watershed (1,887 mi^2), and the Strawberry River watershed (1,165 mi^2). Based on the National Hydrography Dataset, the four watersheds contain approximately 3,087 miles of perennial streams, 15,600 miles of intermittent streams, 1,097 miles of canals/ditches, 36,573 acres of lake and ponds, 418 acres of reservoir, and 942 springs and seeps (USGS 2019).

Approximately 97 percent of surface water withdrawals are for irrigation and the remaining 3 percent are for public water supply, including potable and secondary water supply (UDWR 2016). Table 3.3-1 lists the HUC 8 watersheds, along with the smaller HUC 10 watersheds, crossed by each of the Action Alternatives.

Table 3.3-1. Watersheds Crossed by the Action Alternatives

HUC 8 Watershed[a]	HUC 10 Watershed	Action Alternative
Duchesne	Strawberry River-Duchesne River	Indian Canyon, Whitmore Park
	Antelope Creek	Indian Canyon, Whitmore Park
	Duchesne River	All
Strawberry	Indian Canyon	Indian Canyon, Whitmore Park

HUC 8 Watershed[a]	HUC 10 Watershed	Action Alternative
Lower Green-Desolation Canyon	Upper Pariette Draw	All
	Lower Pariette Draw	All
	Upper Nine Mile Creek	All
	Lower Nine Mile Creek	Wells Draw
Price	Willow Creek	All
	Beaver Creek-Price River	All

Notes:

[a] The four HUC 8 watersheds fall within the Upper Colorado River Basin, which covers parts of Wyoming, Colorado, Utah, Arizona, and New Mexico.

Source: USGS 2019

HUC = Hydrologic Unit Code

The field surveys OEA conducted in 2019 identified six types of surface waters in the field survey study area, as shown in Table 3.3-2. The surface water definitions in this section are similar to Clean Water Act (CWA) Section 404 definitions; final jurisdictional status would be determined during the CWA Section 404 permit process. If the Board were to authorize one of the Action Alternatives, the Coalition would need to obtain a CWA Section 404 permit from the Corps prior to beginning construction, which would require a jurisdictional determination of surface water. Under NEPA, OEA must address impacts on all surface waters regardless of jurisdictional status under CWA Section 404.

Table 3.3-2. Surface Water Types Identified in the Field Survey Study Area

Surface Water	Definition
Perennial stream	Streams that usually flow continuously during typical years or have low to no flow during short periods during drier years.
Intermittent streams	Streams with surface flows that are continuous during certain times of the year. These flows are not solely in direct response to precipitation events.
Ephemeral streams	Streams with surface water flowing or pooling only in direct response to precipitation during typical years. They can be distinguished from upland swales and erosion features by receiving flows sufficiently often (typically at least every year) to maintain a clear and definable OHWM.
Ponds	Depressional ponds and impoundments in which depth and duration of surface water precludes emergent vegetation.
Playas	A relatively flat-floored bottom of an undrained desert basin that becomes, at times, a shallow lake which on evaporation may leave a deposit of salt or gypsum.
Ditches/canals	Canals and ditches are artificial waterways that are used to transport water to be used primarily for agriculture and drainage.

Notes:

Source: Coalition 2020a

OHWM = ordinary high-water mark

Table 3.3-3 summarizes the lengths and areas of surface waters in the field survey study area for each Action Alternative. Additional information, including detailed descriptions of the surface water features identified during field surveys, can be found in the *Waters of the United States Baseline Environment Technical Memorandum: Uinta Basin Railway* (Coalition 2020a), which is available on the Board's website (www.stb.gov) and the Board-sponsored project website (www.uintabasinrailwayeis.com).

Table 3.3-3. Surface Waters Lengths and Areas in the Field Survey Study Area

Surface Water	Indian Canyon Alternative	Wells Draw Alternative	Whitmore Park Alternative
Perennial stream	189,699 linear feet (53.84 acres)	58,089 linear feet (18.53 acres)	197,321 linear feet (56.14 acres)
Intermittent streams	23,544 linear feet (1.77 acres)	108,970 linear feet (71.74 acres)	19,726 linear feet (1.45 acre)
Ephemeral streams	393,171 linear feet (36.38 acres)	396,409 linear feet (68.44 acres)	446,310 linear feet (47.71 acres)
Ponds	4.14 acres	17.32 acres	4.18 acres
Playas	0.44 acre	4.9 acres	3.82 acres
Ditches/canals	47,629 feet (3.10 acres)	24,123 linear feet (3.25 acres)	44,802 linear feet (2.95 acres)

Indian Canyon Alternative

Twelve named streams occur in the field survey study area for the Indian Canyon Alternative: Antelope Creek, Argyle Creek, Beaver Creek, Cripple Creek, Fivemile Creek, Horse Creek, Indian Canyon Creek, KP Creek, Kyune Creek, Price River, West Fork Willow Creek, and Willow Creek (Coalition 2020a; USGS 2019). The Price River is the largest perennial stream in the field survey study area in terms of width (varies from about 20 to about 45 feet) and flow. Apart from the embankment along the streambank supporting an existing UP rail line and several rail crossings, the Price River appears to be in relatively good condition within the field survey study area. The river generally maintains its natural meanders and floodplain functions to support low terrace wetlands and some woody riparian habitat. From the proposed rail connection with the existing UP rail line near Kyune, Utah (milepost 0) to the southern portal of the proposed summit tunnel (at about milepost 18), the field survey study area contains a few perennial streams and many ephemeral and intermittent streams that drain into the Price River. Many of these stream channels are highly incised, which is likely due to a combination of naturally erosive soils and livestock grazing in the Price River watershed. Stream incision is a process of downcutting into a stream channel that results in decreasing the stream channel bed elevation.

North of the summit tunnel (milepost 21 to about milepost 46), the Indian Canyon Alternative would generally follow Indian Canyon Creek, a perennial stream that begins near the top of Indian Canyon and drains into the Strawberry River near the canyon's mouth. The characteristics of Indian Canyon Creek vary at different elevations and several segments contain irrigation diversions. Portions of this stream in the upper canyon appear to be in good condition with natural meanders, clear flows along a cobble substrate, low terraces, and abundant woody riparian vegetation. Other portions of Indian Canyon Creek, mainly in the middle to lower portions of Indian Canyon, are highly modified and diverted for irrigation. In some places, at the time of the field survey, nearly all surface flows were diverted into adjacent ditches. In the lower portions of Indian Canyon, Indian Canyon Creek becomes increasingly incised with steep unvegetated banks and patches of tamarisk species at the base of the banks. There are multiple ephemeral and intermittent streams that drain into Indian Canyon Creek, with characteristics typical of intermittent and ephemeral streams in mountainous terrain. Alluvial features such as floodplains and bankfull benches are generally lacking along these steeper drainages.

East of Indian Canyon (milepost 46 to milepost 80), the field survey study area traverses low arid benchlands, with a few perennial streams and numerous ephemeral and intermittent streams. The stream gradients in the area vary from relatively steep to relatively low. Alluvial features such as floodplains, braiding, low flow channels, and bankfull benches are present in areas of lower gradient. Many portions of these streams are in good condition, but some segments are heavily disturbed by land uses such as oil and gas development.

Canals and ditches in the field survey study area are primarily located in Indian Canyon as diversion to Indian Canyon Creek (milepost 34 to milepost 46). In addition, the Upper Pleasant Valley Canal crosses the field survey study area in the Myton Bench area (milepost 66.5). Delineated open water features generally consist of constructed impoundments such as irrigation ponds and stock ponds, and beaver ponds along Indian Canyon Creek (milepost 23 to milepost 40.5). In addition, 0.44 acre of playa were delineated in the field survey study area for the Indian Canyon Alternative (milepost 69).

Wells Draw Alternative

Seven named streams occur in the field survey study area for the Wells Draw Alternative: Argyle Creek, Beaver Creek, Horse Creek, Kyune Creek, Price River, West Fork Willow Creek, and Willow Creek (Coalition 2020a; USGS 2019). The surface water descriptions for the Wells Draw Alternative are the same as described for the Indian Canyon Alternative for the segment between the proposed rail connection at Kyune (milepost 0) and the portal of the proposed summit tunnel (at about milepost 18). East of the tunnel, Argyle Creek is the main perennial stream that is specific to the Wells Draw Alternative field survey study area (milepost 21 to milepost 23.75). Argyle Creek is a relatively high-elevation mountain stream that is in relatively good condition along much of its length, with natural meandering, beaver dam impoundments, low terraces, and woody riparian vegetation.

Numerous ephemeral and intermittent streams are also specific to the field survey study area for Wells Draw Alternative. Along Argyle Canyon (from about milepost 21 to milepost 43), these streams are typical of intermittent and ephemeral streams in mountainous terrain and are generally in good condition, showing little evidence of disturbance. North of Argyle Canyon (from about milepost 43 to the terminus points in the Basin, including milepost 0M to milepost 6.75M), ephemeral and intermittent streams are numerous and vary from relatively steep to relatively low gradient. At lower elevations, alluvial features such as floodplains, braiding, low flow channels, and bankfull benches are generally present. Many portions of these streams appear to be in good condition, but some segments are heavily disturbed by land uses such as oil and gas development.

Canals and ditches along the field survey study area are primarily located in the Myton Bench area (milepost 82 to milepost 91). These canals and ditches include the Upper Pleasant Valley Canal, Lower Pleasant Valley Canal, and Myton Townsite Canal. Delineated open water features generally consist of constructed impoundments such as irrigation ponds and stock ponds in the Myton Bench area (milepost 81.5 to milepost 89.25 and near milepost 6.75M[5]) and beaver ponds along Argyle Creek (milepost 22). In addition, 4.90 acres of playa were delineated in the field survey study area for the Wells Draw Alternative. This acreage includes a large playa in the Myton Bench area (milepost 88). This playa is mostly unvegetated and exhibits hypersaline conditions.

[5] In some cases, the Coalition uses the single letter M to refer to milepost.

Whitmore Park Alternative

Thirteen named streams occur in the field survey study area for the Whitmore Park Alternative: Antelope Creek, Argyle Creek, Beaver Creek, Cripple Creek, Dry Fork, Fivemile Creek, Horse Creek, Indian Canyon Creek, KP Creek, Kyune Creek, Price River, Pole Creek, and Willow Creek (Coalition 2020a; USGS 2019). The surface water descriptions for the Whitmore Park Alternative are the same as described for the Indian Canyon Alternative for most of the field survey study area, except for the following. Pole Creek and a segment of a Pole Creek tributary (Dry Fork) are the only perennial streams specific to the field survey study area for the Whitmore Park Alternative (milepost 16 to milepost 19). These streams descend from steep mountain slopes down Pole Canyon through Whitmore Park and drain to the Price River. Most portions of Pole Creek are incised with steep banks, which may be due to a combination of naturally erosive soils and livestock grazing in the area. There are multiple ephemeral streams specific to the field survey study area for this alternative, mostly east of Duchesne (from about milepost 53.5 to milepost 62). These ephemeral streams vary from relatively steep to relatively low-gradient. At lower gradients, development of alluvial features such as floodplains, braiding, low flow channels, and bankfull benches is generally present. Most of these ephemeral streams are in good condition. In addition, the Coalition delineated 3.82 acres of playa in the field survey study area for the Whitmore Park Alternative (milepost 52 to 75.75).

Surface Water Quality

Under CWA Section 303(d), states, territories, and authorized tribes are required to develop lists of impaired surface waters, which are those waters that are not attaining beneficial uses according to the established water quality standards. The CWA requires that these jurisdictions establish priority rankings and develop total maximum daily loads (TMDLs) of pollutants for these listed surface waters. Sometimes broad watershed-based TMDLs are developed to address combined cumulative impacts on specific water quality parameters. A TMDL is a calculation of the maximum amount of a pollutant that a surface water body can receive and still safely meet water quality standards. In Utah, the Utah Division of Water Quality (UDWQ) has been delegated authority by the U.S. Environmental Protection Agency (USEPA) to assess water quality of Utah surface waters and to develop the state's Section 303(d) list of impaired surface waters for the state's defined beneficial uses. UDWQ protects surface water under four broad classes of beneficial use: domestic water systems, recreational use and aesthetics, aquatic wildlife, and agricultural uses. Table 3.3-4 lists the four broad classifications and associated subclassifications of surface water beneficial uses.

Table 3.3-4. Classification of Utah Surface Water Beneficial Uses

Class 1 – Domestic Water Systems   **Class 1C** – Drinking Water

Class 2 – Recreational Use and Aesthetics
    Class 2A – Primary contact recreation (e.g., swimming, rafting)
    Class 2B – Secondary contact recreation (e.g., wading, hunting, and fishing)

Class 3 – Aquatic Wildlife
    Class 3A – Cold water aquatic life
    Class 3B – Warm water aquatic life
    Class 3C – Nongame aquatic life
    Class 3D – Wildlife
    Class 3E – Habitat-limited waters

Class 4 – Agricultural (e.g., irrigation of crops and stock watering)

Class 1C waters are often culinary water supply sources, and local municipalities may have facilities such as raw water intakes on streams and rivers to supply culinary water to the public. OEA's review of the Utah Department of Environmental Quality (UDEQ) Public Drinking Water Facilities information (2020)—which includes locations of river water intakes, well intakes, spring intakes, storage facilities, and diversions—found that the nearest downstream public drinking water facility to any Action Alternative is approximately 4 miles away in the City of Duchesne. The next closest downstream drinking water facility to the Action Alternatives is a raw water intake on the Price River water approximately 8 miles downstream of the Action Alternatives.

Every 2 years, UDWQ reviews and assesses the water quality of surface waters statewide and issues a new Section 303(d) list of impaired surface waters. USEPA approved the 2016 Utah Section 303(d) list of impaired surface waters in April 2018 (USEPA 2018a). Table 3.3-5 lists the Section 303(d) impaired surface waters in the field survey study area; Figure 3.3-3 shows the locations of the impaired surface waters.

