Chapter 5: Environmental Consequences

The resources in this chapter have been evaluated for impacts from each of the four alternatives in Table 5.0-1. For a more detailed description of each alternative, see Chapter 2, Alternatives Considered.

Where are the figures for Chapter 5?

The figures for Chapter 5 are at the end of this chapter.

Table 5.0-1. Alternatives Evaluated in This EIS

Alternative	Description	Baseline for Comparison
No-Action Alternative	Includes the existing highway network plus transportation improvements from WFRC's Regional Transportation Plan.	The No-Action Alternative provides a baseline for comparing travel benefits and other environmental impacts associated with the three action alternatives.
Transportation System Management (TSM) Alternative	Includes the No-Action Alternative plus low-cost transit upgrades from 10000 South to 14600 South including increased express bus service, new local feeder bus service, new bus rapid transit service, and two new park-and-ride lots (Draper Town Center and 14600 South).	The TSM Alternative provides a baseline for comparing the cost-effectiveness of the two build alternatives.
Alternative C – Minimum Operable Segment (MOS)	Light-rail transit extending 3.6 miles from the existing Sandy Civic Center 10000 South Station to Draper Town Center (12400 South) along the former Union Pacific Railroad right-of-way. Includes four new station options with park-and-ride lots (10600 South or 11400 South, 11800 South, and Draper Town Center).	None.
Alternative C – Full Build	Light-rail transit extending 8.6 miles from the existing Sandy Civic Center 10000 South Station to 14600 South along the former Union Pacific Railroad right-of-way. Includes six new station options with park-and-ride lots (10600 South or 11400 South, 11800 South, Draper Town Center, Highland Drive, and 14600 South). This alternative extends Alternative C – MOS to 14600 South. It includes an additional 5 miles of rail line and two additional stations (at Highland Drive and 14600 South).	None.

5.1 Land-Use Impacts

This section discusses the expected impacts to existing and future land use along the UTA-owned right-of-way and at the proposed stations for all of the project alternatives.

In general, under the build alternatives, land uses near the proposed stations would change according to the development policies of Sandy, Draper, and Bluffdale Cities. In addition, these changes in land use could increase the value of land near the stations and along the UTA-owned right-of-way. In Sandy and Draper, land uses would change mainly due to development of undeveloped land or redevelopment of existing developed parcels. In the southern sections of the project study area in Draper and Bluffdale, land uses would change mostly due to the development of undeveloped land.

The impacts analysis in this section distinguishes between impacts along the existing railroad mainline right-of-way (that is, the UTA-owned right-of-way) and impacts on and around the parcels for the proposed stations.

What is the land use evaluation area?

The land use evaluation area consists of the area within one-half mile of the UTA-owned right-of-way and within a one-half-mile radius of each proposed station location.

5.1.1 Methodology

The existing land uses along the UTA-owned right-of-way and the development policies of Sandy, Draper, and Bluffdale Cities are described in Section 3.1, Land Use. The discussion in that section focuses on general land uses along the UTA-owned right-of-way (such as residential and nonresidential) rather than uses associated with specific zoning districts or land-use designations. Because each city has its own designations for parcels in the land use evaluation area, it is more meaningful to look at overall patterns of land use.

Section 5.1 examines whether the proposed project alternatives are consistent and compatible with the regional and local land-use plans along the UTA-owned right-of-way. The Cities' general plans address both the current land uses in the land use evaluation area and the expected future land uses. To determine the impacts to land use, the Cities' land-use maps were converted into a single electronic map using GIS software. This map is shown in Figure 3-1, Generalized Land Use, at the end of Chapter 3, Affected Environment. The action alternatives were then overlaid onto the land-use map to calculate the specific acreage of impacts.

The following sections discuss the land-use impacts from the project alternatives, including impacts along the UTA-owned right-of-way and near the proposed stations.

5.1.2 No-Action Alternative

The No-Action Alternative would not be consistent with the land-use and transportation plans of the Cities along the UTA-owned right-of-way. Both Sandy and Draper's land-use and transportation plans include the TRAX line extension to 14600 South. In addition, the No-Action Alternative is not compatible with the 2030 Regional Transportation Plan for transportation improvements. The No-Action Alternative would not provide more travel choices, reduce automobile emissions, or meet the other purposes of the project described in Section 1.2.1, Purpose of the Project. This alternative would not encourage and support the land-use pattern that the Cities' policies seek to achieve and could contribute to further lower-density sprawl and highway and roadway congestion in the cities and in the region.

The No-Action Alternative would have no impact on land use along the existing UTA-owned right-of-way. The intermittent existing freight line service would continue along the existing railroad line and would be available to serve the Intermountain Farmers Association (IFA) food and grain processing plant (also called the Draper Poultrymen and Egg Producers' Plant). There would be no impact from the project at the station locations, since no stations would be built. However, it's reasonable to assume that the undeveloped parcels at and adjacent to the proposed station locations would develop with or without the project.

As shown in Table 3.3-1, Population Projections, population growth projections in the next 25 years for Salt Lake County, Draper, Sandy, and Bluffdale range from a low of 5% in Sandy to a high of 341% in Bluffdale. As shown in Table 3.3-2, Employment Projections, employment growth projections range from 56% to 257%. Given that land is quickly being acquired in the southern part of the Salt Lake Valley, UTA expects that the area would develop even without transit improvements, although the type of development would likely be different from the typical transit-oriented development that occurs with transit and that is included in the Cities' land-use plans.

What is land use?

Most county and city land-use plans include descriptions of existing and future land use. These descriptions include both developments that have already been built and developments that are in the process of being built as well the proposed land-use pattern for future development.

Even parcels that are undeveloped typically have a "use" as defined by local governments. Undeveloped parcels are often being used for things such as open space, agriculture, and utility rights-of-way. Also, the existing land use might be different from the future land use identified in a city's general plan and zoning ordinances.

5.1.3 TSM Alternative

The TSM Alternative would partly be consistent with the Cities' plans but would not fully support the intended transit-oriented development around stations and the land-use plans of the Cities. In addition, the TSM Alternative is not compatible with the 2030 Regional Transportation Plan for transportation improvements. The two proposed park-and-ride lots at Draper Town Center and 14600 South would improve access to transit service over the No-Action Alternative but would offer fewer opportunities for transit-oriented development than the build alternatives.

The TSM Alternative would have no impact on land use along the UTA-owned right-of-way mainline. As shown in Table 5.1-1, Right-of-Way Impacts from the Draper Transit Corridor Alternatives, on page 5-7, the TSM Alternative would require the acquisition of additional right-of-way for the two new park-and-ride lots in developed and undeveloped areas. Under this alternative, about 23 acres of the land use evaluation area would be converted to a transportation use. The Draper Town Center park-and-ride lot would convert about 11 to 12.5 acres, depending on which park-and-ride lot location is chosen, of mostly farmland and some commercial land and would have about 500 to 600 parking spaces. The lot would be compatible with the general urban nature of the area along Draper Parkway (12300 South). The 14600 South park-and-ride lot would have 800 to 1,000 parking spaces and would convert about 10.5 acres of undeveloped (open space) land. The lot would be surrounded by open space/undeveloped land, an electrical substation, and the Utah Department of Corrections administrative office and training academy. The conversion of this small amount of land would not substantially alter existing land uses in Sandy and Draper.

Under this alternative, the Sandy Civic Center 10000 South Station would remain the end-of-the-line station with its 1,170 parking spaces. All of the existing parking would be needed to serve commuters. There is an interest in redeveloping the existing Sandy Civic Center 10000 South Station to suit transit-oriented development. However, under this alternative, the redevelopment at 10000 South would likely not occur on as large a scale as what might occur under either of the build alternatives.

What is transit-oriented development?

Transit-oriented development is a residential and/or commercial area that is designed to maximize access to public transit and often incorporates features to encourage transit ridership. A transit-oriented neighborhood typically has a center with a train station, light-rail transit station, or bus station surrounded by relatively high-density development with progressively lower-density development that spreads out from the center. Transit-oriented developments generally extend one-quarter to one-half mile around the transit stop, since this is considered an appropriate distance for pedestrians to walk to the transit station.

5.1.4 Alternative C – MOS

Alternative C – MOS would use the existing railroad right-of-way, remove the existing single-track freight rail line, and construct a two-track light-rail transit line from the existing Sandy Civic Center 10000 South Station to the proposed Draper Town Center Station. Three light-rail transit stations would be built at either 10600 South or 11400 South, at 11800 South, and at Draper Town Center. Under this alternative, about 30 to 43 total acres (depending on whether the 10600 South Station or 11400 South Station is selected and on what park-and-ride lot location is selected at Draper Town Center) of the land use evaluation area would be converted to a transportation use.

5.1.4.1 Consistency with Plans, Policies, and Growth Strategies

Alternative C – MOS is consistent with plans of Sandy, Draper, and Bluffdale Cities and with the Wasatch Choices 2040 planning study.

What is a general plan?

A *general plan* is a comprehensive, long-range statement of goals and related policies to guide the future growth and development of a city.

Sandy City. Sandy City's 1998 General Plan, 1996 Transportation Master Plan (updated in 1998), 2008 Zoning Map, and 2006 Historic Sandy Plan support the development of transit and the UTA light-rail transit line. The 2008 Zoning Map shows a transit corridor zone along the UTA-owned right-of-way.

Draper City. Draper City's 2003 General Plan, 2008 Master Transportation Plan, 2006 Town Center Land-Use Category, and 1994 South Mountain Development Agreement (updated in 1999 and 2002) encourage, support, and provide for transit and the UTA light-rail transit line. Draper's plans identify transit-oriented development around the 11400 South, Draper Town Center, Highland, and 14600 South Stations in Draper.

Bluffdale City. Bluffdale City's plans do not specifically identify the light-rail transit line or any stations, but the area of the city within a half-mile of the 14600 South station (west of I-15) is designated for commercial, regional commercial, and mixed-use development.

Wasatch Choices 2040. Wasatch Choices 2040 is a land-use and transportation collaboration between WFRC, MAG, Envision Utah, UTA, and UDOT. This 2-year effort concluded with the Wasatch Choices 2040 planning study. The visioning process that created the study actively engaged the citizens and elected officials of the region. It examined the implications of transportation and land-use alternatives on the region's future and formulated a consensus on a

shared vision of regional growth. The study is intended to help improve the future quality of life and economic competitiveness for citizens and businesses. The growth principles and transportation objectives presented in the study were unanimously adopted by the mayors and elected officials who make up WFRC and MAG.

Transit is a fundamental component of the study. The study highlights the value of transit in providing a more environmentally friendly alternative to auto travel while reducing household transportation expenses. The study acknowledges that proper planning and infrastructure investment will be necessary to minimize congestion, and transit options will also become increasingly important to help people get where they need to go (Mountainland Association of Governments and others, no date).

5.1.4.2 Land-Use Impacts from Alternative C – MOS

How would Alternative C – MOS affect land use?

In general, land use along the UTA-owned right-of-way would not change substantially as a result of Alternative C – MOS, although improved transit could increase development in general and increase opportunities for transit-oriented developments around the proposed station locations.

In general, land use along the UTA-owned right-of-way would not change substantially as a result of Alternative C – MOS, although improved transit could increase development in general and increase opportunities for transit-oriented developments around the proposed station locations. Transit-oriented development is an approach to development that focuses land uses around a transit station or within a transit corridor. Because this alternative would use an existing rail corridor, use of the alignment for light-rail transit would not change the corridor's compatibility with the existing land uses.

Since Alternative C – MOS ends at the proposed Draper Town Center Station, this alternative would not encourage transit-oriented development at the Highland Station, and the Transit Center at 14600 South would provide limited support of transit-oriented development. The Draper Town Center Station would be the end-of-the-line station, and parking would be designed to accommodate the projected needs through 2030. UTA would build the number of parking stalls required to meet the forecasted parking demand for 2030 at the Draper Town Center Station as part of Alternative C – MOS. If the TRAX line were later extended south to 14600 South, the area used for parking at the Draper Town Center Station could be converted to commercial or residential uses.

UTA-Owned Right-of-Way

In general, land uses along the UTA-owned right-of-way mainline would not change substantially under this alternative. All improvements on the mainline would occur within existing UTA-owned right-of-way.

How would Alternative C – MOS affect land use along the UTA-owned right-of-way?

In general, land uses along the UTA-owned right-of-way would not change substantially under this alternative.

Proposed Stations

As shown in Table 5.1-1, Alternative C – MOS would require the acquisition of additional right-of-way for the four proposed transit stations and associated park-and-ride lots in developed and undeveloped areas. Under this alternative, about 30 to 43 total acres of the land use evaluation area would be converted to a transportation use. However, the conversion of this land, which is less than 1% of the land in Salt Lake County, would not substantially alter existing land uses in Sandy and Draper.

On Sandy City and Draper City plans, most undeveloped parcels of land identified for the stations are planned for commercial, residential, or mixed-use development. These parcels are expected to be developed with or without the Draper Transit Corridor Project. As shown in Table 5.1-1, Alternative C – MOS would require about 30 to 43 acres of new right-of-way, largely due to the stations. Improved transit could increase development in general and increase opportunities for transit-oriented developments around the proposed station locations.

Table 5.1-1. Right-of-Way Impacts from the Draper Transit Corridor Alternatives

Alternative	Total Acres Affected[a]
No-Action Alternative	0
TSM Alternative	21–23[b]
Alternative C – MOS	30–43[c]
Alternative C – Full Build	42–56[c]

[a] Amount of land required for new right-of-way only. Acres of impacts are estimates only, based on the preliminary design of the alternatives.

[b] A range is given since there are two park-and-ride lot location options at Draper Town Center.

[c] A range is given since either the 10600 South Station or the 11400 South Station would be selected.

Sandy Civic Center 10000 South Station

Alternative C – MOS is a continuation of the existing TRAX line that currently ends at the Sandy Civic Center 10000 South Station. The Dry Creek Development is already approved and planned for construction adjacent to this station. Alternative C – MOS would meet Sandy City's goals to have the Dry Creek Development be a transit-oriented development and would likely facilitate the development in and around this area.

10600 South Station

The 10600 South Station would include 250 to 350 parking spaces and would convert about 18.5 acres of undeveloped land on the west side of the UTA-owned right-of-way. Since only one of the sites at either 10600 South or 11400 South would be selected, the most conservative parking demand and parking stall numbers were calculated. Therefore, these totals could be refined once a final station location has been determined.

There is a church on the west side of and adjacent to the station site, and UTA would likely reach an agreement with the church for shared parking, so some land that is currently under institutional use could be used as shared parking with UTA. The transit station and park-and-ride lot would be compatible with the general urban nature along 10600 South. However, though the surrounding residential uses would support the transit use in general, there would be increased traffic on 10600 South, which is a minor arterial road and not a residential road. However, it's reasonable to assume that any development of the vacant parcels would increase traffic in this area to some extent.

If the 10600 South Station site is selected, some transit-oriented development could occur around the station, since it is unlikely that all 18.5 acres would be required for the transit station and associated parking. However, for the most part, this station would be a neighborhood-type station intended to serve the surrounding residential area. This station would serve commuters who could use the station's parking lot, and the station would provide bus and pedestrian access to and from the area for other transit riders. The station would provide a stable land use on the site and could increase property values in the area due to the improved access to TRAX.

How would Alternative C – MOS affect land use at the proposed station locations?

Existing land uses at the proposed station locations would generally support transit use. However, increased traffic around the stations might not be entirely compatible with the surrounding residential uses. Improved transit could increase development in general and increase opportunities for transit-oriented developments around most of the proposed station locations.

11400 South Station

The 11400 South Station would include 200 to 300 parking spaces and would convert about 5 acres of undeveloped land (primarily vacant pasture land). Since only one of the sites at either 10600 South or 11400 South would be selected, the most conservative parking demand and parking stall numbers were calculated. These totals could be refined once a final station location has been determined.

The transit station and park-and-ride lot would be compatible with the general urban nature along 11400 South. While the surrounding residential uses would support the transit use in general, the increased traffic around the station might not be entirely compatible with the surrounding residential uses. However, it's reasonable to assume that any development of these vacant parcels would increase traffic in this area to some extent.

If the 11400 South Station site is selected, little transit-oriented development would occur around the station. The existing land use around the station offers little opportunity for new development. This station would serve commuters who could use the station's parking lot, and the station would provide bus and pedestrian access to and from the area for other transit riders. The station would provide a stable land use on the site and could increase property values in the area due to the improved access to TRAX.

11800 South Station

The 11800 South Station would include 200 to 300 parking spaces and would convert 12 acres of currently undeveloped land. The transit station and park-and-ride lot would be compatible with the general urban nature along 700 East and 11800 South. Although the surrounding area is mostly residential, there are also other larger, older, single-family parcels along 700 East that have been and are being redeveloped as retail, service, and office uses. This commercial redevelopment further makes this station location compatible with existing uses. The proposed station location offers some opportunity for transit-oriented development and has land uses in place that already somewhat support transit, such as the three schools associated with the Skaggs Catholic Center. There is also a townhome development and a small office adjacent to the station site on the north side.

What is infill?

Infill is the use of land within a built-up area for further construction, especially as part of a community redevelopment or growth-management program or as part of smart growth. It focuses on the reuse and repositioning of obsolete or underused buildings and sites.

The area north of the proposed station and on the east side of 700 East is identified as a Growth Area by Draper City. There is an area of commercial/office uses designated in the city's General Plan and Land-Use Map on the west side of 700 East north of the station and a small commercial/office area south of the station. These intended land uses would support the transit station and could be supported by the improved access provided by the station.

This station would serve commuters who could use the station's parking lot, and the station would provide bus access to and from the area for other transit riders. The station would provide a stable land use on the site and could increase property values in the area due to the improved access to TRAX.

What is a Growth Area?

Draper City has designated certain areas within the city's limits as Growth Areas. A *Growth Area* is an area in Draper where more intensive, mixed-use and transit-supporting land uses are planned.

Draper Town Center Station

The Draper Town Center Station would include 700 to 800 parking spaces and would convert about 12.5 acres of mostly farmland, undeveloped land, and some commercial land. The alternate park-and-ride lot (south of Pioneer Road) would convert about 11.5 acres of farmland, which includes one residence. The station would be compatible with the general urban nature along Draper Parkway (12300 South). The Draper Town Center Station would be the end-of-the-line station under this alternative. UTA would build the number of parking stalls required to meet the forecasted parking demand for 2030 at Draper Town Center as part of Alternative C – MOS. The additional parking at the Draper Town Center Station might limit the amount of transit-oriented development at this station or at least require that more parking be provided.

The current land uses around the station location (public/ institutional, park, retail, commercial, and residential) could support transit-oriented development. The available vacant land and possible redevelopment sites (the IFA/Draper Poultrymen and Egg Producers' Plant site and others) offer further opportunities to develop transit-oriented development in the area. Draper has identified the IFA/ Poultrymen site at 1000 E. Pioneer Road as a major proposed capital investment in the city and has proposed redevelopment of the proposed existing facility into a site with spaces for 40 to 50 retail businesses (University of Utah, Bureau of Economic and Business Research 2006).

5.1.5 Alternative C – Full Build

Alternative C – Full Build would use the existing railroad right-of-way, remove the existing single-track freight-rail line, and construct a two-track light-rail transit line from the existing Sandy Civic Center 10000 South Station to the proposed 14600 South Station. Five light-rail transit stations would be built at either 10600 South or 11400 South, at 11800 South, at Draper Town Center, at Highland, and at 14600 South. Under this alternative, about 42 to 56 total acres of the land use evaluation area would be converted to a transportation use.

How would Alternative C – Full Build affect land use?

The impacts to land use along the UTA-owned right-of-way from Alternative C – Full Build would be the same as those from Alternative C – MOS. The impacts of Alternative C – Full Build at the proposed station locations would be the same as those from Alternative C – MOS.

5.1.5.1 Consistency with Plans and Policies and Growth Strategies

Alternative C – Full Build is consistent with city and regional plans, policies, and growth strategies (see the discussion in Section 5.1.4.1, Consistency with Plans, Policies, and Growth Strategies).

5.1.5.2 Land-Use Impacts from Alternative C – Full Build

UTA-Owned Right-of-Way

The impacts to land use along the UTA-owned right-of-way from Alternative C – Full Build would be the same as those from Alternative C – MOS.

Proposed Stations

Alternative C – Full Build would support transit-oriented development at all the stations identified in the plans of both Sandy City and Draper City. Most undeveloped parcels of land identified for the stations are planned for commercial or residential development. These parcels are expected to be developed with or without the Draper Transit Corridor Project. As shown in Table 5.1-1 above, Right-of-Way Impacts from the Draper Transit Corridor Alternatives, Alternative C – Full Build would require about 42 to 56 acres of new right-of-way, depending on whether the 10600 South Station or the 11400 South Station is selected.

Sandy Civic Center 10000 South Station

The land-use impacts at this station would be the same as from Alternative C – MOS.

10600 South Station

The land-use impacts at this station would be the same as from Alternative C – MOS.

11400 South Station

The land-use impacts at this station would be the same as from Alternative C – MOS.

11800 South Station

The land-use impacts at this station would be the same as from Alternative C – MOS.

Draper Town Center Station

The land-use impacts at this station would be generally the same as from Alternative C – MOS. Under Alternative C – Full Build, this station would not be the end-of-the-line station and would not likely need to provide as much parking as under Alternative C – MOS. UTA would work with Draper City to incorporate TRAX parking into the City's proposed development plans. Alternative C – Full Build would support transit-oriented development around the station.

Highland Station

The Highland Station would convert about 1.5 acres of mostly undeveloped land for the transit station. Due to the topography, there would be limited parking (about 40 to 50 parking spaces) at this station. In general, the transit station would be compatible with the surrounding residential uses. The Highland Station site has existing three- and four-story townhomes directly across Highland Drive from the station site. They are built in a semicircle around a large undeveloped retail/commercial site. The area was planned with the expectation by the developer and Draper City that the light-rail transit line would be extended to this location to help support this development.

Other land uses in the area, such as the existing residential development and cultural and recreational uses, would be supported by the improved access the light-rail transit line and station would provide. The South Mountain amphitheater and Salt Lake County Draper public swimming pool are located just south of the proposed station site.

14600 South Station

The 14600 South park-and-ride lot would include 1,300 to 1,600 parking spaces. The station would convert about 10.5 acres of undeveloped (open space) land. The station would be surrounded by open space/undeveloped land, an electrical substation, and the Utah Department of Corrections administrative office and training academy. The lot would be compatible with the existing land use. This station site has a variety of medium-density residential, office, and commercial and institutional uses surrounding it. These uses and the available undeveloped land nearby provide opportunities for other transit-oriented development or uses that could support the station.

What is medium-density residential land use?

Medium-density residential land use is four to eight dwelling units per acre.

This would be the end-of-the-line station under this alternative and would need to provide parking for commuters who might drive from some distance to use the TRAX system. Other undeveloped sites nearby are available for transit-oriented development. These future land uses can support the light-rail transit extension and station and take advantage of the improved access provided by the light-rail transit station.

5.1.6 Mitigation Measures for Impacts to Land Use

No mitigation measures are proposed.

5.2 Agriculture and Farmland Impacts

5.2.1 Methodology

This section addresses the impacts from the Draper Transit Corridor alternatives on farmland trends and crops. Farmland impacts were evaluated using information from several sources including field surveys along the project alternatives, information obtained from Utah Division of Water Resources water inventory mapping, reviews of project aerial maps, and parcel information (zoning classifications and acreage) obtained from the Salt Lake County assessor's office.

As discussed in Section 3.2.2, Statutory and Regulatory Setting, no analysis of prime, unique, or statewide or locally important farmland is required for the Draper Transit Corridor Project under the Farmland Protection Policy Act. However, an analysis of general cropland was completed.

The Draper Transit Corridor action alternatives would directly affect a small amount of cropland. Some farmland is within the proposed right-of-way and would be directly taken out of production (direct impacts). Indirect impacts from a project typically occur when farmland outside the right-of-way is no longer farmable due to small parcel size or lack of access. Indirect impacts can also occur if the farmland is developed at a faster rate as a result of the project. However, all farmland in the evaluation area is expected to be developed by the end of the study period, even under the No-Action Alternative, due to the rapid development occurring in the area.

Acquiring farmland for transit use is not considered a farm displacement unless the amount of farmland remaining is not enough to farm. UTA and the landowner would determine the viability of each farming operation on a case-by-case basis.

What is the farmland evaluation area?

The farmland evaluation area is the area within 500 feet of the UTA-owned right-of-way centerline and within a 500-foot radius around the proposed station locations. Farmland parcels that were partially within this area were included in the analysis.

5.2.2 No-Action Alternative

Under the No-Action Alternative, the Draper Transit Corridor Project would not be built, so no direct impacts to farmland would occur as a result of the project. In addition, the No-Action Alternative would not cause any indirect impacts to farmland, although continued urban development in the evaluation area would continue to convert existing farmland into residential and commercial uses.

5.2.3 TSM Alternative

The TSM Alternative would affect about 9 to 12 acres of irrigated cropland. The impacts to cropland or farmland from the three action alternatives are shown in Table 5.2-1.

Table 5.2-1. Impacts to Cropland and Farmland

in acres

	Alternative[a]		
Crop or Farmland Type	TSM	Alt. C – MOS	Alt. C – Full Build
Total irrigated	9–12	15–17	15–17
Total non-irrigated	0	0	0
Total impacts	**9–12**	**15–17**	**15–17**

[a] A range is given since either park-and-ride lot location at Draper Town Center could be chosen.

5.2.4 Alternative C – MOS

Alternative C – MOS would affect between about 15 and 17 acres of irrigated cropland, depending on what station location is chosen at Draper Town Center. Non-irrigated cropland would not be affected. All impacts would occur in the vicinity of the proposed 11800 South (the parcel west of the existing UTA-owned right-of-way) and Draper Town Center Stations, since no new right-of-way would be required along the UTA-owned right-of-way. The impacts to cropland or farmland are shown above in Table 5.2-1 and in Figure 5-1, Farmland Impacts, at the end of this chapter.

5.2.5 Alternative C – Full Build

The impacts from Alternative C – Full Build would be the same as those from Alternative C – MOS. The impacts to cropland or farmland are shown above in Table 5.2-1 and in Figure 5-1, Farmland Impacts, at the end of this chapter.

5.2.6 Mitigation Measures for Impacts to Farmland

UTA will work with each farm owner on a case-by-case basis to determine the farm's eligibility for benefits under the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, and other state and federal guidelines. Generally,

UTA will provide compensation for the expense of re-establishing farm enterprises and for fair market value of the buildings and land.

5.3 Social Environment Impacts

5.3.1 Methodology

This section describes the expected impacts to the social environment and the communities in the social evaluation area. The social environment is analyzed in terms of the following elements:

- Socioeconomic characteristics
- Housing and relocations
- Neighborhood and community cohesion
- Quality of life
- Recreation resources
- Community facilities
- Public safety and security
- Public services and utilities

Impacts to socioeconomic characteristics, housing trends, neighborhood and community cohesion, and quality of life were determined using a qualitative approach. Specifically, the analysis considers how the construction of the project would affect the physical and social conditions that define the neighborhoods and communities in the broad social evaluation area.

Impacts related to recreation resources, community facilities, and public services and utilities were determined using a quantitative approach. The alternatives were evaluated to determine how the construction would directly affect properties that support recreation areas, community facilities, or utilities in the refined social evaluation area.

Impacts to public safety and security were determined by examining how the project alternatives would affect emergency response and the safety of pedestrians in the refined social evaluation area. For the most part, health and safety impacts were analyzed qualitatively because limited amounts of data were available on emergency response and pedestrian safety.

What is the social evaluation area?

The broad social evaluation area is the same as the Draper Transit Corridor study area shown in Figure 1-1, Draper Transit Corridor Study Area. This section also considers a refined social evaluation area that consists of the area within one-half mile of the UTA-owned right-of-way and within a one-half-mile radius of each proposed station location.

What are quantitative and qualitative analyses?

A *quantitative* analysis is one that produces specific numeric results, such as a reduction in vehicle-miles traveled or the number of properties that would require relocations.

A *qualitative* analysis looks at impacts in more general and comparative terms. For this EIS, qualitative analyses were performed when numeric data or quantitative methods were not available.

5.3.2 No-Action Alternative

Under the No-Action Alternative, the social environment would generally continue to be affected by ongoing change and growth in the region. The broad social evaluation area would probably remain cohesive without the proposed transit improvements, due to the strong attachments within and between the existing communities. However, the No-Action Alternative is not compatible with regional transportation goals and plans. If transportation improvements do not keep pace with continued growth, the cohesive nature of the communities could decline.

What is cohesion?

Neighborhood and community *cohesion* are the patterns of social networking and the degree to which residents have a sense of belonging to their neighborhood or community, including commitment to the community or a strong attachment to neighbors, institutions, or particular groups.

The availability of recreation resources, community facilities, housing, and public services would not change, although access to community facilities, workplaces, homes, and areas of commerce would become more difficult and less convenient without improvements to the transportation system. There would be no impact to police and fire protection services. Increases in other services, such as the construction of new recreation or medical facilities, would be consistent with the Cities' adopted plans and the anticipated growth in the region.

The No-Action Alternative would not require acquisition of right-of-way, so no residences or businesses would be subject to relocation. However, residential and commercial development would likely continue in the evaluation area with or without the Draper Transit Corridor Project, although inadequate transportation capacity could influence developers, residents, and businesses to locate in areas where there is less congestion and better transportation service and accessibility. These issues could adversely affect how residents feel about their safety and quality of life.

5.3.3 TSM Alternative

5.3.3.1 Impacts to Neighborhood and Community Cohesion

The TSM Alternative would slightly improve transportation service between 10000 South and 14600 South and downtown Salt Lake City. The broad social evaluation area would likely remain cohesive given the strong attachments within and between the existing communities. However, the TSM Alternative is not entirely compatible with regional transportation goals and plans. If transportation improvements do not keep pace with continued growth, the cohesive nature of the communities could decline.

5.3.3.2 Impacts to Quality of Life, Recreation Resources, Community Facilities, and Housing

The availability of recreation resources, community facilities, and housing would not change as a result of this alternative, although access to community facilities, workplaces, homes, and areas of commerce would be enhanced by the improved transportation system. Overall quality of life would likely improve under this alternative.

What are community facilities?

Community facilities provide opportunities for the public to interact, help to define a city, and contribute to community cohesiveness. Community facilities generally include churches, schools, parks, trails, law-enforcement facilities, fire stations, and government offices.

5.3.3.3 Impacts to Housing and Relocations

The TSM Alternative would require acquisition of about 23 acres of right-of-way for construction of the Draper Town Center (about 11.5 acres to 12.5 acres, depending on which park-and-ride lot location is selected) and 14600 South (about 10.5 acres) park-and-ride facilities. Two businesses would potentially need to be relocated in order to construct the Draper Town Center park-and-ride lot. Table 5.3-1 lists the two business properties that might need to be relocated under the TSM Alternative. These businesses are shown in Figure 5-2, Potential Business Relocations, at the end of this chapter. No businesses would need to be relocated in order to construct the alternate Draper Town Center park-and-ride lot option.

Table 5.3-1. Potential Business Relocations

Business Name and Address	Parcel ID	Alternative			
		No-Action	TSM	Alt. C – MOS	Alt. C – Full Build
Jiffy Lube, 1028 Draper Parkway, Draper	2829403009 and east part of 2829403001	No	Yes[a]	Yes[b]	Yes[b]
Big O Tires, 1022 Draper Parkway, Draper	2829403001	No	Yes[a]	Yes[b]	Yes[b]
Bent Log Design, 1006 E. Draper Parkway, Draper	2829405023	No	No	Yes	Yes

[a] If the alternate park-and-ride lot location at Draper Town Center is selected, no businesses would be affected by the TSM Alternative.

[b] If the alternate park-and-ride lot location at Draper Town Center is selected, this business would not be affected by Alternative C.

These two businesses are considered *potential* relocations because it is not clear whether the entire parcel, including the businesses, would need to be acquired for the park-and-ride lot. UTA would make a final determination about the property during the preliminary engineering and final design phases of the project, which would

occur in advance of construction. By the end of the right-of-way acquisition phase, UTA would determine whether each potential relocation is a full relocation or not. No businesses would need to be relocated if the alternate park-and-ride lot location at Draper Town Center is selected. No residences, businesses, or public facilities would need to be relocated in order to construct the 14600 South park-and-ride lot.

Residential and commercial development would likely continue in the evaluation area, and transit-oriented development at the Draper Town Center and 14600 South Station areas would probably occur more quickly than development would occur under the No-Action Alternative. Transit-oriented development—compact, walkable communities centered around high-quality transit systems—typically results in a higher quality of life for its residents. By increasing the capacity of the transportation network, the TSM Alternative would increase mobility options for residents compared to the No-Action Alternative, but neighborhoods would continue to be characterized by dependence on the automobile.

5.3.3.4 Impacts to Public Safety and Security

UTA has adopted an ordinance (UTA Ordinance 2000-01) that establishes safety, parking enforcement, and orderly-conduct requirements for users of public transit. To enforce the ordinance, UTA has transit public safety officers who patrol the existing park-and-ride lots and buses. UTA security officers work closely with the local municipalities to respond to criminal activities and to prevent crime. Parking areas at all park-and-ride lots are well-lit to deter criminal activities.

UTA is participating in a new national public awareness and education campaign patterned after the successful Neighborhood Watch program initiated in communities across the country. Promoting transit as a community partner and safe haven, the Transit Watch campaign encourages transit employees, passengers, and neighborhood residents to be actively involved in staying alert and working together to maintain a safe transit environment.

The Transit Watch campaign encourages all UTA employees, transit riders, and community members to be aware of their surroundings and alert to activities, packages, or situations that seem suspicious. If something out of the ordinary and potentially dangerous is observed,

What is Transit Watch?

Transit Watch is a nationwide safety and security awareness campaign designed to encourage the active participation of transit passengers and employees in working together to maintain a safe transit environment. The campaign provides information and instructions to transit passengers and employees so that they know what to do and whom to contact in the event of an emergency in a transit setting. Transit Watch invites riders and employees to be the "eyes and ears" of their local transit system.

it should be reported immediately to the proper transit or law enforcement authorities.

5.3.3.5 Impacts to Public Services and Utilities

The TSM Alternative would likely require utility treatments at park-and-ride lots constructed at the Draper Town Center and 14600 South Station locations. Because only two park-and-ride lots would be constructed, the potential impacts to utilities would be less than from the build alternatives. All identified utility conflicts are considered potential at this stage of the project; their impacts have not been fully determined given that the *Utility Report* is still considered preliminary (DMJM Harris/AECOM 2008). A more detailed evaluation of utility impacts would be required during the preliminary engineering and final design phases of the project.

What are utility treatments?

Utility treatments are intended to prevent damage to utilities. Utility treatments are based on the level of potential conflict and can consist of protecting utilities during construction, removing or relocating utilities from the conflict area, extending the utility casing, installing a new utility casing, or other measures. A *utility casing* is a larger pipe in which the utility lines are enclosed.

5.3.4 Alternative C – MOS

Overall, by improving access in the broad social evaluation area, Alternative C – MOS would support and enhance existing social conditions in the evaluation area.

5.3.4.1 Impacts to Socioeconomic Trends

This section describes the effects of Alternative C – MOS on socioeconomic trends for the region and for the broad social evaluation area.

Population Trends. Between 2005 and 2030, population in Sandy, Draper, and Bluffdale is expected to grow between 5% and 341%. Alternative C – MOS would support this growth by offering another transportation alternative to and from the evaluation area.

Employment Trends. Employment in Sandy and Draper is expected to grow by 66% and 78%, respectively, between 2005 and 2030. Bluffdale will experience the highest employment growth with an increase of 257% during the same period (WFRC 2007b). Alternative C – MOS would create new permanent job opportunities for operating the transit system. For example, light-rail transit and bus vehicle operators, maintenance-of-way workers, vehicle cleaners, security personnel, and mechanics would be needed to support the system's daily operations. Additional social and economic impacts to the area are expected to stem primarily from increased access to mass transit. Therefore, impacts are likely to be positive. There would be more job opportunities for those who have

mobility limitations, as well as more job opportunities locally, due to increased transit-oriented development in the evaluation area.

5.3.4.2 Impacts to Housing and Relocations

This section describes the effects of Alternative C – MOS on housing trends for the region and for the broad social evaluation area.

Relocations

Most of the land required for Alternative C – MOS is in an existing railroad corridor. Most proposed station locations are on currently vacant land, and about 30 to 43 acres of this vacant land would need to be acquired to accommodate the proposed stations. A range of acres is given since either the 10600 South Station or 11400 South Station would be selected.

Under Alternative C – MOS, the same two *potential* business relocations as the TSM Alternative would be required in order to construct the Draper Town Center station and park-and-ride lot (see Table 5.3-1 above, Potential Business Relocations, and Figure 5-2, Potential Business Relocations, at the end of this chapter). Neither of these two businesses would require relocation if the alternate Draper Town Center park-and-ride lot is selected. In addition, one business would potentially need to be relocated to construct the trackway near the Draper Town Center, regardless of what park-and-ride lot option is chosen. This business is considered a *potential* relocation because it is not clear whether the entire parcel, including the business, would need to be acquired. Currently, this parcel legally encroaches within the UTA-owned right-of-way, but construction of the project could affect a portion of the building. It is possible that UTA could reconfigure the building to remove only the piece that is encroaching, and relocation would not be necessary. UTA would make a final determination about the property during the final design phase of the project, which would occur in advance of construction.

The three residences shown in Table 5.3-2 below and in Figure 5-3, Potential Residential Relocations, at the end of this chapter could also *potentially* require relocation. Because of safety reasons, private driveways are typically not allowed to enter a roadway through a railroad at-grade crossing of the roadway. The existing driveways for 1167 E. Pioneer Road and 1185 E. Pioneer Road currently access Pioneer Road directly through the at-grade crossing. Because 1157 E. Pioneer Road uses 1167's driveway for access, it too would be

unsafe. In addition, if the alternate park-and-ride lot is selected at Draper Town Center, an additional residence (1130 East 12460 South) could *potentially* require relocation.

Table 5.3-2. Potential Residential Relocations

Address	Alternative			
	No-Action	TSM	Alt. C – MOS	Alt. C – Full Build
1157 E. Pioneer Road	No	No	Yes	Yes
1167 E. Pioneer Road	No	No	Yes	Yes
1185 E. Pioneer Road	No	No	Yes	Yes
1130 East 12460 South	No	Yes[a]	Yes[a]	Yes[a]

[a] 1130 East 12460 South would potentially require relocation if the alternate park-and-ride lot location at Draper Town Center is selected for any alternative.

Property Values

An efficient transit system provides residents, customers, and employees with a high level of access to work, business, and other activities. The monetary value of this access is reflected in the value of a home or a business along with the value of other features such as the physical attributes of the building and the characteristics of the surrounding neighborhood.

Some residents who have commented on the Draper Transit Corridor Project have suggested that proximity to a rail line would lower residential property values due to nuisance effects such as noise, vibration, and visual impacts. However, the nuisance effect has not been conclusively supported. Two separate studies—one that focused on proximity to Portland, Oregon's, light-rail line (Chen and others 1998) and one that looked at proximity to BART (Bay Area Rapid Transit) lines in San Francisco, California (Landis and others 1995)—found no statistically significant nuisance effects. (See Section 5.7, Noise and Vibration Impacts, and Section 5.8, Impacts to Visual and Aesthetic Resources, for further discussions of nuisance effects.)

How would Alternative C – MOS affect property values?

Given the results of various studies, the uncertainty about whether improved accessibility outweighs nuisance effects, and rising gasoline costs and their associated impacts on drivers, it is reasonable to assume that most property values in the evaluation area would continue to appreciate under Alternative C – MOS.

However, Landis and his colleagues did find evidence of a nuisance effect for homes adjacent to the CalTrain commuter line in San Mateo County, California. The authors speculate that the nuisance effect for CalTrain was "probably a function of noise levels [from heavy rail technology] that are much higher than BART's." They also point out that the CalTrain trackbed is very close to adjacent

buildings and that CalTrain train cars are not specifically designed for quiet operation. Therefore, nuisance effects associated with light-rail transit can likely be reduced or eliminated through effective design and engineering (Parsons Brinckerhoff 2001).

Additionally, comparison studies of the impact of 12 rail projects (including both heavy rail and light rail) throughout North America show that, in general, proximity to rail transit has a positive impact on property values. The increase in accessibility provided by new rail transit has been cited as a primary contributing factor in increasing property values (Diaz 1999).

In theory, proximity to light-rail transit can have two different effects on residential property values. On one hand, improved accessibility (proximity to transit stations) might increase property values. This has been the case in both Dallas and Denver. In the Dallas metropolitan area, median values between 1997 and 2001 increased nearly 25% for office buildings and about 32% for residential properties near light-rail stations, according to a University of North Texas study (Johnson 2008).

In Denver, homes near light-rail stations along the southeast line, which opened in November 2006, have increased by an average of nearly 4% over the past 2 years, according to an analysis by Your Castle Real Estate. But the rest of the Denver market declined an average of 7.5% during that same period. The closer a home is to a transit station, the more its value increases, according to the Your Castle analysis. Homes less than a half-mile from a station increased by an average of 17.6%, while those 1.5 to 2 miles away increased by 0.1% on average (Jackson 2008).

On the other hand, nuisance effects (proximity to the transit line and stations) might decrease property values. Existing empirical studies are inconclusive, and the failure of these studies to separate the effects of improved accessibility from nuisance effects could explain some of the ambiguity (Chen and others 1998).

In the case of the Draper Transit Corridor Project, the build alternatives are proposed on an existing rail corridor. Nuisance effects from proximity to the existing freight rail have already lowered the property values of homes adjacent to the rail line. Homes nearest the existing rail line generally sell at discounted prices compared to similar homes in the same neighborhood farther away from the rail line. With regard to the Draper Transit Corridor Project, the build alternatives would be built on the existing rail

corridor, and the intermittent freight service currently runs on the portion of track included in Alternative C – MOS. Therefore, there are existing nuisance effects along Alternative C – MOS. However, if light-rail stations are built within walking distances of homes in the area, this is likely to raise property values for some homes.

Given the uncertainty about whether improved accessibility outweighs nuisance effects and about future gasoline costs and their associated impacts on drivers, it is reasonable to assume that most property values in the evaluation area would continue to appreciate under Alternative C – MOS.

5.3.4.3 Impacts to Neighborhood and Community Cohesion

This section describes the effects of Alternative C – MOS on neighborhood and community cohesion for the region and for the broad social evaluation area. Overall, Alternative C – MOS would have a positive effect on neighborhood and community cohesion.

Traffic and congestion affect how people move in and through their communities and therefore how they interact. Community cohesion is often reduced by policies that favor automobile travel to the detriment of other modes of travel, including walking, bicycling, and public transit. Alternative C – MOS would positively affect community cohesion in the broad social evaluation area by centralizing the location of activities and the quality of the public realm (places where people naturally interact, such as sidewalks, local parks, transit-oriented developments, and public transportation) and therefore the ease with which neighbors meet and build positive relationships.

Alternative C – MOS would address some of the current problems associated with traffic and congestion and offer another mode of transportation. These improvements could lead to increased neighborhood and community interaction, and, therefore, improved cohesiveness. In addition, the availability of a transit option in the southern part of the Salt Lake Valley could attract residents to this area who might otherwise prefer another area served by transit. Alternative C – MOS would also likely have a positive effect on other aspects of neighborhood and community cohesion, such as the use of community facilities and services.

5.3.4.4 Impacts to Quality of Life

This section describes the effects of Alternative C – MOS on quality of life in the region and in the broad social evaluation area. Overall, Alternative C – MOS would have a positive effect on quality of life.

Quality of life in the broad social evaluation area is defined by how residents feel about safety, the general living environment, accessibility to public services and shopping, affordable housing, and the availability of leisure, cultural, and recreation activities. For information about recreation, community facilities, and public safety impacts, see Section 5.3.4.5, Impacts to Recreation Resources, Section 5.3.4.6, Impacts to Community Facilities, and Section 5.3.4.7, Impacts to Public Safety and Security.

What is quality of life?

Quality of life can be characterized as a person's well-being and happiness. The factors that affect quality of life vary by person but often include safety, general living environment, accessibility to public services and shopping, affordable housing, and plentiful leisure, cultural, and recreation activities.

Commuters, residents, and visitors would benefit from reduced travel times and an additional transportation option. These improvements would draw people from their cars, which in turn would reduce traffic on the area's regional highway system and reduce vehicle-miles traveled (see Chapter 4, Transportation). This would have a beneficial effect on the evaluation area's generally auto-dependent character. More-convenient commutes, reduced travel time, and less traffic congestion would improve the quality of life for residents in the southern part of the Salt Lake Valley.

Alternative C – MOS would also support the development of transit-oriented land use, which would make it possible for residents to live a higher-quality life without being completely dependent on a car for mobility and survival.

The noise impacts identified in Section 5.7, Noise and Vibration Impacts, would not substantially affect the character of neighborhoods and would not affect quality of life. Although increases in noise constitute a noise impact under FTA guidelines, these adverse effects would be mitigated with standard improvement measures (see Section 5.7.8, Mitigation Measures for Noise and Vibration Impacts).

Alternative C – MOS would also improve quality of life by contributing to improved regional air quality. According to the American Public Transportation Association, public transportation (which includes trolleys and light rail, commuter trains, streetcars, and cable cars) produces 95% less CO, 90% less volatile organic compounds, and about half as much CO_2 and NO_x per passenger mile as private vehicles (APTA 2003).

5.3.4.5 Impacts to Recreation Resources

This section describes the effects of Alternative C – MOS on parks and other recreation facilities—notably trails—in the refined social evaluation area.

While Alternative C – MOS would not have any direct impacts on parks, trail crossings could be altered to improve safety and maintain connectivity in the evaluation area consistent with UTA's trail crossing policy, Light-Rail Design Criteria, Chapter 18, Rail Trails (UTA 2007b):

> When crossing of the track by a trail is necessary, use of existing crossings or grade separation structures is required…Trails users may use existing sidewalks that cross within public ways where appropriate warning devices and approach angles exist. If new at-grade crossings of the track are proposed, approval must be obtained from all affected governing agencies, including UTA and UDOT. Trail intersections and approaches should be on relatively flat grades. Stopping sight distances at intersections should be checked and adequate warning should be given to permit bicyclists to stop before reaching the intersection, especially on downgrades.
>
> If a trail crossing of a roadway is proposed adjacent to an existing roadway/rail grade crossing, the design plans must address modifications that will be required to the existing grade crossing warning devices, stop bars, signal, curbs, and traffic islands to adequately warn trail users. The signal plans for the crossings must identify interlocking requirements between the pedestrian crossing signals and the railroad signal system to prevent queuing of cars on the tracks during pedestrian crossing of the roadway. Any additions of or changes to the railroad's signal or active crossing warning system will be designed and installed by the entity having jurisdiction, at the project's expense.

Under Alternative C – MOS, the existing crossing of the unnamed 10-foot-wide multi-use path parallel to the UTA-owned right-of-way at 10600 South would be maintained and improved by installing railroad gates and flashers on both sides of the roadway and on the raised center median. The crossing of the unnamed multi-use trail that is perpendicular to the UTA-owned right-of-way at 10600 South would be maintained by UTA's trail crossing policy, which is quoted above. No other trail crossing impacts are anticipated within the refined social evaluation area.

Before Alternative C – MOS becomes operational, fencing that meets the height requirements of applicable state and federal

regulations would be installed adjacent to the light-rail transit alignment to prevent unofficial crossing of the UTA-owned right-of-way and to prohibit users from accessing the tracks. Exceptions would be made in approved locations where the trail is directly adjacent to the station platform. Standard UTA "No Trespassing" signs would be installed.

Alternative C – MOS would benefit area residents and would improve access to recreation resources both in the refined social evaluation area and in Salt Lake County overall. Residents would also benefit from increased mobility and opportunities for bicycle and pedestrian travel throughout the evaluation area.

In addition, UTA currently incorporates bicycle racks in its standards for station designs (UTA 2007a), and the Draper Transit Corridor Project would greatly enhance bicycle access to commuter and recreation trails in the refined social evaluation area.

Equestrian Use of the Porter Rockwell Trail. Equestrian use of the Porter Rockwell Trail, which currently runs adjacent to the existing rail mainline and in the UTA-owned right-of-way from about 9980 South to about 11400 South in Sandy, would continue to be allowed as long as the trail can be designed to accommodate appropriate safety features required by UTA. Currently, the walking and equestrian trails are separated between 10000 South and 11400 South. The trail was developed as a multi-use trail (bicycle, pedestrian, equestrian uses) in 1996 through an agreement between Sandy City and UTA (UTA 1996). The agreement states that Sandy City is responsible for the cost and operations to reconstruct, modify, or relocate any segments of the trail if requested by UTA. The agreement also states that Sandy City will transfer ownership of the trail to UTA if UTA requests this. The trail was allowed on UTA right-of-way on the condition that, if a transit corridor was developed, the trail might need to be moved or removed. As stated in 23 CFR 774.13, when a property is formally reserved for a future transportation facility before or at the same time as a recreation area is established and concurrent or joint planning or development of the transportation facility and the Section 4(f) resource occurs, then any resulting impacts of the transportation facility are not considered a 4(f) use. For more information, see Chapter 8, Section 4(f) and 6(f) Evaluation.

Will Alternative C – MOS allow equestrian use of the Porter Rockwell Trail?

UTA will make every effort to ensure that equestrian recreation can be maintained safely on the Porter Rockwell Trail if Alternative C – MOS is implemented. Parts of the trail might need to be closed to users during construction.

UTA will make every effort to ensure that equestrian recreation can be maintained safely on the Porter Rockwell Trail, although parts of

the trail might need to be closed to users during construction. Trail design tools would be used according to FHWA's Equestrian Design Guidebook for Trails, Trailheads, and Campgrounds (FHWA 2008a).

FHWA states that all rails-with-trails with potential equestrian use require site-specific analysis (FHWA 2002). UTA could use the following tools, among others, to allow safe mixed use of trails, including equestrian recreation, along Alternative C – MOS:

- Trail barriers, buffers, fences, and/or walls
- Appropriate trail set-back where right-of-way width allows
- Appropriate trail clearance where right-of-way width allows
- Appropriate trail tread and width
- Appropriate sight distance
- Controlled trail crossings with at-grade intersections
- Controlled trail access
- Signs and trail markings

What are rails-with-trails?

Rails-with-trails are shared-use paths or trails located on or directly adjacent to an active railroad track.

The FHWA guidelines state that building a horse trail in an active railroad corridor requires extensive negotiations between trail developers, governing jurisdictions, and property owners to address safety and liability (FHWA 2008a). The FHWA guidelines further state that specific design considerations are required when planning for equestrian use on trails adjacent to light-rail tracks. Lack of riders' experience near active railroads, horses' instinctual flight behavior, and horses' general wariness of new and challenging situations require special considerations. Some equestrian users advocate fences that are high enough to prevent horses from jumping them when startled or frightened; however, this concern must be balanced with the need for both horses and riders to be able to see the trains. Horses that cannot see an oncoming or approaching train experience greater fear and confusion than if they are able to see and identify the source of the noise. Equestrian use should not be promoted where barriers create a narrow trail.

Horses can become startled and unpredictable due to noises from nearby traffic, weather conditions, and distractions along a shared trail (American Trails, no date). For these reasons, American Trails recommends that a separate horse trail be provided within the same right-of-way as a multi-use trail to facilitate equestrian use. Currently, a soft trail for equestrian use is adjacent to the paved multi-use trail, so additional trail construction would not be necessary. Horse owners might have to provide additional conditioning to acclimate horses to light-rail noise. The Equestrian

Design Guidebook for Trails, Trailheads, and Campgrounds points out that horses ridden in more-developed environments become accustomed to unsettling noises after repeated exposure to them (FHWA 2008a).

Trail width is an overriding design issue when considering equestrian use on trails adjacent to active railroads. Neither the State of Utah nor UTA has trail width specifications, so specifications from other states were considered. In New York, the suggested minimum distance between the railroad track and the equestrian trail is about 10 feet (12 feet from the track center). Trails designed to accommodate equestrian use should provide a separate pathway for multiple users. Narrow railroad rights-of-way, such as those that are wide enough for only a single paved trail or that do not provide enough buffer distance for frightened horses to move away from trains, are not appropriate for equestrian use.

5.3.4.6 Impacts to Community Facilities

This section describes the effects of Alternative C – MOS on community facilities in the refined social evaluation area. Overall, Alternative C – MOS would benefit area residents and would improve access to community facilities both in the refined social evaluation area and in Salt Lake County overall.

No community facilities would be directly affected by Alternative C – MOS. However, the 10600 South Station and its associated park-and-ride lot would affect parking facilities at the LDS Church building at 275 East 10600 South in Sandy. The church property is within the footprint of the proposed station location for Alternative C – MOS. Construction of Alternative C – MOS would not interfere with the operation of the church or prevent access to the building, although driveway access to the property could change depending on the final design of the station and park-and-ride lot. UTA would coordinate with landowners and church administrators to reach an agreement on shared parking to serve both church members and transit riders.

5.3.4.7 Impacts to Public Safety and Security

This section describes the effects of Alternative C – MOS on public safety and security in the refined social evaluation area.

This section analyzes the expected effects of Alternative C – MOS on emergency response and local law enforcement, the safety of

children who attend schools in the refined social evaluation area, the safety of railroad crossings and intersections, and general transit safety and security. Because Alternative C – MOS would be designed, constructed, and operated according to accepted principles for safety and security, it would not have any adverse security or safety impacts compared to the No-Action and TSM Alternatives.

Emergency Response and Law Enforcement

Alternative C – MOS would have no substantial direct or indirect effects on emergency response in the refined social evaluation area. As noted in Section 3.3.9.1, Emergency Response and Law Enforcement, the local jurisdictions of Sandy, Draper, and Bluffdale maintain police and fire stations throughout the evaluation area. These facilities are adequate to respond to current levels of police and fire emergencies in the evaluation area.

The proposed crossing gates at rail crossings would minimally affect the response times for emergency vehicles such as ambulances, fire trucks, and police cars responding to community emergencies. Typically, gates are closed for train crossings for 25 to 45 seconds. Crossing gates would be closed about once every 7½ minutes because the trains on the Alternative C – MOS line would run at 15-minute intervals in each direction.

School Safety

As noted in Section 3.3.9.2, School Safety, the Jordan School District stated that about 525 children from four public schools might cross the UTA-owned right-of-way to get to and from school. The Jordan School District was recently split, and the new Canyons School District now incorporates the Sandy and Draper public schools. However, it's reasonable to assume that the composition of the schools hasn't changed under the new district. UTA would continue to coordinate with the Jordan and Canyon School Districts to help provide students with an alternative to walking across the rail right-of-way in the future, as rail service expands.

What effect would Alternative C – MOS have on school safety?

Alternative C – MOS is not expected to have an adverse impact on school safety.

In addition, an official with the Skaggs Catholic Center stated that a bus currently drives about 50 students from the Sandy Civic Center 10000 South Station to the campus that houses the three Catholic schools (St. John the Baptist Elementary, St. John the Baptist Middle, and Juan Diego Catholic High). The official said that the schools are looking forward to the TRAX extension and especially to

a station closer to the campus. With these changes, bus service could possibly be discontinued, since students could walk the few blocks from the station to the campus (Simpson 2008).

Moreover, fencing and/or barriers would be provided along the UTA-owned right-of-way and would be high enough to prevent trespassing. UTA currently has a Train for Safety program to educate the public on rules to remain safe around transit vehicles, including buses and trains. Before opening the Draper Transit Corridor line, UTA will implement a media campaign using Train for Safety to alert the public and schools. In addition, the Transit Watch campaign encourages transit employees, passengers, and neighborhood residents to be actively involved in staying alert and working together to maintain a safe transit environment. Therefore, Alternative C – MOS is not expected to have an adverse impact on school safety.

As discussed in the section Railroad Crossings and Intersections below, all 10 at-grade crossings in the evaluation area would include active crossing protection for pedestrians and vehicles.

Railroad Crossings and Intersections

Station locations tend to concentrate bus and carpool activity and increase pedestrian activity, including walking along roads, crossing roads, and waiting at bus or rail stops (FHWA 2008b). However, residents in the refined social evaluation area would experience a net benefit from the safety tools that UTA would implement to provide safe access to transit and allow pedestrians to cross safely near stations.

Safety Controls for Protecting Pedestrians and Vehicles

Table 4.1-4, Existing Highway-Rail At-Grade Crossings along the UTA-Owned Right-of-Way, lists the 10 at-grade intersection and road crossing locations for Alternative C – MOS that would require some type of safety control for protecting pedestrians and vehicles. Standard at-grade railroad warning system controls are suggested for all proposed improvements. The control measures used could include crossing gates, signs, signals, and raised medians. All proposed railroad warning devices would be located within the UTA or roadway right-of-way. All sidewalk and curb-and-gutter improvements that might be necessary to accommodate a second

What safety controls would be used at crossings for Alternative C – MOS?

Under Alternative C – MOS, all at-grade crossings would be upgraded to include active crossing protection to alert pedestrians and motorists of oncoming trains.

railroad track or the relocation of track within the UTA-owned right-of-way would be completed within the roadway right-of-way.

UTA would like to attain a quiet zone status for the Draper Transit Corridor Project by using standard railroad warning devices and raised center medians as the proposed improvements. The proposed improvements for all the at-grade crossings accommodate the requirements necessary for quiet zone application. See section titled Train Horns below for more information on quiet zones.

As stated in the section titled Emergency Response and Law Enforcement on page 5-30, gates are typically closed for train crossings for 25 to 45 seconds. Crossing gates would be closed about once every 7½ minutes, since the trains on the Alternative C – MOS line would run at 15-minute intervals in each direction.

Currently, the evaluation area is vehicle-oriented, though it has some areas with concentrated pedestrian, bicycle, and equestrian activity. The introduction of light rail would add a new type of vehicle. The rail alignment could affect the configuration and operation of adjacent streets, and changes in access and circulation for both vehicles and pedestrians could affect travel times. The project design would incorporate measures to minimize light-rail/vehicle/pedestrian conflicts at all at-grade intersections and roads where the light rail would cross.

Under Alternative C – MOS, all at-grade crossings would be upgraded to include gates and bells to alert pedestrians and motorists to oncoming trains. In addition, for safety purposes, fences would be installed along open areas along the tracks to prevent public access.

What is a quiet zone?

A *quiet zone* is a segment of railroad line where train crews are exempt from sounding the horn at grade crossings. Train crews are still permitted to sound the horn within a quiet zone for railroad-related reasons or for safety reasons. UTA cannot apply for the quiet zone; however, UTA will help assist local municipalities with the application process.

Train Horns

In June 2005, the Federal Railroad Administration (FRA) issued laws governing the use of train horns at grade crossings throughout the United States. These laws, which are included in 49 CFR 222 and 229, the Final Rule on the Use of Locomotive Horns at Highway-Rail Grade Crossings, state that a train crew must sound the locomotive's horn when approaching a grade crossing. This practice has been common for many years and was required internally by railroads prior to the federal law.

However, communities were looking for ways to reduce the noise associated with the horns, and FRA stepped in to develop an overall policy. In addition to requiring that train horns must be sounded, the FRA rule now provides a nationally consistent method for

Would train horns be sounded at crossings for Alternative C – MOS?

UTA is taking a lead role in establishing a quiet zone along the Alternative C – MOS right-of-way. UTA cannot apply for the quiet zone; however, UTA would help assist local municipalities with the application process.

establishing, maintaining, and enforcing quiet zones. Quiet zones are segments of railroad lines where train crews are exempt from sounding the horn at grade crossings. Note that train crews are still permitted to sound the horn within a quiet zone for railroad-related reasons or for safety reasons.

Establishing a quiet zone requires cooperative action among the municipalities along the rail right-of-way, UDOT, FRA, and UTA. The Cities are key participants since they must initiate the request to establish the zone through an application to FRA. In addition, to meet safety criteria, improvements are required at grade crossings including modifications to the streets, raised medians, warning lights, and other devices. UTA is taking a lead role in coordinating with these entities to help establish a quiet zone along the right-of-way. See Section 5.7, Noise and Vibration Impacts, for more information about quiet zones.

General Transit Safety and Security

What general transit safety and security measures would be implemented under Alternative C – MOS?

UTA has adopted an ordinance that establishes safety, fare enforcement, parking enforcement, and orderly conduct requirements for users of public transit. With the addition of more track and stations, UTA would hire additional safety officers as necessary to ensure that the current level of security is maintained.

An RTD Fastracks Fact Sheet entitled "Crime at Transit Stations," which was prepared by the Denver Regional Transportation District in 2007, reviewed neighborhood crime statistics in a number of cities before and after the construction of light-rail stations. The study found that there was no increase in crime after a station was constructed (RTD 2007).

UTA has adopted an ordinance (UTA Ordinance 2000-01) that establishes safety, fare enforcement, parking enforcement, and orderly conduct requirements for users of public transit. To enforce the ordinance, UTA has transit public safety officers who patrol the existing light-rail stations, track, and buses. Security officers are available during TRAX operational hours. UTA security officers work closely with the local municipalities to respond to criminal activities and to prevent crime. Parking areas and platform areas at all stations are well-lit to deter criminal activities. With the addition of more track and stations, UTA would hire additional safety officers as necessary to ensure that the current level of security is maintained.

UTA is participating in a new national public awareness and education campaign patterned after the successful Neighborhood Watch program initiated in communities across the country. Promoting transit as a community partner and safe haven, the Transit Watch campaign encourages transit employees, passengers, and

neighborhood residents to be actively involved in staying alert and working together to maintain a safe transit environment.

The Transit Watch campaign encourages all UTA employees, transit riders, and community members to be aware of their surroundings and alert to activities, packages, or situations that seem suspicious. If something out of the ordinary and potentially dangerous is observed, it should be reported immediately to the proper transit or law enforcement authorities.

5.3.4.8 Impacts to Public Services and Utilities

This section discusses the impacts to utilities in the refined social evaluation area from Alternative C – MOS. The utilities addressed include storm drains, sanitary sewers, municipal water lines, pressurized irrigation pipes, communications lines, electric lines, and natural gas lines.

What types of utilities are adjacent to or cross the UTA-owned right-of-way?

Nine types of utilities are adjacent to or cross the UTA-owned right-of-way: natural gas, electric, water, storm drains, cable television, Advanced Traffic Management Systems (ATMS), fiber optic, telephone, and sanitary sewer.

Potential utility conflicts are based on the locations of the existing utilities, as provided by the utility companies (public or private) and municipalities, versus the utilities' proximity to the proposed rail alignment. Alternative C – MOS could affect facilities along the proposed track alignment and could require utility treatments at stations, at-grade crossings, and park-and-ride lots. UTA would determine the effects on these utilities and appropriate utility treatments by working with local jurisdictions during the final design phase of the project once a preferred alternative is identified.

All identified utility conflicts are considered potential at this stage of the project and their impacts have not been fully determined because the *Final Utility Report* is still considered preliminary (DMJM Harris/AECOM 2008). Impacts to utilities and public services would be temporary and would occur during construction. The construction contractor would contact local businesses and residences if any loss of service is required during construction.

Impacts to these facilities might be avoided during the final design phase of the project. UTA would continue to communicate with local jurisdictions throughout the development of the project.

The *Utility Report* (DMJM Harris/AECOM 2008) looked at impacts to utilities along the full rail alignment (Alternative C – Full Build) in order to determine the worst-case potential utility impacts from the project. Table 5.3-3, Potential Utility Conflicts along Alternative C – Full Build, on page 5-38 lists the impacts from Alternative C – Full Build. The impacts from Alternative C – MOS would be less

than those from Alternative C – Full Build. Potential utility conflicts from Alternative C – MOS would be refined during the final design phase to include impacts to the UTA-owned right-of-way from the existing Sandy Civic Center 10000 South Station to the proposed Draper Town Center Station at 12400 South.

Four traction power substations (TPSSs) spaced about 1 to 1.5 miles apart would be required along Alternative C – MOS to support the overhead contact system. The substations would typically be 8 to 12 feet wide and 36 to 40 feet long. The exact locations of the substations would be determined during the final design of the system, and they would be placed within the existing UTA-owned right-of-way or within station areas.

5.3.5 Alternative C – Full Build

5.3.5.1 Impacts to Socioeconomic Trends

The impacts to socioeconomic trends from Alternative C – Full Build would be the same as those from Alternative C – MOS.

5.3.5.2 Impacts to Housing and Relocations

The impacts to housing and relocations from Alternative C – Full Build would be similar to those from Alternative C – MOS. See Table 5.3-1 above, Potential Business Relocations, and Figure 5-2, Potential Business Relocations, at the end of this chapter for the three businesses and Figure 5-3, Potential Residential Relocations, at the end of this chapter for the four residences that could potentially be relocated. Alternative C – Full Build would require that a total of about 42 to 56 acres be acquired to construct the proposed stations, depending on whether the 10600 South Station or 11400 South Station is selected.

5.3.5.3 Impacts to Neighborhood and Community Cohesion

The impacts to housing and relocations from Alternative C – Full Build would be the same as those from Alternative C – MOS.

5.3.5.4 Impacts to Quality of Life

The impacts to quality of life from Alternative C – Full Build would be the same as those from Alternative C – MOS.

5.3.5.5 Impacts to Recreation Resources

The impacts to recreation resources from Alternative C – Full Build would be similar to those from Alternative C – MOS. In addition, the three existing grade-separated trail crossings at 1300 East 13200 South, Bangerter Road, and Marion Drive (which is just south of the 14600 South Station) would be maintained for continued use of the Draper Canal Trail, Porter Rockwell Trail, and 13200 South Connector Trail. Connectivity of the Akagi Park Trail would also be maintained through proposed at-grade crossing improvements including automatic pedestrian gates and emergency swing gates. No other trail crossing impacts are anticipated in the refined social evaluation area.

Equestrian Use of the Porter Rockwell Trail. Equestrian use of the Porter Rockwell Trail, which currently runs adjacent to the existing rail mainline and in the UTA-owned right-of-way from Draper Park at about 12400 South to about 14300 South, would continue to be allowed as long as the trail can be designed to accommodate appropriate safety features required by UTA.

Will Alternative C – Full Build allow equestrian use of the Porter Rockwell Trail?

UTA will make every effort to ensure that equestrian recreation can be maintained safely on the Porter Rockwell Trail if Alternative C – Full Build is implemented. Parts of the trail might need to be closed to users during construction.

Similar to what was described for Alternative C – MOS, the trail was developed as a multi-use trail (bicycle, pedestrian, and equestrian uses) in 1996 through an agreement between Draper City and UTA. (In all, five separate legal agreements were signed between UTA, Sandy City, and Draper City for the various trail segments.) The agreement (UTA 1996) states that Draper City is responsible for the cost and operations to reconstruct, modify, or relocate any segments of the trail if requested by UTA. The agreement also states that Draper City will transfer ownership of the trail to UTA if UTA requests this.