Table 3.3-5. Section 303(d) Impaired Waters Status of Surface Waters in the Field Survey Study Area

Assessment Basin[a]	Beneficial Use Class	Impairment Status[d]
Price River (1)[b]	Class 1C, 2B, 3A, 4	Class 3A: Dissolved oxygen, OE bioassessment
Willow Creek-Carbon	Class 2B, 3A, 4	No surface water impairments reported
Nine Mile	Class 2B, 3A, 4	Class 3A: Temperature
Indian Canyon Creek	Class 1C, 2B, 3A, 4	Class 1C: Arsenic Class 3A: Selenium Class 4: Boron, TDS
Duchesne River (3)[c]	Class 1C, 2B, 3A, 4	No surface water impairments reported
Antelope Creek	Class 1C, 2B, 3A, 4	Class 1C: Arsenic Class 3A: Selenium Class 4: Boron, TDS
Pariette Draw Creek	Class 2B, 3B, 3D, 4	Class 3B: Selenium, temperature Class 3D: Selenium Class 4: Boron, TDS
Duchesne River (2)[c]	Class 2B, 3B, 4	Class 2B: E. coli Class 4: Boron, TDS
Green River – 3 Tributaries	Class 1C, 2A, 3B, 4	No surface water impairments reported

Notes:

[a] The Section 303(d) impaired water assessment is conducted basin-wide and the impairment status includes all surface waters in the assessment basin. While the assessment basins do not always correlate exactly with the HUC 10 basins in Table 3.3-1, they are within the overall watershed study area.

[b] The Price River basin is split into five assessment basins. Price River Assessment Basin 1 is from Price City Water Treatment intake to Scofield Reservoir.

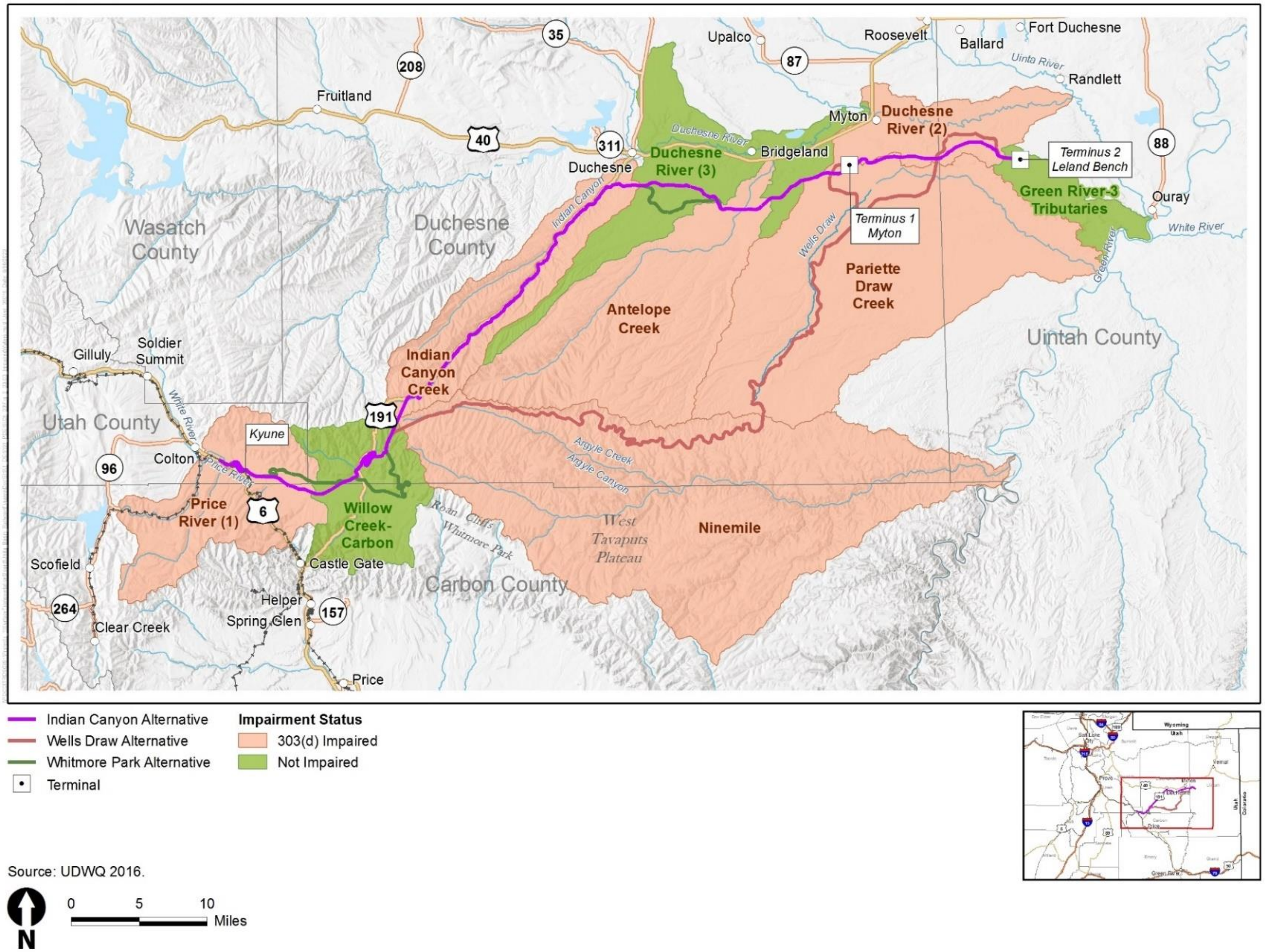
[c] The Duchesne River basin is split into four assessment basins. Duchesne River Assessment Basin 2 is from the confluence with Uinta River to Myton. Assessment Basin 3 is from Myton to Strawberry River confluence.

[d] The Utah 303(d) list does not extend to those waters that are within Indian country, as defined in 18 U.S.C. Section 1151 (USEPA 2018a).

Source: UDWQ 2016

OE = Observed versus Expected; TDS = Total Dissolved Solids; E. coli = Escherichia coli, a bacteria indicator species

Figure 3.3-3. Impaired Surface Waters



3.3.2.2 Floodplains

Floodplains are defined as any land area susceptible to being inundated by waters from any source (44 C.F.R. § 59.1) and are often associated with surface waters and wetlands. Floodplains are valued for their contribution to natural flood and erosion control, enhancement of biological productivity, and socioeconomic benefits and functions. For human communities, however, floodplains can be considered a hazard area because buildings, structures, and properties located in floodplains can be inundated and damaged during floods.

Mapped Floodplains and Flood-Prone Soils

FEMA has mapped approximately 87,086 acres of 100-year floodplains throughout the watershed study area. The agency has not mapped large areas of the watersheds, including nearly all of Duchesne County. Based on NRCS soils data, approximately 146,995 acres of flood-prone soils are mapped throughout the watershed study area. Table 3.3-6 summarizes FEMA-mapped floodplains and NRCS-mapped flood-prone soils in the field survey study area along the Action Alternatives.

Table 3.3-6. Acres of Floodplains in the Field Survey Study Area by Action Alternative

Action Alternative	FEMA-mapped 100-Year Floodplains (acres)	NRCS-mapped Flood-prone Soils[a] (acres)
Indian Canyon	1.40	1,305
Wells Draw	3.19	218
Whitmore Park	46.14	1,277

Notes:
[a] Flood-prone soils include soils with flood classifications of *very rare*, *rare*, *occasional*, *frequent,* and *very frequent*.
Sources: FEMA 2020; NRCS 2019a

Streambank flooding and overbank flooding are examples of typical types of flooding that could occur along mapped floodplains in the field survey study area. Most natural streams follow a channel that has developed over a long period of time and have the capacity to carry water flow collected in the watershed to the point where it discharges into another water body (e.g., larger stream, lake). During intense rains over short periods of time or periods of snowmelt, streams could collect more water than the channel can handle, and the water is forced out over the river or streambank, temporarily inundating adjacent land (Utah Floodplain and Stormwater Management Association, no date; National Weather Service, no date). Streambank flooding could also occur when debris or ice accumulates in a stream channel and creates a debris dam, backing water up and forcing it out of the channel (Utah Floodplain and Stormwater Management Association no date). Peak runoff on streams in the field survey study area is normally due to snowmelt. For example, discharge data indicate that peak runoff from the Strawberry and Duchesne Rivers and Indian Canyon Creek usually occurs in May or June (FEMA 1988).

Cloudburst Floods and Mud-Rock Flows

Cloudburst[6] floods are common to the southern part the Colorado River basin in Utah, which includes the study areas for surface water. Although cloudburst storms could occur on many days in

[6] Cloudbursts are commonly used to designate a torrential downpour of rain, which by its spottiness and relatively high intensity, suggests the discharge of a whole cloud at once. Associated with thunderstorms, cloudbursts are

one season and could be distributed over a rather wide area, the high-intensity rainfall is limited to very small areas, often less than 1 square mile. Some drainage basins are subject to more cloudburst floods than others in the same general locality because of physical features (e.g., topography, vegetation cover), and other contributing factors. The probability of a cloudburst or high-intensity rainfall recurring in the same small drainage area during consecutive years is unlikely. A cloudburst flood could occur with or without producing a mud-rock flow.[7] Although mud-rock flows could be associated with cloudburst floods, the presence of certain soil conditions is required to produce them. Because of infrequent observation of these flows, it is difficult to estimate the probable recurrence interval of cloudburst floods at any given site (USGS 1962).

Cloudburst floods have occurred historically in the study area. The USGS historical cloudburst study of Utah identified four cloudburst floods between 1939 and 1969 along Indian Canyon Creek (USGS 1972 in FEMA 1988) that caused damage downstream near Duchesne, primarily to the bridge on State Highway 33 (now US 191) entering the city. An older USGS study (1946) documented a cloudburst flood in Indian Canyon on September 9, 1938, that resulted in a "highway covered with debris," presumably US 191, which also runs through Indian Canyon. Cloudburst storms in this region occur primarily in late summer and fall (FEMA 1988).

3.3.2.3 Wetlands

Wetlands are important features in the landscape that provide numerous beneficial services or functions. Some of these include protecting and improving water quality, providing fish and wildlife habitats, storing floodwaters, providing aesthetic value, ensuring biological productivity, filtering pollutant loads, and maintaining surface water flow during dry periods. NWI has mapped approximately 66,027 acres of wetlands throughout the watershed study area, including 51,102 acres of palustrine emergent wetlands and 14,925 acres of palustrine forested/shrub wetlands (USFWS 2019). Many of these wetlands are found adjacent to streams and rivers in valley bottoms and in flat areas, such as the Basin. The *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin Classification) defines the following classes of wetlands (Cowardin et al. 1979).

- **Palustrine Emergent wetlands (PEM).** Emergent wetlands are characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. This vegetation is present for most of the growing season in most years. These wetlands are usually dominated by perennial plants.
- **Palustrine Forested wetlands (PFO).** Forested wetlands are characterized by woody vegetation that is 20 feet tall or taller.
- **Palustrine Scrub-shrub wetlands (PSS).** Scrub-shrub wetlands are dominated by woody vegetation less than 20 feet tall. The species include true shrubs, young trees (saplings), and trees or shrubs that are small or stunted because of environmental conditions.

Field surveys conducted in 2019 identified three types of wetlands in the field survey study area: emergent marsh, wet-meadow, and scrub-shrub wetlands. Emergent marsh and wet meadows fall under PEM Cowardin Classification and scrub-shrub under the PSS Cowardin Classification. Table 3.3-7 summarizes the wetlands in the field survey study area.

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common in the hilly and mountainous districts of the western United States, including Utah. The resulting floods are often flashy and destructive (USGS 1946). Cloudbursts have been recorded in Utah for over a century and continue to be unpredictable events (Utah Division of Emergency Management 2019).

[7] Mud-rock flows are flows of mud, rock, debris, and water, mixed to a consistency similar to that of wet concrete.

Table 3.3-7. Wetlands in the Field Survey Study Area by Action Alternative (acres)

Wetland Type	Action Alternative		
	Indian Canyon	**Wells Draw**	**Whitmore Park**
Emergent marsh	0.57	16.21	0.57
Wet meadow	52.55	50.43	36.35
Scrub-shrub	11.64	6.67	8.83
Total	**64.76**	**73.31**	**45.75**

Indian Canyon Alternative

Wetland characteristics in the field survey study area for the Indian Canyon Alternative vary due to elevation, landscape position, soils, local hydrology, and land use. Wetland functions specific to the field survey study area include providing wildlife habitat, performing biochemical processes such as nutrient uptake, stabilizing channel edges to reduce sedimentation, attenuating peak flooding, and trapping sediments during flooding. The extent of these functions varies by wetland characteristics, including whether the wetland's condition is good or degraded.

Wetlands in the western end of the field survey study area for the Indian Canyon Alternative (milepost 0 to milepost 2.5) are common in low terraces along the Price River. These wetlands are primarily wet meadow and scrub-shrub wetlands that are supported by shallow groundwater associated with the Price River and are occasionally inundated by flood flows. Dominant plant species in these wet meadows include Nebraska sedge (*Carex nebrascensis*), clustered field sedge (*Carex praegracilis*), common spikerush (*Eleocharis palustris*), baltic rush (*Juncus arcticus*), and reed canarygrass (*Phalaris arundinacea*). Scrub-shrub wetlands are dominated by willow species (*Salix* sp.) with an herbaceous understory similar to wet meadow communities. These wetlands generally appear to be in good condition with relatively low cover by invasive species and little evidence of human disturbance. The existing rail line embankment, which abuts wetlands at some locations, is an exception to low disturbance characterization.