Currently, an additional portion of the trail is being constructed between 11400 South and 12300 South. Efforts to ensure that equestrian recreation can be maintained safely on the Porter Rockwell Trail under Alternative C – Full Build would be the same as those under Alternative C – MOS. Parts of the trail might need to be closed to users during construction.

5.3.5.6 Impacts to Community Facilities

The impacts to community facilities from Alternative C – Full Build would be the same as those from Alternative C – MOS.

5.3.5.7 Impacts to Public Safety and Security

The impacts to public safety and security from Alternative C – Full Build would be the same as those from Alternative C – MOS.

5.3.5.8 Impacts to Public Services and Utilities

The impacts to public services and utilities from Alternative C – Full Build would be similar to those from Alternative C – MOS. However, the potential impacts would extend through the entire UTA-owned right-of-way.

The levels of potential utility conflict are defined as follows:

- **High** – The utility would be in direct conflict with the proposed alignment and needs to be removed and relocated out of the conflict area.
- **Medium** – The utility would be affected by the proposed alignment but would remain at the same location. The impact requires a utility treatment such as extending the utility casing, installing a new casing, lowering the utility farther into the ground, or other adjustments.
- **Low** – The utility would be within the right-of-way of the proposed alignment but would be minimally affected or unaffected by the proposed alignment. The utility might need to be protected during construction, but no further measures are recommended.
- **None** – The utility is outside the proposed track right-of-way and would not be affected by the proposed alignment.

The project team attempted to identify all information pertaining to utilities along the build alternatives. However, the findings are preliminary and are subject to change as modifications to the alignment are made. See Section 3.3.9.5, Public Services and Utilities, for a discussion on how utilities within the UTA-owned right-of-way were determined. Table 5.3-3 below lists the potential utility conflicts along Alternative C – Full Build.

What are utility treatments?

Utility treatments are intended to prevent damage to utilities. Utility treatments are based on the level of potential conflict and can consist of protecting utilities during construction, removing or relocating utilities from the conflict area, extending the utility casing, installing a new utility casing, or other measures. A *utility casing* is a larger pipe in which the utility lines are enclosed.

Table 5.3-3. Potential Utility Conflicts along Alternative C – Full Build

Utility	Utility Conflict Level			
	High	Medium	Low	None
Water	6	43	8	60
Sanitary sewer	3	17	2	26
Storm drain	1	11	8	23
Electric	2	11	10	27
Telephone	10	18	10	38
Natural gas	2	10	3	19
Advanced Traffic Management Systems	0	0	0	0
Fiber optic	0	1	0	1
Cable TV	1	10	7	20
Total	**25**	**121**	**48**	**214**

Source: DMJM Harris/AECOM 2008

As described in Section 5.3.4.8, Impacts to Public Services and Utilities, the substations would typically be 8 to 12 feet wide and 36 feet long. The exact locations of the substations would be determined during the final design of the system, and they would be placed within the existing UTA-owned right-of-way.

5.3.6 Mitigation Measures for Social Impacts

5.3.6.1 Mitigation Measures for Impacts to Housing and Relocations

All property acquisitions and relocations will be completed in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended. Suitable replacement properties will be found nearby for the affected residents and business owners.

5.3.6.2 Mitigation Measures for Impacts to Public Safety and Security

What measures would be implemented to mitigate impacts to public safety and security?

If a build alternative is selected, UTA will implement fences and barriers, station platform designs that allow emergency access and egress, pay telephones, additional safety officers, and other measures to mitigate impacts to public safety and security.

The following mitigation measures will reduce adverse operational impacts to public safety and security from the build alternatives.

- **Fences and Barriers.** Fences and/or barriers will be provided along the UTA-owned right-of-way and surrounding station areas. The fences and barriers will be designed to be a safety barrier to prevent vehicles, trucks, and other roadway users from accidentally entering the UTA-owned right-of-way and will be high enough to prevent trespassing.
- **Emergency Access and Egress.** Station platform design will meet the requirements of applicable local, state, and federal codes as well as the requirements of the UTA design criteria.
- **Pay Telephones.** Pay telephones will be located on the platforms.

If a build alternative is selected, UTA will hire additional safety officers as needed to ensure that the current level of security is maintained. The new stations will be well lit to deter criminal activities. Though the frequency of trains would increase, fencing or barriers will be installed along open areas of the tracks to reduce public access, and all at-grade crossings will be upgraded to include active crossing protection to alert schoolchildren, other pedestrians, and motorists of oncoming trains.

UTA currently has a Train for Safety program to educate the public on rules to remain safe around transit vehicles, including buses and trains. UTA will implement a media campaign using Train for Safety to alert the public and schools before opening the Draper Transit Corridor line. In addition, the Transit Watch campaign encourages transit employees, passengers, and neighborhood residents to be actively involved in staying alert and working together to maintain a safe transit environment.

5.3.6.3 Mitigation Measures for Impacts to Public Services and Utilities

If utility service would be interrupted during construction, the construction contractor will contact local businesses and residences.

Typical solutions to utility conflicts vary depending on the individual utility. With pressure pipelines, a utility conflict could require lowering the pipeline farther into the ground if the line is not at the required depth, or it could require extending the casing to meet the required casing offset from the track centerline. Power poles might need to be removed and installed at a new location, which would lead to a new configuration of the wires.

Proposed mitigation measures will be determined on a case-by-case basis for each identified utility conflict. Each utility that requires mitigation will be carefully analyzed, based on its conflict designation in the list below and the criteria for treatment, to determine how best to protect it and the new corridor facilities.

- **High conflict** – Mitigation for a high-conflict utility will typically include removal and possible reinstallation (relocation) of the utility.
- **Medium conflict** – Mitigation for a medium-conflict utility will typically require the treatment of an existing utility scheduled to remain in place. In most instances, a casing will be installed to protect the affected utility.
- **Low conflict** – Mitigation for a low-conflict utility is typically minimal. Generally, protection of the utility in place during construction is recommended for this classification, and no additional treatment (such as a casing) is required.
- **No conflict** – A no-conflict utility does not appear to require treatment.

What measures will be implemented to mitigate impacts to public services and utilities?

If utility service would be interrupted during construction, the construction contractor will contact local businesses and residences. In addition, proposed mitigation measures will be determined on a case-by-case basis for each identified utility conflict.

5.4 Economic Impacts

This section discusses the expected economic effects of the No-Action and action alternatives. Any of the action alternatives could affect local businesses and employment, the tax base, and overall investment in the economic evaluation area.

What is the economic evaluation area?

The economic evaluation area includes Salt Lake County, the cities of Draper, Sandy, and Bluffdale, and the businesses adjacent to the UTA-owned right-of-way that could experience adverse or beneficial impacts from construction and operation of the Draper Transit Corridor Project.

5.4.1 Methodology

Aerial photographs, county assessor property data, and the results of a drive-through survey of the economic evaluation area were used to verify the businesses in the evaluation area. For this analysis, potential relocations of business properties were considered. Land-only impacts (strip takes) are not discussed in this section.

Acquisition of property for right-of-way to support stations and park-and-ride lots would convert taxable land to a nontaxable transportation use. To evaluate impacts to property tax revenue, current property tax rates were applied to the total market value for the right-of-way that would be acquired. Impacts to retail sales taxes are also considered in this section.

5.4.2 No-Action Alternative

Traffic volumes resulting from the projected growth in the region are expected to continue. The No-Action Alternative would result in increased traffic congestion and delays. No new job opportunities related to the operations of an expanded light-rail system would occur under this alternative. Further, the No-Action Alternative would not provide the social and economic enhancements for travel to work or recreation, or the mobility enhancements for no-vehicle households and low-income citizens, that would be attributed to the action alternatives.

5.4.2.1 Commerce and Employment Impacts

If transit improvements are not made, business and employment growth would likely continue to increase consistent with their past trends in the short term. However, as traffic congestion increases over time and as businesses seek to reduce costs, the region's economic competitiveness would diminish compared to other areas in the region with better transportation systems. The growth in business commerce and employment, especially with respect to businesses that depend on the transportation system, would be

reduced over time compared to businesses in the region with better transportation access.

5.4.2.2 Local Government Revenue Impacts

Under the No-Action Alternative, local government revenues would continue to increase at a pace about equal to the community's population and job growth. Property tax revenues and sales tax revenues would continue to be an important source of funds for the communities, and other forms of revenue generation would likely be developed.

5.4.2.3 Property Value Impacts

Under the No-Action Alternative, residential and non-residential property values in the economic evaluation area and the region would continue to increase over time. However, as traffic congestion in the evaluation area worsens and as travel times increase, the desirability of the residential and non-residential properties in the evaluation area would decrease compared to areas with better transportation access. As a result, property values might continue to increase, but not as much as they would with a more effective regional transit system.

How would the No-Action Alternative affect property values?

Under the No-Action Alternative, property values might continue to increase, but not as much as they would with a more effective regional transit system.

5.4.3 TSM Alternative

The TSM Alternative would provide increased opportunities for travel to work or recreation and would improve the mobility for no-vehicle households and low-income citizens. It would also provide new permanent bus transit jobs within the UTA system.

5.4.3.1 Commerce and Employment Impacts

The TSM Alternative would likely have beneficial commerce and employment impacts to businesses near the two proposed park-and-ride lots (on 700 East and on State Street near the 14600 South Station and near the Draper Town Center for the Draper Town Center Station). In particular, the alternative would benefit those businesses, such as drycleaners, auto mechanics, supermarkets, and other service industries, that can serve commuter customers. The proposed park-and-ride lot at Draper Town Center would potentially affect two businesses in Draper. Table 5.4-1 below summarizes the potential business impacts from the TSM Alternative. These potential relocations could result in the loss of about 30 to 50 jobs.

What business relocations would be required under the TSM Alternative?

The acquisition of right-of-way would require two Draper businesses to potentially be relocated. No businesses in either Sandy or Bluffdale would be directly affected by this alternative.

However, if necessary, these businesses could likely relocate nearby, given the availability of commercial and vacant property. If shoppers continue to want the services provided by a relocated business, it is reasonable to assume that the business should be successful at its new location, especially if it is reasonably close to the current location. If the alternate park-and-ride lot location at Draper Town Center is selected, no businesses would be affected by the TSM Alternative.

Table 5.4-1. Potential Business Relocations

Business Name and Address	Business Type	Estimated Employees	Alternative			
			No-Action	TSM	Alt. C – MOS	Alt. C – Full Build
Jiffy Lube, 1028 Draper Parkway, Draper	Automotive services	15–25	No	Yes[a]	Yes[b]	Yes[b]
Big O Tires, 1022 Draper Parkway, Draper	Automotive services	15–25	No	Yes[a]	Yes[b]	Yes[b]
Bent Log Design, 1006 E. Draper Parkway, Draper	Log furniture manufacturer	2–5	No	No	Yes	Yes

[a] If the alternate park-and-ride lot location at Draper Town Center is selected, no businesses would be affected by the TSM Alternative.

[b] If the alternate park-and-ride lot location at Draper Town Center is selected, this business would not be affected by Alternative C.

Since key factors in selecting a business location include the quality of an area's transportation infrastructure, the availability of the work force, and the cost of doing business, the TSM Alternative would make only a minor contribution to the region's attractiveness as a business location.

The TSM Alternative would involve only minor improvements to the region's infrastructure, and these improvements would likely not be enough to allow the region to continue to retain and attract businesses. This lack of support for business could reduce the economic growth in the evaluation area compared to what is projected. Although the TSM Alternative would likely improve the transportation infrastructure enough to maintain current levels of employment and probably some economic growth, the full growth predicted for 2030 would probably not occur.

5.4.3.2 Local Government Revenue Impacts

The TSM Alternative would require UTA to purchase right-of-way at the Draper Town Center and 14600 South park-and-ride lot locations. Purchasing right-of-way for transit purposes would reduce Draper City's municipal revenue because Draper would lose the property tax and sales tax generated by the parcels. Public transportation services are not a retail business activity, so they do not contribute business or occupation taxes.

What is an occupation tax?

An *occupation tax* is a fixed charge, levied usually as a license fee, on professionals such as architects, attorneys, and doctors.

5.4.3.3 Property Value Impacts

Properties that are close to a transit system generally have higher property values. The availability of a transit system reduces household transportation costs. Further, transit improves the "walkability" of a community, which improves the quality of life and associated property values. These reduced costs and improved amenities increase the desirability of housing near transit stations and stops, which leads to higher residential property values.

The TSM Alternative includes minimal transit improvements and two park-and-ride lots rather than full transit stations. Therefore, the TSM Alternative would not likely contribute to a substantial increase in property values. However, the TSM Alternative would not contribute to a decrease in property values either, since the homes are located far enough away from the proposed park-and-ride lot and shouldn't be affected by noise or lights.

How would the TSM Alternative affect property values?

The TSM Alternative would not likely contribute to a substantial increase in property values. However, the TSM Alternative would not contribute to a decrease in property values either.

5.4.4 Alternative C – MOS

There are various methods for determining the economic impacts of transportation improvements, including measuring rates of return on the infrastructure investment (see Chapter 6, Local Financial Commitment) and a more broad-based measurement of how infrastructure investment affects economic growth. Investment in transportation infrastructure is one of the principal factors in attracting and retaining businesses in an area.

Alternative C – MOS would have a beneficial economic impact to the traveling public. In addition to the benefit to those using the transit system, motorists would benefit from the small reduction in traffic congestion due to fewer commuters on the roads. Alternative C – MOS would create new net economic growth due to the coordination of transportation services.

5.4.4.1 Commerce and Employment Impacts

The scope of Alternative C – MOS would shape the nature of transit-oriented development adjacent to the UTA-owned right-of-way and at several station locations and would extend throughout the transportation network because of increased mobility. This investment would not only help downtown Salt Lake City retain employers and residents, but it would also improve the evaluation area's ability to successfully compete for new residents and jobs on a national basis.

New jobs would include those directly associated with operation and maintenance of Alternative C – MOS. It is not possible to determine the number of direct jobs needed for the project and the resulting impact on the local or regional work force until final design of the project has been completed and an exact project timetable has been established for construction activities. Finding qualified workers to fill those jobs would not be burdensome.

Under Alternative C – MOS, the same two *potential* business relocations as for the TSM Alternative would be required in order to construct the Draper Town Center park-and-ride lot, unless the alternate park-and-ride lot location is selected (see Table 5.4-1 above, Potential Business Relocations, and Figure 5-2, Potential Business Relocations, at the end of this chapter). In addition, one business would potentially need to be relocated to construct the trackway near the Draper Town Center. This business is considered a *potential* relocation because it is not clear whether the entire parcel, including the business, would need to be acquired. Currently, this parcel legally encroaches within the UTA-owned right-of-way, but construction of the project could affect a portion of the building. It is possible that UTA could reconfigure the building to remove only the piece that is encroaching, and relocation would not be necessary. UTA would make a final determination about the property during the final design phase of the project, which would occur in advance of construction.

What business relocations would be required under Alternative C – MOS?

The acquisition of right-of-way would require three Draper businesses to potentially be relocated. No businesses in either Sandy or Bluffdale would be directly affected by this alternative.

These potential relocations could result in the loss of about 32 to 55 jobs. However, if necessary, these businesses could likely relocate nearby, given the availability of commercial and vacant property. If shoppers continue to want the services provided by a relocated business, it is reasonable to assume that the business should be successful at its new location, especially if it is reasonably close to the current location.

No businesses in either Sandy or Bluffdale would be directly affected by this alternative.

Any major construction project temporarily inconveniences or disturbs the residents, businesses, and business customers adjacent to the project. The congestion associated with construction could also cause increased travel delays and lost worker productivity. This impact would affect both commuters and businesses that rely on local transportation.

Temporary adverse impacts could also occur because of reduced accessibility during construction. These impacts would primarily be experienced by businesses whose clientele is based on convenience or impulse patronage rather than businesses with a specific client base. For example, motorists might avoid a gas station near a construction zone because it is more difficult to access. In contrast, patients going to a doctor's office in a construction zone would be less likely to select another doctor based on temporary access problems. The above impacts would be temporary but could result in an adverse impact depending on the length of construction.

5.4.4.2 Local Government Revenue Impacts

Alternative C – MOS would not increase government tax revenues (property, sales, business and occupation, and others) in the evaluation area over the long term. Public transportation services are not a retail business activity, so they do not contribute business or occupation taxes. Property tax revenues directly related to the development of Alternative C – MOS would not substantially change as long as the alignment and station locations are owned by UTA.

Overall, the reduction in the property tax base of Salt Lake County and the municipalities from Alternative C – MOS would be small. Over the long term, increased property values and transit-oriented development that result from an improved regional transit system would generate enough revenue to offset the short-term impact to local revenues.

The new jobs and wages associated with Alternative C – MOS and the resulting increases in income would foster greater retail spending. As discussed in Section 3.4.4.4, Tax Rates, the State of Utah taxes retail sales at a 4.65% rate. Salt Lake County imposes an additional local-option sales tax rate of 2.15%. Additionally, the wages earned during the construction phase of the project would be subject to state income tax.

How would Alternative C – MOS affect local government revenue?

Alternative C – MOS would reduce the property tax bases of Salt Lake County and the municipalities by a small amount. In the long term, Alternative C – MOS would increase the amount of revenue collected from local-option use taxes in the municipalities.

In the long term, Alternative C – MOS would increase the amount of revenue collected from local-option use taxes in the municipalities. Sales taxes are collected on products that are produced by the commercial and industrial sectors and sold to end users. Sales tax revenues are reduced when a business is displaced or removed from a taxing jurisdiction, which removes the business's contribution to the local jurisdiction's tax base. Sales tax revenues increase when more businesses open in a taxing jurisdiction.

The three businesses that would potentially be displaced by Alternative C – MOS generate sales taxes. The possible displacement of these businesses could reduce the amount of retail sales taxes if the businesses did not relocate nearby; however, compared to the total sales taxes generated in the jurisdictions, these losses would be minor. The resulting impacts would likely be far less than 1% of the overall tax revenues shown in Table 3.4-5, Local-Option Sales Tax Revenues.

5.4.4.3 Property Value Impacts

How would Alternative C – MOS affect property values?

Due to the improved accessibility provided by Alternative C – MOS, residential properties in the affected communities would increase in value by some small but unknown percentage compared to property values without the project.

Impacts to property values are usually due to the operation of a project rather than its construction. Implementation of light-rail transit generally increases the value of and development opportunities for residential and commercial properties within walking distance of the station areas. The increase in value translates into greater tax revenues. Private development around the stations would increase sales and business tax revenue.

Over the long term, transit improvements would facilitate economic development by providing a regional transportation system. The increased economic competitiveness and higher property values due to the improvements would likely offset any local adverse impacts. These economic benefits would similarly increase local government revenues, most likely increasing them above the levels that would occur under the No-Action Alternative.

This analysis uses several commonly accepted generalizations when discussing property value impacts. These generalizations are either intuitive or are supported by empirical data and in either case indicate whether an impact would be beneficial or adverse. In some cases, these generalizations provide insights into the degree to which the property value might be changed.

Properties that are close to transit stations and stops are generally considered to have higher value. Proximity to transit reduces

transportation costs for nearby households and increases the visibility of and accessibility to adjacent businesses. In a survey of eight previous studies, Diaz (1999) demonstrated a positive relationship between the proximity of rail transit and property values, particularly residential property values. However, based on the wide range of methodologies and impacts used in the studies, it was not possible to standardize the results.

Due to the improved accessibility to other parts of the evaluation area and to the region as a whole provided by Alternative C – MOS, residential properties in the affected communities would increase in value by some small but unknown percentage compared to property values without the project. Further, undeveloped residential properties would similarly increase in value based on their improved transportation access. Though this increase in value would be small for an individual residence, when summed across the number of existing and future residences in the economic evaluation area, these combined small increases in residential property values would outweigh the possible adverse property value impacts on properties directly adjacent to the transit line.

An increase in residential property values from an improved transportation system would likely increase annual property tax bills for residential homeowners. Though the increase in property value would be small and the associated increase in the total tax bill is uncertain, this increase in property taxes would add to the financial burden for people on low, fixed incomes.

5.4.5 Alternative C – Full Build

How would Alternative C – Full Build affect economic issues in the evaluation area?

The economic impacts from Alternative C – Full Build would be similar to those from Alternative C – MOS.

The economic impacts from Alternative C – Full Build would be similar to those from Alternative C – MOS. No additional businesses would require relocation under Alternative C – Full Build. The property, sales, business, and occupation tax effects from Alternative C – Full Build would be similar to those from Alternative C – MOS.

While additional right-of-way would be converted to transit use to accommodate the proposed Highland and 14600 South Stations, the overall impact to the property tax base of Salt Lake County and the municipalities from Alternative C – Full Build would continue to be small. The anticipated growth in the communities would likely overcome this impact with continued development, which would add additional revenues to the tax base and offset the loss of property taxes from the alternative. The full rail line would further stimulate

development and redevelopment around the two additional proposed station locations. In addition, Alternative C – Full Build would enhance access to destinations in the Salt Lake Valley for those living in Utah County, which would further increase productivity and decrease traffic congestion.

5.4.6 Mitigation Measures for Economic Impacts

Overall, the project would result in economic benefits. However, it would require the acquisition of property. Although the acquisition of property could cause an adverse impact on the business, this impact would not likely cause an adverse impact to the regional economy. Acquired businesses would be relocated by UTA according to the Uniform Relocation Assistance Act, as amended; Title VI of the Civil Rights Act of 1964; and 49 CFR 24, Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally Assisted Programs.

Construction activities could temporarily affect access to businesses in the construction area. Although access to properties would be maintained to the extent practicable, temporary detours would limit some access or change the route to some businesses. For each phase of the project, the project team will coordinate with property owners and businesses to evaluate ways to maintain access while still allowing efficient construction operations. This could entail sharing temporary access or identifying acceptable timeframes when access is not needed. Adequate signage will be placed in construction areas to direct motorists to businesses and industrial areas.

Mitigation is generally not offered to local governments that are adversely affected when lands are removed from their tax base. Over the long term, increased property values and transit-oriented development that result from an improved regional transit system will generate enough revenue to offset the short-term impact to local government revenues.

For residential properties close to the build alternative alignments that experience adverse noise and aesthetic impacts and an associated loss of property values, no mitigation is specifically recommended. However, the mitigation measures identified in Section 5.7, Noise and Vibration Impacts, and Section 5.8, Impacts to Visual and Aesthetic Resources, will partially mitigate these adverse impacts.

5.5 Environmental Justice Impacts

Executive Order 12898, Federal Actions To Address Environmental Justice in Minority and Low-Income Populations, mandates that all federal actions be reviewed for possible disproportionate effects on minority or low-income populations, also known as environmental justice populations. Guidance on incorporating environmental justice concerns is found in EPA's Final Guidance for Incorporating Environmental Justice Concerns in NEPA Compliance Analyses (EPA 1998). This section considers whether the community, economic, noise, air quality, safety, and construction impacts of the Draper Transit Corridor action alternatives would disproportionately affect environmental justice populations.

What is the refined environmental justice evaluation area?

The refined environmental justice evaluation area consists of the area within one-half mile of the UTA-owned right-of-way and within a one-half-mile radius of each proposed station location.

5.5.1 Methodology

The environmental justice analysis is based on public input and meetings with city and county planning officials and school districts. The methodology for determining impacts was developed by examining applicable laws, regulations, executive orders, policy papers, and guidance materials.

What is environmental justice?

Environmental justice is a term used to describe the fair and equitable treatment of minority and low-income people (environmental justice populations) with regard to all federally funded projects and activities.

With regard to transit projects, the objective of an environmental justice analysis is to determine whether the benefits and costs of a transit project would be experienced differently by minority and low-income populations than by other members of society.

A disproportionately high and adverse effect on an environmental justice population would occur in the following situations:

- The adverse effect associated with the transportation project would be predominantly borne by the environmental justice population.
- The adverse effect on the environmental justice population would be substantially more severe or greater in magnitude than the adverse effect on the non–environmental justice population.

To determine the expected environmental justice impacts, a two-step approach was developed. First, the project team determined whether the proposed alternatives could cause changes to resources and whether these changes would then affect people in the refined environmental justice evaluation area. The main resources that are likely to affect local populations are community cohesion (the extent to which a community feels connected or cohesive), economics,

relocations, transportation, air quality, noise, and water quality. Although changes in a hazardous waste site could negatively affect a neighborhood, the project team determined that impacts would be short-term during construction and that appropriate measures would be taken to avoid the release of any hazardous materials.

Next, the project team reviewed the impact information for these resources in this EIS to determine if the impacts would exceed a law, regulation, guidance, or accepted guideline, or if, based on their professional judgment, the impacts would have some effect on environmental justice communities. If the project team determined that any of the previous conditions would occur, the second step was to decide whether the impact would result in a disproportionately high and adverse effect on an environmental justice population.

What is the purpose of an environmental justice analysis?

With regard to transit projects, the objective of an environmental justice analysis is to determine whether the benefits and adverse impacts of a transit project would be experienced differently by minority and low-income populations than by other members of society.

The ongoing public outreach efforts for the Draper Transit Corridor Project will provide further information on expected project impacts and help determine effective mitigation measures. To be consistent with NEPA and Executive Order 12898, outreach to and involvement of environmental justice communities will continue beyond the environmental process through final project design and construction until the project is completed.

The following sections discuss the expected impacts to environmental justice populations due to changes in social and economic conditions, air quality, noise, and safety and security. The results of these other environmental analyses are included by reference and summarized only as needed to support the findings of the environmental justice analysis.

The expected impacts to environmental justice populations were determined by overlaying the action alternatives on an aerial photograph of the refined environmental justice evaluation area. The alternatives were examined for direct land-based impacts and for potential indirect impacts related to accessibility and mobility. The impact analysis considers the following environmental justice groups:

- **Contiguous block groups 112605-3 in Sandy, 112605-4 in Sandy, and 112807-2 in Draper** (see Figure 3-6, Minority Population [Census Block Group Level], Figure 3-7, Hispanic or Latino Population [Census Block Group Level], and Figure 3-8, Poverty Population [Census Block Group Level], at the end of Chapter 3, Affected Environment). These block groups have a percentage of racial minority residents that is higher than the county averages (1.4, 1.7, and 4.2 percentage points higher, respectively). One block group (112807-2) also has a percentage of Hispanic or Latino persons that is 2.7 percentage points higher than the county average. Block group 112807-2 includes the Utah State Prison, which likely accounts for the higher percentage.
- **Block group 112812-3 in Sandy** has a slightly higher percentage of persons living below poverty level than the county as a whole (an average of 0.2 percentage point higher).

What are accessibility and mobility?

Accessibility refers to the ability of residents to access goods and services. For example, an accessible city hall is one that is easy to find and get to.

Mobility refers to the choices—such as automobile, bus, light rail, or carpooling—that are available to people when they travel as well as the ease with which residents can move through their communities. For example, an area with good mobility is one that provides numerous ways to physically access a particular good or service.

5.5.2 No-Action Alternative

Under the No-Action Alternative, the Draper Transit Corridor Project would not be built, so no direct impacts to environmental justice populations would occur as a result of the project. Under the No-Action Alternative, there would be no project construction, so there would be no construction-related dust, noise, access, or other nuisance impacts on people in the evaluation area. Without improvements to transit service, traffic congestion, delays, and regional air pollution would increase.

Additionally, unlike the build alternatives, this alternative would not improve access and mobility for residents who do not own or drive a vehicle. As population grows, the demand for these services will continue to increase, and the demand will not be met. However, these adverse impacts would affect the full range of people throughout the evaluation area and would not disproportionately affect environmental justice populations.

How would the No-Action Alternative affect environmental justice populations?

The No-Action Alternative would not have disproportionate adverse effects on environmental justice populations.

5.5.3 TSM Alternative

The TSM Alternative would not directly affect environmental justice populations. The TSM Alternative would not have disproportionate adverse effects on minority, low-income, or disadvantaged populations. The TSM Alternative would provide additional access and mobility options for these populations.

How would the TSM Alternative affect environmental justice populations?

The TSM Alternative would not have disproportionate adverse effects on environmental justice populations.

5.5.4 Alternative C – MOS

Section 5.5.6, Overall Community Impacts, summarizes the expected impacts to environmental justice communities by resource from the build alternatives. Based on this evaluation, Alternative C – MOS would not have disproportionate adverse impacts on minority, low-income, or disadvantaged populations. Although adverse impacts from noise would occur in some locations that have concentrations of low-income and minority residents, these impacts would affect the entire community along the transit alignment, and no specific group (such as environmental justice populations) would experience disproportionately high and adverse impacts. Furthermore, all residents would benefit from improved transit service in the evaluation area. Alternative C – MOS would also decrease vehicle-miles traveled and would therefore contribute to a reduction in regional air pollution.

Alternative C – MOS would improve transportation for all population groups in the evaluation area, especially transit-dependent groups such as people with disabilities, minorities, low-income residents, the elderly, and those without access to automobiles.

All households in the evaluation area would experience the same noise, vibration, and traffic impacts, and similar mitigation measures are proposed for all population groups. The analysis concludes that Alternative C – MOS would not result in disproportionately high and adverse impacts to environmental justice populations.

How would Alternative C – MOS affect environmental justice populations?

Alternative C – MOS would improve transportation for all population groups in the evaluation area, especially transit-dependent groups such as people with disabilities, minorities, low-income residents, the elderly, and those without access to automobiles. Alternative C – MOS would not result in disproportionately high and adverse impacts to environmental justice populations.

5.5.5 Alternative C – Full Build

The impacts to environmental justice populations from Alternative C – Full Build would be similar as those from Alternative C – MOS. However, residents would likely benefit more from the full alignment than from the minimum operable segment because a larger area would be served by transit.

How would Alternative C – Full Build affect environmental justice populations?

The impacts to environmental justice populations from Alternative C – Full Build would be similar as those from Alternative C – MOS. However, residents would likely benefit more from the full alignment than from the minimum operable segment because a larger area would be served by transit.

5.5.6 Overall Community Impacts

This summary of community impacts applies to both of the build alternatives since they would have similar impacts. Because the air quality analysis focuses on Alternative C – Full Build, the summary information below is for that alternative specifically. However, the analysis also applies to Alternative C – MOS, which would have slightly less air quality impacts.

Social and Economic Conditions. As described in Section 5.3, Social Environment Impacts, and Section 5.4, Economic Impacts, none of the alternatives would cause any community cohesion or economic impacts to the local communities overall, so there would be no community cohesion or economic impacts to environmental justice populations.

Noise. As described in Section 5.7, Noise and Vibration Impacts, under Alternative C – MOS, overall project noise levels (as shown in Table 5.7-4, Overall Project-Related Noise Impacts at Residences under the Build Alternatives, on page 5-80) are predicted to exceed the FTA *moderate* impact criteria at 114 residences and the FTA *severe* impact criteria at an additional 146 residences. Under Alternative C – Full Build, overall corridor wide project noise levels (as shown in Table 5.7-4) are predicted to exceed the FTA *moderate* impact criteria at 259 residences and the FTA *severe* impact criteria at an additional 192 residences.

Given that these impacts would affect the entire community along the transit alignment, no specific group (such as environmental justice populations) would experience disproportionately high and adverse impacts.

Vibration. As described in Section 5.7, Noise and Vibration Impacts, under Alternative C – MOS, overall project vibration levels are predicted to exceed the FTA *frequent* criterion of 72 VdB at six residences. Under Alternative C – Full Build, overall project

vibration levels are predicted to exceed or equal the FTA *frequent* criterion at seven residences.

Given that these vibration impacts are corridor-wide, there would be no disproportionately high and adverse vibration issues for any environmental justice community. Moreover, all vibration impacts could be eliminated with the track modifications recommended in Section 5.7.8.1, Operations.

Air Quality. As described in Section 5.6.1, Methodology, the air quality analysis was conducted for Alternative C – Full Build because it would have the greatest local air quality impacts. The air quality impacts from Alternative C – MOS would be similar to but slightly less than those from Alternative C – Full Build.

What overall community impacts would the project alternatives have on environmental justice populations?

None of the alternatives would cause disproportionately high or adverse effects on any environmental justice community.

As described in Section 5.6.5, Alternative C – Full Build, Alternative C – Full Build would be a minor source of PM_{10} and CO at the regional level. Future CO levels on roads and at intersections serving the transit stations for Alternative C – Full Build would be lower than the national standards. In addition, Alternative C – Full Build conforms to PM_{10} emission budgets at the project level and would have a minor impact on overall PM_{10} emissions. At the project level, Alternative C – Full Build would be minor source of regional ozone in Salt Lake County. Overall, there would be no disproportionately high and adverse air quality effects on any environmental justice community.

Safety and Security. As described in Section 3.3.9.4, General Transit Safety and Security, residents are concerned with safety in and around the proposed TRAX line and stations. The local jurisdictions of Sandy, Draper, and Bluffdale Cities maintain police stations throughout the evaluation area. These facilities are adequate to respond to current emergencies in the area. In addition, UTA has adopted an ordinance (UTA Ordinance 2000-01) that establishes safety, fare enforcement, parking enforcement, and orderly-conduct requirements for users of public transit. This ordinance is enforced by UTA transit public safety officers who patrol the light-rail stations, light rail trains, and buses. Security officers are available during TRAX's hours of operation. UTA security officers work closely with the local municipalities to respond to criminal activities and to prevent security risks. Parking areas and platform areas at all stations are well-lit during operational hours. Overall, there would be no disproportionately high and adverse safety and security issues in any environmental justice community.

Construction Impacts. Short-term, temporary construction-related noise, air quality, community, and safety impacts from the project would affect all communities along the UTA-owned right-of-way (see Section 5.17, Construction Impacts). Since all residents would experience impacts equally, construction-related impacts would not disproportionately affect minority or low-income people.