East of the Price River, wet meadows are relatively common along the high bench area and drainage slopes known as Emma Park (milepost 2.5 to about milepost 12). Relatively narrow wet meadows occur within multiple drainage channels. Most of these wetlands are hydrologically supported by intermittent flows through the drainages, and a few of these wetlands abut perennial channels. All of these drainages flow into the Price River. Some larger wet meadows near Emma Park Road appear to be located in a groundwater discharge zone. These wetlands are supported primarily by shallow groundwater, seeps, and springs. Dominant plant species in these wet meadows include Nebraska sedge, clustered field sedge, common spikerush, and baltic rush. The conditions of these wetlands range from moderately degraded to good; invasive plant cover is generally low, but most of these wetlands are degraded by livestock grazing, and several wetlands are bisected by Emma Park Road.

North of Emma Park adjacent to US 191 (milepost 12 to milepost 18), there are some low terrace wetlands along perennial streams and a few relatively small wetlands in hillslope drainages. The low terrace wetlands are scrub-shrub and wet-meadows wetlands primarily supported by shallow groundwater and by ponding due to beaver dams with some occasional inundation by stream surface flows. Dominant plant species in the wet meadows include Nebraska sedge, common spikerush, and baltic rush. Scrub-shrub wetlands are dominated by willow species with an herbaceous understory similar to the wet meadows. Wetlands in the hillslope drainages are wet meadows dominated by Baltic rush; these wetlands are supported by shallow groundwater, surface flows in drainage channels, and hillside seeps. Wetlands in this area are in good condition with little human disturbance and minimal invasive plant species cover despite the proximity of several wetlands to dirt roads and US 191.

In Indian Canyon (milepost 21 to about milepost 46), multiple relatively small low-terrace wetlands are located in the field survey study area along Indian Canyon Creek. These wetlands are primarily wet meadow and scrub-shrub wetlands supported by shallow groundwater associated with Indian Canyon Creek and are occasionally inundated by flood flows. A few relatively large wet meadows are located above Indian Canyon Creek's low terraces and appear to be supported by a combination of shallow groundwater and irrigation diversions or return flows. Some stream flows are impounded by beaver dams, which create alluvial dynamics to support wetlands. In addition, seeps were identified in some of the wet meadows. Dominant plant species in wet meadows include Nebraska sedge, common spikerush, and baltic rush. Scrub-shrub wetlands are dominated by willow species at moderate to higher elevations in the canyon, while dominant species at lower elevations include tamarisk species (*Tamarix* sp.), narrowleaf willow (*Salix exigua*), and Russian olive (*Elaeagnus angustifolia*). A few emergent marsh wetlands are also found in this area, and are dominated by Nebraska sedge, reed canarygrass, common reed (*Phragmites australis*), hardstem bulrush (*Schoenoplectus acutus*), and cattail (*Typha latifolia*). Apart from a few wetlands dominated by invasive species at lower elevations, most low terrace wetlands are in good condition, with the larger wet meadows moderately degraded by livestock grazing.

East of Indian Canyon (milepost 46 to milepost 80), wetlands are uncommon. A few wet meadow and emergent marsh wetlands appear to be associated with irrigation drainages and impoundments. The condition of these wetlands has been degraded by adjacent agricultural land use and relatively high cover by invasive plants (reed canarygrass and common reed).

Wells Draw Alternative

The wetland descriptions for the Wells Draw Alternative are the same as described for the Indian Canyon Alternative for the segment that is shared between the two Action Alternatives (milepost 0 to 19). Wetlands located toward the top of Argyle Canyon (milepost 21 to milepost 23) and wetlands located in the Myton Bench area (milepost 81.5 to milepost 89.5) are specific to the field survey study area. Low terrace wetlands are common along Argyle Creek, and most of these floodplain areas are augmented by beaver dams. Hillside seeps help support some of these wetlands. Scrub-shrub wetlands dominated by willow species are the most common wetland in this area. A few wet meadows are also present and are dominated by Baltic rush and Nebraska sedge. These wetlands are generally in good condition, though a dirt road parallels Argyle Creek and there are several culvert crossings in the area. No wetlands were identified between milepost 24 and milepost 81.5. Wetlands in the Myton Bench area (milepost 81.5 to milepost 89.5) are mostly associated with irrigation drainages that are mostly vegetated as emergent marsh wetlands. Adjacent to these emergent marshes are some wet meadows dominated by saltgrass (*Distichlis spicata*). Wetlands in the Myton Bench area appear to range from moderately degraded to good condition, and are variably affected by agricultural land uses and a cover of invasive plant species, especially common reed.

Whitmore Park Alternative

The Whitmore Park Alternative coincides with the Indian Canyon Alternative for much of its length, and the wetland descriptions are the same for these areas. A few additional wetlands were identified in the field survey study area for the Whitmore Park Alternative in the vicinity of Emma Park, where the study areas of the two alternatives diverge (milepost 5 to milepost 14). These wetlands are wet meadows similar in character and description as wet meadows described for the Indian Canyon Alternative. These wet meadows occur in relatively narrow drainage channels supported by intermittent flows and groundwater. Dominant plant species include Nebraska sedge, baltic rush, common spikerush, and clustered field sedge (*Carex praegracilis*). Conditions range from moderately degraded to good. Invasive plant cover is generally low, but most of the wet meadows are degraded by livestock grazing.

3.3.2.4 Groundwater

Groundwater is subsurface water that saturates the pores and cracks in soil and rock and is transmitted via geologic layers called aquifers. Aquifers are natural reservoirs that collect and store water that comes from precipitation, snowmelt runoff, and streamflow. A sole-source aquifer is defined by USEPA as an aquifer that supplies at least 50 percent of the drinking water consumed in an area overlying the aquifer (USEPA 2018b).

Groundwater Use

An estimated 31 million acre-feet of groundwater is stored in the upper 100 feet of saturated material in aquifers of the Basin (UDWR 1999). The principal aquifer (and shallowest aquifer nearest the proposed rail line) that comprises the groundwater study area is the Uinta-Animas aquifer in the Basin. The Uinta-Animas aquifer is present in water-yielding beds of sandstone, conglomerate, and siltstone of the Duchesne River and Uinta Formations. Water-yielding units in the aquifer commonly are separate from each other and from underlying aquifers by units of low permeability composed of claystone, shale, marlstone, or limestone (USGS 1995).

Natural discharge and recharge rates in the Basin are approximately equal and the rate of groundwater withdrawals is small (USGS 1995). Groundwater recharge to the Uinta-Animas aquifer generally occurs in areas of higher altitude along the margins of the Basin, especially along the northern margin of the Basin, which is outside the location of the proposed rail line. This is because more water, particularly in the form of precipitation, is available to enhance the recharge in the Uinta Mountains than is available to the much lower upland areas at the southern edge of the Basin (UDWR 1999).

Groundwater is discharged mainly to streams and springs and by transpiration from vegetation growing along stream valleys. It could also discharge through groundwater wells and by upward and downward leakage into overlying and underlying geological formations (USGS 1995; UDWR 1999). In some areas adjacent to active stream channels and below floodplains, groundwater can be discharged to streams from localized stream channel aquifers; this discharge can be critical to supplying late-season stream flow and late-season water for wetlands. The total annual estimated recharge of 630,000 acre-feet per year (AFY) includes precipitation infiltration (600,000 AFY), irrigation water infiltration (20,000 AFY), and return flow from wells and springs (10,000 AFY) (UDWR 1999, 2016). The total annual estimated discharge of 630,000 AFY includes transpiration (246,000 AFY), seepage to streams and discharge to springs (363,000 AFY), and well withdrawal (21,000 AFY); subsurface inflow and outflow in the Basin is considered to be negligible (UDWR 1999).

The Uinta-Animas aquifer water table extends as deep as 500 feet below land surface, with shallower or near surface water tables occurring in valleys in areas of groundwater discharge. The water table is generally furthest from the surface in highland areas that are remote from streams or other sources of recharge (USGS 1995). West of the Green River, groundwater primarily flows toward the central part of the Basin to the discharge area along the Strawberry and Duchesne Rivers (USGS 1995).

Groundwater use in the study area has been developed primarily for municipal and industrial uses (UDWR 2016). According to the Utah Division of Water Resources (UDWR) (2016), use of groundwater resources in the study area has been limited for several reasons:

- Existing surface water sources have been adequate to meet the demands imposed for irrigation and municipal and industrial needs.
- The consolidated aquifers generally have hydraulic properties that preclude large-scale groundwater development.
- The quality of the groundwater in some areas is unsuitable for domestic, municipal, or agricultural use.
- The cost of drilling and pumping water from deep aquifers is prohibitive.

Total groundwater withdrawals from wells and springs in the study area are estimated at 21,060 AFY, including for 10,290 AFY for municipal water supply, 7,000 AFY for power production, 3,000 AFY for mining (3,000 AFY), and 770 AFY for oil production (UDWR 1999, 2016).

The Utah Division of Water Rights (UDWRi) administers the appropriation and distribution of the state's water resources, including groundwater, and is the office of public record for information pertaining to water rights. Table 3.3-8 summarizes the UDWRi records of groundwater use in the study area. UDWRi data records water rights for 5,010 wells and 232 springs in the study area (UDWRi 2020); these numbers are less than the totals for the water rights shown in Table 3.3-8 because wells and springs can have more than one reported use.

Table 3.3-8. Groundwater Use in the Study Area

Groundwater Use	Wells[a]	Springs
Domestic	2,878	60
Irrigation	2,575	56
Municipal	184	12
Power	39	0
Stock watering	2,196	176
Mining	6	0
Other[b]	732	37

Notes:

The table includes water rights that have been approved or are in use. The table does not include nonproduction wells; these wells are typically described as monitoring or testing wells in the water rights database. Table does not include the 14 springs identified by ground surveys in the combined Action Alternative field survey study area, as they may not be associated with water rights.

[a] Wells include wells, tunnels, sumps, and undergrounds drains.

[b] Not defined in the database.

Source: UDWRi 2020

Groundwater Quality

The Utah Groundwater Quality Protection Program classifies groundwater quality into four classes based on Total Dissolved Solids (TDS) concentration and contaminant concentration (Table 3.3-9). In general, any groundwater with a TDS concentration of less than 10,000 milligrams per liter (mg/l) with no or limited contaminant exceedances is considered useable (Class I, II, and III); groundwater with higher concentrations greater than 10,000 mg/l is considered unusable (Class IV). The Federal Safe Drinking Water Act regulations also consider the 10,000 mg/l concentration as a useable groundwater threshold; they define an Underground Source of Drinking Water as an aquifer or portion of aquifer that supplies any public water system, or contains a sufficient quantity of groundwater to supply a public water system and currently supplies drinking water for human consumption or contains fewer than 10,000 mg/l of TDS (40 C.F.R. § 144.3).

Table 3.3-9. Utah Groundwater Classes

Class	Description
Class I	**Class IA (Pristine Groundwater):** TDS less than 500 mg/l; no contaminant concentrations that exceed groundwater quality standards.[a] **Class IB (Irreplaceable Groundwater)**: A source of water for an existing community public drinking water system for which no reliable or comparable water quality and quantity is available because of economic or institutional constraints. **Class IC (Ecologically Important Groundwater):** A source of groundwater discharge important to the continued existence of wildlife.
Class II	**Drinking Water Quality groundwater:** TDS greater than 500 mg/l and less than 3,000 mg/l; no contaminant concentrations that exceed groundwater quality standards.[a]
Class III	**Limited Use Groundwater:** TDS is greater than 3,000 mg/l and less than 10,000 mg/l; one or more contaminants that exceed groundwater quality standards.[a]
Class IV	**Saline Groundwater:** TDS greater than 10,000 mg/l.

Notes:

[a] Utah groundwater quality standards can be found at Utah Administrative Code Rule R317-6-2, *Groundwater Quality Standards*.

Source: UDEQ 2019a

TDS = Total Dissolved Solids; mg/l = milligrams per liter

Groundwater quality classification of an aquifer under the Utah Groundwater Quality Protection Program requires a person to petition the Utah Water Quality Board. To date, there have been no petitions submitted to the Utah Water Quality Board for the aquifers in the study area (UDEQ 2019b). However, most groundwater in the study area is acceptable for use in municipal, industrial, and agricultural operations with only a few restrictions in isolated areas of poorer quality (UDWR 1999). The groundwater TDS concentrations of the entire Uinta-Animas aquifer in the Basin range between 25 mg/l in the Uinta Mountains Group and 178,200 mg/l found in the Green River Formation. However, TDS concentrations for most areas generally range from 500 to 3,000 mg/l, which would be considered Class II under Utah's groundwater classification system. Smaller TDS concentrations are prevalent near recharge areas and larger dissolved solids concentrations are more common near discharge areas (USGS 1995). The overall chemistry of the groundwater changes as it moves from higher recharge areas toward the deeper central part of the Basin (UDWR 1999). Most groundwater pollution in the study area is from natural geological sources such as the Green River and Wasatch Formations (UDWR 1999).

3.3.3 Environmental Consequences

Construction and operation of the proposed rail line could result in impacts on water resources, including surface waters, floodplains, wetlands, and groundwater. This subsection first presents the potential impacts that would be the same for all three Action Alternatives and then compares the potential impacts that would be different for each Action Alternative. For comparison purposes, this subsection also describes water resources under the No-Action Alternative. Section 3.4, *Biological Resources*, addresses impacts on fish species associated with water resources in the study area.

3.3.3.1 Impacts Common to All Action Alternatives

Surface Waters

Surface water impacts could result from construction and operation of the proposed rail line through vegetation removal, excavation, fill placement, use of equipment, and installation of surface water crossing structures (i.e., culverts and bridges). Construction and operation could result in both physical and chemical alteration of surface waters crossed by or adjacent to the proposed rail line. Potential physical alterations could include changes in sediment transport and deposition, modification of channel configuration and shape, and streamflow characteristics (e.g., volume/velocity). Potential chemical alterations from the release of pollutants into surface waters could affect water quality. The extent of physical and chemical impacts would depend on specific construction activities and their proximity to surface water, which would be determined in the final design stage of project planning. The intensity of impacts on surface water would vary between the Action Alternatives depending on the number of surface water crossings, number of bridges and culverts, number of stream realignments, presence of easily erodible soils, and presence of impaired surface waters. While the impact types and mechanisms described in this section apply to all surface water types, the potential impacts on surface waters with little or no annual flow may not be as immediate or to the same extent compared to surface waters with perennial or more frequent flows. For example, ephemeral streams are typically dry most of the year (i.e., no flow), and any construction that would occur during those dry periods would not affect flow or water quality at the time of construction, although potential impacts may occur at a later time if a precipitation event initiates temporary stream flow. The ecological and hydrological significance of ephemeral streams or streams with intermittent flows in a watershed context is well documented (e.g., USEPA 2008), but the extent of potential construction and operation impacts of the proposed rail line on these surface waters may be different than perennial streams or streams with more frequent flows.

OEA understands that the Coalition would design the proposed rail line to meet or exceed local, state, federal, and railway standards for the design of surface water crossings. The Coalition would design all culverts and bridges to clear the predicted 50-year flood event water elevation without causing a backwater increase and the predicted 100-year flood event with no more than a 1-foot backwater increase. The Coalition intends to design the proposed rail line so that existing stormwater drainage patterns would not be impeded significantly and to avoid risk of damage to the proposed rail line infrastructure (e.g., drainage impediments that would cause washouts along the rail line). The Coalition also intends to obtain a CWA Section 404 permit for any proposed filling of jurisdictional surface waters. CWA Section 404 requires that all appropriate and practicable steps be taken first to avoid and minimize impacts on aquatic resources; for unavoidable impacts, compensatory mitigation is required to replace the loss of surface waters. In assessing the potential impacts on surface waters, OEA assumed that the Coalition would implement these design and regulatory standards.

Construction

Surface Water Hydrology

Clearing, excavation, and fill-placement activities would expose soil and construction materials (e.g., subballast) to the erosive forces of wind, rain, and surface runoff. This exposure would increase sediment, erosion, and the potential for material to be transported to surface waters during rainstorms or snowmelt. Introduction of increased sediment loads to a stream system could change the sediment deposition and transport characteristics of that system, resulting in potential changes in downstream channel morphology, including a reduction in channel sinuosity,[8] increased channel gradient, and reduced pool depth (USEPA 2007).

Depending on the time of year and the level of water flow, culvert and bridge installation could require surface water alterations during construction, including temporary channel blockage or stream rerouting to isolate in-water worksites, channel straightening to achieve the proper culvert or bridge approach alignment, channel and streambank excavation and fill placement for culvert installation and bridge abutment construction, placement of bridge pilings, and placement of engineered streambank structures for erosion protection. Such activities could temporarily alter stream configuration and hydraulics, resulting in higher discharge velocities. This could cause increased streambed erosion and sediment loads, changes to stream structure, and increased transport of nutrients and other pollutants (USEPA 2007). These potential impacts would be temporary (lasting for the duration of construction) and would occur locally around the culvert and bridge installation sites.

To minimize impacts on surface water hydrology, OEA is recommending mitigation requiring the Coalition design culverts and bridges so as to maintain existing surface water drainage patterns, flow conditions, and long-term hydrologic stability and design project-related supporting structures, such as bridge piers, to minimize scour (sediment removal) and avoid increased flow velocity, to the extent practicable (WAT-MM-1, WAT-MM-2, WAT-MM-4). In addition, to minimize effects on surface water flow, the Coalition has proposed voluntary mitigation that would commit the Coalition to constructing stream crossings during low-flow periods, when practical (VM-30). These mitigation measures would minimize the impact of construction activities on surface water hydrology, but some impacts would be unavoidable.

Stream Channel Realignment

Construction of any of the Action Alternatives would involve realigning stream channels. These stream realignments would occur in areas where the proposed rail line would parallel a stream and topography, existing infrastructure (e.g., highways), or rail line design standards (e.g., curvature ratio) would make it impossible to avoid the stream. Stream realignments would involve filling and abandoning segments of the stream and moving the stream channel to maintain hydrologic connectivity and stream flow. The stream realignment process typically involves designing and constructing the new stream channel prior to placement of permanent fill in the existing stream. Once construction of the new channel is completed, flow is diverted into the new channel by blocking flow into the existing stream channel. After flow is established in the new channel, the

[8] Sinuosity refers to how much a stream or river meanders across the landscape.

original stream is permanently filled and any stream segment outside of the rail line footprint would likely be abandoned up to the point where the new stream channel was created. If improperly designed, realigned stream channels can present a set of physical and ecological issues. Primary changes to the channel dimensions (including length/sinuosity) and materials, alongside changes to flow velocity or channel capacity, can lead to various problems, such as heightened erosion or deposition, changes in geomorphology and sediment transport dynamics downstream, hanging tributaries, vegetation loss, water quality issues, and associated ecological impacts (Flatley et. al. 2018). OEA is recommending mitigation requiring the Coalition design all stream realignments in consultation with the Corps as part of the CWA Section 404 permit compensatory mitigation plan development to ensure that affected stream functions are adequately mitigated (WAT-MM-3). In addition, the Coalition has proposed voluntary mitigation that would commit the Coalition to relocating streams using bioengineering methods and obtaining stream alteration permits (VM-29, VM-31). These mitigation measures would offset the impact of stream realignments, but some impacts would be unavoidable.

Water Quality Degradation

Clearing, excavation, and fill placement to construct the proposed rail line could degrade water quality through the erosion and transport of sediment to surface waters. Surface waters that would be crossed by the proposed rail line as well as downstream receiving surface waters would be the most directly affected. Sediment deposition into surface waters can affect water quality by increasing turbidity, which can then directly affect aquatic species and habitats, and limit the beneficial use of surface waters (e.g., recreation). Turbidity can decrease light penetration and lead to higher water temperatures because darker sediment particles absorb more heat from solar radiation, and higher water temperatures can decrease dissolved oxygen levels (USEPA 2007). Sediment deposition into surface waters can also increase pollutant and nutrient levels (e.g., phosphorous), which can alter water quality conditions. For example, excess nutrients in surface water could enhance the growth of algae, which can affect the availability of oxygen in water.

Construction would require the use of construction equipment and common construction materials (e.g., paint, concrete) that may affect water quality. The use of construction equipment could result in accidental spills or leaks of petrochemicals (e.g., gasoline, hydraulic fluids) directly into surface waters or onto the ground surface, which could reach surface waters if not contained and cleaned up. Although the risk of a major spill and contamination of surface waters is low, accidental spills of petrochemicals and construction materials could degrade surface water quality, which could adversely affect aquatic habitat or limit the beneficial use of waters (e.g., recreation). Because there are no municipal drinking water facilities in the vicinity of the project footprint, construction activities would not affect these facilities or the water used by these facilities.

Although the degradation of water quality in surface waters could occur during construction, this impact would be temporary. Any turbid surface waters caused by construction activities would return to baseline conditions once the fine sediment material settled. To minimize construction-related impacts, the Coalition has proposed voluntary mitigation that would commit the Coalition to obtaining a Section 401 water quality certification and a National Pollutant Discharge Elimination System (NPDES) permit[9] from prior to beginning construction (VM-19, VM-21, VM-26). These

[9] NPDES is the permit system mandated by Clean Water Act Section 402 to control pollutants in waters of the United States. With the exception of Tribal trust lands, the U.S. Environmental Protection Agency (EPA) has

permits would involve developing and implementing a stormwater pollution prevention plan (SWPPP) to prevent sediment and other contaminants from entering surface waters. The 401 water quality certification, SWPPP, and NPDES permit conditions would contain site-specific measures to avoid and minimize erosion and sedimentation and petrochemical spills that could cause water quality impacts. In addition, to minimize impacts on water quality, OEA is recommending mitigation requiring the Coalition minimize soil compaction, implement erosion prevention and sediment control best management practices, implement runoff control and conveyance best management practices, and remove construction debris in surface waters (WAT-MM-5, WAT-MM-6, WAT-MM-8). Therefore, with the permit protections and OEA-recommended mitigation, OEA does not expect long-term impacts on water quality from construction activities. Because mitigation would minimize impacts on water quality during construction and because those impacts would occur in surface waters immediately adjacent to the proposed rail line, impacts on water quality downstream of the proposed rail line or in surface waters outside of the immediate vicinity of the proposed rail line would not be significant.

Water Quality in Section 303(d)-Listed Impaired Assessment Units

Any of the Action Alternatives would cross Section 303(d) impaired assessment units (Figure 3.3-3). Two of the assessment units—Duchesne River (2)[10] and Pariette Draw Creek—have TMDLs developed for the identified surface water impairments (Table 3.3-5). A TMDL is the maximum amount of a pollutant a surface water can receive without violating water quality standards. The remaining Section 303(d) impaired assessment units do not have TMDLs developed for the impairments identified. Impacts on impaired surface waters from construction would be the same as those described previously for all surface waters and would include impacts related to erosion and sedimentation and contaminant spills. However, as described in *Water Quality Degradation*, the Coalition would develop a SWPPP and obtain an NPDES permit to ensure water quality standards for all surface waters, including Section 303(d) impaired waters (with or without TMDLs), are not exceeded. The Coalition would also obtain a Section 401 water quality certification from UDWQ before issuance of a Section 404 permit and an NPDES permit. The SWPPP, NPDES permit conditions, and Section 401 water quality certification conditions would contain site-specific measures to avoid and minimize water quality impacts, including impacts on Section 303(d)-listed impaired waters. If those conditions are implemented, OEA does not expect construction to result in long-term impacts on Section 303(d)-listed impaired waters.

Operations

Surface Water Flows

During rail operations, culverts and bridges would continue to alter channel hydraulics because both types of crossing structures would confine the flow, which could increase flow velocity (USEPA 2007). This could result in increased channel scour and erosion processes, which could lead to increased sediment loads and downstream sedimentation. Impacts caused by increased flow velocity from culverts and bridges would most likely continue until dynamic equilibrium in the

delegated authority to issue NPDES permits to the state of Utah, referred to as Utah Pollutant Discharge Elimination System (UPDES) permits. On Tribal trust lands, EPA retains authority to issue NPDES permits. NPDES refers to both UPDES and NPDES permits in this section.

[10] The Duchesne River basin is split into four assessment basins. Duchesne River Assessment Basin 2 is from the confluence with Uinta River to Myton.

stream channel is reestablished. Dynamic equilibrium refers to the natural balance that a stream maintains in terms of such characteristics as sediment size and volume, stream slope, and discharge. The installation of a culvert or bridge can disrupt the equilibrium of a stream, which triggers a process of stream adjustments and self-correcting mechanisms in order to reestablish the balance (Vermont Department of Environmental Conservation 2011). During operations, deposits of soils and debris could obstruct culverts and bridges and block flows. Such obstructions would reduce the capacity of the culvert or bridge to convey water and could lead to increased flooding near the culvert or bridge crossing.

During operations, realigned streams would continue to alter flow velocity or channel capacity, potentially leading to continued heightened erosion or deposition, and changes in geomorphology and sediment transport dynamics downstream. This would likely continue until dynamic equilibrium in the stream channel is established. OEA is recommending mitigation requiring the Coalition design all stream realignments in consultation with the Corps as part of the CWA Section 404 permit compensatory mitigation plan development to ensure that affected stream functions are adequately mitigated (WAT-MM-3). In addition, the Coalition has proposed voluntary mitigation that would commit the Coalition to relocating streams using bioengineering methods and obtaining stream alteration permits (VM-29, VM-31). These mitigation measures would offset the impact of stream realignments, but some impacts would be unavoidable.

OEA is recommending mitigation requiring the Coalition design culverts and bridges to maintain existing surface water drainage patterns, to the extent practicable, and to regularly inspect all project-related stream crossings during rail operations to ensure that those crossings are clear of debris that could cause flow blockages, flow alteration, or increased flooding (WAT-MM-1, WAT-MM-10). These mitigation measures would minimize the impact of culverts and bridges on surface water hydrology, but some impacts would be unavoidable.

Water Quality Degradation

Operation and maintenance activities could result in water quality impacts on surface waters. Stormwater runoff from the railbed and access road surface could transport fine-grained sediments and other pollutants from trains and maintenance vehicles into surface waters where they could alter water chemistry. Fugitive dust generated by rail operation and maintenance vehicles could also affect water quality by depositing fine sediments into surface waters. Maintenance associated with tracks, access roads, ditches, bridges, culverts, and other rail infrastructure could disturb the ground surface, require the use of chemicals (such as herbicides), or result in petroleum leaks and spills from maintenance vehicles and equipment. Such impacts typically would be limited to those portions of the proposed rail line that are near surface waters.

Rail operation could also deposit pollutants into surface waters. One of the most common types of pollutants connected with railway transport are polycyclic aromatic hydrocarbons (PAHs) (Wilkomirski et al. 2011). PAHs have middling to high toxicity impacts on aquatic life and tend to bioaccumulate in the aquatic food chain (Igwe and Ukaogo 2015). PAHs occur naturally throughout the environment in the air, water, and soil but can also be manufactured. PAHs are found in substances such as asphalt, oil, coal, and creosote (U.S. Department of Health and Human Services 1995), and can be found in the diesel fuel, oils, grease, and other fluids required for the operation and maintenance of railroad locomotives and rail cars. These fluids could drip or leak directly into surface waters through the openings on bridges and trestles, and could also be deposited onto the rail bed where they could be exposed to precipitation and storm flows that could carry them into adjacent surface waters. Most PAHs do not dissolve easily in water; they stick to solid particles and settle at the bottom of surface waters (U.S. Department of Health and Human Services 1995). Breakdown of PAHs in water generally takes weeks to months and is caused primarily by the actions of microorganisms (U.S. Department of Health and Human Services 1995). Any releases of PAHs associated with fluids for operating the proposed rail line could degrade surface water quality in the immediate vicinity of the rail line.