5.5.7 Summary of Environmental Justice Impacts

As a whole, most people living in the evaluation area are Caucasian and have incomes above the poverty level. Although there are minority and low-income populations in Sandy near the northern end of the evaluation area and in Draper near the southwest part of the evaluation area, both Sandy and Draper are dominated by Caucasian, moderate-to-upper-income families. The proposed project would improve accessibility to employment and education destinations served by public transportation for all residents of the region regardless of race, ethnicity, or income. None of the alternatives would directly or indirectly affect any populations of a specific race, ethnicity, or income. None of the alternatives would cause disproportionately high or adverse effects on any environmental justice populations in the evaluation area.

5.5.8 Mitigation Measures for Environmental Justice Impacts

No mitigation measures are proposed.

5.6 Air Quality Impacts

This section describes the air quality impacts from the Draper Transit Corridor Project. The air quality impacts from the Draper Transit Corridor Project were evaluated using guidelines and procedures from EPA, FTA, FHWA, and UDOT. The project would result in both short-term, construction-related impacts and long-term, operational impacts after the project is built. The operational impacts of the Draper Transit Corridor Project would be due to the operation of light-rail transit vehicles on the alignment as well as vehicle traffic on nearby roads (for example, vehicle traffic to and from park-and-ride lots constructed as part of the project).

What is the air quality evaluation area?

Because the project would be located in Salt Lake County, this county makes up the evaluation area for the air quality analysis.

Air quality in an area is a function of the area itself (size and topography), the prevailing weather patterns (meteorology and

climate), and the pollutants released in the area. Air quality is described in terms of the concentrations of various pollutants in a given area of atmosphere (for example, micrograms per cubic meter).

5.6.1 Methodology

Compared to the other action alternatives considered in this EIS, Alternative C – Full Build would have the most transit stations and park-and-ride lots, and these are likely to attract more local traffic than are the other alternatives. Although the differences between the alternatives would not be large, the air quality impacts from the other alternatives would be less than those from Alternative C – Full Build. Therefore, air quality impacts were considered for only Alternative C – Full Build in the sections below.

5.6.1.1 Analyses Required

Table 5.6-1 lists the air quality analyses that are required by the federal Clean Air Act and NEPA. The following sections provide more details about each analysis as well as other analyses that were performed for this EIS.

Table 5.6-1. Air Quality Analyses Required for the Draper Transit Corridor Project

Law, Statute, or Regulation	Analysis Required	Geographic Area of Analysis	Applicable Air Quality Standard
Clean Air Act	Regional conformity analysis for PM_{10}	Salt Lake County PM_{10} non-attainment area	PM_{10} emission budget in the State Implementation Plan
Clean Air Act	Project-level conformity analysis for PM_{10}	Roads and intersections near the Alternative C – Full Build alignment within the Salt Lake County PM_{10} non-attainment area	PM_{10} emission budget in the State Implementation Plan
NEPA	Project-level analyses of CO and PM_{10}, the primary pollutants associated with transportation projects	Roads and intersections near the Alternative C – Full Build alignment	National Ambient Air Quality Standards

Analyses Required by the Clean Air Act (Transportation Conformity)

Transportation conformity is the process of determining whether transportation projects are consistent with, or "conform" to, the State Implementation Plan. (For more information, see Section 3.6.1.3, Conformity Requirements.) This conformity requirement applies when a proposed project is located in a non-attainment or maintenance area. Because the Draper Transit Corridor Project is located in Salt Lake County, which is a non-attainment area for PM_{10}, this EIS includes conformity analyses for PM_{10} at both the regional and project levels.

In order for the Draper Transit Corridor Project to be built, the conformity analysis needs to show that PM_{10} emissions from the project, in combination with PM_{10} emissions from other regionally significant transportation projects, would not exceed the PM_{10} emission budget in the State Implementation Plan.

What is the State Implementation Plan?

The *State Implementation Plan* explains how Utah will comply with the requirements of the federal Clean Air Act of 1970. This plan specifies allowable regional limits, or *emission budgets*, for air pollutants such as CO and PM_{10}.

Regional PM_{10} Conformity Analysis

Regional conformity analyses are conducted by the appropriate metropolitan planning organization (in this case, WFRC for Salt Lake County). WFRC has included the Draper Transit Corridor Project as a "regionally significant" project in its most recent regional conformity analysis (WFRC 2007c).

What are attainment, non-attainment, and maintenance areas?

An *attainment area* is an area that meets (or "attains") the national standards for a given pollutant. A *non-attainment area* is an area that does not meet the national standards for a given pollutant. A *maintenance area* is a non-attainment area that has not had a recorded violation of the national standards in several years and is in the process of being redesignated as an attainment area.

Project-Level PM_{10} Conformity Analysis

For the Draper Transit Corridor Project, a project-level conformity analysis was conducted for PM_{10} using the appropriate guidelines for air quality assessments in non-attainment and maintenance areas.

There are currently no EPA-approved quantitative methods for conducting a project-level analysis for PM_{10} or $PM_{2.5}$. Therefore, EPA requires a qualitative project-level analysis. The methodology for this qualitative analysis is described in the EPA and FHWA guidance *Transportation Conformity Guidance for Qualitative Hot-Spot Analysis in $PM_{2.5}$ and PM_{10} Non-attainment and Maintenance Areas* (EPA and FHWA 2006).

PM_{10}. PM_{10} comes from direct PM_{10} sources such as dust that is stirred up by vehicle tires as well as from secondary reactions of NO_x and sulfur oxides (SO_x) that form PM_{10} in the atmosphere. The Draper Transit Corridor Project is located in a PM_{10} non-attainment area in Salt Lake County. Therefore, a qualitative project-level analysis for PM_{10} was conducted for the project.

$PM_{2.5}$. A qualitative project-level analysis for $PM_{2.5}$ was not conducted for the project. The Draper Transit Corridor study area is within the northern Wasatch Front $PM_{2.5}$ non-attainment area. EPA made official attainment and non-attainment designations for $PM_{2.5}$ in October 2009, and those designations became effective in November 2009. The transportation conformity requirements would apply to FHWA and FTA projects 1 year after the effective date of the designations (late 2010). A project-level conformity determination is required for the first federal approval action after the 1-year grace period for new non-attainment areas expires, which is expected to be in April 2010 for $PM_{2.5}$.

What are quantitative and qualitative analyses?

A *quantitative* analysis is one that produces specific numeric results, such as a reduction in vehicle-miles traveled or the number of properties that would require relocations.

A *qualitative* analysis looks at impacts in more general and comparative terms. For this EIS, qualitative analyses were performed when numeric data or quantitative methods were not available.

Analyses Required by NEPA

Project-Level Analysis for PM_{10}

The project-level conformity analysis for PM_{10} that is required by the Clean Air Act satisfies the requirement for a project-level analysis of PM_{10} impacts under NEPA.

Project-Level Analysis for CO

To comply with NEPA requirements, future-year traffic volumes on roads near Alternative C – Full Build were compared to the screening thresholds in UDOT's *Air Quality Hot-Spot Manual* (UDOT 2003). According to this manual, if the future traffic volume on a road at a given location is less than the screening volume in the manual, then the CO emissions at that location are assumed to be "pre-screened" and would not cause the air quality standard for CO at that location to be exceeded. This approach has been used for CO analyses for other light-rail projects in Utah in CO attainment areas.

5.6.1.2 Other Analyses

Regional CO Conformity Analysis

Salt Lake City, which is outside the project study area, is a maintenance area for CO. The rest of Salt Lake County is in attainment for CO. Because the Draper Transit Corridor Project is not located in Salt Lake City, this EIS is not required to include a project-level conformity analysis for the Salt Lake City CO maintenance area. However, in order to fully disclose the air quality impacts of the project, a discussion of the effects of the project on CO emissions in the project area is included in Section 5.6.5.2, Project-Level Analysis of CO (CO Hot-Spot Analysis).

Ozone

EPA revoked the 1-hour ozone standard on June 19, 2005. Therefore, this EIS is not required to include a conformity analysis for the 1-hour ozone standard in Salt Lake County. However, in order to fully disclose the air quality impacts of the project, a discussion of the effects of the project on ozone levels along the Wasatch Front is included in Section 5.6.2.3, Ozone.

Greenhouse Gases

At present, an analysis of greenhouse gases is not required under the Clean Air Act. However, a discussion of greenhouse gases is included in Section 5.6.5.5, Greenhouse Gases and Climate Change.

5.6.2 No-Action Alternative

Under the No-Action Alternative, the Draper Transit Corridor Project would not be built. However, other regionally significant transportation projects identified in the WFRC long-range plan and by the communities would be constructed, and these projects would contribute to regional and local air quality impacts throughout the project study area.

How would the No-Action Alternative affect air quality in the air quality evaluation area?

The No-Action Alternative would not result in new violations of the national air quality standards, increase the frequency or severity of existing violations of the standards, or delay the attainment of the standards.

The most recent transportation conformity analysis for the Salt Lake County PM_{10} non-attainment area and the Salt Lake City CO maintenance area was conducted by WFRC in 2007. This conformity analysis concluded that, in 2030 with all regionally significant transportation projects in the Regional Transportation Plan (including Alternative C – Full Build) constructed, Salt Lake County would be well within the PM_{10} emission budget in the State Implementation

Plan, and Salt Lake City would be well within the CO emission budget in the State Implementation Plan (WFRC 2007c).

If all regionally significant transportation projects are completed, more than 50% of the CO and PM_{10} emission budgets in the State Implementation Plan would remain in 2030. As a result, the No-Action Alternative (which includes all of these regionally significant projects minus the Draper Transit Corridor Project) would not result in new violations of the national air quality standards, increase the frequency or severity of existing violations of the standards, or delay the attainment of the standards.

What are the main air pollutants in the evaluation area?

The main air pollutants in the evaluation area are wind-blown dust and particulates ($PM_{2.5}$ and PM_{10}) from exposed soils and vehicle emissions (primarily CO) from traffic on existing roads in the area.

Because the Draper Transit Corridor Project would not be built under this alternative, no project-level air quality analyses were conducted for the No-Action Alternative. The following sections provide more details about the most recent regional conformity analyses for the Salt Lake County PM_{10} non-attainment area and the Salt Lake City CO maintenance area.

5.6.2.1 Salt Lake County PM_{10} Regional Conformity Determination

The State Implementation Plan does not establish PM_{10} emission budgets beyond 2003. The 2003 emission budget is the established budget for 2003 and for future-year conformity determinations. Regional conformity analyses conducted after 2003 must use the 2003 emission budgets for primary and secondary particulates.

- **Primary particulates** consist mostly of fugitive road dust (that is, dust stirred up by vehicles) but also include particles from brake and tire wear as well as direct tailpipe emissions.
- **Secondary particulates** consist of gaseous tailpipe emissions that form through chemical reactions in the atmosphere. NO_x is the main component of secondary particulates.

Table 5.6-2 and Table 5.6-3 below, which are taken from WFRC's 2007 regional conformity determination, show that the expected mobile-source emissions for primary and secondary particulates in the Salt Lake County PM_{10} non-attainment area are within the 2003 emission budgets established for Salt Lake County in the State Implementation Plan. The regional conformity determination shows that the No-Action Alternative would conform to the PM_{10} budgets in the State Implementation Plan.

Table 5.6-2. Regional Conformity Determination for Primary PM_{10} Emissions in Salt Lake County

Parameter	2015	2025	2030
Emission budget (tons/day)	40.30	40.30	40.30
Vehicle-miles traveled (VMT)	30,629,058	36,414,101	38,963,912
Projected emissions (tons/day)	28.37	33.04	35.18
Conformity determination (projected < budget?)	Pass	Pass	Pass

Source: WFRC 2007c

Table 5.6-3. Regional Conformity Determination for Secondary PM_{10} (NO_x) Emissions in Salt Lake County

Parameter	2015	2025	2030
Emission budget (tons/day)	32.30	32.30	32.30
Vehicle-miles traveled (VMT)	30,629,058	36,414,101	38,963,912
Projected emissions (tons/day)	25.90	12.89	11.43
Conformity determination (projected < budget?)	Pass	Pass	Pass

Source: WFRC 2007c

An additional factor that will affect PM_{10} levels between now and 2030 is particulate-control programs that have been established by EPA at the national level. These programs will reduce particulate emissions from most major sources as well as the emissions' precursor pollutants (such as NO_x). EPA's Tier 2 light-duty vehicle regulations and 2007 heavy-duty vehicle standards, along with control of the sulfur content of fuels, are expected to reduce the rate of particulate emissions from motor vehicles by 59% between 2005 and 2015, with an additional 25% reduction between 2015 and 2030. EPA's May 2004 non-road engine regulations (EPA 2004) took effect in 2008 and will reduce particulate matter and NO_x emissions from these vehicles by 90% by 2030.

5.6.2.2 Salt Lake City CO Regional Conformity Determination

WFRC's 2007 regional conformity determination found that all regionally significant transportation projects included in the WFRC 2030 Regional Transportation Plan would conform to the CO emission budget established in the State Implementation Plan. Table 5.6-4 shows the projected mobile-source emissions for CO in Salt Lake City and demonstrates that CO emissions will be within the emission budget established by the CO maintenance plan through 2030.

Table 5.6-4. Regional Conformity Determination for CO Emissions in Salt Lake City

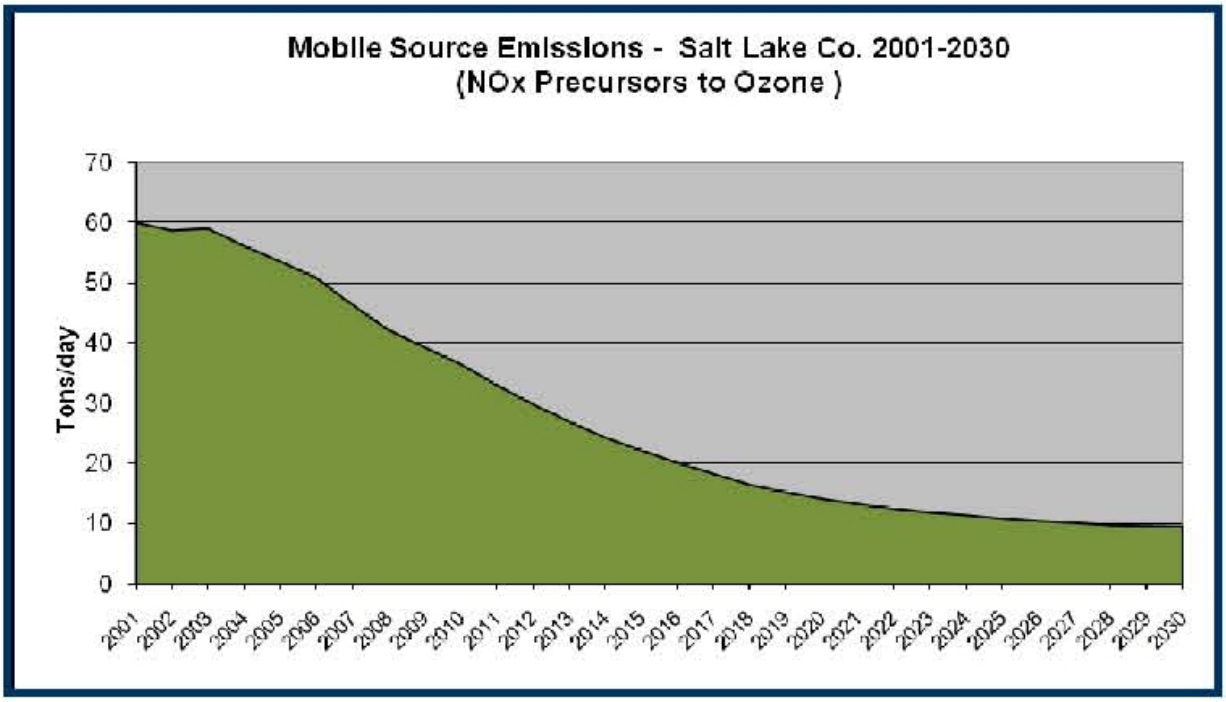
Parameter	2012	2019	2025	2030
Emission budget (tons/day)	278.62	278.62	278.62	278.62
Vehicle-miles traveled (VMT)	6,811,664	7,557,447	8,106,562	8,662,868
Projected emissions (tons/day)	107.65	95.25	95.38	100.06
Conformity determination (projected < budget?)	Pass	Pass	Pass	Pass

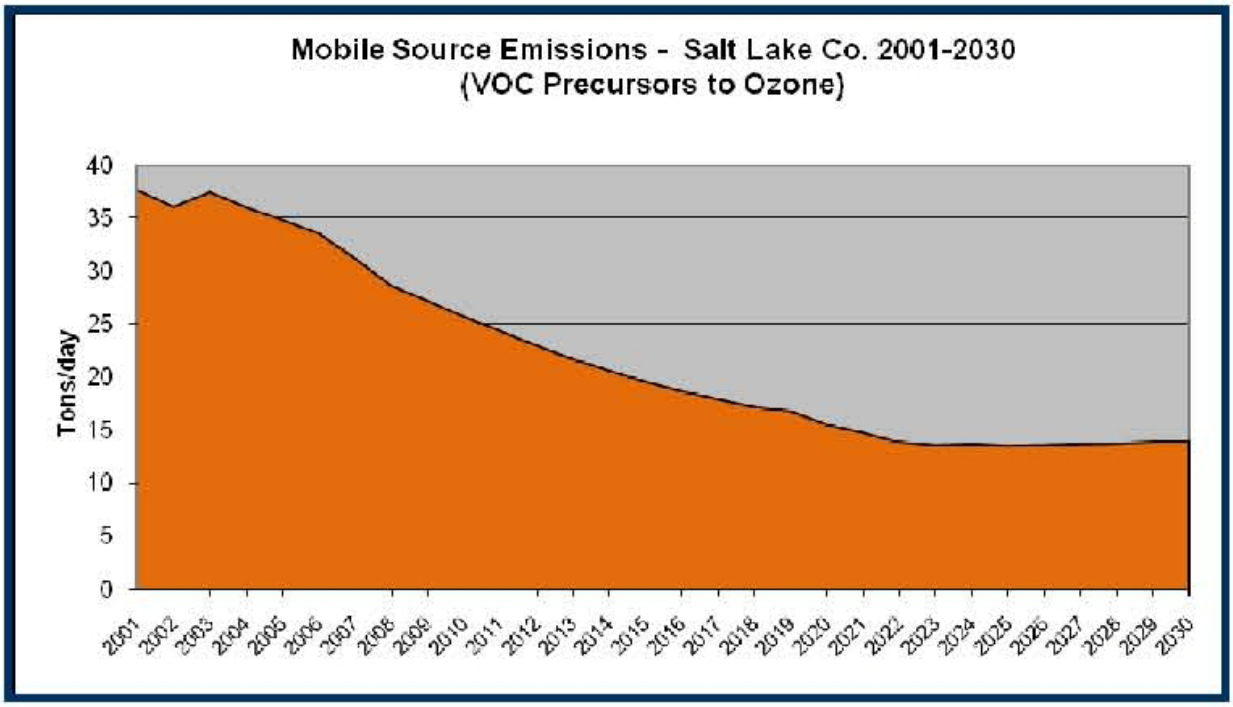
Source: WFRC 2007c

5.6.2.3 Ozone

The Wasatch Front is currently in attainment for the national 8-hour ozone standard. Modeling projections by WFRC indicate that ozone-related emissions from mobile sources along the Wasatch Front will decrease through 2030 (see Chart 5.6-1 below).

Chart 5.6-1. Mobile-Source Ozone Emissions in Salt Lake County





Source: WFRC 2007c

5.6.3 TSM Alternative

Under the TSM Alternative, a high level of transit service would be provided in the project study area without constructing a new fixed-guideway facility such as a dedicated bus or light-rail-transit corridor.

The amount of VMT in the project study area under the TSM Alternative would be about 35.26 million miles per day, compared to 35.25 million miles per day under the No-Action Alternative (Lobb 2008b). A difference of 10,000 miles per day between the TSM Alternative and the No-Action Alternative would have no appreciable impact on air quality in the project study area. The air quality impacts under the TSM Alternative would be the same as those from the No-Action Alternative.

How would the TSM Alternative affect air quality in the air quality evaluation area?

The air quality impacts under the TSM Alternative would be the same as those from the No-Action Alternative.

5.6.4 Alternative C – MOS

The air quality analysis was conducted for Alternative C – Full Build because it would have the greatest air quality impacts. Air quality impacts from Alternative C – MOS would be similar to those from Alternative C – Full Build. With the exception of the East Sego Drive intersection, average daily traffic volumes under Alternative C – MOS would be within about 3% of those for Alternative C – Full Build. At the East Sego Drive intersection, the average daily traffic volume under Alternative C – MOS would be 12.7% higher than under Alternative C – Full Build but would remain well below screening thresholds that could potentially result in substantial air quality impacts.

How would Alternative C – Full Build affect regional air quality?

Alternative C – Full Build (in combination with other projects) is projected to reduce regional PM_{10} and CO emissions by less than 1% compared to the No-Action Alternative. Alternative C – Full Build would be a minor source of PM_{10} and CO at the regional level.

5.6.5 Alternative C – Full Build

5.6.5.1 Regional Conformity Determinations for PM_{10} and CO

The Draper Transit Corridor Project's Alternative C – Full Build is included in WFRC's most recent regional conformity analysis for Salt Lake County. In that analysis, all regionally significant transportation projects were determined to be in compliance with the PM_{10} and CO emission budgets in the State Implementation Plan. According to WFRC's analysis, more than 50% of the emission budgets would remain in 2030 if all regionally significant projects, including Alternative C – Full Build, are constructed. The other Draper Transit Corridor alternatives would also comply with the

State Implementation Plan because they would have lower air quality impacts than Alternative C – Full Build.

As shown in Table 5.6-5, Alternative C – Full Build (in combination with other transit and roadway projects in WFRC's long-range plan) is projected to reduce VMT in Salt Lake County by 50,000 miles per day in 2030 compared to the No-Action Alternative, or less than 1% of the total daily VMT in Salt Lake County. Similarly, Alternative C – Full Build (in combination with other projects) is projected to reduce regional PM_{10} and CO emissions by less than 1% compared to the No-Action Alternative.

Table 5.6-5. Air Quality in Salt Lake County in 2005 and 2030

		Regionally Significant Projects minus Alternative C – Full Build (No-Action Alternative)		Regionally Significant Projects with Alternative C – Full Build	
Parameter	Existing Conditions (2005)	Emissions in 2030 (Projected)	Percent Change from Existing Conditions	Emissions in 2030 (Projected)	Percent Change from No-Action
VMT (million miles/day)	21.5	35.3	64.2	35.25	–0.14
Carbon monoxide					
CO (tons/day)	660.4	405.5	–38.6	405.0	–0.12
Particulate matter					
NO_x (tons/day)	61.3	10.51	–82.9	10.5	–0.096
Direct PM (tons/day)	1.3	1.04	–20.0	1.03	–0.96
Fugitive dust (tons/day)	22.2	30.8	38.7	30.8	0.0
Total PM emissions (tons/day)	84.7	42.35	–50.0	42.3	–0.12

Source: Lobb 2008a

5.6.5.2 Project-Level Analysis of CO (CO Hot-Spot Analysis)

What is a hot-spot analysis?

A *hot-spot analysis* is a project-level analysis that looks at local air quality impacts, such as at intersection crosswalks or residences near a road.

A local CO hot-spot analysis for roads and intersections serving the transit stations on the Alternative C – Full Build alignment was conducted using the screening tools in UDOT's *Air Quality Hot-Spot Manual* (UDOT 2003). The analysis was conducted using the following steps:

- Daily traffic volumes in 2030 on the most heavily traveled roads near the transit stations were compared to screening volumes in UDOT's CO hot-spot intersection screening look-up tables.
- If the 2030 traffic volumes on the most heavily traveled roads were less than the screening volumes in UDOT's look-up tables, then UTA concluded that future CO levels at that intersection (and other, lower-volume intersections) would be less than the national standards.

As shown in Table 5.6-6, the average daily traffic volumes in 2030 on roads and at intersections under either build alternative would not exceed the UDOT screening threshold of 30,000 or 50,000 vehicles per day (depending on the number of lanes). Therefore, the future CO levels on roads and at intersections serving the transit stations would be lower than the national standards.

Table 5.6-6. Traffic Volumes and CO Levels at Roads and Intersections near the Build Alternatives

Mainline/ Intersection	Lanes in Each Direction	Transit Station	Traffic Volume			Screening Threshold	CO Level Less Than National Standards?
			Existing Conditions (2005)	Alternative C – Full Build (2030)	Alternative C – MOS (2030)		
East Sego Drive	1	—	10,700	11,000	12,400	30,000	Yes
10600 South	2	10600 South	29,500	31,500	32,500	50,000	Yes
11000 South	1	—	9,300	7,500	7,500	30,000	Yes
11400 South	2	—	18,600	24,000	24,300	50,000	Yes
700 East	1	11800 South	14,800	18,800	19,200	30,000	Yes
Draper Parkway (12300 South)	2	12400 South	30,200	35,000	35,500	50,000	Yes
Pioneer Road (12400 South)	1	—	5,500	7,000	7,100	30,000	Yes
City Oak Lane (1300 East)	1[a]	—	17,700	19,000	19,500	30,000	Yes
13200 South	1	—	2,200	2,900	2,900	30,000	Yes
13800 South	1		12,600	11,000	11,100	30,000	Yes

[a] Roundabout

5.6.5.3 Project-Level Analysis of PM_{10} (Qualitative PM_{10} Hot-Spot Analysis)

PM_{10} concentrations in the environment come from direct sources such as dust stirred up by vehicle tires as well as secondary reactions of NO_x and SO_x that form PM_{10} in the atmosphere. Traffic volumes and the corresponding traffic congestion have less of an impact on PM_{10} concentrations than do the larger regional trends in emission rates and industrial pollution controls (UDOT 2003). Therefore, PM_{10} in Salt Lake County will likely remain a regional issue related to prolonged temperature inversions and a gradual build-up of PM_{10}-related pollutants.

How would Alternative C – Full Build affect local PM_{10} concentrations?

Since all regionally significant transportation projects have been determined to conform to the PM_{10} emission budgets in the State Implementation Plan, Alternative C – Full Build would conform at the project level as well.

In WFRC's most recent regional conformity analysis, all regionally significant transportation projects were determined to be in compliance with the PM_{10} emission budgets in the State Implementation Plan (see Table 5.6-5 above, Air Quality in Salt Lake County in 2005 and 2030). Therefore, since the region has been determined to conform to the PM_{10} emission budgets, Alternative C – Full Build would conform at the project level as well.

Construction-Related Impacts

PM_{10} emissions from construction activities are usually local and short-term and last only for the duration of the construction period. Construction emissions will be minimized through good construction practices such as watering exposed surfaces, minimizing the amount of exposed and disturbed surfaces, minimizing construction equipment and vehicle speeds, and properly maintaining vehicle engines.

Operational Impacts

PM_{10} monitoring data for Salt Lake County are shown in Table 5.6-7 below.

Table 5.6-7. Summary of PM_{10} Monitoring Data for Salt Lake County

Station	Parameter	2002	2003	2004	2005	2006
Cottonwood (5715 South 1400 East, Holladay)	Annual average ($\mu g/m^3$)[a]	32	28	32	27	25
	Peak 24-hour value ($\mu g/m^3$)[b]	119	92	145	114	82
	Days above standard	0	0	0	0	0
Hawthorne (1675 South 600 East, Salt Lake City)	Annual average ($\mu g/m^3$)	29	26	29	24	24
	Peak 24-hour value ($\mu g/m^3$)	130	360	129	139	88
	Days above standard	0	2	0	0	0
Magna (2935 South 8560 West, Magna)	Annual average ($\mu g/m^3$)	25	26	24	22	20
	Peak 24-hour value ($\mu g/m^3$)	87	421	88	177	80
	Days above standard	0	1	0	1	0
North Salt Lake (1795 North 1000 West, Salt Lake City)	Annual average ($\mu g/m^3$)	41	40	42	37	41
	Peak 24-hour value ($\mu g/m^3$)	121	358	189	153	188
	Days above standard	0	3	1	0	2

Source: EPA 2008b

[a] Annual PM_{10} standard = 50 $\mu g/m^3$ (annual standard revoked by EPA on December 18, 2006).

[b] 24-hour PM_{10} standard = 150 $\mu g/m^3$ (standard allows for three exceedances over a 3-year period).

There were three days in 2003 (February 1, April 1, and April 2), one day in 2004 (May 10), and one day in 2005 (September 10) when the 24-hour standard was exceeded due to unusually high winds. In each instance, the Salt Lake Valley experienced very dusty winds because a dry weather front passed through the area, and elevated concentrations of PM_{10} were observed at other monitoring locations throughout the region. These events have been described in the PM_{10} maintenance plan as natural events for which regional control measures are not expected to work (Utah Air Quality Board 2005). Such unusual weather events are not indicators of overall air quality trends in the region.

Alternative C – Full Build would be an electric light-rail line and would not be a direct source of PM_{10} emissions. Therefore, at the project level, Alternative C – Full Build would have a minor impact on overall PM_{10} emissions. The other Draper Transit Corridor alternatives would also be minor sources of PM_{10} emissions.

5.6.5.4 Ozone

Regional ozone trends are discussed in Section 5.6.2.3, Ozone, and shown in Chart 5.6-1, Mobile-Source Ozone Emissions in Salt Lake County, above. At the project level, the Draper Transit Corridor Project would be minor source of regional ozone in Salt Lake County.

5.6.5.5 Greenhouse Gases and Climate Change

The issue of global climate change is an important national and global concern that is being addressed in several ways by the federal government. The transportation sector is the second-largest source of total greenhouse gases in the United States and the largest source of CO_2 emissions, the predominant greenhouse gas. In 2004, the transportation sector was responsible for 31% of all CO_2 emissions produced in the United States. The principal anthropogenic (human-made) source of carbon emissions is the combustion of fossil fuels, which account for about 80% of anthropogenic emissions of carbon worldwide. Almost all (98%) of transportation-related greenhouse gas emissions result from the consumption of petroleum products such as motor gasoline, diesel fuel, jet fuel, and other residual fuels.

Recognizing this concern, FTA and FHWA are working with other agencies through the U.S. Department of Transportation Center for Climate Change and Environmental Forecasting to develop strategies to reduce transportation's contribution to greenhouse gases—particularly CO_2 emissions—and to assess the risks to transportation systems and services from climate changes.

In Utah, the Governor's Blue Ribbon Advisory Council on Climate Change identified measures that the state could take to minimize the impacts of transportation-related greenhouse gas emissions. The recommended measures include reducing vehicle-miles traveled through developing and encouraging the use of mass transit, ridesharing, and telecommuting. Other strategies outlined in the report include promoting alternative fuels and hybrid vehicles and vehicle technologies that support greater fuel efficiency. In addition, the report encourages an idle-reduction program for school buses and heavy-duty trucks.

Because climate change is a global issue and the emission changes due to the proposed project would be very small compared to global totals, greenhouse gas emissions were not estimated for individual alternatives.

Utah highway CO_2 emissions are expected to decrease by 6.2% between 2006 and 2030 (Houk 2008). The UDOT Planning Division predicts that statewide VMT will increase by 58% during this period.

How would Alternative C – Full Build affect the production of greenhouse gases?

Because climate change is a global issue and the emission changes due to the proposed project would be very small compared to global totals, greenhouse gas emissions were not estimated for individual alternatives.

5.6.6 Summary

The No-Action Alternative (which includes all regionally significant transportation projects minus the Draper Transit Corridor Project) would not result in an exceedance of the national air quality standards, increase the frequency or severity of existing violations of the standards, or delay the attainment of the standards.

Alternative C – MOS and Alternative C – Full Build (in combination with other projects in the State Transportation Improvement Plan) would have the following air quality impacts:

- Alternative C – MOS and Alternative C – Full Build would decrease regional PM_{10} and CO emissions by less than 1%.
- Future CO levels on roads and at intersections serving the transit stations for Alternative C – MOS and Alternative C – Full Build would be lower than the national standards.
- Since the region has been determined to conform to the PM_{10} emission budgets, Alternative C – MOS and Alternative C – Full Build conform at the project level as well.
- At the project level, Alternative C – MOS and Alternative C – Full Build would have a minor impact on overall PM_{10} emissions.
- At the project level, Alternative C – MOS and Alternative C – Full Build would be a minor source of regional ozone in Salt Lake County.

5.6.7 Mitigation Measures for Impacts to Air Quality

The Utah Air Quality Rules require a dust-control plan from all sources whose activities or equipment could produce fugitive dust or airborne dust. A dust-control plan will be prepared for the construction phase of the Draper Transit Corridor Project. Dust-control measures could include planting vegetative cover, providing synthetic covers, and watering and/or chemically stabilizing unpaved haul roads.

5.7 Noise and Vibration Impacts

This section describes the noise and vibration impacts associated with the Draper Transit Corridor Project. The project team conducted a detailed assessment to determine the noise and vibration impacts at residences and other sensitive receptors in the noise and vibration evaluation area due to the action alternatives.

This section summarizes the FTA transit noise and vibration impact criteria, the modeling methodologies that were used, the noise and vibration levels under the action alternatives, and the recommended mitigation measures. The existing noise levels described in Section 3.7, Noise and Vibration, were used to assess the expected noise impacts from the Draper Transit Corridor Project.

What is the noise and vibration evaluation area?

The noise and vibration evaluation area consists of the area within 350 feet of the UTA-owned right-of-way and within a 350-foot radius of each proposed station location.