During operations there is a risk of rail-induced wildfires and potential soil erosion and landslides from burned areas that could result in water quality impacts. Impacts related to wildfire risk are addressed in Section 3.4, *Biological Resources*, which shows that most areas along the Action Alternatives have low wildfire risk and that rail-induced fires make up a small percentage of wildfire causes. (Landslides are addressed in Section 3.5, *Geology, Soils, Seismic Hazards, and Hazardous Waste Sites*.) The impact of a wildfire would depend on the location, the size of the area burned, precipitation regime, and season. Because fires result in removal of vegetation cover, most precipitation that falls in the burned area is converted to surface flow and moves unimpeded downslope, which can produce large amounts of sediment, ashes, and other chemical contaminants that can affect water quality (Tecle and Neary 2015).

During consultation leading to the issuance of this ~~Draft~~ EIS, some stakeholders in the field survey study area expressed concern that ground-borne vibration from trains could result in loosening and erosion of soils that could deposit in surface waters. As described in Section 3.6, *Noise and Vibration*, train-generated ground vibration is relatively low, and the damage contour for buildings extend only 5 feet from the rail line. Therefore, while soil settlement could occur due to vibration, vibration impacts would be extremely localized and any potential water quality impacts would be negligible.

To address these potential impacts, OEA is recommending mitigation requiring the Coalition implement best management practices to convey, filter, and dissipate runoff from the proposed rail line, which could include vegetated swales, vegetated filter strips, streambank stabilization, and channelized flow dissipation (WAT-MM-9). In addition, OEA is recommending geotechnical investigation to identify potential areas of mass movement or slumping and to implement engineering controls to avoid mass movement or slumping (GEO-MM-2). If those measures are implemented, OEA expects that rail operations would not significantly affect surface water quality. Because mitigation would minimize impacts on water quality during rail operations and because those impacts would occur in surface waters immediately adjacent to the proposed rail line, impacts on water quality downstream of the proposed rail line or in surface waters outside of the immediate vicinity of the proposed rail line would not be significant.

Accidents and Spills of Hazardous Materials

The Coalition anticipates rail traffic on the proposed rail line would primarily consist of trains transporting crude oil and frac sand. Train accidents or derailments could cause train~~tanker~~ cars to rupture or overturn and spill crude oil or frac sand into the environment. The Coalition has also indicated that the other products could move on the rail line, though the volume of these products would be very low. Therefore, OEA is not analyzing accidents and spills of those products in detail. Section 3.2, *Rail Operations Safety*, discusses the probability of rail accidents. Factors in determining the potential impact from such an incident include the crude oil and frac sand properties and the probability of a train accident or derailment occurring.

Uinta Basin black and yellow crude oils are waxy crude oils that have a wax content higher than most North American crude oils. The oil does not flow at room temperature and must be heated at higher temperatures for it to flow. Because of this characteristic, the oil, if spilled onto land, tends to not disperse, and if spilled in water, tends to form globules of semisolid material that lock it in place. UDEQ documented an oil spill incident (July 12, 2018) and cleanup effort where a tanker truck spilled 1,000 gallons of crude oil that reached the Price River in Carbon County (UDEQ 2018, 2019c). Due to the oil's properties, as the crude oil spilled onto the road surface, it began to harden, so a smaller amount entered the river. Once the oil reached the river, instead of forming a giant slick on the water surface, the oil solidified and formed floating chunks that were easily removed by hand and with assistance from a boom that captured the oil chunks. Sampling of public drinking water supply intakes downstream of the spill showed no exceedances of drinking water standards. In the report for this spill (UDEQ 2019c), UDEQ stated that Uinta Basin crude oil has been described as "cleanup friendly" and that "thanks to the nature of the crude oil, most of these spills can be easily cleaned up afterward." A similar incident occurred in the Provo River in 2015 with similar results (CUWCD 2015, 2016; Orvis News 2015). As with most crude oils, Uinta Basin crude oil is toxic, and an accidental release would have negative effects on the environment. Waxy crude oil may persist in the environment for a longer time relative to other non-waxy crude oil (Boufadel et al. 2015). However, the oil's other properties would help reduce the potential impact and make cleanup easier than with most crude oils, which would help to avoid or minimize the long-term chronic effects from typical crude oils that would spread out over large areas as giant slicks in the event of a spill.

Rail traffic on the proposed rail line would also consist of trains transporting frac sand. Frac sand is a naturally occurring, highly pure silica sand, with rigorous physical specifications, that is used during hydraulic fracturing of oil and gas wells (USGS 2015). The physical properties of frac sand are quite specific and include high silica content, homogeneous grain size, high sphericity and roundness, high crush resistance, low solubility, and low turbidity (USGS 2015). If a train accident were to occur and result in a release of frac sand that were to reach a surface water, there would be little, if any, toxic effects because frac sands are naturally occurring and have low solubility. The other potential effects could include turbidity and smothering of aquatic habitats. Because low turbidity is a property of frac sand, due to the extensive washing away of sediments during processing, there would be little impact on water quality from turbidity. The physical presence of frac sand in a surface water could result in a complete loss of aquatic habitat until cleanup is completed. Frac sand deposited in a stream could also affect stream channel configuration and hydraulics, which could result in altered discharge velocities, thus, affecting streambed erosion, sediment loads, and stream structure.

The potential environmental impact of crude oil or frac sand being transported on the proposed line would depend on a train accident or derailment occurring and if the accident or derailment were severe enough to result in a rupture and release of crude oil or frac sand. Based on train accident and derailment modeling in Section 3.2, *Rail Operations Safety*, operation of any of the Action Alternatives would yield a small number of predicted accidents per year, with roughly one accident involving a loaded train every 3 to 10 years, depending on the alternative, and only a quarter of those would be expected to have any release. The Coalition has also proposed voluntary mitigation measures to minimize potential impacts related to spills of crude oil. These measures include a commitment to preparing a hazardous materials emergency response plan; complying with applicable regulations and tribal ordinances related to the safe and secure transportation of hazardous materials; and notifying appropriate federal, state, and tribal environmental agencies as required under federal, state, and tribal law in the event of a reportable spill (VM-11, VM-12, VM-13, VM-14, VM-15).

Floodplains

Impacts on floodplains and flood flows could result from construction and operation of the proposed rail line, potentially resulting in changes in floodplain capacity and diversion of flows, constriction of flows, and reduced floodwater retention. The extent of such impacts would depend on the specific activity and its proximity to floodplains, which would depend on the final design characteristics of the Action Alternative that is authorized and built. The intensity of impacts on floodplains would vary depending on the floodplain area affected by construction. The Coalition has indicated that the proposed rail line would be designed to meet the requirements of the local county floodplain ordinances and codes. The Coalition would build all culverts and bridges to clear the predicted 50-year flood event water elevation without causing a backwater increase and the predicted 100-year flood event with no more than a 1-foot backwater increase. Any part of the proposed rail line within FEMA-mapped 100-year floodplains would be designed to meet the required floodplain development regulations. The following potential floodplain impacts should be considered taking into account these regulatory requirements and design standards.

Construction

Storage Capacity and Flows with Fill Placement

Any of the Action Alternatives would cross FEMA-mapped 100-year floodplains and NRCS-mapped flood-prone soils, and construction would involve placing fill in these areas. The proposed rail line and road relocations would either cross a stream and floodplain perpendicularly or would run parallel to and encroach on a floodplain along a stream. Placement of fill in a floodplain can reduce the overall floodplain system storage capacity, resulting in an increase of flooding in areas that would normally not flood. Placement of fill material would also constrict flood-flow paths and increase floodwater elevation upstream of the constriction, resulting in a backup of floodwaters and potential upstream flooding. Placement of fill would redirect flood flows to existing channels, leading to channel erosion and the potential alteration of channel alignment. In the unlikely event that a construction staging area is needed in a floodplain, natural drainage patterns would be affected should a flood occur. This would block or divert flood flows, which would reduce flood capacity and increase flooding elevations.

The Coalition has proposed voluntary mitigation that would commit the Coalition to designing the proposed rail line in accordance with all FEMA or FEMA-approved local floodplain construction requirements and with a goal of not impeding floodwaters and not raising water surface elevations to levels that would change the regulated floodplain boundary (VM-32). This mitigation measure would minimize impacts of construction on floodplain storage capacity and flows, but some impacts would be unavoidable.

Flows with Bridge and Culvert Construction

Construction of bridges and culverts could affect floodplains and flood flows. Typically, bridge spans are supported by building up the edges of the streambank, installing bridge abutments, and setting the bridge on top. Similarly, placement of culverts requires building up to the edges of the streambank with fill as the proposed rail line approaches the culverts. Water flow during a flood is restricted at the culvert because of the artificially narrowed streambank. This restriction would result in two impacts: 1) water flow would back up behind the bridge or culvert and this ponded, slower moving water would lack the energy to move sediments, which would drop in the streambed, upstream of the structure, and 2) water flow would accelerate as it passes through the culvert in the narrow channel, which could increase the flow's erosive force downstream of the structure. These impacts could lead to changes in channel alignment, increased erosion, increased channel migration, and the potential for increased flooding upstream.

The diversion of stream flows during bridge and culvert construction could also affect floodplains and flood flows. Diversion would temporarily reduce channel capacity in the area of construction, leading to higher floodwaters in the surrounding areas. OEA's recommended mitigation measures (WAT-MM-1, WAT-MM-2, WAT-MM-4) regarding the design of bridges and culverts would minimize these potential impacts, but some impacts would be unavoidable.

Floodwater Retention

Clearing floodplain vegetation would impair a floodplain's ability to slow down, retain, and absorb floodwaters. Denser floodplain vegetation has a greater ability to retain floodwater flows. Vegetation removal could lead to increased downstream flood flows, sedimentation, channel erosion, and flooding. The areas of floodplain that would be cleared and maintained along the proposed rail line would be a small part of the total floodplain area in the watersheds. OEA is recommending mitigation requiring the Coalition minimize the area of temporary disturbance during construction and to remediate affected areas by promoting vegetation regrowth after construction is complete (WAT-MM-5). In addition, the Coalition has proposed voluntary mitigation that would commit the Coalition to minimizing ground disturbance and to revegetating temporarily disturbed areas (VM-16, VM-22, BIO-MM-16). If these mitigation measures are implemented, construction impacts on floodwater retention would be minimal.

Operations

Flood Dynamics

While most potential floodplain impacts would occur during construction, specifically, during filling and clearing activities, potential impacts on flood flows could occur from the presence of rail infrastructure. If placed in floodplains, culverts, stream realignments, the rail line embankment, and other permanent project-related features could change floodplain hydraulics, which could alter channel alignment and channel erosion. Channel stabilization measures, such as riprap, designed to protect the proposed rail line from channel migration, could increase channel migration upstream and downstream by altering flow velocities and erosive forces. If OEA's recommended mitigation measures related to the design of water crossings are implemented (WAT-MM-1, WAT-MM-2, WAT-MM-4), OEA expects that impacts on the floodplain system in the watersheds would be minimal.

Deposition of soils and debris from overland runoff and stream flows could obstruct culverts and block flows. Such obstructions would reduce the conveyance capacity of the culvert and lead to increased flooding near the culvert crossing. Obstructions could be of particular concern in the rare event of a cloudburst flood where high-intensity rainfall in a small area and over a short period of time could result in movement of debris and other ground material that could reach the proposed rail line and impede or block flows at culverts and bridges. If OEA's recommended mitigation related to the inspection and clearing of debris at water crossings is implemented (WAT-MM-10), OEA does not expect that significant impedance or blockage of flood flows from culvert or bridge obstructions would occur.

Accidents and Spills of Hazardous Materials

As stated under *Surface Waters, Accidents and Spills of Hazardous Materials,* train accidents or derailments could cause train~~tanker~~ cars to rupture or overturn and spill crude oil or frac sand into the environment. Oil or frac sand could spill from a train~~tanker~~ car onto a floodplain should a train accident or derailment occur in or near a floodplain. Cleanup and oil and frac sand removal would likely commence immediately, which would avoid changes to floodplain capacity. However, some permanent and temporary floodplain vegetation impacts could occur during cleanup, which could affect floodwater retention functions. The Coalition has proposed voluntary mitigation measures to minimize potential impacts related to spills of crude oil. These measures include a commitment to preparing a hazardous materials emergency response plan; complying with applicable regulations and tribal ordinances related to the safe and secure transportation of hazardous materials; and notifying appropriate federal, state, and tribal environmental agencies as required under federal, state, and tribal law in the event of a reportable spill (VM-11, VM-12, VM-13, VM-14, VM-15).

Wetlands

Construction of the proposed rail line would require clearing, excavating, and filling in the project footprint, which could result in the loss or alteration of wetlands and affect wetland habitat, water quality, and flood and storage capacity functions. Construction of the rail line would not directly affect wetlands adjacent to the project footprint but could result in indirect impacts, such as edge effects on wetland habitat, interruption or alteration of shallow groundwater flow from compaction of soil, or loss of or alteration of hydrology in wetlands that would be located partially adjacent to the project footprint (i.e., fragmentation). The extent of wetland impacts in and adjacent to the project footprint would depend on specific construction activities and their proximity to wetlands, which would be determined during the final design stage. The intensity would vary depending on the acreage of wetland that would be affected for each Action Alternative (Subsection 3.3.3.2, *Impact Comparison between Action Alternatives*). The Coalition intends to obtain a CWA Section 404 permit from the Corps, which would require the Coalition to take all appropriate and practicable steps to avoid and minimize impacts on wetlands; for unavoidable impacts, compensatory mitigation would be required to replace the loss of wetland and associated functions. The following impacts should be considered taking into consideration these regulatory requirements.

Construction

Wetland Habitat

Fill material placed in wetlands during construction would result in the permanent loss of wetlands, associated vegetation, and any habitat that the wetland provides for fish and wildlife. If a wetland were completely filled, these habitat functions would be lost entirely. If a wetland were partially filled and fragmented or if wetland vegetation were trimmed or cleared, vegetation and habitat would be altered and degraded. Any fragmentation or interruption of wetland habitat and vegetation could affect wildlife use of the wetland. Wetland habitat and vegetation could also be affected if the hydrology of the wetland system is altered by construction of the proposed railbed, which could result in wetland draining or ponding on either side of the rail or access road embankments, including wetlands adjacent to the project footprint. For example, if the railbed were built through the middle of a wetland, the interruption and fragmentation of the wetland's hydrology could result in the draining or ponding of water in the remaining wetland fragments on either side of the rail embankment. In addition, impacts on shallow groundwater from rail embankment compaction and related interruption or redirection of groundwater flow could cut off a hydrology source to wetlands. These hydrology alterations could affect vegetation and wetland habitat by changing plant species' composition (i.e., from wetland to upland plants if the wetland were to dry up over time).

To minimize wetland impacts, the Coalition has proposed voluntary mitigation that would commit the Coalition to obtaining a Section 404 permit prior to beginning construction and to minimizing wetland impacts to the extent practicable (VM-25, VM-27). As part of the Section 404 permitting process, the Coalition would need to demonstrate that impacts on water resources, including wetlands, have been avoided or minimized, to the extent practicable. For unavoidable impacts, the Section 404 permit would provide for compensatory mitigation to be developed in consultation with the Corps. In addition, to minimize impacts on wetlands, OEA is recommending the Coalition use temporary barricades, fencing, and/or flagging around wetlands to contain project-related impacts during construction (WAT-MM-7).

During rail construction, fugitive dust from loose soil could be generated by heavy equipment operation. Any accumulation of fugitive dust on wetland vegetation could affect plant growth by inhibiting photosynthesis, which could result in reduced vegetation density and plant diversity. This could also allow invasive plant species to take hold and colonize wetland areas, which could reduce plant species' richness. Impacts related to fugitive dust would be temporary and would cease once construction is complete. To minimize this temporary impact, the Coalition has proposed voluntary mitigation (VM-23) that would commit the Coalition to implement measures to reduce fugitive dust from project-related construction activities.

Wetland Water Quality

Fill material placed in a wetland during rail construction would result in a permanent reduction in the wetland's ability to improve water quality; on a watershed level, any permanent wetland loss could reduce the capacity of regional wetlands to improve water quality. Aside from filling wetlands, other alterations of wetland hydrology could also reduce a wetland's ability to improve water quality by changing the natural hydrologic flows; this could extend to wetlands adjacent to the project footprint. For example, if a wetland with a high ability to retain water were channelized to direct flow through a culvert under the railbed, the amount of time water remained in the wetland could be reduced, thereby affecting the ability of the wetland to retain and filter sediments and other contaminants. Conversely, railbeds could fragment the normal flow through wetlands, leading to the creation of surface water impoundments that would decrease water circulation and lead to water stagnation. In addition, impacts on shallow groundwater from rail embankment compaction and related interruption or redirection of groundwater flow could cut off or alter a hydrology source to wetlands, which could adversely affect water quality functions or result in complete wetland loss. Decreased water circulation can result in increased water temperature, lower dissolved oxygen levels, changes in salinity and pH, the prevention of nutrient outflow, and increased sedimentation (USEPA 1997). Wetland fragmentation impacts would be reduced by placement of bridges or culverts in the railbed in wetland areas to maintain hydrologic connection. If OEA's recommended mitigation measures related to the design of water crossings were implemented (WAT-MM-1, WAT-MM-2, WAT-MM-4), OEA expects that impacts on wetland functions would be localized to the wetlands that the proposed rail line would cross or wetlands adjacent to the project footprint, and that water quality would not be affected on a watershed level.

Ground disturbance in or near wetlands could degrade water quality of the wetland itself. The primary concerns would be potential impacts associated with sedimentation and petroleum products. Soil disturbance and exposure to rain and surface runoff during construction could increase sediment in nearby wetlands, potentially increasing surface water turbidity, smothering vegetation, reducing water oxygen levels, and reducing water storage capacity. Petroleum leaks and accidental spills from rail construction equipment are other potential sources of wetland water contamination. While many wetlands act to filter out sediment and contaminants, any significant increase in sediment or contaminant loading could exceed the capacity of a wetland to perform its normal water quality functions. Although the degradation of water quality in wetlands could occur during construction, this impact would be short-term and temporary. OEA expects that the Coalition's NPDES permit, Section 401 water quality certification, and SWPPP would include site-specific measures to avoid and minimize erosion, sedimentation, and spills that could cause wetland water quality impacts. If those measures were implemented, OEA does not expect that construction activities would result in long-term impacts on wetland water quality.

Wetland Stormwater and Floodwater Storage Capacity

Fill material placed in a wetland during rail construction would result in the permanent loss of the wetland's ability to impede and retain stormwater and floodwater. On a watershed level, any permanent wetland loss could reduce the capacity of regional wetlands to impede and retain these flows. Any alteration of wetland hydrology could also reduce a wetland's ability to retain water by changing the natural hydrologic flows; this could extend to wetlands adjacent to the project footprint. For example, if a wetland with a high ability to retain stormwater and floodwater were channelized to flow directly through a culvert under the railbed, the volume of water that the wetland would have otherwise been able to retain could be reduced. Clearing and trimming of wetland vegetation would also reduce the capacity of wetlands to impede and retain stormwater and floodwater. Densely vegetated wetlands have a greater ability to slow down and retain stormwater and floodwater; clearing or removing wetland vegetation for rail construction would reduce this functional capacity.

OEA is recommending mitigation measures requiring the Coalition design and install water crossings so as to maintain existing wetland hydrology, to the extent practicable (WAT-MM-1, WAT-MM-4). If these mitigation measures and the conditions of the Coalition's CWA Section 404 permit are implemented, OEA concludes that decreases in wetland stormwater and floodwater storage capacity from construction of the proposed rail line would be localized and minimal and would not significantly affect the capacity of regional wetlands to impede and retain stormwater and floodwater at the watershed level.

Operations

Maintenance Activities

Most wetland impacts would occur during construction of the proposed line. However, potential impacts on wetlands also could occur during rail operations because of maintenance activities and incidental pollutant discharges. Maintenance activities would include vegetation maintenance in the right-of-way and repairs and maintenance associated with tracks, access roads, ditches, bridges, culverts, and other associated rail infrastructure. These activities would be infrequent and brief. Vegetation would be periodically cleared or trimmed in the right-of-way to ensure safe rail operations. Clearing or trimming could alter wetland vegetation and structure (e.g., a scrub/shrub wetland that is continuously cleared for maintenance could convert an existing wetland to an emergent wetland). Any change in wetland vegetation structure could alter the habitat, water quality, and hydrology functions that the wetland provides, and could extend to wetlands adjacent to the project footprint. Maintenance associated with tracks, access roads, ditches, bridges, culverts, and other rail infrastructure could disturb the ground surface, require the use of chemicals (such as herbicides), or result in petroleum leaks and spills from maintenance vehicles and equipment. Any mobilized sediment, spilled chemicals, or petroleum products could reach wetlands, which could degrade vegetation communities, habitat, water quality, and overall wetland productivity.

OEA is recommending mitigation that would require the Coalition implement best management practices to convey, filter, and dissipate runoff from the new rail line, which could include but would not be limited to vegetated swales, vegetated filter strips, streambank stabilization, and channelized flow dissipation (WAT-MM-9). If OEA's recommended mitigation measures are implemented, OEA expects that wetland vegetation and wetland water quality impacts from maintenance activities would be infrequent, brief, localized, and minimal.

Accidents and Spills of Hazardous Materials

As stated under *Surface Waters, Accidents and Spills of Hazardous Materials*, train accidents or derailments could cause train~~tanker~~ cars to rupture or overturn and spill crude oil or frac sand into the environment. Oil or frac sand could spill from a train~~tanker~~ car onto a wetland should a train accident or derailment occur in or near a wetland. Some permanent and temporary wetland vegetation impacts could occur from the spill and during cleanup, which could affect wetland hydrology and habitat functions. The Coalition has proposed voluntary mitigation measures to minimize potential impacts related to spills of crude oil. These measures include a commitment to preparing a hazardous materials emergency response plan; complying with applicable regulations and tribal ordinances related to the safe and secure transportation of hazardous materials; and notifying appropriate federal, state, and tribal environmental agencies as required under federal, state, and tribal law in the event of a reportable spill (VM-11, VM-12, VM-13, VM-14, VM-15). ~~In the event of a spill, some permanent and temporary wetland vegetation impacts could occur during cleanup, which could affect wetland hydrology and habitat functions.~~

Groundwater

Impacts on groundwater could result from construction and operation of the proposed rail line through clearing, fill placement, tunnel construction, and use of equipment, potentially altering infiltration, degrading groundwater quality, and affecting groundwater wells and springs.

Construction

Infiltration and Recharge Characteristics, Shallow Groundwater Flow Interruption, and Water Quality

Construction of the proposed rail line would alter infiltration and recharge characteristics and permanently reduce or impede infiltration due to surface soil compaction. These impacts would be limited to the rail line footprint. The rail line footprint represents a small fraction of the total recharge area because of the extensive Uinta-Animas aquifer that makes up the groundwater study area. In addition, groundwater recharge to the Uinta-Animas aquifer generally occurs in areas of higher altitude along the margins of the Basin, the majority of which is in the northern half of the Basin outside the location of the Action Alternatives. Therefore, OEA does not expect that construction would significantly affect groundwater infiltration and recharge.

Construction of the proposed rail line could affect shallow groundwater in localized stream channel aquifers where rail embankment soil compaction could interrupt and redirect shallow groundwater flow away from wetlands and streams that are supported in whole or part by groundwater in these shallow aquifers. OEA's recommended mitigation measure regarding the design, construction, and operation of the rail line to maintain existing water patterns and flow conditions (including shallow aquifer subsurface flow) and providing long-term hydrologic stability would minimize these potential impacts (WAT-MM-4).

Any accidental contaminant (e.g., petrochemicals used for operating construction equipment) released to the ground during construction could infiltrate and temporarily degrade groundwater quality if the contaminant were to reach groundwater. However, recharge areas more susceptible to groundwater contamination from surface activities and these areas are generally outside of the location of the Action Alternatives. To minimize impacts on groundwater quality, the Coalition has proposed voluntary mitigation that would commit the Coalition to developing a SWPPP and obtaining an NPDES permit to minimize and contain spills during construction (VM-20, VM-21). If these voluntary measures are implemented, the likelihood of a large contaminant spill would be low making it unlikely that large amounts of contaminants would reach groundwater and impair quality. Therefore, OEA does not anticipate any long-term impacts related to groundwater quality.

Water Rights of Wells and Springs

Construction of the proposed rail line would affect a very small proportion of the groundwater wells and springs that OEA identified in the study area. Depending on the Action Alternative, up to three groundwater wells and two springs would be located in the rail line footprint. Groundwater wells in the rail line footprint would be closed and springs in the rail line footprint would no longer be available for water users. Groundwater would no longer be extracted from these wells, which could increase the amount of water in the aquifer and, thus, the water available for discharge to surface waters and available for withdrawal at other nearby wells. OEA is recommending mitigation concerning the loss of a landowner's groundwater well (WAT-MM-11).

There are no groundwater wells or springs directly above any of the proposed tunnels for the Action Alternatives (UDWRi 2020; USGS 2019); however. there are groundwater wells and springs in the vicinity of the tunnels (UDWRi 2020; USGS 2019). The water rights details of groundwater wells in the vicinity (within approximately 2,000 feet) of several of the tunnels proposed for the Action Alternatives indicate that groundwater depths typically range from 100 feet to 500 feet below the ground surface (UDWRi 2020). Near-surface construction activities associated with tunnel construction, such as blasting, boring, and excavation, could disrupt or modify the flow of groundwater that could be present around the construction activities. However, because tunnel construction activities would be limited to the near surface (upper 100 feet) and the occurrence of groundwater is generally deeper than 100 feet, the impacts of these activities on groundwater flow is not expected to be significant. The lateral extent of the water-bearing units, regardless of whether groundwater is shallow or deep, would generally be orders of magnitude more extensive than the relatively limited dimensions of a construction impact zone. Groundwater springs are smaller in scale and more localized; since no springs are known to occur above any of the proposed tunnels, it is unlikely that tunnel construction would affect springs.

Depending on the Action Alternative, up to six groundwater wells and up to nine springs would be located in the temporary footprint. Groundwater wells and springs in the temporary footprint would not be lost.

Operations

Groundwater Quality

Any accidental contaminant released to the ground during operations, such as gasoline or diesel fuel from maintenance vehicles, could infiltrate into the ground and could temporarily degrade groundwater quality if the contaminant were to reach groundwater. However, by implementing best management practices, the likelihood of a large contaminant spill would be low. In addition, because clean-up procedures would commence immediately after a spill, it would be unlikely that a large amount of a contaminant would reach groundwater and impair quality. No long-term impacts are anticipated.

As stated under *Surface Waters, Accidents and Spills of Hazardous Materials,* train accidents or derailments could cause train~~tanker~~ cars to rupture or overturn and spill crude oil or frac sand into the environment. Due to Uinta Basin crude oil properties, the oil would start to congeal and solidify upon contact with the ground and cooling down and, therefore, would be unlikely to physically seep into the ground. Similarly, frac sand is a solid substance that would not penetrate into the ground, and due to its non-toxic properties, it would have no effect on groundwater quality. The Coalition has also proposed voluntary mitigation measures to minimize potential impacts related to spills of crude oil and frac sand. These measures include a commitment to preparing a hazardous materials emergency response plan; complying with applicable regulations and tribal ordinances related to the safe and secure transportation of hazardous materials; and notifying appropriate federal, state, and tribal environmental agencies as required under federal, state, and tribal law in the event of a reportable spill (VM-11, VM-12, VM-13, VM-14, VM-15).