5.7.1 Transit Noise and Vibration Evaluation Criteria

FTA's *Transit Noise and Vibration Impact Assessment* guidance manual presents the basic concepts, methods, and procedures for evaluating the extent and severity of noise and vibration impacts from transit projects. Transit noise and vibration impacts are assessed based on land-use categories and these uses' sensitivity to noise and vibration from transit sources as described in the FTA guidelines.

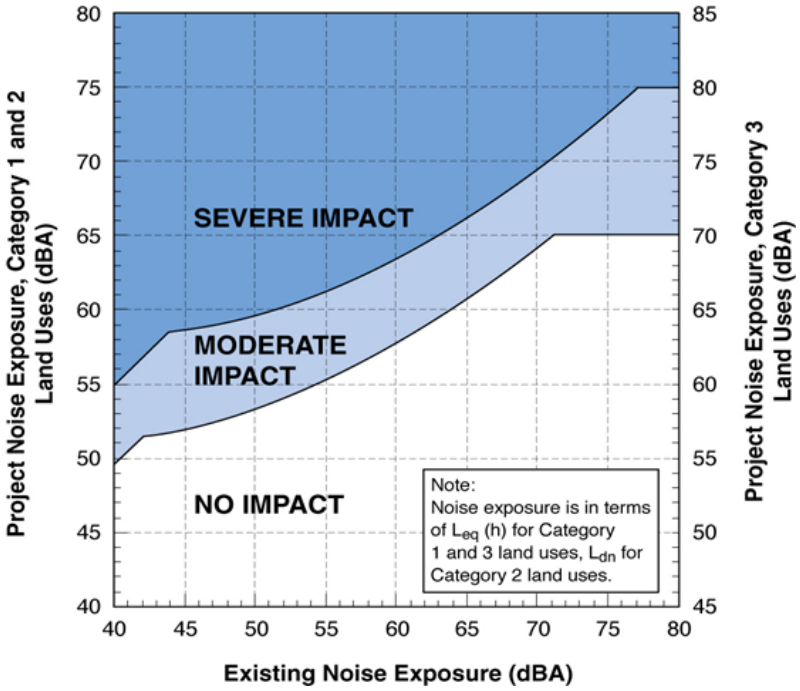
5.7.1.1 Noise Criteria

As shown in Chart 5.7-1 below, the FTA transit noise impact criteria define noise impacts in terms of the existing noise levels, the expected noise levels with the proposed project, and the land uses that would be affected. Category 1 and 2 land uses are more sensitive to noise than Category 3 land uses (see Table 3.7-1, FTA Land-Use Categories). For example, a project noise level of 60 dBA might be considered a moderate impact at a Category 1 or 2 land use but no impact at a Category 3 land use.

Why were FTA's noise impact criteria developed?

FTA's noise criteria were developed to assess impacts from mass transit projects like the Draper Transit Corridor Project. They incorporate both absolute criteria, which consider activity interference caused by the transit project alone, and relative criteria, which consider annoyance due to the change in the noise environment caused by the transit project.

Chart 5.7-1. FTA Transit Noise Impact Criteria



Source: FTA 2006

The FTA noise criteria separate noise impacts into two categories: *moderate impact* and *severe impact*. The *moderate impact* category indicates that the change in noise is noticeable but might not be great enough to cause a strong, adverse community reaction. The *severe impact* category indicates that a significant percentage of the population would be highly affected by the new noise. The degree of impact at any specific location can be determined by comparing the predicted project noise level at the site to the existing noise level.

5.7.1.2 Vibration Criteria

The FTA vibration criteria for evaluating ground-borne vibration impacts from trains passing by at sensitive receptors are shown in Table 5.7-1 below. These vibration criteria are related to ground-borne vibration levels that are expected to result in human annoyance and are based on root-mean-square (RMS) velocity levels expressed in velocity decibels (VdB) referenced to 1 µips (micro-inch per second).

FTA's experience with community response to ground-borne vibration indicates that, when only a few trains pass by per day, it takes higher vibration levels to evoke the same community response that occurs from more frequent trains. This is taken into account in the FTA criteria by distinguishing between projects with *frequent*,

What is headway?

The *headway* between vehicles in public transit systems is the time between two vehicles passing the same point traveling in the same direction on a given route. This term is most frequently applied to rail transport, where the number of tracks is limited and signaling capabilities control the headway. A shorter headway signifies a more frequent service.

occasional, and *infrequent* vibration events. The *frequent events* category is defined as more than 70 trains per day; the *occasional events* category is defined as between 30 and 70 trains per day; and the *infrequent events* category is defined as fewer than 30 trains per day. The FTA *frequent events* criteria were used to assess ground-borne vibration impacts along the UTA-owned right-of-way based on the expected 15-minute headway service times and an average transit train consisting of four vehicles.

Table 5.7-1. FTA Ground-Borne RMS Vibration Impact Criteria

Receptor Land Use		RMS Vibration Levels (VdB)[a]		
Category	Description	Frequent Events	Occasional Events	Infrequent Events
1	Buildings where low vibration is essential for interior operations	65	65	65
2	Residences and buildings where people normally sleep	72	75	80
3	Daytime institutional and office use	75	78	83
Specific buildings	TV or recording studios, concert halls	65	65	65
	Auditoriums	72	80	80
	Theaters	72	80	80

Source: FTA 2006

[a] Ground-borne vibration levels (VdB) are referenced to 1 micro-inch per second.

The vibration criteria shown in Table 5.7-1 above are defined in terms of human annoyance for different land-use categories such as high-sensitivity (Category 1), residential (Category 2), and institutional (Category 3) receptors. In general, people can't perceive vibrations below about 65 VdB.

For above-grade transit systems, the FTA ground-borne noise criteria are typically not applied except for buildings that have sensitive interior spaces (such as laboratories and other Category 1 receptors) and that are well insulated from exterior noise (such as optical or medical research laboratories). In general, airborne noise often masks ground-borne noise for above-ground (at-grade or elevated) transit systems such as the system proposed for the build alternatives. Therefore, ground-borne noise impacts were not evaluated along the UTA-owned right-of-way since no Category 1 sensitive buildings were identified.

5.7.2 Modeling Methodology

What is noise?

Noise is defined as unwanted sound.

The noise assessment was conducted according to FTA's *Transit Noise and Vibration Impact Assessment* guidelines. Specifically, a detailed assessment was conducted to model the noise levels from the proposed light-rail transit operations under the build alternatives in the design year (2030). The modeling assumptions and input parameters (such as reference noise levels) used in the noise assessment are summarized in Table 5.7-2 and are described following the table.

Table 5.7-2. Summary of Noise Source Reference Data

Noise Source			Duration (seconds)	Height (feet)	Noise Level (dBA)[a]	
Category	Name	Description			L_{max}	SEL
Light-rail train	Train passbys	Passby operations	NA[b]	2	80[d]	82
	Train warning device	Onboard bell	NA[b]	10	64[d]	67
	Train switches/crossovers	Special track work	NA[b]	0	86[d]	122
	Train auxiliary equipment	Stations only	30[c]	10	70[e]	106[e]
Freight train	Train passbys	Passby operations	NA[b]	2	88[e]	92
	Train warning device	Onboard bell	NA[b]	10	110[d]	110
Crossing bell	Grade crossing bell	Grade crossing	20[d]	10	72[d]	108

Source: FTA 2006

[a] All noise levels are reported in A-weighted decibels (dBA) at a reference distance of 50 feet and a reference speed of 50 mph for passbys only. L_{max} represents the maximum noise level during an event, and SEL is the sound exposure level that converts the cumulative noise energy of an event to one second.

[b] Not applicable. Duration time is not used to compute passby and facility noise levels.

[c] The default dwell time is 30 seconds at all proposed stations.

[d] Noise levels and duration times as reported in the *Mid-Jordan Transit Corridor EIS* for UTA-specific equipment (UTA 2005b).

[e] Default FTA reference levels were used when only minimal data were available.

- Total daily operations were determined based on 15-minute headways during all periods of the day between 5:00 AM and 1:45 AM (using the Friday and Saturday UTA operating plan).
- A four-vehicle train was assumed for all periods of the day except at night after 9:00 PM when a two-vehicle train is expected to operate.
- At stations, an average idling time of 20 seconds was used at each of the designated station stops to compute the noise contribution from stationary or auxiliary vehicle noise (such as rooftop mechanical equipment).

- Proposed trains speed profiles were used along the Alternative C – MOS alignment north of Pioneer Road with a maximum travel speed of 65 mph and a minimum speed of 25 mph.
- Following UTA operating practices, onboard light-rail transit warning devices or gongs would be sounded within 200 feet of the approaching grade crossing with a maximum noise level of 64 dBA.
- Similarly, grade-crossing bells are predicted to generate a noise level of 72 dBA at 50 feet for 20 seconds for each train crossing.
- Based on information in the Mid-Jordan Transit Corridor Environmental Impact Statement (UTA 2005b), a single 80-foot-long train operating at 50 mph on ballast-and-tie track with continuous welded rail track generates a maximum noise level of 80 dBA at 50 feet from the track centerline.
- Wheel impacts at special track work are based on a maximum noise level of 86 dBA at 50 feet.
- The vibration impacts from light-rail transit vehicle operations were predicted using the default FTA ground surface vibration curves. These curves were adjusted to reflect local conditions such as changes in train speed, special track work such as switches, and coupling to building foundations for residential wood-frame houses.
- Because existing freight trains operate only rarely along the UTA-owned right-of-way north of Pioneer Road, particularly during the summer, they did not contribute to the measured existing noise levels. Therefore, the background noise levels, which were used to determine the project impact criteria, were not adjusted to reflect nighttime freight. As a result, nighttime freight was also not included in the modeling analysis to assess the onset of impact. The impact from freight was described qualitatively only.
- Finally, additional noise impacts could occur at residences near stations due to feeder buses that idle while waiting for train passengers. During the final design phase of the project, when the feeder bus routes and schedules are finalized, proper station design and layout are recommended to minimize impacts from idling buses.

What is special track work?

Special track work refers to rails, track structures, and fittings other than plain unguarded track that are neither curved nor fabricated before laying (such as turn-outs).

5.7.3 No-Action Alternative

5.7.3.1 Noise Impacts

Future noise levels in the noise and vibration evaluation area under the No-Action Alternative are expected to be similar to those measured under the existing conditions. Except for infrequent nighttime freight trains, the evaluation area is characterized as a quiet rural community with primarily natural sounds and occasional or light local street traffic. Since there are no major highways or other large transportation corridors near the project area, the No-Action Alternative is expected to be as quiet as the existing conditions. The occasional freight train warning horns would continue to be very noticeable above the low nighttime ambient noise conditions when people are sleeping. However, since no project elements are proposed under the No-Action Alternative, the alternative would not cause any noise impacts.

How would the No-Action Alternative affect noise and vibration levels?

Under the No-Action Alternative, overall corridor-wide project noise and vibration levels are expected to be similar to those currently experienced under the existing conditions. Ambient noise would continue to be characterized by quiet rural conditions with occasional noise from nighttime freight trains north of Pioneer Road.

5.7.3.2 Vibration Impacts

Future vibration levels in the noise and vibration evaluation area under the No-Action Alternative are expected to be similar to those currently experienced under the existing conditions. Traffic, including heavy trucks and buses, rarely creates perceptible ground-borne vibration unless vehicles are operating very close to buildings or there are irregularities in the road, such as potholes or expansion joints. The pneumatic tires and suspension systems of automobiles, trucks, and buses eliminate most ground-borne vibrations. However, existing passbys from the infrequent nighttime freight train along older jointed-rail track could bother residents when they are asleep. Since no project elements are proposed under the No-Action Alternative, the alternative would not cause any vibration impacts.

5.7.4 TSM Alternative

5.7.4.1 Noise Impacts

Future noise levels in the noise and vibration evaluation area under the TSM Alternative are expected to be similar to those measured under the existing conditions. Since this alternative involves primarily roadway improvements rather than transit-related changes, the TSM Alternative is not expected to cause any noise impacts.

How would the TSM Alternative affect noise and vibration levels?

Under the TSM Alternative, overall corridor-wide project noise and vibration levels are expected to be similar to those currently experienced under the existing conditions.

5.7.4.2 Vibration Impacts

Future vibration levels in the noise and vibration evaluation area under the TSM Alternative are expected to be similar to those currently experienced under the existing conditions. The roadway and traffic improvements proposed as part of the TSM Alternative are expected to benefit motor vehicles by reducing congestion and delays. Since no transit project elements are proposed under the TSM Alternative, it would not cause any vibration impacts.

5.7.5 Alternative C – MOS

5.7.5.1 Noise Impacts

Under Alternative C – MOS, light-rail transit service is proposed between the Sandy Civic Center 10000 South Station and Draper Town Center (about 12400 South) along the existing UTA-owned right-of-way. This would be a shared right-of-way with the Utah Railway Company, which currently runs freight trains on the UTA-owned right-of-way to the IFA/Poultrymen site just north of Pioneer Road. The entire rail alignment along the 4.7-mile stretch of existing tracks would be updated to include new continuous welded rail tracks and grade crossings to reduce noise and vibration impacts from both light-rail transit and nighttime freight service.

How would Alternative C – MOS affect noise levels?

Under Alternative C – MOS, overall project noise levels are predicted to exceed the FTA *moderate* impact criteria at 114 residences and the FTA *severe* impact criteria at an additional 146 residences. No noise impacts are predicted at any schools, parks, or other FTA Category 3 receptors along Alternative C – MOS.

Since almost all noise-sensitive sites for this project are residential, the L_{dn} descriptor was used to reflect the heightened sensitivity of residents to nighttime noise. To show the change in noise levels from the existing conditions, the predicted future noise levels from light-rail transit operations are summarized below in Table 5.7-3 for the same receptor locations used to monitor current noise levels (see Figure 3-9, Noise-Monitoring Locations, at the end of Chapter 3, Affected Environment). As shown in Table 5.7-3, the L_{dn} day-night noise levels at residences along Alternative C – MOS (shaded Receptors M01 to M07) are predicted to range from 53 dBA at Receptor M06 (single-family homes along 11900 South) to 63 dBA at Receptors M02 and M05 (residences along S. Heather Ridge Road and Thornberry Drive, respectively). Except for Receptor M06, all of the L_{dn} noise levels at the selected discrete receptors along Alternative C – MOS are predicted to exceed either the FTA *moderate* or *severe* impact criteria.

Table 5.7-3. Predicted Noise Levels at Representative Monitoring Locations under the Build Alternatives

Receptor[a]		Noise Levels (dBA)		Impact Criteria (dBA)[b]		Level of Impact[c]
ID	Location	Existing	Build	Moderate	Severe	
M01	10364 South 360 East	51	60	54	60	SEV
M02	10815 S. Heather Ridge Road	49	63	53	59	SEV
M03	11317 Glen Croft Lane	51	56	54	60	MOD
M04	466 Camden Park Court	56	58	56	62	MOD
M05	11623 Thornberry Drive	49	63	53	59	SEV
M06	685 East 11900 South	54	53	55	61	NO
M07	12361 Parkstone Court	53	61	54	61	SEV
M08	1405 Country Oak Lane	49	60	53	59	SEV
M09	12765 Costanza Way	50	63	53	60	SEV
M10	13091 Shadowlands Lane	48	61	53	59	SEV
M11	13297 Akagi Lane	48	59	53	59	SEV
M12	13712 Vestry Road	54	52	55	61	NO
M13	738 Point Hills Cove	55	61	55	61	SEV
M14	14312 Selina Lane	50	58	53	60	MOD

The gray-shaded receptors represent areas along Alternative C – MOS. The full set of receptors in the table represents areas along Alternative C – Full Build.

[a] The receptor locations are shown in Figure 3-9, Noise-Monitoring Locations, at the end of Chapter 3, Affected Environment.

[b] The impact criteria vary by location based on the existing noise levels.

[c] The level of impact was assessed according to the FTA thresholds no impact (NO), *moderate* impact (MOD), and *severe* impact (SEV).

Noise impacts at the seven noise-monitoring locations described above were used to characterize noise impacts from Alternative C – MOS within the entire noise and vibration evaluation area. The project-related noise impacts in the evaluation area were determined at a total of 528 receptors along Alternative C – MOS. As a result of this overall evaluation, project noise levels under Alternative C – MOS are predicted to exceed the FTA *moderate* impact criteria at 114 residences and the FTA *severe* impact criteria at an additional 146 residences (see Table 5.7-4 below). The majority of the noise impacts are due to the wheel-rail interaction from the LRT passbys.

No noise impacts are predicted at any schools, parks, or other FTA Category 3 receptors along Alternative C – MOS. All of the noise impacts along Alternative C – MOS were evaluated using the FTA impact criteria shown above in Chart 5.7-1, FTA Transit Noise Impact Criteria, to reflect the introduction of new transit service.

Table 5.7-4. Overall Project-Related Noise Impacts at Residences under the Build Alternatives

Corridor Segment		Alt. C – MOS		Alt. C – Full Build	
Segment	Location	Moderate	Severe	Moderate	Severe
1	10000 South in Sandy to Pioneer Road in Draper	114	146	114	146
2	Pioneer Road to 14600 South in Draper	0[a]	0[a]	145[b]	46
	Totals	**114**	**146**	**259**	**192**

[a] No noise impacts are predicted south of the Alternative C – MOS alignment, which ends at Pioneer Road (12300 South, Draper Town Center) or Stationing Number 1472+00.

[b] A *moderate* noise impact is also predicted at the Draper City Park at Stationing Number 1460+00 in Segment 2.

Two FTA Category 3 parks were also evaluated within the screening distance of 350 feet. Future peak-hour L_{eq} noise levels predicted at each of these parks, as well as at other Category 3 receptors, under Alternative C – MOS ranged from 40 dBA at the Mehraban Wetlands Park in Draper to 50 dBA at the Off Leash-Dog Park/Landfill Park in Sandy to 51 dBA at the LDS church at 275 East 10600 South. No additional impacts are predicted at any of the FTA Category 3 receptors under Alternative C – MOS.

Although L_{max} is used to develop L_{dn} noise levels, people can better relate to L_{max} because it is the noise level that people actually hear. Maximum noise levels from LRT train passbys are predicted to range from 69 dBA at Receptor M06 along 11900 South to 81 dBA at Receptors M02 (Heather Ridge Drive) and M05 (along Thornberry Drive). The L_{max} levels from onboard LRT warning bells are about 20 dBA lower than the LRT passby levels (primarily due to wheel-rail interaction).

5.7.5.2 Vibration Impacts

Unlike noise, which is assessed using cumulative noise levels over a 24-hour period, transit vibration impacts are assessed based on individual events such as when a train passes by. To reduce transit vibration impacts at residences and other sensitive receptors along Alternative C – MOS, the entire rail corridor will be upgraded with new ballast and continuous welded rail track. These measures are expected to eliminate elevated vibration levels that are currently caused by steel wheels rolling over steel rails at rail joints. All predicted vibration levels were compared with the FTA *frequent* impact criteria to asses the onset and severity of impact.

How would Alternative C – MOS affect vibration levels?

Under Alternative C – MOS, overall project vibration levels are predicted to exceed the FTA *frequent* criterion of 72 VdB at six residences. No impacts are predicted at any schools, parks, or other FTA Category 3 receptors.

To show the variation in vibration levels in the evaluation area, transit vibration levels were predicted at the same receptor locations as for the noise analysis. As shown in Table 5.7-5, under Alternative C – MOS, the maximum vibration levels from light-rail transit vehicles in the noise and vibration evaluation area are predicted to range from 54 VdB at Receptor M06 (a residence along 11900 South) to 67 VdB at Receptors M02 (a residence on S. Heather Ridge Road) and M05 (a residence along Thornberry Drive). As shown in Table 5.7-5, all of the vibration levels are predicted to be below the FTA *frequent* impact criteria.

However, throughout the evaluation area, vibration levels are predicted to exceed the FTA *frequent* criterion of 72 VdB at six residences. All of these impacts are due to rail discontinuities at switches. No impacts are predicted at any schools, parks, or other FTA Category 3 receptors.

Table 5.7-5. Predicted Vibration Levels at Representative Monitoring Locations under the Build Alternatives

Receptor[a]		Vibration Levels (in VdB)		Impact Criteria (VdB)	
ID	Location	Alt. C – MOS	Alt. C – Full Build	Frequent Events	Exceed?
M01	10364 South 360 East	62	62	72	No
M02	10815 S. Heather Ridge Road	67	67	72	No
M03	11317 Glen Croft Lane	57	57	72	No
M04	466 Camden Park Court	61	61	72	No
M05	11623 Thornberry Drive	67	67	72	No
M06	685 East 11900 South	54	54	72	No
M07	12361 Parkstone Court	66	66	72	No
M08	1405 Country Oak Lane	—[b]	63	72	No
M09	12765 Costanza Way	—	66	72	No
M10	13091 Shadowlands Lane	—	65	72	No
M11	13297 Akagi Lane	—	61	72	No
M12	13712 Vestry Road	—	47	72	No
M13	738 Point Hills Cove	—	64	72	No
M14	14312 Selina Lane	—	61	72	No

[a] The receptor locations are shown in Figure 3-9, Noise-Monitoring Locations, at the end of Chapter 3, Affected Environment.

[b] Under Alternative C – MOS, no vibration levels are predicted south of the Alternative C – MOS alignment, which ends at Pioneer Road (12300 South, Draper Town Center) or Stationing Number 1472+00.

5.7.6 Alternative C – Full Build

5.7.6.1 Noise Impacts

Under Alternative C – Full Build, light-rail transit service is proposed between the Sandy Civic Center 10000 South Station and 14600 South along the existing UTA-owned right-of-way. A portion of this would be a shared right-of-way with the Utah Railway Company, which currently runs freight trains on the UTA-owned right-of-way to the IFA/Poultrymen site just north of Pioneer Road. Light-rail transit would operate in a dedicated corridor on the UTA-owned right-of-way south of Pioneer Road. The entire rail alignment along the 9-mile stretch of existing tracks would be updated to include new continuous welded rail tracks and grade crossings to reduce noise and vibration impacts from both light-rail transit and nighttime freight service.

How would Alternative C – Full Build affect noise levels?

Under Alternative C – Full Build, overall project noise levels are predicted to exceed the FTA *moderate* impact criteria at 259 residences and the FTA *severe* impact criteria at an additional 192 residences. The future noise level under Alternative C – Full Build of 61 dBA at the Draper City Park is also predicted to exceed the FTA Category 3 *moderate* impact criterion of 59 dBA (an FTA Category 3 land use). No impacts are predicted at the other four parks along Alternative C – Full Build or at the Draper Library.

Since almost all noise-sensitive sites for this project are residential, the L_{dn} descriptor was used to reflect the heightened sensitivity of residents to nighttime noise. To show the change in noise levels from the existing conditions, the predicted future noise levels from light-rail transit operations under Alternative C – Full Build are summarized in Table 5.7-3 above, Predicted Noise Levels at Representative Monitoring Locations under the Build Alternatives, for the same receptor locations used to monitor current noise levels (see Figure 3-9, Noise-Monitoring Locations, at the end of Chapter 3, Affected Environment). As shown in Table 5.7-3 above, the L_{dn} day-night noise levels at residences are predicted to range from 52 dBA at Receptor M12 (a residence along Vestry Road on the bluff overlooking Highland Drive) to 63 dBA at Receptors M02 (S. Heather Ridge Road), M05 (Thornberry Drive), and M09 (Costanza Way). The future noise levels under Alternative C – Full Build from light-rail transit trains are predicted to exceed the FTA *moderate* impact criteria at Receptors M03, M04, and M14. Similarly, future project noise levels are predicted to exceed the FTA *severe* impact criteria at the remaining receptors except Receptors M06 and M12.

All of the noise impacts along Alternative C – Full Build were evaluated using the FTA impact criteria shown above in Chart 5.7-1, FTA Transit Noise Impact Criteria, to reflect the introduction of new transit service.

Using the same evaluation methodology described for Alternative C – MOS, overall noise levels under Alternative C – Full Build are

predicted to exceed the FTA *moderate* impact criteria at 259 residences and the FTA *severe* impact criteria at an additional 192 residences (see Table 5.7-4 above, Overall Project-Related Noise Impacts at Residences under the Build Alternatives).

Five FTA Category 3 parks were also evaluated within the screening distance of 350 feet. Additionally, although the Draper Amphitheater is located well outside the FTA screening distance (about 1,700 feet from the Highland Station along Vestry Road in Draper), it was also evaluated as an FTA Category 1 receptor to reflect the grass-roots effort to complete this partially constructed but currently abandoned facility. The following future peak-hour L_{eq} noise levels were predicted at each of these parks under Alternative C – Full Build:

- Off Leash-Dog Park/Landfill Park (Alternative C – Full Build, Sandy) – 50 dBA
- Mehraban Wetlands Park (Alternative C – MOS, Draper) – 40 dBA
- Draper City Park (Alternative C – Full Build, Draper) – 61 dBA
- Andy Ballard Equestrian Center (Alternative C – Full Build, Draper) – 52 dBA
- Porter Rockwell Trail (Alternative C – Full Build, Draper) – 60 dBA
- Draper Amphitheater (Alternative C – Full Build, Draper) – 35 dBA

Additionally, future peak-hour L_{eq} noise levels predicted at institutional receptors (also FTA Category 3) range from 51 dBA at each of the two LDS churches (275 East 10600 South and 498 E. Hollow Creek Road in Draper) to 53 dBA at the Draper Library (1136 E. Pioneer Road). Except for Draper City Park (Stationing Number 1460+00), which is predicted to exceed the FTA Category 3 *moderate* impact criterion of 59 dBA, no additional impacts are predicted at any of the other FTA Category 3 receptors under Alternative C – Full Build.

Note that, while the Draper City Park qualifies as an FTA Category 3 land use with picnic and recreation areas, the low-moderate impact that is predicted there would not affect the intended use of the park as a recreation area. Because the park is used for outdoor activities such as baseball, volleyball, basketball, and playing on playground equipment, it is not considered a noise-sensitive facility where quiet and serenity are significant attributes.

Although L_{max} is used to develop L_{dn} noise levels, people can better relate to L_{max} because it is the noise level that people actually hear. Maximum noise levels from LRT train passbys are predicted to range from 69 dBA at Receptor M06 along 11900 South to 81 dBA at Receptors M02 (Heather Ridge Drive), M05 (along Thornberry Drive), and M09 (Costanza Way). The L_{max} levels from onboard

LRT warning bells are about 20 dBA lower than the LRT passby levels (primarily due to wheel-rail interaction).

5.7.6.2 Vibration Impacts

As shown in Table 5.7-5 above, Predicted Vibration Levels at Representative Monitoring Locations under the Build Alternatives, the maximum vibration levels from light-rail transit vehicles in the noise and vibration evaluation area under Alternative C – Full Build are predicted to range from 47 VdB at Receptor M12 (a residence along Vestry Road on the bluff overlooking Highland Road) to 67 VdB at Receptors M02 (S. Heather Ridge Road) and M05 (Thornberry Drive). As shown in Table 5.7-5 above, none of the vibration levels are predicted to exceed the FTA *frequent* impact criteria at any of the discrete receptor locations.

However, throughout the evaluation area, vibration levels are predicted to exceed or equal the FTA *frequent* criteria of 72 VdB at seven residences under Alternative C – Full Build. All of these impacts are due to rail discontinuities at switches. Additionally, project vibration levels are not predicted to exceed the FTA Category 3 impact criterion of 75 VdB at any of the five parks or the three institutional receptors (the two LDS churches and the Draper Library) along Alternative C – Full Build.

How would Alternative C – Full Build affect vibration levels?

Under Alternative C – Full Build, overall project vibration levels are predicted to exceed the FTA *frequent* criteria at 7 residences. Project vibration levels are not predicted to exceed the FTA Category 3 impact criterion of 75 VdB at any of the five parks along Alternative C – Full Build or the three institutional receptors (the Draper Library and the two LDS churches).

5.7.7 Construction Noise and Vibration Impacts

Noise levels from construction activities along the UTA-owned right-of-way, although temporary, could be a nuisance at nearby sensitive receptors such as residences and schools. Noise levels during construction are difficult to predict and vary depending on the types of construction activity and the types of equipment used for each stage of work. Heavy machinery, the major source of noise in construction, is constantly moving in unpredictable patterns and is not usually at one location for very long. Project construction activities can include constructing track bed, relocating utilities, renovating grade crossings, and constructing stations. No heavy-duty impulsive equipment, such as pile drivers, is required as part of the construction activities.

However, construction normally occurs during daylight hours when some residents are not at home, when residents who are at home are less sensitive to construction activities, and when other community noise sources contribute to higher ambient noise levels. Since none

How would construction affect noise and vibration levels?

Noise levels from construction activities along the UTA-owned right-of-way, although temporary, could be a nuisance at nearby sensitive receptors such as residences and schools. However, since none of the receptors along the UTA-owned right-of-way is expected to be exposed to construction noise for a long time, extended disruption of normal activities is not expected.

of the receptors along the UTA-owned right-of-way is expected to be exposed to construction noise for a long time, extended disruption of normal activities is not expected.

Construction noise differs from transit noise in two ways.

- Construction noise lasts for the duration of the construction contract and it is usually limited to daylight hours when most human activity occurs. Construction activities are generally of a short duration and, depending on the nature of construction operations, could last from seconds (such as for a truck passing by) to months (such as when constructing a bridge at an overpass).
- Construction noise is also intermittent and depends on the type of operation, location, and function of the equipment as well as the equipment usage cycle. Transit noise, on the other hand, is present in a more continuous fashion after construction activities are completed.

5.7.8 Mitigation Measures for Noise and Vibration Impacts

5.7.8.1 Operations

Noise

Since noise impacts are predicted under the build alternatives, mitigation measures were investigated to determine their effectiveness in reducing *severe* noise impacts from light-rail transit operations. The following three mitigation measures were evaluated for their potential to eliminate *severe* noise impacts along the project corridor:

- Spring frogs to eliminate rail gaps and the resulting elevated noise levels.
- FRA-approved quiet zones at grade crossings to eliminate the need to sound warning horns, particularly at night.
- Noise barriers to shield residents from wayside train passbys. Based on FTA guidance (FTA 2006), UDOT's procedures for noise abatement are acceptable for gauging the reasonableness of the cost of mitigation. For this EIS, noise barriers were evaluated using the UDOT Noise-Abatement Policy (January 2008).

What is a quiet zone?

A *quiet zone* is a segment of railroad line where train crews are exempt from sounding the horn at grade crossings. Train crews are still permitted to sound the horn within a quiet zone for railroad-related reasons or for safety reasons. UTA cannot apply for the quiet zone; however, UTA will help assist local municipalities with the application process.

Although continuously welded rail track is proposed as an upgrade to eliminate the vast majority of impacts due to rail discontinuities, switches are necessary at several locations along the project corridor to improve the operating efficiency of the proposed LRT service. Impulse noise (steel wheels rolling over the gaps of standard rail bound manganese track switches) could contribute to impacts at nearby residences. Mitigation measures to eliminate these impacts could include relocating these switches away from residences or using special low-impact frogs (such as spring frogs) that eliminate the gaps in the switch.

At grade crossings, supplemental safety measures (SSM), such as four-quadrant gates and median barriers, would eliminate the need to sound warning horns, thereby creating FRA-approved quiet zones (FRA 2003). The quiet zones are an effective measure for mitigating noise impacts from freight warning horns, particularly during the nighttime when residents are particularly sensitive to noise.

As an example of UTA's commitment to establishing quiet zones throughout the entire project area, UTA is renewing its current waiver along the North-South TRAX Line in Murray to include freight as well. Furthermore, UTA has already started the quiet zone application process with FRA for other nearby corridors such as the Mid-Jordan Line, for which UTA signed Memorandums of Understanding with the local communities (Midvale and West Jordan) to establish quiet zones throughout that project corridor as well (UTA 2008e). UTA will coordinate with both Sandy and Draper Cities so that they can pass resolutions for the Draper Transit Corridor similar to those passed in the Mid-Jordan communities. UTA recognizes that establishing quiet zones requires cooperative action among the municipalities along the rail right-of-way along with UDOT as well. UTA continues to work with the Cities since they are key participants who must initiate the request to establish a quiet zone through their application to FRA.

Additionally, improvements are proposed at grade crossings to meet FRA criteria. Some of the proposed safety improvements in the preliminary corridor designs include raised medians, warning lights, and other devices. Through proactive design and collaboration with the local municipalities, UTA is taking a lead role in coordinating with these entities to help establish quiet zones along the Draper Transit Corridor alignment.

Also, noise barriers were evaluated along the project corridor to supplement the benefits of the switch isolation and the quiet zones (see Figure 5-4 through Figure 5-10, Potential Noise Barrier Locations, at the end of this chapter). To be effective, noise barriers need to be high enough to block the line of sight between the receiver and the noise source and must not have any gaps or openings. Barriers must also be constructed of solid material with a minimum weight or density of 4 pounds per square foot.

Due to the density of the residential communities along the UTA-owned right-of-way and the encroachment of newly constructed homes within 100 feet of the existing rail corridor, noise impacts are predicted throughout the corridor under each of the build alternatives. As shown in Table 5.7-6 below, 21 noise barriers were evaluated to determine their potential for reducing the severity of FTA *moderate* and *severe* noise impacts predicted along the UTA-owned right-of-way. All of the barrier heights are specified above top-of-rail. During final design, the barrier heights and lengths would be adjusted to reflect actual ground conditions for both existing and modified alignment grading and actual residential receptor locations.

How would noise impacts from rail operations be mitigated?

UTA recommends noise barriers at 17 locations along the UTA-owned right-of-way to reduce the severity of noise impacts from rail operations (see Table 5.7-6 below). In addition, quiet zones will be used to reduce noise impacts from freight warning horns. Finally, switches will be relocated whenever possible to avoid impacts or substituted with spring frogs.