3.3.3.2 Impact Comparison between Action Alternatives

This subsection describes the potential impacts on water resources that would differ between the three Action Alternatives.

Surface Water

Construction and Operations

Although all three Action Alternatives would result in similar types of construction and operations impacts on surface waters, the severity of those impacts would vary across the Action Alternatives based on the number and area of surface waters that each Action Alternative would cross. To compare impacts on surface waters across the three Action Alternatives, OEA considered 1) the area and linear distance of surface waters that each Action Alternative would affect, 2) the number of surface waters that each Action Alternative would cross, and 3) the area of surface disturbance, including disturbance within impaired assessment units, associated with each Action Alternative. Should the Board license one or more of the Action Alternatives, the Coalition, as part of the CWA Section 404 permit process, would develop detailed engineering and design to determine the precise surface water impacts (in both area and linear distance) from bridges, culverts, and fill.

Table 3.3-10 shows the linear feet and area of surface waters that each Action Alternative would affect, based on the surface waters within the project footprint. As the table shows, the Wells Draw Alternative would affect the greatest area and the most linear feet of surface waters across the three Action Alternatives. Overall, the Wells Draw Alternative would affect a larger area of surface water and greater linear distances of streams and canals/ditches than the Whitmore Park Alternative or Indian Canyon Alternative. The Whitmore Park Alternative would affect a somewhat greater area of surface water and linear distance of streams and canals/ditches than the Indian Canyon Alternative mostly because the Whitmore Park Alternative would affect a greater area and linear distance of ephemeral streams than the Indian Canyon Alternative.

Table 3.3-10. Surface Water Impacts by Action Alternative

Surface Water	Action Alternative[a,b] Indian Canyon	Wells Draw	Whitmore Park
Perennial stream			
Permanent	22,744 feet/6.3 acres	12,599 feet/3.0 acres	20,261 feet/5.6 acres
Temporary	52,896 feet/15.4 acres	20,566 feet/6.5 acres	58,143 feet/16.4 acres
Intermittent stream			
Permanent	3,076 feet/0.2 acre	46,980 feet/30.4 acres	2,667 feet/0.2 acre
Temporary	2,473 feet/0.2 acre	36,423 feet/28.1 acres	2,275 feet/0.2 acre
Ephemeral stream			
Permanent	51,464 feet/4.1 acres	94,262 feet/23.5 acres[c]	65,682 feet/6.4 acre
Temporary	109,599 feet/8.6 acres	148,000 feet/24.7 acres	149,645 feet/15.7 acre
Canal/ditch			
Permanent	15,264 feet/0.9 acre	2,449 feet/0.3 acre	14,440 feet/0.9 acre
Temporary	12,635 feet/ 1.3 acres	9,271 feet/1.1 acre	12,493 feet/1.3 acre
Pond			
Permanent	1.0 acre[d]	3.3 acres	0.4 acre[d]
Temporary	1.0 acre	4.6 acres	0.9 acre
Playa			
Permanent	0.1 acre	0.8 acre	0.1
Temporary	<0.1 acre	1.2 acres	<0.1 acre

Notes:

[a] Stream/canal/ditch impacts in this table generally do not represent permanent impacts (i.e., permanent fill) but are streams/canals/ditches in the disturbance areas of the culvert and bridge installation sites where these structures are being installed to maintain hydrologic flow. Several stream realignments would occur along each Action Alternative that would permanently fill the stream channel but would also create new stream channel to maintain stream hydrology and flow (Table 3.3-11 provides stream realignment numbers).

[b] Does not include impacts on surface waters over proposed rail tunnels, which total 0.3 acre each for the Indian Canyon Alternative and Whitmore Park Alternative, 0.6 acre for the Wells Draw Alternative. There would be no surface construction disturbance above these tunnels.

[c] OEA identified two springs associated with an ephemeral stream, but installed culverts are anticipated to maintain flow of both the stream and any flow from the spring.

[d] OEA identified one spring associated with a pond ~~both~~ in the permanent impact area.

Sources: Coalition 2020a; USGS 2019

Surface waters in the field survey study area that are adjacent to the project footprint would not be filled, cleared, or excavated during rail construction, but could be affected by rail construction and operation in the project footprint. These impacts are described in Subsection 3.3.3.1, *Impacts Common to All Action Alternatives*, *Surface Waters*, and could include alterations to hydrology, erosion, and stream flow. OEA has quantified the distance and area of streams adjacent to the project footprint that would be susceptible to potential indirect impacts.~~Impacts on surface waters adjacent to the project footprint cannot be quantified, but~~ Action Alternatives with more surface waters adjacent to the project footprint would result in a greater surface water area that could be susceptible to construction and operation impacts when compared to Action Alternatives with fewer surface waters adjacent to the project footprint. The Wells Draw Alternative has the least area of surface waters adjacent to the project footprint, while the Indian Canyon Alternative and the Whitmore Park Alternative have about the same (Table 3.3-11).

Table 3.3-11. Surface Waters Adjacent to Project Footprint by Action Alternative

	Action Alternative		
Surface Water	**Indian Canyon**	**Wells Draw**	**Whitmore Park**
Perennial stream	113,360 feet/32.0 acres	24,520 feet/8.9 acres	118,232 feet/34.0 acres
Intermittent stream	15,798 feet/1.2 acres	23,797 feet/12.7 acres	12,578 feet/0.9 acre
Ephemeral stream	232,176 feet/23.6 acres	154,027 feet/20.3 acres	230,996 feet/25.6 acres
Canal/ditch	19,730 feet/0.9 acre	12,403 feet/1.9 acres	17,872 feet/0.8 acre
Pond	2.1 acres	9.4 acres	3.0 acres
Playa	0.3 acre	2.8 acres	0.3 acre
Total	**381,064 feet/60.1 acres**	**214,747 feet/56.0 acres**	**379,734 feet/64.6 acres**

Notes:
Sources: Coalition 2020a; USGS 2019

Table 3.3-12 shows the number of surface water crossing structures and stream realignments for each Action Alternative. Because it would cross the most surface waters, the Wells Draw Alternative would have the greatest number of crossing structures, followed by the Whitmore Park Alternative and Indian Canyon Alternative. Over 70 percent of all surface water crossing structures for all Action Alternatives are at ephemeral streams. The number of stream realignments and distance of stream fill impacts at stream realignment locations is similar for the Indian Canyon Alternative and Whitmore Park Alternative. The Wells Draw Alternative would have less stream realignments and less stream fill impacts where streams would be realigned. Stream realignments would primarily affect perennial stream types across all Action Alternatives.

Table 3.3-12. Surface Waters Crossings by Crossing Structure and Number of Stream Realignments

	Action Alternative[a,b]		
Estimated Crossing Structure[a]	**Indian Canyon**	**Wells Draw**	**Whitmore Park**
36- or 48-inch CMP	193	295	229
72-inch CMP	22	24	20
8-foot-by-8-foot box culvert	44	30	56
Bridge[c]	19	10	20
Other culvert[d]	113	147	118
Culvert Total	**391**	**506**	**443**
Number of Stream Realignments	**59**	**17**	**55**
Miles of Stream Impact at Realignment Locations			
Perennial	2. 4~~5~~	1.1	2.3
Intermittent	0.2	0	0.2
Ephemeral	0.6	0.3	0.7
Ditch/canal	0.6	0	0.6

Notes:
[a] Crossing structure type, size, and number is based on preliminary hydrologic analysis. Should the Board license an Action Alternative, site-specific detailed engineering and design would determine the exact type, size, and number of crossing structures.

[b] While the majority of crossing structures are at stream crossings, the table does include crossing structures at open water and wetland crossings. Also, numbers do not include surface waters over tunnels, as they would not require any crossing structure.

[c] Some bridges cross/span a stream and an adjacent road together.

[d] These are non-surface water and nonwetland culverts that may be needed along the proposed rail line to minimize disruption of overall hydrology (e.g., to accommodate stormwater flows and overland runoff in low areas, and preventing ponding).

CMP = Corrugated metal pipe [culvert]

Table 3.3-13 shows the sinuosity impacts on realigned streams, based on preliminary design information provided by the Coalition. Sinuosity impacts account for the meandering stream channel distance that is lost and potentially replaced with a realigned stream channel that may lack the sinuosity of the affected stream. During Section 404 permitting, the Coalition would consult with the Corps to design the stream realignments so as to adequately replace the functions of the affected stream channel. Based on preliminary design information provided by the Coalition, the Indian Canyon Alternative and Whitmore Park Alternative would have about the same loss in sinuosity, while the Wells Draw Alternative would have a net zero sinuosity impact.

Table 3.3-13. Sinuosity Impacts at Stream Realignments

	Action Alternative (miles)		
Impact	**Indian Canyon**	**Wells Draw**	**Whitmore Park**
Filled stream channel[a]	-3.8	-1.4	-3.8
Abandoned stream channel[b]	-1.5	-0.4	-1.5
Total	**-5.3**	**-1.8**	**-5.3**
New channel[c]	**+4.5**	**+1.8**	**+4.3**
Sinuosity difference[d]	**-0.8**	**0.0**	**-1.0**

Notes:

[a] Stream channel filled and permanently lost in the rail line footprint.

[b] Stream channel between the permanently filled channel and the point of new channel. This part of the stream channel may or may not be filled, but is otherwise disconnected from the new stream channel.

[c] New stream channel is the realigned stream in the form of a straight line, based on preliminary information provided by the Coalition. During Section 404 permitting, the designs of realigned streams are unlikely to be straight lines, as this would not adequately replace the functions of the affected stream channel.

[d] Sinuosity difference indicates the change in sinuosity from realigning a stream channel. A negative number indicates a loss in sinuosity.

Table 3.3-14~~13~~ shows the summary of proposed rail line distances and impact areas within Section 303(d) impaired assessment units. The numbers reported in the table refer to total disturbance within 303(d) impaired assessment units, not only the area of disturbance within impaired surface waters. Because any disturbance within impaired assessment units could directly or indirectly affect impaired surface waters due to runoff from construction areas or the rail line itself, OEA expects that the severity of impacts on impaired surface waters would be related to the total extent of disturbance within impaired assessment units. While all Action Alternatives would affect water quality, the Wells Draw Alternative would disturb the greatest surface area overall and within Section 303(d) impaired assessment units, followed by the Whitmore Park Alternative and Indian Canyon Alternative. Surface waters within Section 303(d) impaired assessment basins could be more sensitive to sedimentation and pollutant discharge during construction and operations, which could result in impacts on the beneficial uses of these surface waters.

Table 3.3-14~~-13~~. Distance and Area of Impact in Section 303(d) Impaired Assessment Units

	Action Alternative		
Assessment Unit	**Indian Canyon**	**Wells Draw**	**Whitmore Park**
Price River (1)	8.9 miles/434.0 acres	8.9 miles/434.0 acres	10.6 miles/634.6 acres
Nine Mile	0.5 mile/12.1 acres	37.4 miles/4,064.1 acres	0.5 acre/12.1 acres
Indian Canyon Creek	28.2 miles/1,077.0 acres	0 miles/0 acres	28.2 miles/1075.8 acres
Antelope Creek	4.3miles/204.6 acres	<0.1 mile/0.1 acre	4.3 miles/211.7 acres
Pariette Draw Creek	4.3 miles/230.5 acres	34.5 miles/2,081.3 acres	4.3 miles/230.5 acres
Duchesne River (2)	11.1 miles/701.5 acres	9.7 miles/510.1 acres	11.1 miles/701.5 acres
Total	**57.3 miles/2,660.0 acres**	**90.6 miles/7,089.6 acres**	**59 miles/2,866.2 acres**

Notes:
The Willow Creek-Carbon, Duchesne River (3), and Green River – 3 assessment units are not included in table because they are not Section 303(d) impaired.
Ephemeral streams are not included in Utah's Integrated Report (UDWQ 2016).
Source: UDWQ 2016

A secondary factor differentiating surface water impacts between the Action Alternatives is the area of erosive soils along each Action Alternative. A greater area of soil susceptible to water and wind erosion would increase the potential for sedimentation and turbidity impacts on surface waters during construction and operations. However, as stated in Section 3.5, *Geology, Soils, Seismic Hazards, and Hazardous Waste*, only a small portion of the study area for each Action Alternative is rated as having high risk to wind and water erosion and all of the Action Alternatives would have similar areas of susceptibility to wind erosion and water erosion. Therefore, soil susceptibility to water and wind erosion is not a significant factor in differentiating surface water impacts between the Action Alternatives.

Floodplains

Construction and Operations

Construction and operation of any of the Action Alternatives would affect floodplains. The primary factor in differentiating floodplain impacts between the Action Alternatives is the area of floodplains that each Action Alternative would affect. A greater floodplain impact would generally indicate a greater potential for floodplain and flood flow construction and operations impacts as described in Subsection 3.3.3.1, *Impacts Common to All Action Alternatives, Floodplains*. Table 3.3-154 summarizes the floodplain impacts by Action Alternative.