Based on this evaluation, 17 of the 21 barriers were determined to be both feasible (able to reduce noise levels by at least 5 dBA at over 75% of all first-row receptors) and reasonable (able to achieve compliance at a cost below the UDOT criterion of $30,000 per benefitted receiver at a unit material cost of $25 per square foot) (UDOT 2008). As shown in Table 5.7-6 below, all of the barriers were evaluated for their potential to reduce project noise levels. However, Barriers 9, 15, and 21 are not predicted to achieve a 5-dBA reduction at over 75% of the first-row receptors (they would achieve this reduction at 50%, 67%, and 46% of the first-row receptors, respectively) and are, therefore, determined to be not feasible under the UDOT guidelines. Similarly, Barriers 9 and 16, with a cost-effectiveness index of $45,000, do not comply with the UDOT criterion of $30,000 per benefited receiver. All other barriers are predicted to be both feasible and reasonable according to the UDOT noise barrier evaluation guidelines (see Figure 5-11 through Figure 5-24, Noise Impacts Before and After Mitigation, at the end of this chapter).

Table 5.7-6. Noise Barriers Evaluated To Mitigate Impacts from the Build Alternatives

No.[a]	Barrier Description	Stationing No. Begin	Stationing No. End	Align Side	Length[b] (feet)	Height[b] (feet)	Noise Reduction (dBA)[c]	Benefited Receivers	Cost-Effectiveness	Feasible and Reasonable?[d]
1	Sandy Willows Cove	1617+00	1644+00	NB	2,700	8	3–13 (8)	59	$9,153	Yes
2	Heather Ridge Drive	1590+00	1611+50	SB	2,150	8	5–14 (10)	41	$10,488	Yes
3	Ardonna Way	1598+50	1601+00	NB	250	6	5–8 (7)	19	$7,895	Yes
4	O'Henry Road	1563+50	1589+00	NB	2,550	8	1–10 (7)	41	$12,439	Yes
5	Glencroft Lane	1583+00	1566+50	SB	1,650	6	2–10 (6)	31	$7,984	Yes
6	Camden Park and Shadow View Lanes	1530+50	1562+00[e]	NB	2,350	8	2–14 (9)	88	$7,159	Yes
7	Thornberry Drive	1561+00	1539+50	SB	2,200	6	2–11 (8)	41	$8,049	Yes
8	800 East inbound	1512+50	1519+00	NB	600	6	5–8 (6)	3	$30,000	Yes[f]
9	12000 South outbound	1516+00	1513+00	SB	300	6	4–7 (6)	1	$45,000	No
10	800 East outbound	1512+00	1505+00	SB	700	8	3–11 (9)	6	$23,333	Yes[f]
11	Pond Ridge Drive	1497+00	1512+00	NB	1,450	8	3–10 (6)	18	$16,111	Yes[f]
12	Parkstone Court	1470+00	1476+00	NB	600	14	5–12 (9)	17	$12,353	Yes[f]
13	Blacksmith Lane	1436+00	1452+00	NB	1,250	8	6–13 (10)	23	$10,870	Yes
14	Country Oaks Lane	1449+00	1436+00	SB	1,000	4	5–6 (5)	5	$20,000	Yes
15	Costanza Way	1417+00	1434+00	NB	1,700	6	1–8 (4)	8	$31,875	Not feasible
16	Boulter Street	1434+00	1419+00	SB	1,500	6	5–12 (7)	5	$45,000	Not reasonable
17	Mountain Crest Circle	1405+00	1414+00	NB	950	6	4–9 (8)	15	$9,500	Yes
18	Shadowlands Lane	1416+00	1397+00	SB	1,850	6	5–12 (10)	20	$13,875	Yes
19	Red Tree Court	1381+50	1396+00	NB	1,400	8	5–12 (8)	20	$14,000	Yes
20	Akagi Lane	1396+00	1360+50	SB	3,500	6	0–13 (7)	34	$15,441	Yes
21	Highland Drive	1359+50	1251+50	SB	10,750	2	0–6 (3)	39	$13,782	Not feasible
	Total Feasible and Reasonable				**28,700**					

Table 5.7-6. Noise Barriers Evaluated To Mitigate Impacts from the Build Alternatives

No.[a]	Barrier Description	Stationing No. Begin	Stationing No. End	Align Side	Length[b] (feet)	Height[b] (feet)	Noise Reduction (dBA)[c]	Benefited Receivers	Cost-Effectiveness	Feasible and Reasonable?[d]

The gray-shaded receptors represent areas along Alternative C – MOS. The full set of receptors in the table represents areas along Alternative C – Full Build.

[a] The noise barrier associated with each number is shown in Figure 5-4 through Figure 5-10, Potential Noise Barrier Locations, at the end of this chapter.

[b] During final design, the barrier heights and lengths would be adjusted to reflect actual ground conditions for both existing and modified alignment grading and actual residential receptor locations.

[c] This column shows the range of noise reduction and the average noise reduction (in parentheses).

[d] The UDOT "feasible and reasonable" criteria include only barriers (1) that achieve a minimum 5-dBA reduction at over 75% of first-row receptors and (2) whose cost-effectiveness index is less than $30,000 per benefitted receptor based on a material unit cost of $25 per square foot.

[e] No mitigation is proposed between stationing 1535+00 and 1543+00 because there are no existing residential receptors.

[f] Cost-effectiveness will need to be re-evaluated based on more-advanced design of barrier dimensions and the actual number of benefitted receivers. This could affect the feasibility of noise barriers at this location.

The results of the cumulative mitigation measures (noise barriers, quiet zones, and switch controls) are shown in Table 5.7-7 below for the 14 representative receptor locations. As shown in Table 5.7-8 below, cumulative mitigation measures are predicted to reduce corridor-wide receptor noise levels on average by 8 dBA, which would reduce the number of severe impacts over 96% along Alternative C – MOS and 95% along Alternative C – Full Build. For example, as shown in Table 5.7-8 below for Alternative C – Full Build, for example, 120 receptors are predicted to decrease from severe impact to no impact and 176 receptors are predicted to decrease from moderate impact to no impact. An additional 62 receptors would be reduced from severe to moderate impact along Alternative C – Full Build as a result of the proposed mitigation measures.

However, 146 moderate impacts (including Draper City Park) and 10 severe impacts are predicted to remain along Alternative C – Full Build with mitigation. Although almost all of the moderate impacts are the result of benefits provided by the proposed noise barriers, the remaining severe impacts are predicted only at grade crossings, where noise barriers would be less effective because of the openings in the noise barrier required for the crossing.

Although the proposed noise barriers would provide some benefits at grade crossings, it is not enough to eliminate severe impacts at the following 10 remaining isolated sites:

- 10408 South 360 East (ID #78) – Segment 1 (Alternative C – MOS)
- 10420 South 360 East (ID #82) – Segment 1 (Alternative C – MOS)
- 10430 South 360 East (ID #84) – Segment 1 (Alternative C – MOS)
- 10434 South 360 East (ID #87) – Segment 1 (Alternative C – MOS)
- 10442 South 360 East (ID #92) – Segment 1 (Alternative C – MOS)
- 790–792 East 12000 South (ID #473) – Segment 1 (Alternative C – MOS)
- 1167 E. Pioneer Road (ID #533) – Segment 2 (Alternative C – Full Build)
- 1185 E. Pioneer Road (ID #534) – Segment 2 (Alternative C – Full Build)
- 12736 S. Boulter Street (ID #569) – Segment 2 (Alternative C – Full Build)
- 14340 S. Debrian Way (ID #940) – Segment 2 (Alternative C – Full Build)

The predicted number of impacts, which is based on both aerial photographs and land-use maps, was verified in the field to determine which houses are abandoned or used for nonresidential purposes (such as garages, sheds, and barns).

Table 5.7-7. Predicted Noise Levels at Representative Monitoring Locations under the Build Alternatives with Mitigation

Receptor[a]		Noise Levels (dBA)			Impact Criteria (dBA)[b]		
ID	Location	Existing	Build without Mitigation	Build with Mitigation	Moderate	Severe	Level of Impact[c]
M01	10364 South 360 East	51	60	50	54	60	SEV/NO
M02	10815 S. Heather Ridge Road	49	63	51	53	59	SEV/NO
M03	11317 Glen Croft Lane	51	56	51	54	60	MOD/NO
M04	466 Camden Park Court	56	58	55	56	62	MOD/NO
M05	11623 Thornberry Drive	49	63	53	53	59	SEV/MOD
M06	685 East 11900 South	54	53	53	55	61	NO/NO
M07	12361 Parkstone Court	53	61	49	54	61	MOD/NO
M08	1405 Country Oak Lane	49	60	54	53	59	SEV/MOD
M09	12765 Costanza Way	50	63	57	53	60	SEV/MOD
M10	13091 Shadowlands Lane	48	61	51	53	59	SEV/NO
M11	13297 Akagi Lane	48	59	51	53	59	SEV/NO
M12	13712 Vestry Road	54	52	52	55	61	NO/NO
M13	738 Point Hills Cove	55	61	59	55	61	SEV/MOD
M14	14312 Selina Lane	50	58	58	53	60	MOD/MOD

The gray-shaded receptors represent areas along Alternative C – MOS. The full set of receptors in the table represents areas along Alternative C – Full Build.

[a] The receptor locations are shown in Figure 3-9, Noise-Monitoring Locations, at the end of Chapter 3, Affected Environment.

[b] The impact criteria vary by location based on the existing noise levels.

[c] The level of impact was assessed according to the FTA thresholds no impact (NO), *moderate* impact (MOD), and *severe* impact (SEV). This column indicates the level of impact without and with mitigation.

Table 5.7-8. Effects of Mitigation on Overall Noise Impacts at Residences under the Build Alternatives

Corridor Segment	Build Alternatives with Mitigation[a]					
Location	NO	MOD→NO	SEV→MOD	SEV→NO	MOD	SEV[b]
Alternative C – MOS – 10000 South in Sandy to Pioneer Road in Draper	247	88	42	98	26	6
Alternative C – Full Build – 10000 South in Sandy to 14600 South in Draper	523	176	62	120	84	10

[a] The following categories describe noise impacts under the build alternatives with mitigation compared to conditions without mitigation (quiet zones and noise barriers): receptors that would remain no impact (NO); receptors that would be reduced from *moderate* impact to no impact (MOD→NO); receptors that would be reduced from *severe* to *moderate* impact (SEV→MOD); receptors that would be reduced from *severe* impact to no impact (SEV→NO); receptors that would remain *moderate* impact (MOD); and receptors that would remain *severe* impact (SEV).

[b] The remaining *severe* impacts would be re-evaluated during the final design phase of the project.

Vibration

As described in Section 5.7.5.2, Vibration Impacts, and Section 5.7.6.2, Vibration Impacts, the FTA vibration impact criterion of 72 VdB would be exceeded at several locations under both build alternatives. To eliminate vibration impacts predicted along the build alternatives, several mitigation measures are recommended. These measures include relocating switches and turnouts and using special low-impact spring frogs that eliminate the gaps in the switch. Along tangent track, installing resiliently supported ties and track fasteners is recommended to reduce impacts from light-rail transit vehicles passing by along straight continuous welded rail track. Since switches have already been located away from residences whenever possible, the following vibration-control measures are recommended to eliminate the impacts predicted under the build alternatives:

- Install spring frogs or other high-speed switches and turn-outs to eliminate impacts due to rail discontinuities at the following proposed switch locations:
    - Pioneer Road, southbound (ID. No. T110) at Stationing Number 2470+77 (two impacts along Parkstone Court)
    - 12200 South, southbound (ID. No. X140) at Stationing Number 2501+19 (one impact at S. Pond Ridge Drive)
    - 12200 South, southbound (ID. No. T130) at Stationing Number 2498+41 (one impact at S. Pond Ridge Drive)
    - 12200 South, northbound (ID. No. X140) at Stationing Number 1497+58 (one impact at S. Pond Ridge Drive)
    - North of 10600 South #1, northbound (ID. No T-150) at Stationing Number 1643+98 (one impact at S. Sandy Willows Cove)
    - North of 10600 South #2, southbound (ID. No T-155) at Stationing Number 2644+18 (one impact at S. Sandy Willows Cove)

All vibration impacts would be eliminated with the recommended track modifications. Other mitigation measures such as operational restrictions that involve speed reductions are not recommended because they are only marginally effective and would limit the overall function and flexibility needed for a rapid-transit system.

How would vibration impacts from rail operations be mitigated?

A combination of track modifications and operational modifications could eliminate all predicted vibration impacts from rail operations. However, operational modifications might not be viable because they would limit the overall function and operational flexibility of the TRAX system.

5.7.8.2 Construction

To reduce temporary construction noise and vibration impacts that are expected along the UTA-owned right-of-way, several "good housekeeping" practices are recommended. For example, the following noise- and vibration-control measures could be incorporated into the construction process:

- Use alternative construction methods that avoid impact pile-driving near noise- and vibration-sensitive receptors, such as residences, schools, and hospitals. Whenever possible, UTA would consider using drilled piles or sonic/vibratory pile drivers to reduce excessive vibration.
- Erect temporary noise barriers between noisy activities and noise-sensitive receptors.
- Establish equipment and material staging areas away from sensitive receptors.
- Re-route construction traffic along roads to reduce impacts at nearby sensitive receptors.
- Require contractors to use best available control technologies (BACT) to limit excessive noise and vibration at nearby residences.
- Whenever possible, conduct all construction activities during the daytime between 7 AM and 10 PM in accordance with Draper City's noise-control ordinance (Draper City 2008d).
- Adequately notify the public of construction operations and schedules. Methods such as construction-alert publications could be used to handle complaints quickly.

All mitigation measures should be re-evaluated during the final design phase of the project when the details of the project components and the construction scenarios are finalized.

How would noise and vibration impacts from construction be mitigated?

UTA will incorporate the "good housekeeping" practices listed at left to reduce temporary construction noise and vibration impacts.

5.8 Impacts to Visual and Aesthetic Resources

This section analyzes the impacts to visual and aesthetic resources in the visual evaluation area. Section 3.8, Visual and Aesthetic Resources, characterizes the existing visual resources and the evaluation area.

What is the visual evaluation area?

The visual evaluation area consists of the UTA-owned right-of-way, the proposed station locations, and the viewshed for these areas. *Viewshed* is a term that describes all of the views that can be seen from a given location.

5.8.1 Methodology

The project team divided the visual evaluation area into five assessment units (see Figure 3-10, Visual Assessment Units, at the end of Chapter 3, Affected Environment). Each of these units was defined and assessed based on its general visual character, the commonality of its land uses, and its primary viewers. Primary viewers are those who regularly experience views in the evaluation area, such as residents, passing motorists, pedestrians, recreational users, and employees.

What are visual assets?

Visual assets are the positive attributes of the environment that contribute to the visual quality and character as seen by the viewers in an area. These visual assets can include nearby views of trees, neighboring structures, and the surrounding area as well as distant views of features such as the Oquirrh and Wasatch Mountains and the Salt Lake Valley.

The project team then developed ratings for describing the levels of project impacts on the visual assets in each assessment unit (see Table 5.8-1). The final impact ratings for each alternative take into consideration the impacts from the project alternatives, any planned mitigation measures, and the sensitivity of the viewer types in that assessment unit to changes in their visual environment (see Table 5.8-2 below).

Table 5.8-1. Visual Impact Ratings

Impact	Definition
High	Indicates major changes to visual resources including the introduction of structures that obstruct scenic vistas or the removal of mature vegetation that provides landscape character.
Moderate	Indicates noticeable changes to visual resources such as the introduction of major elements into the existing landscape that obstruct or alter existing scenic vistas. Mitigation methods could be used to reduce impacts.
Low	Indicates minor changes to visual resources such as the introduction of elements in areas where existing transportation or utility facilities are located.
None/Negligible	Indicates no impact or negligible impact to visual resources or viewing conditions.

When determining the visual impact ratings for each alternative, the project team considered how sensitive different types of viewers were to changes in their visual environment. Viewer groups were developed by determining each viewer type's proximity to the rail line and its frequency and duration of exposure to the visual environment. Visual sensitivity is also modified by viewer activity, awareness, and visual expectations in relation to the viewing duration. The visual sensitivity is generally higher for the group viewing the new rail right-of-way than for the group that uses the rail right-of-way (FHWA 1983). Residential viewers typically have extended viewing periods and are concerned about changes in their views. Viewers using recreation areas are also concerned about the changes in their views.

Table 5.8-2 lists the three viewer types that were used in this analysis. Viewer types were mainly defined in relation to visual changes along the UTA-owned right-of-way.

Table 5.8-2. Viewer Types

Viewer Type	Definition
Resident	Viewer who lives in the evaluation area and has views of the existing UTA-owned right-of-way (including views from an adjacent yard or through residential windows that face the right-of-way). Residents are considered the most sensitive viewer type since they would have the most visual exposure to the rail line. A resident's degree of sensitivity to the rail line depends on the orientation and distance of his or her house relative to the rail line.
Motorist	Viewer who travels across or parallel to the UTA-owned right-of-way in a motorized vehicle. The motorist would be temporarily exposed to the rail line. Motorists are considered less sensitive to the rail line because their exposure would be short term.
Pedestrian or recreational user	Viewer on foot, bicycle, or horse either within the UTA-owned right-of-way (using the Porter Rockwell Trail) or within viewing distance of the right-of-way. Pedestrians and recreational users have a higher degree of sensitivity to the rail line due to their proximity to the rail line and the fact that they travel within or near the right-of-way at a slower rate than vehicles. In addition, many trail users are regular users of recreational facilities near the rail line.

5.8.2 No-Action Alternative

5.8.2.1 Construction Impacts

How would the No-Action Alternative affect visual and aesthetic resources?

Under the No-Action Alternative, there would be no construction-related impacts from the Draper Transit Corridor Project. However, commercial and residential construction will likely continue to occur, which would cause long-term visual impacts.

Under the No-Action Alternative, the Draper Transit Corridor Project would not be built, and the UTA-owned right-of-way would remain as is. Because the existing TRAX line would not be extended, there would be no large topographic changes or soil disturbances from construction-related cuts and fills. However, commercial and residential construction will likely continue to occur adjacent to the UTA-owned right-of-way and at the proposed station locations, which would result in typical construction views: cleared land, graded parcels, construction equipment, construction fencing, and construction materials.

5.8.2.2 Long-Term Impacts

Under the No-Action Alternative, the UTA-owned right-of-way would remain as is. Therefore, there would be no long-term impacts to visual and aesthetic resources along or adjacent to the UTA-owned right-of-way or the adjacent trail system from the No-Action Alternative.

The long-term visual impacts of the No-Action Alternative would come from continued commercial and residential development. With or without the Draper Transit Corridor Project, views near Sandy, Draper, and Bluffdale would change as development occurs. The remaining agricultural areas west of the UTA-owned right-of-way at 11800 South and Draper Town Center are planned for development in the Cities' land-use plans. Most future development would occur at the proposed station locations, since large parcels of undeveloped land are still available at these locations. The density and type of developments that would be built at these locations would likely vary from the transit-oriented development that would occur with the project.

5.8.3 TSM Alternative

5.8.3.1 Construction Impacts

How would the TSM Alternative affect visual and aesthetic resources?

The TSM Alternative would involve construction impacts to the areas around the two proposed park-and-ride lots. The TSM Alternative would have long-term visual impacts on these areas, mostly due to the addition of pavement and lighting.

Under the TSM Alternative, the UTA-owned right-of-way would remain as is. Because the existing TRAX line would not be extended as part of the TSM Alternative, there would be no large topographic changes or soil disturbances from construction-related cuts and fills along the right-of-way. The TSM Alternative would affect the areas around the two proposed park-and-ride lots, which would be built at Draper Town Center and 14600 South. Typical short-term, construction-related impacts would include construction vehicle activity and accompanying staging areas, stockpiling of excavated material, traffic congestion, and construction-related dust.

During construction of the park-and-ride lots, the work zone would be cleared of vegetation. The exposed bare ground would likely contrast visually with the surrounding residential and commercial areas that viewers are used to seeing. Visual quality from sensitive viewer locations (such as residences) would be temporarily reduced during construction. Until the construction is completed and the disturbed areas are revegetated or become part of the parking lot, the construction areas would stand out.

5.8.3.2 Long-Term Impacts

The TSM Alternative would not involve any changes to the existing UTA-owned right-of-way mainline. Therefore, there would be no impacts from the TSM Alternative to visual and aesthetic resources along or adjacent to the UTA-owned right-of-way or to the adjacent trail system.

The TSM Alternative would affect the areas around two proposed park-and-ride lots, which would be built at Draper Town Center and 14600 South. These park-and-ride lots are located in Visual Assessment Units 2 and 5 (see the sections titled Unit 2 – Draper Town Center on page 5-102 and Unit 5 – Bangerter Parkway to 14600 South on page 5-105). Most changes would be due to the addition of pavement and lighting at the currently undeveloped park-and-ride lot locations, and the changes would be a low-to-moderate impact to viewers in the evaluation area. There are farm fields at both of the Draper Town Center park-and-ride lot location options. These fields would likely be acquired by UTA for the park-and-ride lot, and the remaining open space is either already scheduled for

development or soon will be developed in accordance with Draper City's land-use plans.

5.8.4 Alternative C – MOS

5.8.4.1 Construction Impacts

Under Alternative C – MOS, short-term, construction-related impacts would include construction vehicle activity and accompanying staging areas, stockpiling of excavated material, traffic impacts, and construction-related dust. During construction, the work zone would be cleared of vegetation. The exposed bare ground would likely contrast visually with the surrounding residential and commercial areas that viewers are used to seeing. Visual quality from sensitive viewer locations (such as residences) would be temporarily reduced during construction. Until the construction is completed and the disturbed areas are revegetated or become part of the rail line or stations, the construction areas would stand out.

How would the build alternatives affect visual and aesthetic resources?

Both build alternatives would have construction-related impacts along the right-of-way and at the station locations. In the long term, neither build alternative would substantially alter the general visual conditions along and adjacent to the UTA-owned right-of-way, and both would have a low-to-moderate impact to viewers in the evaluation area.

5.8.4.2 Long-Term Impacts

Overall, Alternative C – MOS would not substantially alter the general urban visual conditions along and adjacent to the UTA-owned right-of-way and would have a low-to-moderate impact to viewers in the evaluation area. While the fixed elements of light-rail transit along the UTA-owned right-of-way would not obstruct long-range views, such as views of the Wasatch and Oquirrh Mountains, the current views would change due to the addition of new elements. The changes to views would be most noticeable in the foreground and middle-ground views due to two new light-rail tracks and cut-and-fill slopes, less agricultural land and other vegetation, drainage structures, pavement, lighting, and sound barriers.

TRAX would operate Monday through Thursday from 5:00 AM to midnight, Friday and Saturday from 5:00 AM to 1:45 AM (the next day), and Sunday from 8:00 AM to 10:00 PM. Trains typically run every 15 minutes. For this reason, the users of the Porter Rockwell Trail, in addition to residents whose homes abut or are adjacent to the UTA-owned right-of-way, are likely to have a greater sensitivity to the trains.

The fixed elements of Alternative C – MOS, such as track, stations, the overhead contact system, and other facilities, would be designed using the UTA Light-Rail Design Criteria. Major elements of the

project include stations with 435-foot-long platforms, canopies, lights, bus bays, parking, signaling/signing, and TPSSs spaced about 1 to 1.5 miles apart along the rail line. TPSSs consist of small, single-story, shed-like buildings. All TPSSs would be built within the existing UTA-owned right-of-way. The TPSS footprint would be about 80 feet by 200 feet, although the actual TPSS building itself is about 8 to 12 feet wide and 36 to 40 feet long.

Throughout the rail corridor, the OCS that interfaces with the catenary would be a 30-foot-high maximum simple catenary auto-tensioned OCS. Back-to-back cantilever arms would connect to wide flange poles built in the center of the right-of-way between the tracks and would be wired with copper messenger wire. Specific design standards would be used when designing all elements of Alternative C – MOS to reduce visual impacts on the surrounding viewshed, particularly in areas that UTA determines have higher visual sensitivity. In urban settings, wires and poles are common elements and should blend into the existing setting.

What is a viewshed?

Viewshed is a term that describes all of the views that can be seen from a given location. (This term is based on the concept of a *watershed*, which is the area that drains into a body of water.)

To be effective, noise barriers need to be high enough to block the line of sight between the receiver and the source and must not have any gaps or openings. Barriers must also be constructed of solid material; therefore, views for some residents could be blocked depending on the height of the proposed noise barriers and the location of homes in relation to the proposed barriers. In addition, to some people, noise barriers themselves are perceived as unattractive visual elements, though they do block views of the light-rail transit vehicles. UTA will work with the local governments to fit barrier designs to the community character. UTA will consider several design types to best fit with the surrounding aesthetics.) For more information about noise barriers, see Section 5.7.8, Mitigation Measures for Noise and Vibration Impacts.)

Alternative C – MOS would affect visual and aesthetic resources in Visual Assessment Units 1 and 2 (see the sections titled Unit 1 – Sandy/North Draper on page 5-100 and Unit 2 – Draper Town Center on page 5-102).

5.8.5 Alternative C – Full Build

5.8.5.1 Construction Impacts

The construction impacts from Alternative C – Full Build on visual and aesthetic resources would be the same as those from Alternative C – MOS.

5.8.5.2 Long-Term Impacts

The long-term visual and aesthetic impacts from Alternative C – Full Build would be similar to those from Alternative C – MOS and would affect visual and aesthetic resources in Visual Assessment Units 1 through 5 (see Section 5.8.5.3 below).

5.8.5.3 Impacts to Specific Visual Assessment Units

Unit 1 – Sandy/North Draper

Bounded by the Sandy Civic Center 10000 South Station to the north and 12300 South (Draper Parkway) to the south, Visual Assessment Unit (VAU) 1 includes single-family residences, parks, a cemetery, and a church. Primary viewers include residents of nearby homes, motorists on arterial roads, and recreational users of the Porter Rockwell Trail and parks.

Overall, the visual impact rating for VAU 1 is moderate. Both build alternatives would follow the existing railroad corridor and would be at grade. The perceived visual impacts would be lower on the north end of this VAU closer to 10000 South, since the rail line would be a continuation of the existing TRAX line and viewers in this area are already used to what the TRAX system looks like. Visual impacts would be greater south of 11400 South, where the UTA-owned right-of-way narrows.

South of 11400 South, the right-of-way begins at 100 feet wide and tapers to about 80 feet wide from this point to 12100 South, then varies between 65 and 120 feet wide from there to 12300 South (Draper Parkway). This means that properties adjacent to the right-of-way, and the structures on them, are generally closer to the existing freight-rail tracks than in areas farther south where the right-of-way is wider. Because of the narrower right-of-way, the addition of the light-rail transit fixed elements would be more dominant in the foreground. However, there are currently overhead utilities in the area that run adjacent to the UTA-owned right-of-way and nearby

How would Visual Assessment Unit 1 be affected?

The visual impact rating for VAU 1 is moderate. While no scenic vistas would be obstructed, the introduction of light-rail transit would alter existing visual resources by adding new elements into the landscape. Perceived changes at the northern end of the VAU would be less sensitive since the rail-build alternatives would be a continuation of the existing TRAX line. Visual sensitivity to these changes would be greatest for nearby residents and recreational users of the Porter Rockwell Trail due to their heightened awareness of the surroundings.

homes. While the catenary wire and poles associated with light-rail transit would introduce new visual elements to the area, they would be similar in appearance to the existing power poles and wires.

Views of the UTA-owned right-of-way would change for users of the Porter Rockwell Trail. The paved trail would remain adjacent to the right-of-way. The existing single-track freight-rail line would be replaced by a two-track light-rail line with the additional fixed elements described in Section 5.8.5.2, Long-Term Impacts. The views on the trail would most dramatically change every 7½ minutes when a train passes by.

Views for residents of nearby homes would also change, since the only current use of the right-of-way is for a freight train, which runs late at night and infrequently. UTA trains would pass behind residences along this corridor on a regular basis and during daytime and nighttime hours. Although the UTA trains would pass relatively close to some residences, fences and trees on adjacent properties would help to shield residents' views of the UTA trains. While the visual intrusion would be frequent (about every 7½ minutes, since the trains for both build alternatives would run at 15-minute intervals in each direction), it would be extremely short (about 25 to 45 seconds).

Some of the existing mature trees that line the UTA-owned right-of-way might be removed to accommodate the new light-rail tracks and associated elements. However, the visual contrast from construction would gradually diminish over time as replacement vegetation grows and matures.

VAU 1 includes the proposed stations at 10600 South, 11400 South, and 11800 South. The introduction of transit stations and parking lots would alter the character and the views at all of these locations. Light poles and associated nighttime lighting of the parking lot would change the existing visual environment for all of these proposed stations, since residential areas are close by. The 10600 South and 11400 South Stations are mostly surrounded by residential neighborhoods. In the case of the 10600 South Station, there is a church on the west side of and adjacent to the station site, so an expanded parking lot would likely blend in. The 11800 South Station would be compatible with the general urban nature along 700 East and 11800 South and would likely blend in visually. Although residential uses are nearby, there are also other larger, older, single-family parcels along 700 East that have been and are being

redeveloped as retail, service, and office uses. This commercial redevelopment will visually tie together with a transit station.

Unit 2 – Draper Town Center

The Draper Town Center VAU begins at 12300 South (Draper Parkway) and continues to 1300 East. This visual assessment unit includes a mixture of commercial and industrial areas with two- and three-story buildings and other industrial structures, a public park, and undeveloped parcels of land, some of which are currently farmed, adjacent to the UTA-owned right-of-way. Primary viewers include residents of nearby homes, motorists on arterial roads, and recreational users of the Porter Rockwell Trail.

Overall, the visual impact rating for VAU 2 is low to moderate. The potential removal of three businesses and introduction of a transit station and parking lot at the proposed Draper Town Center Station would alter the character and views of this area. Moreover, the conversion of agricultural parcels to a transit station would change the look and feeling of the area compared to what is there today. However, this area consists of a mix of commercial and industrial buildings in the vicinity of the proposed station, and Draper City's land-use plans show this area as Draper's future town center area.

Light standards and associated nighttime lighting of the parking lot would change the existing visual environment. However, nearby residences are far enough away that the lighting should have no effects on these homes. The UTA-owned right-of-way is currently seen from Draper City Park. The biggest change for users of the park would be the addition of the trains, since the current freight service runs infrequently and at night. Alternative C – MOS would run adjacent to the park, and the project would introduce new visual elements in an existing right-of-way. The new features would include walls and fencing, catenary wire and poles, the rail bed, light-rail cars, and lighting.

In addition, Draper Town Center would be the end-of-the-line station under Alternative C – MOS and would include tail tracks adjacent to the park that would be used for train storage. Stored trains would add a new visual element to the area compared to today, although the parked trains would eventually blend in with the surrounding transit uses.

How would Visual Assessment Unit 2 be affected?

The visual impact rating for VAU 2 is low to moderate. The introduction of light-rail transit would alter existing visual resources by adding new elements into the landscape, including a transit station and parking lot. Long-range vistas would not be obstructed, but existing agricultural parcels would be converted to a transit station and parking lot, which would change the look and feeling of the area compared to what is there today.

Unit 3 – 1300 East to 13400 South

The 1300 East to 13400 South VAU is characterized by low-density residential areas and fields and pastures adjacent to or facing the existing UTA-owned right-of-way. In one area, the rail right-of-way is 10 to 15 feet higher than adjacent properties, which results in foreground views of the right-of-way and background views of the Wasatch Front. Specifically, the existing rail trackbed is 10 to 15 feet higher than the properties to the west and is lower than the properties to the east. The west-side properties have foreground views of the slope up to the right-of-way, middle-ground views of the east-side residences, and a background view of the Wasatch Mountains. The properties on the east side have middle-ground views across the right-of-way of downhill residences and background views of the Oquirrh Mountains.

Overall, the visual impact rating for VAU 3 is low to moderate since most of the current viewing conditions are of the existing right-of-way. Given that there is an existing rail right-of-way, the railroad track is already part of the visual landscape, and it is currently visible at railroad crossings as well as from the back yards of residences. The greatest changes would come from the addition of the light-rail transit fixed elements described in Section 5.8.5.2, Long-Term Impacts. However, the addition of new transit facilities would be designed with UTA-developed Design Standards that would reduce visual impacts on sensitive viewers, and the vertical elements of light rail would not block long-range views such as those of the Wasatch and Oquirrh Mountains.

Views of the UTA-owned right-of-way would change for users of the Porter Rockwell Trail. The paved trail would remain adjacent to the UTA-owned right-of-way. The existing single-track freight-rail line would be replaced by a two-track light-rail line with the additional fixed elements described in Section 5.8.5.2, Long-Term Impacts. The views on the trail would most dramatically change every 7½ minutes when a train passes by.

How would Visual Assessment Unit 3 be affected?

The visual impact rating for VAU 3 is low to moderate. Because the rail right-of-way is visible from most of the houses, the addition of light-rail transit fixed elements as well as passing trains would alter the surrounding views for nearby residents and users of the Porter Rockwell Trail.

Unit 4 – 13400 South to Bangerter Parkway

The 13400 South to Bangerter Parkway VAU is characterized by residential areas, including the South Mountain planned development, open space, and recreational areas including the Porter Rockwell Trail and Ballard Ball Park and Equestrian Center. The topography and vegetation within this VAU vary along the right-of-way, which creates unobstructed views of the Wasatch Mountains to the east and the Oquirrh Mountains across the valley to the west. Viewing conditions in VAU 4 are largely characterized by unobstructed foreground and middle-ground views of the UTA-owned right-of-way with open views of the Wasatch Mountains, the Oquirrh Mountains, and the Salt Lake Valley in the background.