Table 3.3-15-~~14~~. Floodplain Impacts by Action Alternative

Action Alternative	FEMA-Mapped 100-Year Floodplain	NRCS Flood-prone Soil[a]
Indian Canyon		
Permanent	0.1 acre	218.7 acres
Temporary	0.8 acre	246.1 acres
Wells Draw		
Permanent	0.2 acre	49.6 acres
Temporary	1.7 acres	87.6 acres
Whitmore Park		
Permanent	5.9 acres	216.4 acres
Temporary	20.2 acres	245.8 acres

Notes:
[a] For all Action Alternatives, the NRCS flood-prone soil frequency classification of *rare* and *very rare* make up approximately 99 percent of all flood-prone soils; the remaining 1 percent of the soils is classified as *frequent* and *occasional* flooding.
Sources: FEMA 2020; NRCS 2019a

Based on FEMA-mapped floodplains, the Whitmore Park Alternative would affect the greatest area of 100-year floodplain, followed by the Wells Draw Alternative and Indian Canyon Alternative. The Whitmore Park Alternative's FEMA-mapped floodplain impacts would occur primarily on floodplains mapped along Pole Creek and Dry Fork in Carbon County; a small area of floodplain impact would also occur along an unnamed tributary to the Duchesne River in Uintah County. The Indian Canyon Alternative's and the Wells Draw Alternative's small area of FEMA-mapped floodplain impacts would occur along the unnamed tributary to the Duchesne River in Uintah County.

Any part of an Action Alternative within a FEMA-mapped 100-year floodplain would have to be designed to meet the required federal and local floodplain development regulations. Based on NRCS flood-prone soil information, the Indian Canyon Alternative and Whitmore Park Alternative would affect the most, and approximately the same, acreage of floodplains. The much higher area of NRCS flood-prone soil along the Indian Canyon Alternative and Whitmore Park Alternative compared to the Wells Draw Alternative is a result of the greater area of flood-prone soils in the bottom of Indian Canyon. However, it should be noted that nearly all (approximately 99 percent) of the NRCS flood-prone soils for all Action Alternatives are classified as *rare* or *very rare* flooding.

As described in Subsection 3.3.3.1, *Impacts Common to All Action Alternatives, Floodplains*, cloudburst floods are known to occur in Utah and have been documented along the Action Alternatives. Cloudburst floods are rare and unpredictable, and given the conditions necessary for such an event (i.e., torrential downpour of rain in a short time period over specific terrain), it is not possible to determine exactly where and when a cloudburst flood would occur. However, in the rare event cloudburst floods were to occur along the Action Alternatives, they would be limited to the hilly and mountainous terrain associated with these events, including Indian Canyon and Argyle Canyon.

The Indian Canyon Alternative and Whitmore Park Alternative would travel through Indian Canyon for about 22 miles, and the Wells Draw Alternative would travel through Argyle Canyon for about 24 miles. While the distance through these canyons is similar for each of the Action Alternatives and is unlikely to be a differentiating factor for the chance of cloudburst flood occurrence, the location of the Action Alternatives in the canyons could indicate if an Action Alternative is more susceptible to cloudburst flood impacts if one were to occur. The Indian Canyon Alternative and Whitmore Park Alternative would travel through the bottom of Indian Canyon while the Wells Draw Alternative would travel through the upper half of Argyle Canyon, which could indicate that a cloudburst flood could cause more damage to the Indian Canyon Alternative and Whitmore Park Alternative, as the cloudburst flood could increase in flow, volume, and momentum as it moves downslope toward the bottom of Indian Canyon.

Wetlands

Construction and Operations

Although all three of the Action Alternatives would result in similar types of construction impacts and operations impacts on wetlands, the severity of those impacts would vary across the Action Alternatives based on the area of wetlands that each Action Alternative would affect. Table 3.3-16~~5~~ shows the total acres of wetlands that each Action Alternative would temporarily and permanently disturb. OEA assumed that temporary impacts on wetlands would last for the duration of construction, which would be approximately 20 to 28 months for the Indian Canyon Alternative and the Whitmore Park Alternative and approximately 32 to 48 months for the Wells Draw Alternative.

Table 3.3-16~~-15~~. Wetland Impacts by Action Alternative

	Action Alternative (acres)		
Wetland Type	**Indian Canyon**	**Wells Draw**	**Whitmore Park**
Emergent Marsh			
Permanent	<0.1	1.1	<0.1
Temporary	<0.1	6.6	<0.1
Wet Meadow			
Permanent	4.0[a]	3.2	2.8[a]
Temporary	9.8	9.0	8.9
Scrub-Shrub			
Permanent	2.9	2.2	0.7
Temporary	3.3	0.7	2.2
Total Permanent	**7.0**	**6.5**	**3.6**
Total Temporary	**13.2**	**16.3**	**11.2**

Notes:
[a] OEA identified one spring associated with a wet meadow in the permanent impact area.
Sources: Coalition 2020a; USFWS 2019

While the Wells Draw Alternative would temporarily affect the greatest area of wetlands, the Indian Canyon Alternative would have the greatest permanent wetland impact. The Whitmore Park Alternative would have the least permanent and temporary wetland impacts. While any of the Action Alternatives would affect wetland water quality, the Wells Draw Alternative would disturb the greatest surface area overall and within Section 303(d) impaired assessment units, followed by the Whitmore Park Alternative and Indian Canyon Alternative (Table 3.3-14~~3~~). Wetlands within Section 303(d) impaired assessment basins would be more sensitive to sedimentation and pollutant discharge during construction and operations. Wetland culvert crossings are included in the numbers in Table 3.3-14~~3~~. The Wells Draw Alternative would have the greatest number of crossing structures in wetland areas, including one bridge and 14 culverts. The Indian Canyon Alternative would have one bridge and 11 culverts across wetlands, while the Whitmore Park Alternative would have five culverts in wetland areas. The majority of wetlands affected by permanent fill actions for the Action Alternative would be from partial filling; however, several wetlands would be completely filled, including 12 wetlands along the Indian Canyon Alternative, seven wetlands along the Wells Draw Alternative, and four wetlands along the Whitmore Park Alternative. Some of the partially filled wetlands would also be bifurcated by the Action Alternatives, including nine wetlands along the Indian Canyon Alternative and Wells Draw Alternative, and seven wetlands along the Whitmore Park Alternative.

Wetlands in the field survey study area that are adjacent to the project footprint would not be filled, cleared, or excavated during rail construction, but could be affected by rail construction and operation in the project footprint. These impacts are described in Subsection 3.3.3.1, *Impacts Common to All Action Alternatives*, *Wetlands*, and could include alterations to wetland hydrology, including impacts on shallow subsurface water flow, water quality, and vegetation growth and diversity. OEA has quantified the area of wetland adjacent to the project footprint that could be susceptible to potential indirect impacts.~~Impacts on wetlands adjacent to the project footprint cannot be quantified, but~~ Action Alternatives with more wetland area adjacent to the project footprint would result in a greater wetland area that could be susceptible to construction and operation impacts when compared to Action Alternatives with fewer acres of wetlands adjacent to the project footprint. The Wells Draw Alternative has the greatest area of wetland adjacent to the project footprint, followed by the Indian Canyon Alternative and the Whitmore Park Alternative (Table 3.3-17~~6~~).

Table 3.3-17 ~~16~~. Wetlands Adjacent to Project Footprint by Action Alternative

	Action Alternative (acres)		
Wetland Type	**Indian Canyon**	**Wells Draw**	**Whitmore Park**
Emergent marsh	0.4	8.4	0.4
Wet meadow	38.7	38.3	24.8
Scrub-shrub	5.4	3.7	5.9
Total	**44.5**	**50.4**	**31.1**

Notes:
Sources: Coalition 2020a; USFWS 2019

A secondary factor differentiating wetland impacts between the Action Alternatives is how susceptible the surrounding soils are to wind and water erosion along each Action Alternative. A greater area of soil susceptible to water and wind erosion would increase the potential for sedimentation and turbidity impacts on wetlands during construction and operations. However, as stated in Section 3.5, *Geology, Soils, Seismic Hazards, and Hazardous Waste*, only a small portion of the study area for each Action Alternative is rated as having high risk to wind and water erosion and all Action Alternatives would have similar areas of susceptibility to wind erosion and water erosion. Therefore, soil susceptibility to water and wind erosion is not a significant factor in differentiating wetland impacts between the Action Alternatives.

Groundwater

Construction and Operations

Construction of any of the Action Alternatives would affect groundwater. To compare groundwater impacts between Action Alternatives, OEA considered 1) the area of the rail line footprint and temporary footprint for each Action Alternative, and 2) the number of groundwater wells and springs in the rail line footprint and temporary footprint for each Action Alternative. In general, the Action Alternatives with a larger project footprint would create more impervious or compacted surfaces that could affect water infiltration and groundwater recharge. Table 3.3-18~~7~~ shows the number of groundwater wells and springs located in the groundwater study area by Action Alternative.

Table 3.3-18~~-17~~. Impacts on Groundwater Wells and Springs by Action Alternative

Action Alternative	Number of Groundwater Wells[a]	Number of Springs[b]
Indian Canyon		
Rail line footprint	2	2
Temporary footprint	6	7
Wells Draw		
Rail line footprint	1	2
Temporary footprint	4	9
Whitmore Park		
Rail line footprint	0	2
Temporary footprint	2	4

Notes:

This table includes Utah water rights for groundwater wells and springs that are identified as being approved or in use, and springs identified during field surveys that are not in the Utah water rights database. Numbers include wells and springs in both the rail line footprint (e.g., permanent impact area of fill) and excavation and temporary footprint (e.g., staging areas).

[a] Includes wells, tunnels, sumps, undergrounds drains, and non-production wells (i.e., monitoring or testing wells).

[b] Includes springs or surface waters identified as being sourced by a nearby spring.

Sources: UDWRi 2020; Coalition 2020a

The Wells Draw Alternative would have the largest rail line footprint and temporary footprint, followed by the Whitmore Park Alternative and the Indian Canyon Alternative. However, as stated in Subsection 3.3.2.2, *Groundwater*, groundwater recharge areas are generally outside of the area of the Action Alternatives, and therefore, none of the Action Alternatives are anticipated to have any measurable impact on groundwater recharge. The Indian Canyon Alternative would affect the greatest number of groundwater wells, followed by the Wells Draw Alternative and Whitmore Park Alternative. All Action Alternatives would affect two springs in the rail line footprint, but the Wells Draw Alternative would affect the greatest number of springs in the temporary footprint, followed by the Indian Canyon Alternative and Whitmore Park Alternative. Because springs are considered important and difficult to replace resources under CWA regulations, the Coalition would need to develop measures to avoid, minimize, and mitigate impacts on springs in the temporary footprint in consultation with the Corps as part of the Section 404 permitting process, if the Board were to authorize one of the Action Alternatives.

As discussed in Subsection 3.3.3.1, *Impacts Common to All Action Alternatives, Groundwater,* OEA anticipates that impacts on groundwater quality during construction and operations would be minimal. There are no significant differentiating factors between the Action Alternatives other than footprint area and length of Action Alternative, with a larger footprint equating to more construction and the potential for more spills, and a longer rail line equating to a longer distance for train travel over a greater area of groundwater that would be susceptible to spills during operations. However, as previously mentioned, groundwater recharge areas are generally outside the locations of the Action Alternatives, and implementing best management practices during construction would contain and quickly clean up a spill.

3.3.3.3 No-Action Alternative

Under the No-Action Alternative, the Coalition would not construct and operate the proposed rail line, and there would be no impacts on surface water, floodplains, wetlands, and groundwater from construction or operation of the proposed rail line.

3.3.4 Mitigation and Unavoidable Environmental Impacts

Any of the Action Alternatives would result in impacts on water resources, including surface waters, wetlands, floodplains, and groundwater. In general, the Wells Draw Alternative would result in the most impacts on surface waters and wetlands. The Indian Canyon Alternative and the Whitmore Park Alternative would have largely similar impacts on perennial streams and intermittent streams, but the Whitmore Park Alternative would affect a larger area of ephemeral streams and the Indian Canyon Alternative would affect a larger area of wetlands.

The Coalition has proposed eight voluntary mitigation measures related to water resources (Chapter 4, *Mitigation*). Those mitigation measures include the requirement that the Coalition obtain a CWA Section 404 permit from the Corps prior to undertaking any construction-related activities. As part of the CWA Section 404 permitting process, the Coalition shall demonstrate, in consultation with the Corps, that all appropriate and practicable steps have been taken to avoid and minimize impacts on water resources under the jurisdiction of the Corps. For unavoidable impacts, the Coalition shall develop and implement compensatory mitigation in consultation with the Corps to replace the loss of surface waters. In addition to the Coalition's voluntary mitigation measures, OEA is also recommending that the Board impose additional measures to avoid, minimize, and mitigate impacts on water resources in any decision authorizing construction and operation of the proposed rail line.

Even if the Board were to impose the Coalition's voluntary mitigation measures and OEA's recommended mitigation measures, some adverse impacts on surface waters and wetlands would be unavoidable. Those unavoidable impacts would include changes to natural drainage around water crossings; changes to channel morphology and sinuosity; increased potential for debris jams and water backup; increased channel scour and erosion; increased turbidity, sediment loads, and concentration of pollutants during construction; degradation of wetland stormwater and floodwater storage capacity and wetland quality from alterations or filling of wetlands; decreased wetland quality from discharges of pollutants into wetlands; the loss of wetland habitat; and the loss of springs. Due to the large number of surface water crossings and the large area of potentially affected wetlands, OEA concludes that unavoidable impacts on surface waters and wetlands, including and in particular, the loss of wetland habitat and permanent changes to surface water hydrology from crossing structures and stream realignments, would be locally significant for any of the Action Alternatives. Construction and operation of the proposed rail line would not significantly affect water quality or ecological services associated with water resources on a watershed or regional level.

Construction and operation of any of the Action Alternatives would result in some minor adverse impacts on floodplains and groundwater, including decreased floodplain storage capacity, diversion of flood flows by fill placement, constriction of flood flows at bridge and culvert locations, decreased floodplain water retention, and altered flood dynamics from the presence of rail infrastructure; altered infiltration recharge characteristics and temporary degradation of groundwater quality. The Coalition's voluntary mitigation measures and OEA's recommended mitigation measures would minimize these impacts, and OEA does not anticipate that construction and operation of the proposed rail line would significantly affect floodplains or groundwater.