Overall, the visual impact rating for VAU 4 is low to moderate because of the relatively clear views of the dominant and remarkable vistas in the background and because the position of the existing right-of-way results in open views of the tracks from properties on higher ground. While the vertical elements of light-rail transit would not block the background views, they would add new elements to the view that aren't currently there. In addition, the presence of light-rail trains would slightly alter the visual environment.

Because of the topography and vertical alignment of the rail line, the adjacent residential properties on both sides of the right-of-way are farther from the rail line than in other VAUs and are on higher ground than the tracks. The greater distance between the right-of-way and the homes would lessen the visual impact on foreground views compared to other VAUs. However, since the homes are on higher ground, views of the right-of-way might not be as easily blocked as if the ground were level.

VAU 4 has one of three existing grade-separated crossings of the UTA-owned right-of-way. This existing bridge is already visually pleasing; however, views of the bridge would change when trains start passing over it.

How would Visual Assessment Unit 4 be affected?

The visual impact rating for VAU 4 is low to moderate. The introduction of light-rail transit would alter existing visual resources by adding new elements into the landscape. Because of the topography in this VAU, homes are farther from the rail right-of-way than in other VAUs, so the greater distance would lessen the perceived visual impacts.

VAU 4 includes the proposed Highland Station. Although this station would have limited onsite parking, the introduction of a transit station would alter the character and the views at this location. Light poles and associated nighttime lighting of the station would change the existing visual environment, since a residential area is close by. Due to the topography and vertical alignment of the rail line, many residential properties would look down on the station, and this would be a change to the view from those residences.

Unit 5 – Bangerter Parkway to 14600 South

The Bangerter Parkway to 14600 South VAU extends from Bangerter Parkway/300 East to the terminus of Alternative C – Full Build at 14600 South. In this VAU, the right-of-way rises to a higher elevation and traverses large swaths of undeveloped land. The right-of-way begins to follow the contours of the land partway up the mountain slope and rises above properties to the northwest. There is a small enclave of medium-density, single-family residences along the west side of Bangerter Parkway about 25 feet lower than the tracks.

How would Visual Assessment Unit 5 be affected?

The visual impact rating for VAU 5 is low. There are few sensitive viewers in this VAU, and existing utility features currently dominate the existing views.

Other features in this VAU include a Rocky Mountain Power substation (with monopole overhead transmission lines that cross the UTA-owned right-of-way and extend south parallel to it) and large and undeveloped tracts of commercial, office, and industrial properties in various stages of construction (ranging from undeveloped/vacant to rough graded/under construction).

Overall, the visual impact rating for VAU 5 is low. Although this VAU is characterized by unobstructed panoramic views of the mountains in the background, there are few sensitive viewers in this area. Additionally, utility features such as transmission lines and associated facilities currently dominate some of the foreground views in the area, which diminishes the effects of introducing transportation facilities into the existing right-of-way.

VAU 5 contains two of the three existing grade-separated crossings of the UTA-owned right-of-way. These existing bridges are already visually pleasing; however, views of the bridges would change when trains start passing over them.

VAU 5 includes the proposed 14600 South Station. The introduction of a transit station would alter the character and the views at this location, which are currently mostly open space and undeveloped land. Light poles and associated nighttime lighting of the station would change the existing visual environment, since a residential area is close by. Due to the topography and vertical alignment of the rail line, many residential properties would look down on the station, and this would be a change in the views from those residences. However, an electrical substation and the Utah Department of Corrections administrative office and training academy are nearby, so a transit station and park-and-ride lot would not be altogether out of place.

5.8.6 Mitigation Measures for Visual Impacts

Aesthetic measures such as lighting and vegetation at stations according to local ordinances will be considered during the final design of the project. Lighting will be provided at all station locations, and lights will be directed downward and away from residential buildings to the extent possible. The TPSS facilities will be located within the right-of-way and/or the station envelope.

5.9 Impacts to Historic Properties

This section addresses the impacts from the Draper Transit Corridor alternatives on historic properties. Based on the historic properties inventories, the Draper Transit Corridor Project would affect historic properties.

5.9.1 Definition of Section 106 Impacts

Impacts to historic properties from the action alternatives were documented using the Section 106 guidelines in 36 CFR 800.5. (See Section 3.9.1, Section 106 of the National Historic Preservation Act, for more information.) These impacts are described as no historic properties affected, no adverse effect, or adverse effect. The types of impacts from the action alternatives were documented by FTA and UTA in the Determination of Eligibility and Finding of Effect (see Appendix A, Pertinent Correspondence). These impacts are defined as follows:

- **No historic properties affected.** A *no historic properties affected* determination is made when it is determined that either there are no historic properties present or there are historic properties present but the undertaking would have no effect on them as defined in 36 CFR 800.16(i).
- **Adverse effect.** An *adverse effect* determination is made when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register of Historic Places (NRHP) in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration is given to all qualifying characteristics of a historic property, including those that might have been identified after the original evaluation of the property's eligibility for the NRHP. Adverse effects can include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance, or be cumulative.
- **No adverse effect.** A *no adverse effect* determination is made when the undertaking's effects do not meet the criteria described in the bullet above for an adverse effect, or the undertaking is modified or conditions are imposed, such as the subsequent review of plans for rehabilitation by the SHPO, to ensure consistency with the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 CFR 68) and applicable guidelines, to avoid adverse effects.

What is Section 106?

Section 106 of the National Historic Preservation Act requires federal agencies to take into account the effects of their undertakings on historic properties and give the Advisory Council on Historic Preservation a reasonable opportunity to comment on such undertakings. Under Section 106, a *historic property* is defined as any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on, the National Register of Historic Places.

What is an undertaking?

An *undertaking* is a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a federal agency, including those carried out by or on behalf of a federal agency, those carried out with federal financial assistance, and those requiring a federal permit, license, or approval.

5.9.2 Methods for Assessing Impacts

This section describes the methods for assessing impacts to historic properties from the Draper Transit Corridor Project alternatives. The historic properties described in Section 3.9, Historic Properties, that are considered to be eligible for the NRHP were assessed to determine whether any of the action alternatives would affect any portion of the historic property.

For NRHP-eligible historic properties, an impact was considered likely if any portion of the primary building, contributing outbuilding(s), historically associated lands, or site features and artifacts was found within the APE. Next, the nature and extent of that impact on the characteristics of the property or site that qualify it as eligible for the NRHP under a particular criterion were assessed. If the contributing characteristics would be altered so that some portion of the property or site may no longer convey its historic significance as an eligible property, an adverse impact was considered likely. The assessment of effects on both historic buildings and archaeological sites (a category that includes historic linear resource sites such as railroads and canals) was carried out in consultation with the Utah SHPO, tribes, and other consulting parties as described in Section 3.9.6, Consulting Parties.

What is the National Register of Historic Places (NRHP)?

The *National Register of Historic Places*, or NRHP, is the official federal list of districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, engineering, and culture.

What is the area of potential effects (APE)?

The *area of potential effects*, or APE, is the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and can be different for different kinds of effects caused by the undertaking.

5.9.3 No-Action Alternative

Under the No-Action Alternative, the Draper Transit Corridor Project would not be built, so no direct or indirect impacts to historic properties would occur as a result of the project.

5.9.4 TSM Alternative

5.9.4.1 Impacts to Historic Properties

Impacts to Historic Buildings

Under the TSM Alternative, all of the 25 historic buildings determined to be eligible for the NRHP would experience no effect (see Table 5.9-1 below). No NRHP-eligible historic buildings are located within the design footprint for areas that would be physically disturbed by construction of the proposed park-and-ride lots at the Draper Town Center (12400 South) and 14600 South Stations. In addition, the NRHP-eligible historic buildings in the area near the two Draper Town Center proposed parking lot locations would not be indirectly affected by noise, vibration, or visual intrusions.

What effect would the TSM Alternative have on historic buildings?

Under the TSM Alternative, all of the 25 historic buildings determined to be eligible for the NRHP would experience no effect.

Table 5.9-1. Impacts of the Action Alternatives on NRHP-Eligible Historic Buildings in the Historic Properties Evaluation Area (APE)

	Description of Impact/FTA Finding of Effect		
Address	TSM Alternative[a]	Alternative C – MOS	Alternative C – Full Build
600 E. 11800 S.; 1947 WWII-Era cottage	No direct or indirect impact/No Historic Properties Affected	Building and associated property are outside the area of direct disturbance and impact distance for vibration and noise impacts. The park-and-ride lot for the 11800 South Station would surround the property on its east and southern boundaries. The property is lined on both of these boundaries with thick rows of trees. The parking lot would not be readily visible from the property and would not alter the setting and feeling of the historic property./No Historic Properties Affected	Same as Alternative C – MOS
11925 S. 700 E.; 1959 Ranch/ Rambler residence	No direct or indirect impact/No Historic Properties Affected	Rail line would pass to the rear of the property more than 250 feet behind the historic residence. There would be no direct disturbance of any portion of the associated property, and the noise and vibration levels would be so low as to not affect the historic uses, setting, or feeling of the property. The only change in viewshed would be the addition of new tracks within an existing rail corridor behind the property, which would not constitute a visual intrusion./No Historic Properties Affected	Same as Alternative C – MOS
11930 S. 700 E.; 1930 Bungalow residence	No direct or indirect impact/No Historic Properties Affected	The nearest project component would be the rail line, which would pass more than 200 feet to the east of the property within an existing rail corridor. The property is separated from the rail corridor by a major road and a commercial property. There would be not direct disturbance to any portion of the property, and significant vibration and noise levels would not extend as far as the property. The rail line would not be visible from the property./No Historic Properties Affected	Same as Alternative C – MOS
624 E. 11900 S.; 1932 Bungalow residence	No direct or indirect impact/No Historic Properties Affected	The 11800 South Station would be built to the north of the historic residence. A large open-space parcel and a densely wooded canal corridor and stand of trees separate the property from the station location. There would be no direct disturbance of the property and no noise or vibration levels that would affect the property's historic integrity. The station facilities would not be visible from the property./No Historic Properties Affected	Same as Alternative C – MOS
625 E. 11900 S.; 1952 Ranch/ Rambler residence	No direct or indirect impact/No Historic Properties Affected	The 11800 South Station would be built to the northeast of the historic residence. A densely wooded canal corridor and stand of trees separate the property from the station location. There would be no direct disturbance of the property and no noise or vibration levels that would affect the property's historic integrity. The station facilities would not be visible from the property./No Historic Properties Affected	Same as Alternative C – MOS

Table 5.9-1. Impacts of the Action Alternatives on NRHP-Eligible Historic Buildings in the Historic Properties Evaluation Area (APE)

	Description of Impact/FTA Finding of Effect		
Address	TSM Alternative[a]	Alternative C – MOS	Alternative C – Full Build
12121 S. 800 E.; 1959 Early Ranch residence	No direct or indirect impact/**No Historic Properties Affected**	Rail line would pass to the rear of the property more than 350 feet behind the historic residence. There would be no direct disturbance of any portion of the associated property, and the noise and vibration levels would be so low as to not affect the historic uses, setting, or feeling of the property. The only change in viewshed would be the addition of new tracks within an existing rail corridor behind the property, which would not constitute a visual intrusion./**No Historic Properties Affected**	Same as Alternative C – MOS
12170 S. 800 E.; 1952 Early Ranch residence	No direct or indirect impact/**No Historic Properties Affected**	Rail line would pass to the rear of the property more than 300 feet behind the historic residence. There would be no direct disturbance of any portion of the associated property, and the noise and vibration levels would be so low as to not affect the historic uses, setting, or feeling of the property. The only change in viewshed would be the addition of new tracks within an existing rail corridor behind the property, which would not constitute a visual intrusion./**No Historic Properties Affected**	Same as Alternative C – MOS
12183 S. 800 E.; 1890 central passage residence	No direct or indirect impact/**No Historic Properties Affected**	Rail line would pass to the rear of the property more than 500 feet behind the historic residence. There would be no direct disturbance of any portion of the associated property, and the noise and vibration levels would be so low as to not affect the historic uses, setting, or feeling of the property. The only change in viewshed would be the addition of new tracks within an existing rail corridor behind the property, which would not constitute a visual intrusion./**No Historic Properties Affected**	Same as Alternative C – MOS
?12045 S. 850 E.; 1898 vernacular foursquare residence	No direct or indirect impact/**No Historic Properties Affected**	Rail line would pass to the rear of the property more than 150 feet behind the historic residence. There would be no direct disturbance of any portion of the associated property, and the noise and vibration levels would be so low as to not affect the historic uses, setting, or feeling of the property. The only change in viewshed would be the addition of new tracks within an existing rail corridor behind the property, which would not constitute a visual intrusion; the residence is surrounded by a dense grove of trees that would block the view of the rail line and diminish noise./**No Historic Properties Affected**	Same as Alternative C – MOS

Table 5.9-1. Impacts of the Action Alternatives on NRHP-Eligible Historic Buildings in the Historic Properties Evaluation Area (APE)

	Description of Impact/FTA Finding of Effect		
Address	TSM Alternative[a]	Alternative C – MOS	Alternative C – Full Build
865 E. 12200 S.; 1952 Early Ranch residence	No direct or indirect impact/No Historic Properties Affected	Rail line would pass to the north and east of the property more than 250 feet behind the historic residence. There would be no direct disturbance of any portion of the associated property, and the noise and vibration levels would be so low as to not affect the historic uses, setting, or feeling of the property. The only change in viewshed would be the addition of new tracks within an existing rail corridor behind the property, which would not constitute a visual intrusion; a dense grove of trees located on an adjacent property would block the view of the rail line and diminish noise./No Historic Properties Affected	Same as Alternative C – MOS
12214 S. 900 E.; 1910 side-passage residence	No direct or indirect impact/No Historic Properties Affected	Rail line would pass to the east of the property about 100 feet to the side of the historic residence. There would be no direct disturbance of any portion of the associated property. Noise and vibration levels would be so low as to not affect the historic uses, setting, or feeling of the property. The only change in viewshed would be the addition of new tracks within an existing rail corridor behind the property, which would not constitute a visual intrusion; a dense grove of trees located on an adjacent property would block the view of the rail line and diminish noise./No Historic Properties Affected	Same as Alternative C – MOS
12332 S. 970 E.; 1942 Period Cottage residence	No direct or indirect impact/No Historic Properties Affected	Rail line would pass to the north and east of the property more than 200 feet from the historic residence at its nearest point. There would be no direct disturbance of any portion of the associated property, and the noise and vibration levels would be so low as to not affect the historic uses, setting, or feeling of the property. There would be minimal change to the viewshed from the addition of new tracks within an existing rail corridor visible only to the north of the property at an existing road crossing. A large warehouse complex is located east of the property and would block the view of the station and most of the new rail line./No Historic Properties Affected	Same as Alternative C – MOS
12344 S. 970 E.; 1940 Cape Cod residence	No direct or indirect impact/No Historic Properties Affected	Rail line would pass to the north and east of the property more than 260 feet from the historic residence at its nearest point. There would be no direct disturbance of any portion of the associated property, and the noise and vibration levels would be so low as to not affect the historic uses, setting, or feeling of the property. There would be minimal change to the viewshed from the addition of new tracks within an existing rail corridor visible only to the north of the property at an existing road crossing. A large warehouse complex is located east of the property and would block the view of the station and most of the new rail line./No Historic Properties Affected	Same as Alternative C – MOS

Table 5.9-1. Impacts of the Action Alternatives on NRHP-Eligible Historic Buildings in the Historic Properties Evaluation Area (APE)

	Description of Impact/FTA Finding of Effect		
Address	TSM Alternative[a]	Alternative C – MOS	Alternative C – Full Build
1052 E. 12400 S.; 1919 Bungalow residence	No direct or indirect impact/**No Historic Properties Affected**	The rail line and Draper Town Center Station would be constructed to the north of the property across Pioneer Road and behind an industrial property. The rail line would be located in an existing rail corridor. There would be no direct disturbance of any portion of the associated property, and the noise and vibration levels would be so low as to not affect the historic uses, setting, or feeling of the property. There would be minimal change to the viewshed from the addition of new tracks within an existing rail corridor and paving of an existing open field, the view of which to and from the historic residence is almost entirely obstructed by the industrial complex./**No Historic Properties Affected**	Same as Alternative C – MOS
1071 E. 12400 S.; 1931/1962 Draper Poultrymen and Egg Producers' Plant (Also referred to as the IFA site)	The Draper Town Center park-and-ride lot would be constructed to the north (rear) of the property. There would be no direct disturbance of any portion of the associated property, and the noise levels would be so low as to not affect the historic uses, setting, or feeling of the property. There would be minimal change to the viewshed—which is not a character-defining feature of the property—from the addition of new tracks within an existing rail corridor and paving of an existing open field./**No Historic Properties Affected**	The rail line and Draper Town Center Station would be constructed to the north (rear) of the property. There would be no direct disturbance of any portion of the associated property, and the noise and vibration levels would be so low as to not affect the historic uses, setting, or feeling of the property. There would be minimal change to the viewshed—which is not a character-defining feature of the property—from the addition of new tracks within an existing rail corridor and paving of an existing open field./**No Historic Properties Affected**	Same as Alternative C – MOS
1144 E. 12400 S.; 1887 Fitzgerald House, Cross-wing residence	No direct or indirect impact/**No Historic Properties Affected**	The rail line and Draper Town Center Station would be constructed to the north and northwest of the property across Pioneer Road. There would be no direct disturbance of any portion of the associated property, and the noise and vibration levels would be so low as to not affect the historic uses, setting, or feeling of the property. There would be minimal change to the viewshed from the addition of new tracks within an existing rail corridor and paving of an existing open field that is minimally visible from the residence./**No Historic Properties Affected**	Same as Alternative C – MOS

Table 5.9-1. Impacts of the Action Alternatives on NRHP-Eligible Historic Buildings in the Historic Properties Evaluation Area (APE)

	Description of Impact/FTA Finding of Effect		
Address	TSM Alternative[a]	Alternative C – MOS	Alternative C – Full Build
1201 E. 12400 S.; 1957 Early Ranch residence	No direct or indirect impact/No Historic Properties Affected	The rail line and Draper Town Center Station would be constructed to the south and west of the property. The rail line would be located in an existing rail corridor. There would be no direct disturbance of any portion of the associated property, and the noise and vibration levels would be so low as to not affect the historic uses, setting, or feeling of the property. None of the project facilities (station, parking lot, access road, or rail line) would be visible from the residence due to a dense stand of trees that surrounds the residence./No Historic Properties Affected	Same as Alternative C – MOS
1229 E. 12400 S.; 1887 Terry House, Cross-wing residence	No direct or indirect impact/No Historic Properties Affected	The rail line would be constructed in an existing rail corridor to the south of the property at a distance greater than 220 feet. There would be no direct disturbance of any portion of the associated property, and the noise and vibration levels would be so low as to not affect the historic uses, setting, or feeling of the property. The rail line would be minimally visible from the residence due to a dense stand of trees to the west and southwest of the residence./No Historic Properties Affected	Same as Alternative C – MOS
1231 E. 12400 S.; 1930 Clipped Gable Cottage	No direct or indirect impact/No Historic Properties Affected	The rail line would be constructed in an existing rail corridor to the south of the property at a distance greater than 220 feet. There would be no direct disturbance of any portion of the associated property, and the noise and vibration levels would be so low as to not affect the historic uses, setting, or feeling of the property. The rail line would be minimally visible from the residence due to a dense stand of trees to the west and southwest of the residence./No Historic Properties Affected	Same as Alternative C – MOS
12535 S. 1300 E.; 1952 Early Ranch residence	No direct or indirect impact/No Historic Properties Affected	The rail line would be constructed in an existing rail corridor to the east of the property at a distance greater than 120 feet at its closest point. There would be no direct disturbance of any portion of the associated property, and the noise and vibration levels would be so low as to not affect the historic uses, setting, or feeling of the property. The rail line would be minimally visible from the rear of the residence./No Historic Properties Affected	Same as Alternative C – MOS
12660 S. 1565 E.; 1906 Smith House, Side passage residence	No direct or indirect impact/No Historic Properties Affected	The rail line would be constructed in an existing rail corridor to the west of the property at a distance greater than 200 feet at its closest point. There would be no direct disturbance of any portion of the associated property, and the noise and vibration levels would be so low as to not affect the historic uses, setting, or feeling of the property. The rail line would be minimally visible from the rear of the residence due to dense trees between the residence and the rail corridor./No Historic Properties Affected	Same as Alternative C – MOS

Table 5.9-1. Impacts of the Action Alternatives on NRHP-Eligible Historic Buildings in the Historic Properties Evaluation Area (APE)

	Description of Impact/FTA Finding of Effect		
Address	TSM Alternative[a]	Alternative C – MOS	Alternative C – Full Build
12736 S. Boulter St.; 1888 central passage residence	No direct or indirect impact/No Historic Properties Affected	The rail line would be constructed in an existing rail corridor to the east of the property at a distance greater than 140 feet at its closest point. There would be no direct disturbance of any portion of the associated property, and the noise and vibration levels would be so low as to not affect the historic uses, setting, or feeling of the property. The rail line would be minimally visible from the residence./No Historic Properties Affected	Same as Alternative C – MOS
12752 S. Boulter St.; 1929 Clipped Gable Cottage	No direct or indirect impact/No Historic Properties Affected	The rail line would be constructed in an existing rail corridor to the east of the property at a distance greater than 230 feet at its closest point. There would be no direct disturbance of any portion of the associated property, and the noise and vibration levels would be so low as to not affect the historic uses, setting, or feeling of the property. The rail line would be minimally visible from the residence./No Historic Properties Affected	Same as Alternative C – MOS
12801 S. Boulter St.; 1928 Heward House, Bungalow residence	No direct or indirect impact/No Historic Properties Affected	The rail line would be constructed in an existing rail corridor to the east of the property at a distance greater than 275 feet at its closest point. There would be no direct disturbance of any portion of the associated property, and the noise and vibration levels would be so low as to not affect the historic uses, setting, or feeling of the property. The rail line would not be visible from the residence because the building is completely surrounded by a dense stand of trees and other vegetation./No Historic Properties Affected	Same as Alternative C – MOS
12741 S. Costanza Way; 1897 cross-wing residence	No direct or indirect impact/No Historic Properties Affected	The rail line would be constructed in an existing rail corridor to the west of the property at a distance greater than 300 feet at its closest point. There would be no direct disturbance of any portion of the associated property, and the noise and vibration levels would be so low as to not affect the historic uses, setting, or feeling of the property. The rail line would be minimally visible from the residence due to a dense stand of trees between the building and the rail corridor./No Historic Properties Affected	Same as Alternative C – MOS

Source: SWCA 2008

One additional property was documented during the survey (11868 S. Kimball Lane); however, it has since been demolished and is not included in this table.

[a] No indirect impact = Vibration and noise levels would not be high enough to cause any effect on the property. No visual intrusions would affect the setting, feeling, or historic viewshed.

Impacts to Archaeological Sites, Including Historic Linear Resource Sites

Of the three historic linear resource sites determined to be eligible for the NRHP, none would be adversely affected under the TSM Alternative. The TSM Alternative would affect one segment of the Draper Irrigation Canal (site 42SL350) at the Draper Town Center Station, including possibly one bridge/spillway feature; however, the effect would not be adverse (see Table 5.9-2 below). The Draper Irrigation Canal extends east-west across the middle of the Draper Town Center location about halfway down the hillside. The Draper Irrigation Canal is eligible for the NRHP for its associations with early development of communities and the agricultural economy of the Salt Lake Valley.

What effect would the TSM Alternative have on archaeological sites, including historic linear resource sites?

Of the three historic linear resource sites determined to be eligible for the NRHP, none would be adversely affected under the TSM Alternative. The TSM Alternative would affect one segment of the Draper Irrigation Canal, but the effect would not be adverse.

The proposed park-and-ride lot north of Pioneer Road at the Draper Town Center Station would be constructed on each side of the canal. One to two bridges that would accommodate both vehicle and pedestrian traffic would span the canal so that traffic could access both sides of the lot, but there would be no physical changes to the canal or any of its contributing features. The historic alignment of the canal would be retained. The canal might be used as a detention basin for stormwater from the park-and-ride lot; this would restore the historic function of the canal as a water-conveyance structure. If the alternate park-and-ride lot location south of Pioneer Road is selected, the Draper Canal would not be affected.

5.9.4.2 Impacts to Traditional Cultural Properties

No known traditional cultural properties would be affected by this alternative.

Table 5.9-2. Impacts of the Action Alternatives on NRHP-Eligible Archaeological Sites, Including Historic Linear Resource Sites, in the Historic Properties Evaluation Area (APE)

	Description of Impact/FTA Finding of Effect		
Site Number/Name	TSM Alternative	Alternative C – MOS	Alternative C – Full Build
42SL344/Southern Utah/Union Pacific Railroad	No direct or indirect impact/**No Historic Properties Affected**	Five historical features (culverts) associated with the railroad would be removed to accommodate construction of the new transit line./**Adverse Effect**	Seventeen associated features, including one culvert that is associated with the Draper Irrigation Canal (site 42SL350), would be removed or physically altered./**Adverse Effect**
42SL350[a]/Draper Irrigation Canal at Draper Town Station	Construction on both sides of the canal as well as bridge features constructed across the canal would change the setting and feeling of this irrigation canal, which is associated with rural agricultural uses of the area./**No Adverse Effect**	Same as TSM Alternative.	Same as TSM Alternative.
42SL350[a]/Draper Irrigation Canal between Draper Town Center and Highland Stations	No direct or indirect impact/ **No Historic Properties Affected**	No direct or indirect impact/ **No Historic Properties Affected**	A historic culvert, which is a contributing feature of the canal, would be removed or altered./**Adverse Effect**
42SL290/East Jordan Canal	No direct or indirect impact/ **No Historic Properties Affected**	No direct or indirect impact/ **No Historic Properties Affected**	No direct or indirect impact/**No Historic Properties Affected**

[a] Two segments of site 42SL350 are located within the APE.

5.9.5 Alternative C – MOS

Alternative C – MOS follows the alignment of the existing UTA-owned right-of-way, which was formerly the Southern/Union Pacific Railroad corridor, from immediately south of the existing Sandy Civic Center 10000 South Station in Sandy to the Draper Town Center location (about 12400 South) in Draper. The UTA-owned right-of-way has been a dedicated railroad corridor since the early 1870s, and very few structures, either modern or historic, have been constructed within or immediately adjacent to the rail corridor.

Alternative C – MOS includes four proposed stations. Each station would have a loading platform to allow passengers to board and exit the trains. The station footprint was assumed to be large enough to handle light-rail operations in 2030, including parking.

5.9.5.1 Impacts to Historic Properties

Impacts to Historic Buildings

What effect would Alternative C – MOS have on historic buildings?

Under Alternative C – MOS, all of the 25 historic buildings determined to be eligible for the NRHP would experience no effect.

Under Alternative C – MOS, all of the 25 historic buildings determined to be eligible for the NRHP would experience no effect (see Table 5.9-1 above, Impacts of the Action Alternatives on NRHP-Eligible Historic Buildings in the Historic Properties Evaluation Area (APE)). No NRHP-eligible historic buildings are located within the design footprint for areas that would be physically disturbed by construction of the proposed mainline and stations. In addition, none of the NRHP-eligible historic buildings would be indirectly affected by noise, vibration, or visual intrusions from this alternative. Although the proposed Draper Town Center Station would be located adjacent to the IFA/Poultryman historic site, no adverse effect is anticipated.

Impacts to Archaeological Sites, Including Historic Linear Resource Sites

Three NRHP-eligible historic linear resource sites were identified within or adjacent to the APE for Alternative C – MOS. Of these three, one historic linear resource site would experience an adverse effect, one historic linear resource site would experience no adverse effect, and the third historic linear resource site would experience no effect (see Table 5.9-2 above, Impacts of the Action Alternatives on NRHP-Eligible Archaeological Sites, Including Historic Linear Resource Sites, in the Historic Properties Evaluation Area (APE)).

Alternative C – MOS would adversely affect about 3.6 miles of the historic Southern Utah/Union Pacific Railroad (site 42SL344), including five associated historic culvert contributing features, between the Sandy Civic Center 10000 South and Draper Town Center Stations (see Table 5.9-2 above, Impacts of the Action Alternatives on NRHP-Eligible Archaeological Sites, including Historic Linear Resource Sites, in the Historic Properties Evaluation Area (APE)). Although this historic linear resource site is eligible under Criterion A, it has been periodically upgraded and maintained and has some modern alterations. A 100-foot segment of the railroad was removed over Highland Drive in Draper. Alternative C – MOS would replace the existing tracks and add a new set of tracks but would primarily use the existing alignment of the railroad.

The Southern Utah/Union Pacific Railroad is eligible for the NRHP for its local and regional role in the settlement and economic

development of the area and, in particular, the development of agriculture and the industrial economies of the Salt Lake Valley. Other than the segment of railroad removed over Highland Drive in Draper, the overall eligibility of the railroad also relies on its integrity of association, setting, feeling, and location rather than the physical integrity of the property. None of the five contributing historic culvert features have been moved or modified and, therefore, they all retain qualities that contribute to the railroad's eligibility for the NRHP. These contributing features consist of early-20th-century date-stamped culverts. Although light-rail transit operations are consistent with the historic railroad function and character of the historic property, the physical changes to the features along the railroad segment would result in an adverse effect to this site.

Alternative C – MOS would affect the Draper Irrigation Canal (site 42SL350), including possibly one bridge/spillway feature, at the Draper Town Center Station by changing the setting and feeling of this agricultural irrigation canal. However, the effect would not be adverse (see Table 5.9-2 above, Impacts of the Action Alternatives on NRHP-Eligible Archaeological Sites, Including Historic Linear Resource Sites, in the Historic Properties Evaluation Area (APE)). The Draper Irrigation Canal extends east-west across the middle of the Draper Town Center location about halfway down the hillside. The Draper Irrigation Canal is eligible for the NRHP for its associations with early development of communities and the agricultural economy of the Salt Lake Valley. The proposed park-and-ride lot north of Pioneer Road at the Draper Town Center Station would be constructed on each side of the canal. One to two bridges that would accommodate both vehicle and pedestrian traffic would span the canal so that traffic could access both sides of the lot, but there would be no physical changes to the canal or its contributing features. The historic alignment of the canal would be retained. The canal might be used as a detention basin for stormwater from the park-and-ride lot; this would restore the historic function of the canal as a water-conveyance structure. If the alternate park-and-ride lot location south of Pioneer Road is selected, the Draper Canal would not be affected.

What effect would Alternative C – MOS have on archaeological sites, including historic linear resource sites?

Three NRHP-eligible historic linear resource sites were identified within or adjacent to the APE for Alternative C – MOS. Of these three historic linear resource sites, one site would experience an adverse effect, one site would experience no adverse effect, and the third site would experience no effect.

5.9.5.2 Impacts to Traditional Cultural Properties

No known traditional cultural properties would be affected by this alternative.

5.9.6 Alternative C – Full Build

Alternative C – Full Build follows the alignment of the existing UTA-owned right-of-way, which was formerly the Southern/Union Pacific Railroad corridor, from immediately south of the existing Sandy Civic Center 10000 South Station in Sandy to 14600 South in Draper. The UTA-owned right-of-way has been a dedicated railroad corridor since the early 1870s, and very few structures, either modern or historic, have been constructed within or immediately adjacent to the rail corridor.

Alternative C – Full Build includes six proposed station options. Each station would have a loading platform to allow passengers to board and exit the trains. The station footprint was assumed to be large enough to handle light-rail operations in 2030, including parking.

5.9.6.1 Impacts to Historic Properties

Impacts to Historic Buildings

The impacts on historic buildings from Alternative C – Full Build would be the same as those from Alternative C – MOS (see Table 5.9-1 above, Impacts of the Action Alternatives on NRHP-Eligible Historic Buildings in the Historic Properties Evaluation Area (APE)).

What effect would Alternative C – Full Build have on historic buildings?

Under Alternative C – MOS, all of the 25 historic buildings determined to be eligible for the NRHP would experience no effect.

Impacts to Archaeological Sites, Including Historic Linear Resource Sites

Three NRHP-eligible historic linear resource sites were identified within or adjacent to the APE for Alternative C – Full Build, one of which (site 42SL350) has two separate eligible segments within the APE. Of these three historic linear resource sites, one site (42SL344) and one segment of site 42SL350 would experience an adverse effect, the other segment of site 42SL350 would experience no adverse effect, and the third site (42SL290) would experience no effect.

Alternative C – Full Build would affect about 8.6 miles of the historic Southern Utah/Union Pacific Railroad (site 42SL344). Although converting the existing tracks to a light-rail facility would not diminish the qualities of the site that contribute to its NRHP eligibility, modifying or removing 17 contributing historic culvert features between the Sandy Civic Center 10000 South and 14600 South Stations, including a culvert that is part of the Draper

Irrigation Canal (site 42SL350) along the UTA-owned right-of-way about halfway between the Draper Town Center and Highland Stations where the canal passes under the railroad tracks in a culvert, would result in an adverse effect (see Table 5.9-2 above, Impacts of the Action Alternatives on NRHP-Eligible Archaeological Sites, Including Historic Linear Resource Sites, in the Historic Properties Evaluation Area (APE)). For the segment of the Draper Irrigation Canal that crosses the railroad right-of-way between the Draper Town Center and Highland Stations, the impacts associated with modifying or removing the culvert feature shared with the railroad, which contributes to the NRHP eligibility of the railroad at this location, would result in an adverse effect to both sites 42SL344 and 42SL350.

Although the Southern Utah/Union Pacific Railroad (site 42SL344) is eligible under Criterion A, it has been periodically upgraded and maintained and has some modern alterations. A 100-foot segment of the railroad was removed over Highland Drive in Draper. Alternative C – Full Build would replace the existing tracks and add a new set of tracks but would primarily use the existing alignment of the railroad.

The Southern Utah/Union Pacific Railroad is eligible for the NRHP for its local and regional role in the settlement and economic development of the area and, in particular, the development of agriculture and the industrial economies of the Salt Lake Valley. Other than the segment of railroad removed over Highland Drive in Draper, the overall eligibility of the railroad also relies on its integrity of association, setting, feeling, and location rather than the physical integrity of the property. None of the 17 historic culvert contributing features have been moved or modified and, therefore, they all retain integrity of location. These contributing features consist of 15 early-20th-century date-stamped culverts, a culvert shared with the Draper Irrigation Canal (site 42SL350), and a red sandstone culvert. Although light-rail transit operations are consistent with the historic railroad function and character of the historic property, the physical changes to the features along the railroad in the APE would result in an adverse effect to this site.

Alternative C – Full Build would also affect the Draper Irrigation Canal (site 42SL350) in two locations: at the Draper Town Center Station and along the UTA-owned right-of-way about halfway between the Draper Town Center and Highland Stations where the canal passes under the railroad tracks in a culvert (see Table 5.9-2 above, Impacts of the Action Alternatives on NRHP-Eligible

What effect would Alternative C – Full Build have on archaeological sites, including historic linear resource sites?

Three NRHP-eligible historic linear resource sites were identified within or adjacent to the APE for this alternative, one of which (site 42SL350) has two separate eligible segments within the APE. Of these three historic linear resource sites, one site (42SL344) and one segment of site 42SL350 would experience an adverse effect, the other segment of site 42SL350 would experience no adverse effect, and the third site (42SL290) would experience no effect.

Archaeological Sites, Including Historic Linear Resource Sites, in the Historic Properties Evaluation Area (APE)). The impacts from Alternative C – Full Build on the Draper Irrigation Canal at the Draper Town Center Station would be the same as those from Alternative C – MOS and therefore would not be adverse. If the alternate park-and-ride site south of Pioneer Road is selected, the Draper Canal would not be affected.

For the segment of the Draper Irrigation Canal that crosses the railroad right-of-way between the Draper Town Center and Highland Stations, the impacts associated with modifying or removing the culvert feature shared with the railroad, which contributes to the NRHP eligibility of the canal, would result in an adverse effect.

5.9.6.2 Impacts to Traditional Cultural Properties

No known traditional cultural properties would be affected by this alternative.

5.9.7 Mitigation Measures for Impacts to Historic Properties

What measures are proposed for mitigating impacts to historic properties?

The exact mitigation measures will be negotiated among FTA, UTA, the Utah SHPO, and other consulting parties through the Section 106 process of the National Historic Preservation Act.

Adverse impacts to the Utah Southern/Union Pacific Railroad and the Draper Irrigation Canal would require mitigation. The exact mitigation measures will be negotiated among FTA, UTA, the Utah SHPO, and other consulting parties through the Section 106 process of the National Historic Preservation Act. Typically, mitigation of a historic linear structure, such as a railroad or canal, involves a combination of field documentation and historic archival research. These measures will be determined by historic protection experts to mitigate the impacts to these historic properties to the greatest extent feasible.

A Memorandum of Agreement (MOA) will be developed among FTA, the Utah SHPO (UTA is an invited signatory), the Advisory Council on Historic Preservation (if it chooses to participate), and any appropriate consulting parties describing the specific mitigation measures to be implemented if an action alternative is selected in the Record of Decision for the project. The MOA must be executed before FTA can issue its Record of Decision. A Draft MOA is included in Appendix D, Draft Memorandum of Agreement. The final MOA will be included in Appendix D, Final Memorandum of Agreement, in the Final EIS.

Since no historic buildings would be affected by any of the action alternatives, no mitigation measures are necessary for those properties.

In accordance with 36 CFR 800.13(b), FTA and UTA are providing for the protection, evaluation, and treatment of any historic property discovered prior to or during construction. The procedures to be followed if any historic properties and/or human remains are discovered during construction of the project are outlined in the MOA.

5.9.8 Next Steps

FTA and UTA will provide information to the public regarding any historic property impacts and will accept comments on the Draft EIS and the Section 106 process during the Draft EIS public comment period. In addition, the three consulting parties (the Draper Historic Preservation Committee, the Utah Heritage Foundation, and the Northwestern Band of Shoshone; see Section 3.9.6, Consulting Parties) were sent information regarding impacts to historic properties but have not provided additional comments to date. All consulting parties and all Native American tribes initially contacted for this project (see Section 3.9.6) will receive copies of this Draft EIS and the Draft MOA.

5.10 Ecosystem Impacts

This section addresses the impacts from the Draper Transit Corridor alternatives on habitats, plants, fish, wildlife, sensitive species, and wetlands and other waters of the U.S.

What is the ecosystem evaluation area?

The ecosystem evaluation area consists of the UTA-owned right-of-way, the parcels that contain the proposed station locations, and the surrounding area on each side of the track centerline that could be affected by the project.

5.10.1 Methodology

The information used to analyze project impacts included data that were previously collected for other projects in the area such as the *Draper Transit Alternatives Study*, field reviews, and published literature.

5.10.2 No-Action Alternative

Under the No-Action Alternative, the Draper Transit Corridor Project would not be built, so no direct impacts to any ecosystem resource (vegetation, fish, wildlife, or sensitive species) would occur as a result of the project. In addition, the No-Action Alternative would not cause any indirect impacts to ecosystem resources, although continued urban development in the evaluation area would continue to convert existing undeveloped land to residential and commercial uses.

What are waters of the U.S.?

Under the Clean Water Act, *waters of the U.S.* are defined as waters that are navigable waters, those that are interstate waters, and/or those used for interstate commerce, their tributaries, and their associated wetlands. Waters of the U.S. are under the jurisdiction of USACE, so they are sometimes referred to as *jurisdictional waters*.

5.10.3 TSM Alternative

The TSM Alternative would affect about 13 acres of disturbed areas, 9 to 11 acres of farmland, and less than 1 acre of urbanized areas. The impacts to these habitat types are shown in Table 5.10-1.

Table 5.10-1. Impacts to Ecosystems

in acres

	Alternative[a]		
Habitat Type	TSM	Alt. C – MOS	Alt. C – Full Build
Undeveloped land	0	8–16	8–16
Farmland/cropland	9–11	15–17	15–17
Drainages/waters of U.S.	0	<0.01	0.02
Urbanized areas	0.3	0–1	0–1
Disturbed areas	13	30	83
Wetlands	0	0.15	0.18
Total (rounded)	22–24	53–62	106–115

[a] A range is given for some habitat types since either the 10600 South Station or the 11400 South Station would be selected and since there are two station and park-and-ride lot location options at Draper Town Center.

5.10.3.1 Impacts to Habitats and Vegetation

The TSM Alternative would affect 13 acres of disturbed land at the 14600 South Station and at one of the parcels that make up the Draper Town Center Station site. However, since much of the area in and around the 14600 South Station parcel is under development, there is little remaining viable habitat for any species. The narrow strip of disturbed land in the Draper Town Center Station site has herbaceous vegetation in the western part and mature trees in the eastern part.

5.10.3.2 Impacts to Fish and Wildlife

The TSM Alternative would not affect Corner Canyon Creek or any of the habitat types listed in Table 5.10-1 above in the evaluation area that might be used by fish and wildlife.

5.10.3.3 Impacts to Special-Status Species

No special-status species (including federally listed and state-listed species) are known to be present or have habitat within the evaluation area. Therefore, the TSM Alternative would not affect special-status species.

5.10.3.4 Impacts to Wetlands and Other Waters of the U.S.

The TSM Alternative would not affect any wetlands or other waters of the U.S.

5.10.4 Alternative C – MOS

Alternative C – MOS would affect about 15 to 17 acres of farmland, depending on which station and park-and-ride lot location is selected at Draper Town Center; about 8 to 16 acres of undeveloped land depending on whether the 10600 South Station or the 11400 South Station is selected; about 30 acres of disturbed land (mostly within the UTA-owned right-of-way); about 0 to 1 acre of urbanized land depending on whether the 10600 South Station or the 11400 South Station is selected; about 0.15 acre of wetlands; and less than 0.01 acre of drainages. The impacts to these land types are shown above in Table 5.10-1, Impacts to Ecosystems.

How would Alternative C – MOS affect ecosystems?

Alternative C – MOS would have a minor impact on wildlife and habitat, no impact on special-status species, 0.15 acre of impacts on one wetland, and a minor impact on one water of the U.S.

5.10.4.1 Impacts to Habitats and Vegetation

Alternative C – MOS would affect undeveloped land and disturbed land and would have minor impacts on wetlands and drainages. The undeveloped land that would be taken for the 10600 South Station has scattered forested areas and open grassy areas that provide species with foraging and nesting habitat. However, this remnant pasture has been disturbed, which has reduced the plant community to a mostly weedy and invasive mix that typically provides low-quality habitat for native species.

The disturbed land, which is located primarily along the existing UTA-owned right-of-way, is a similar mix of some native, partially forested areas (mostly cottonwoods) along with other stretches of weedy, disturbed areas where the right-of-way is much narrower. The forested areas are in a narrow strip along the UTA-owned right-of-way and are surrounded by residential and commercial developments. For these reasons, the forested areas provide low-quality habitat for most native species.

A few acres of disturbed land are also located at the Draper Town Center Station site (see Section 5.10.3.1, Impacts to Habitats and Vegetation). A single, small, ephemeral drainage would be affected by the 10600 South Station. This drainage carries stormwater runoff from the adjacent right-of-way area and therefore does not support an extensive riparian community. Given the low quality of this habitat and the amount of similar habitat in the region, the loss of this habitat would have a minor impact on wildlife.

What is riparian habitat?

Riparian habitat is habitat along the bank of a river or other similar waterway such as a stream or canal.

The impacts from Alternative C – MOS on wetland habitat would be minor (see Section 5.10.4.4, Impacts to Wetlands and Other Waters of the U.S.). The wetlands are located near 1300 East just east of the Pioneer Road crossing in Draper. Alternative C – MOS would require a tail track for train storage, and this track would affect the wetlands west of 1300 East. These wetlands support some native plant species (such as reed canary grass, cattails, and western goldenrod) and some invasive species (such as Russian olive). Although the wetlands likely support various animal species, the limited extent of these wetlands would also reduce the significance of the loss of these wetlands.

5.10.4.2 Impacts to Fish and Wildlife

Alternative C – MOS would affect a few common, migratory bird species (such as house sparrow, rock dove, mourning dove, starling, and robin) and small mammal species (such as field mouse and meadow vole). The area affected by this alternative is too small and limited in its habitat complexity to support a richer native species community.

The impacts to wildlife species from Alternative C – MOS would consist of the minor loss of wetlands (emergent marsh wetlands) and drainage habitats (see Section 5.10.4.4, Impacts to Wetlands and Other Waters of the U.S.). However, given the low quality of this habitat and the amount of similar habitat in the region, the loss of this habitat would have a minor impact on wildlife.

5.10.4.3 Impacts to Special-Status Species

No special-status species (including federally listed and state-listed species) are known to be present or have habitat within the evaluation area. Therefore, Alternative C – MOS would not affect special-status species.

5.10.4.4 Impacts to Wetlands and Other Waters of the U.S.

How would Alternative C – MOS affect wetlands and other waters of the U.S.?

One 0.34-acre wetland would be reduced by 0.15 acre by Alternative C – MOS. Alternative C – MOS would also affect one ephemeral stormwater drainage.

All waters of the U.S., including wetlands, within the UTA-owned right-of-way were delineated by Wetland Resources, Inc., during August and November 2006 as part of the *Draper Transit Alternatives Study*. Initially, two areas, W1 and W2, were identified as wetlands and delineated (see Figure 5-25, Impacts to Wetlands and Waters of the U.S., and Figure 5-26, Wetland Impacts, at the end of this chapter). Wetland W1 was determined by USACE to be nonjurisdictional in its jurisdictional determination issued March 16, 2009 (see Appendix C, Wetland Verification Information). The remaining jurisdictional wetland, W2 (0.34 acre), would be reduced by 0.15 acre by Alternative C – MOS.

Alternative C – MOS could affect one jurisdictional water of the U.S.—a small, ephemeral stormwater drainage in the 10600 South Station parcels. None of the larger irrigation canals, such as the canals adjacent to the 10600 South and 11800 South Stations, would be affected by this alternative.

5.10.5 Alternative C – Full Build

Alternative C – Full Build would affect the same amount of farmland, undeveloped land, and urbanized areas as Alternative C – MOS. However, Alternative 2 would affect nearly 83 acres of disturbed land (mostly within the UTA-owned right-of-way), about 0.18 acre of wetlands, and about 0.02 acre of drainages. The impacts to these land types are shown above in Table 5.10-1, Impacts to Ecosystems.

How would Alternative C – Full Build affect ecosystems?

Alternative C – Full Build would have a minor impact on wildlife and habitat, no impact on special-status species, 0.18 acre of impacts on one wetland, and 0.02 acre of impacts on waters of the U.S.

5.10.5.1 Impacts to Habitats and Vegetation

The impacts to habitats and vegetation from Alternative C – Full Build would be similar to those from Alternative C – MOS except that Alternative C – Full Build would affect more acreage of some land types (such as disturbed lands and drainages). The additional impacts from this full-length alternative on disturbed land, drainages, and wetlands are described below.

The impacts to disturbed land from Alternative C – Full Build would be much the same as those from Alternative C – MOS. From the Draper Town Center Station (the terminus of Alternative C – MOS), Alternative C – Full Build continues south through forested areas that are denser than the forested areas north of the station that would be affected by Alternative C – MOS. These forested areas end about a half-mile north of 13200 South. In addition, Alternative C – Full Build would affect open shrub (mostly rabbitbrush) communities beginning about a half-mile north of 13200 South and extending to the terminus of Alternative C – Full Build at 14600 South. Given the low quality of this habitat and the limited diversity of the plant and animal communities in these areas, the loss of this habitat would have a minor impact on wildlife.

What is an ephemeral drainage?

An *ephemeral drainage* is wet for less than 9 months of the year.

The impacts of Alternative C – Full Build on drainage habitat include the impacts described for Alternative C – MOS and four additional ephemeral drainages. The estimated acreages of impact are conservative and are based on the entire area of the drainages that intersect the right-of-way footprint. The actual impacts would be the same as or less than what is estimated. The additional ephemeral drainages bisect the right-of-way and flow through culverts under the existing rail line. These ephemeral drainages primarily convey stormwater and do not support a rich, riparian plant community. In some cases, the upstream areas either have been developed or are in the process of being developed, so there is little native vegetation

along the banks. One of the ephemeral drainages, Corner Canyon Creek, has been recently altered (see Section 3.10.3.1, Habitats in the Study Area) and therefore has a limited riparian plant community, mostly outside and on the western edge of the right-of-way. Because the culverts that already contain the flow of these drainages would be extended or replaced, any impacts to drainages and their associated riparian habitats would be minor.

The impacts from Alternative C – Full Build on wetland habitat would be minor and would be the same as the impacts from Alternative C – MOS (see Section 5.10.5.4, Impacts to Wetlands and Other Waters of the U.S.).

5.10.5.2 Impacts to Fish and Wildlife

The impacts of Alternative C – Full Build on the various habitats could affect wildlife species that inhabit or otherwise use these areas for foraging or traveling to other habitats. Overall, many of the habitats that would be affected by Alternative C – Full Build are of a lower quality to wildlife species because the alignment is an existing rail line. The Utah Division of Wildlife Resources and USFWS did not identify the existing rail line as either a migration route or critical habitat for any wildlife species, including mule deer. However, this does not preclude its use as a gathering place or temporary shelter and forage area for mule deer (and other wildlife species), especially during the winter, when their preferred wilderness lands in the adjacent mountains are under deep snow.

Most of the station parcels are either active cropland or abandoned and weedy pasture. Therefore, Alternative C – Full Build would have a small but measurable impact on wildlife species, but this impact would be less than if the habitats were pristine.

The impacts to wildlife species from Alternative C – Full Build would consist of the loss of wetlands (emergent marsh and scrub-shrub wetlands) and drainage habitats (see Section 5.10.5.4, Impacts to Wetlands and Other Waters of the U.S.), the loss of 21.3 acres of undeveloped land, and the loss of 82.6 acres of disturbed land of variable quality (most of which is in the UTA-owned right-of-way). However, given the low quality of this habitat and the amount of similar habitat in the region, the loss of this habitat would have a minor impact on wildlife.

The impacts from Alternative C – Full Build on fish and other aquatic species would be minor for two reasons. First, the evaluation

area likely does not support a large number of fish or a complex community of aquatic invertebrates (see Section 3.10.3.2, Fish and Wildlife). Second, any impacts to aquatic habitat would be mainly temporary as culverts are extended or replaced.

5.10.5.3 Impacts to Special-Status Species

No special-status species (including federally listed and state-listed species) are known to be present or have habitat within the evaluation area. Therefore, Alternative C – Full Build would not affect special-status species.

5.10.5.4 Impacts to Wetlands and Other Waters of the U.S.

Alternative C – Full Build would affect slightly more jurisdictional wetlands (0.18 acre) than Alternative C – MOS. W2 is located at the terminus of Alternative C – MOS. Since Alternative C – Full Build continues along the UTA-owned right-of-way, it would affect 0.03 additional acre of W2 (see Section 5.10.4.4, Impacts to Wetlands and Other Waters of the U.S.).

Alternative C – Full Build would also affect five ephemeral drainages, most of which are nonjurisdictional, nonregulated waters (see Section 5.10.5.1, Impacts to Habitats and Vegetation, and Figure 5-25, Impacts to Wetlands and Waters of the U.S., at the end of this chapter). These impacts would total about 0.02 acre. Combined with the wetland impacts, the total impacts to waters of the U.S. from this alternative would be about 0.2 acre.

All waters of the U.S., jurisdictional or nonjurisdictional, that cross the existing UTA-owned right-of-way do so in a previously built culvert. Alternative C – Full Build could cause a small amount of temporary construction impacts to these drainages if the existing culverts are extended or replaced. Permanent impacts would occur if the culverts were extended to accommodate wider tracks or a second set of tracks. These permanent impacts would affect the riverbank vegetation but not the function of the drainages.

How would Alternative C – Full Build affect wetlands and other waters of the U.S.?

One 0.34-acre wetland would be reduced by 0.18 acre by Alternative C – Full Build. Alternative C – Full Build would also affect about 0.02 acre of five ephemeral drainages. Combined with the wetland impacts, the total impacts to waters of the U.S. from this alternative would be about 0.2 acre.

5.10.6 Mitigation Measures for Impacts to Ecosystems

UTA will be required to develop mitigation for impacts to wetlands and other waters of the U.S., such as ephemeral and perennial drainages. Because the impacts would be less than 0.5 acre, UTA will seek authorization to build the project under the Clean Water Act Nationwide Permit 14 (Linear Transportation Projects). Since impacts would exceed 0.1 acre, UTA will work with USACE to develop an appropriate mitigation plan. In the past, UTA has partnered with government agencies such as Salt Lake County or the Utah Department of Natural Resources to develop or enhance wetlands owned by the agency.

5.11 Impacts to Geology and Soils

This section addresses the impacts to geology and soils from the Draper Transit Corridor alternatives. The project team assessed whether the construction and operation of the project alternatives would substantially affect the local topography, geology, and soils. The primary impact from the project alternatives would be direct soil impacts from grading the transit alignment right-of-way (for example, to remove vegetation) and earthwork required for the transit stations and park-and-ride lots.

What is the geology and soils evaluation area?

The geology and soils evaluation area includes the southern Salt Lake Valley for regional geology and seismicity and about 1 mile on each side of the UTA-owned right-of-way and proposed stations for geologic hazards.

5.11.1 Methodology

Soil impacts were evaluated by determining the number of acres of soil that would be cleared or excavated for each alternative as well as reviewing topographic and geologic maps, relevant published geology, water resources reports logs, soil borings, and preliminary design information. The project team also relied on its experience in similar settings and construction. The analysis assumes that the entire right-of-way and/or area encompassed by the transit stations and park-and-ride lots would be cleared; therefore, the analysis represents the worst-case condition for soil impacts.

The design of each proposed station would take topography into account. The slope is steepest at the proposed Highland Station location, and design variations would be required at this site to accommodate the topography.

What is topography?

Topography refers to the configuration of the ground surface, including features such as slope and differences in elevation.

5.11.2 Construction Impacts

The temporary disturbance of vegetation is difficult to predict and impossible to quantify. Areas of exposed soil could lead to erosion and sedimentation. These effects would be fairly local and could be reduced by using BMPs. Nonetheless, even with BMPs, erosion could occur during and immediately after construction on steep slopes that lack vegetation, and sedimentation could occur in waters below these slopes.

Additionally, invasions of noxious weeds typically occur in areas that have been disturbed by construction, are in full sun, and/or have not been properly revegetated. The likelihood of weed invasion is increased if seeds are transported in fill material or if construction equipment moves into previously undisturbed areas.

5.11.3 No-Action Alternative

The amount of soil that would be excavated for each alternative is shown in Table 5.11-1. Under the No-Action Alternative, the Draper Transit Corridor Project would not be built, so no direct impacts to soils, topography, or geologic conditions would occur as a result of the project. Continued development in the evaluation area under the No-Action Alternative would result in soil excavations and vegetation removal from ongoing urban development.

Table 5.11-1. Soil Impacts from the Draper Transit Corridor Alternatives

Alternative	Soil Excavation (acres)[a]
No-Action Alternative	0
TSM Alternative	21–23[b]
Alternative C – MOS	58–71[c]
Alternative C – Full Build	109–123[c]

[a] Soil impacts include excavation of proposed station parcels as well as excavation of soil in the UTA-owned right-of-way.

[b] A range is given since there are two park-and-ride lot options at Draper Town Center.

[c] A range is given since either the 10600 South Station or the 11400 South Station would be selected.

5.11.4 TSM Alternative

5.11.4.1 Soil Impacts

The TSM Alternative would require about 21 to 23 acres of soil excavation and vegetation removal in order to construct park-and-ride lots at Draper Town Center and 14600 South. The range of required acres includes acreage for either park-and-ride lot location at Draper Town Center. Direct soil impacts would include the removal of vegetation, exposure of the soil, mixing of soil horizons, loss of topsoil productivity in areas that are not currently paved, and short-term increased susceptibility to wind and water erosion. These activities could cause more erosion of soil and sedimentation of canals and ditches during the construction phase of the project.

What is a soil horizon?

A *soil horizon* is a layer of soil parallel to the surface whose physical characteristics differ from the layers above and beneath.

5.11.4.2 Topographic Impacts

The TSM Alternative would not change the existing topography along the UTA-owned right-of-way. The TSM Alternative would likely change the topography at the park-and-ride lots at Draper Town Center and 14600 South.

5.11.4.3 Geologic Impacts

The TSM Alternative would not adversely affect the existing geologic conditions or increase the potential for geologic hazards at either the Draper Town Center or 14600 South park-and-ride lots.

5.11.5 Alternative C – MOS

5.11.5.1 Soil Impacts

Alternative C – MOS would require about 58 to 71 acres of soil and vegetation removal to construct 3.6 miles of transit right-of-way and three proposed stations and associated park-and-ride lots. The range of required acres includes acreage for either the 10600 South or 11400 South Stations, the 11800 South Station, and the Draper Town Center Station. Other direct soil impacts from Alternative C – MOS, such as removing vegetation and exposing the soil, would be the same as those from the TSM Alternative.

How would Alternative C – MOS affect soils and geology?

Alternative C – MOS would cause mostly minor changes to the existing topography along the right-of-way. Alternative C – MOS would not adversely affect the existing geologic conditions or increase the potential for geologic hazards in the geology and soils evaluation area.

5.11.5.2 Topographic Impacts

Alternative C – MOS would cause mostly minor changes to the existing topography along the right-of-way of the proposed rail line

because the new rail grade, like the existing ground, would be relatively flat. Due to the flat natural topography, most of the new rail line would be at or near the natural grade, and only small changes would be needed to fill in depressions or excavate the higher ground. These changes would raise or lower the existing topography and would include compacted embankment fill and a subballast/ ballast section under the ties and track.

The impacts to topography at the station locations would include cut and fill to level the topography for the platform and parking facilities. Culverts would be provided so that existing drainages can safely pass storm runoff.

5.11.5.3 Geologic Impacts

Alternative C – MOS would not adversely affect the existing geologic conditions or increase the potential for geologic hazards in the geology and soils evaluation area.

As discussed in Section 3.11, Geology and Soils, the primary geologic hazards that could affect the region are ground motions caused by earthquake shaking, soil liquefaction, and tectonic subsidence. UTA does not anticipate that the rail line or increased local traffic would affect seismicity, landslides, or the frequency or intensity of earthquakes.

The actual inclinations of the cut-and-fill slopes have not been determined but would be selected based on the observed subsurface conditions and the configuration of the cut or fill. The earthen cuts and fills required to construct the new rail line would not adversely affect the geologic conditions or the stability of the ground or cause an increase in seismic activity. The configuration of the cuts and fills would be selected to provide long-term stability, erosion resistance, and minimal maintenance.

5.11.6 Alternative C – Full Build

The topographic and geologic impacts from Alternative C – Full Build would be the same as those from Alternative C – MOS except that Alternative C – Full Build would require about 109 to 123 acres of soil and vegetation removal to construct 8.6 miles of transit right-of-way and five proposed stations and associated park-and-ride lots. The range of required acres includes acreage for either the 10600 South or 11400 South Stations and the 11800 South, Draper Town Center, Highland, and 14600 South Stations.

How would Alternative C – Full Build affect soils and geology?

The topographic and geologic impacts from Alternative C – Full Build would be the same as those from Alternative C – MOS except that Alternative C – Full Build would remove more soil and vegetation.

5.11.7 Mitigation Measures for Impacts to Geology and Soils

The impacts to geology and soils from the action alternatives are not expected to be significant. These impacts can be minimized with the use of standard construction practices such as minimizing the amount of soil excavated at any one time, limiting ground disturbance to only the areas necessary for project-related construction activities, and watering exposed soil to reduce erosion.

5.12 Paleontological Impacts

Because no known paleontological resources were identified within the APE for the proposed alternatives, no analysis of specific paleontological localities was conducted. No known paleontological resources would be affected by any of the alternatives.

5.13 Water Quality Impacts

5.13.1 Methodology

This section identifies the impacts to water resources and water quality in the water quality evaluation area. Water resources are described in Section 3.13, Water Quality, and include surface water bodies such as rivers, streams, and canals as well as subsurface aquifers, water rights, and groundwater wells as identified in Figure 3-12, Water Quality, at the end of Chapter 3, Affected Environment.

The impact analysis consisted of identifying whether typical contaminants from constructing or operating the action alternatives would affect surface waters and groundwater resources in the water quality evaluation area. The impact analysis also identified the number of groundwater rights and wells that would be affected by each alternative (see Figure 5-27, Water Quality Impacts, at the end of this chapter).

Typically, transportation facilities are an acceptable land use in drinking water protection Zones 3 and 4 but not in Zone 2. Therefore, if a build alternative would encroach into Zone 2, as shown in Table 5.13-1, Direct Impacts to Water Points of Diversion, on page 5-138, then a water quality impact would occur.

What is the water quality evaluation area?

The water quality evaluation area for surface water includes the water bodies that are within the Draper Transit Corridor study area and their associated watersheds. In addition, a refined water quality evaluation area was used for the evaluation of water rights (surface water and groundwater wells), water points of diversion and wells, and public drinking water sources and protection zones. The refined water quality evaluation area is the area within one-half mile of the UTA-owned right-of-way and within a one-half-mile radius of each proposed station location.

5.13.2 No-Action Alternative

Under the No-Action Alternative, the Draper Transit Corridor Project would not be built, so there would be no water quality impacts from the project. The existing stormwater runoff and drainage patterns would continue. In addition, the existing water quality and current beneficial uses would be maintained. No groundwater rights or wells would be affected.

5.13.3 TSM Alternative

5.13.3.1 Impacts to Surface Water

Stormwater runoff from the impervious (paved) areas at two new park-and-ride lots could reduce the water quality of receiving waters such as creeks and canals if the stormwater is not properly managed. Runoff from the parking areas could contain pollutants such antifreeze, lubricating fluids (oil and grease), gasoline and other petroleum-related hydrocarbons, and heavy metals, all of which are associated with automobiles. Impervious surfaces can also accumulate material that, when washed off with stormwater runoff, can increase concentrations of total suspended solids (TSS) and total dissolved solids (TDS) and can reduce the quality of the receiving waters.

The addition of impervious surface area also increases the amount of runoff relative to open spaces. This increased runoff can contribute to increased flows and velocity in receiving waters, which can increase in-stream erosion of sediment. This erosion can also increase concentrations of TSS, TDS, and nutrients (phosphorus and nitrogen).

UTA would incorporate into the project detention basins with oil/water separators to reduce pollutants as part of the TSM Alternative. The exact locations and sizes of the detention basins would be determined as project planning and engineering progresses. These features would be designed to capture runoff from the parking areas and reduce the flow rate of the runoff into adjacent water bodies. These features would help minimize downstream erosion and improve the water quality of stormwater runoff by allowing pollutants to settle out of the water before it is discharged to the receiving waters. With the use of detention basins as an integral part of the TSM Alternative, the beneficial uses of the receiving waters would be maintained.

What are beneficial uses?

Lakes, rivers, and other water bodies have uses to humans and other life. These uses are called *beneficial uses*. The State of Utah defines 13 different beneficial uses for rivers, streams, lakes, and reservoirs in Utah.

5.13.3.2 Impacts to Groundwater

The Salt Lake Valley contains a deep principal aquifer and several shallower aquifers that sit on top of the deep aquifer's confining layer. Most of the water quality evaluation area is within a secondary recharge area for these aquifers. There is a primary recharge area south of the refined water quality evaluation area.

The addition of new impervious surface is not likely to affect the overall groundwater quality of the evaluation area because the drainage system and detention facilities would control pollutants in runoff and because the water quality of the shallow aquifer does not substantially affect the deeper aquifer, which is the typical water source for groundwater wells in the area. The increase in impervious surface would not affect groundwater recharge because the new park-and-ride lots associated with the TSM Alternative would not be built within a primary groundwater recharge zone.

What is an aquifer?

An *aquifer* is an underground geologic formation that stores and transmits water. An aquifer is said to be *confined* if it is covered by an impermeable layer of rock or clay. Due to this confining layer, the groundwater in confined aquifers is usually under pressure.

5.13.3.3 Impacts to Water Rights, Groundwater Wells, Public Drinking Water Sources, and Drinking Water Protection Zones

There would be no direct impacts to public drinking sources, water points of diversion, or any drinking water protection zones under the TSM Alternative.

5.13.4 Alternative C – MOS

5.13.4.1 Impacts to Surface Water

Alternative C – MOS would cross Dry Creek. The existing culvert crossing in this creek would likely need to be replaced, although that decision would be made during the final design phase of the project. It is likely that Dry Creek would receive stormwater runoff. However, Dry Creek is not currently listed on the 303(d) list of impaired waters. Alternative C – MOS would directly affect one unnamed ephemeral wash in Sandy. The unnamed ephemeral wash is small and usually dry. The impacts to the ephemeral wash would be short term and would be mitigated by reconfiguring the wash to restore its hydrologic connection within the Jordan River watershed (see Section 5.13.7.1, Mitigation Measures for Impacts to Surface Water).

What is a 303(d) list?

When a lake, river, or stream fails to meet the water quality standards for its beneficial uses, Section 303(d) of the Clean Water Act requires the state to place the water body on a list of "impaired" waters. This list is known as a 303(d) list.

The impacts to surface water from Alternative C – MOS would be similar to those from the TSM Alternative. Alternative C – MOS would require a similar amount of new impervious surface due to the construction of three new transit stations and park-and-ride lots, so the water quality impacts from pollutants and from the increased stream velocity of receiving waters would be the similar to those from the TSM Alternative. Light-rail track is built on ballast, which is porous. The surface surrounding the light-rail tracks would be unpaved, which would allow stormwater to infiltrate into the soil all along the right-of-way. With the planned drainage system and detention basins at the park-and-ride lots, the current quality of stormwater runoff would be maintained, the water quality of the receiving waters would not be substantially reduced, and the beneficial uses of the receiving waters would be maintained.

What is a stream?

In Section 5.12, *stream* is used as a general term to describe waterways such as rivers, creeks, and canals.

The exact locations and sizes of hydraulic structures, detention basins, and other storm drainage features are not known during this phase of the analysis. A more-detailed evaluation would be conducted during the final design phase of the project to quantify the impacts to streams, canals, and creeks within the evaluation area.

5.13.4.2 Impacts to Groundwater

Alternative C – MOS would have fewer impacts to groundwater than the No-Action Alternative. Alternative C – MOS would reduce the amount of non-point-source contaminants that automobiles contribute to groundwater by reducing the number of automobiles on roads in the evaluation area.

What are non-point-source contaminants?

Water contaminants can be divided into two categories: point-source contaminants and non-point-source contaminants. *Point-source contaminants* come from specific ("point") sources such as a pipe or a smokestack. *Non-point-source contaminants* come from non-specific sources such as roads and agricultural fields. Examples of non-point-source contaminants include automobile emissions, road dirt and grit, and runoff from parking lots.

Construction of the light-rail tracks would not change the amount of or characteristics of runoff from the UTA-owned right-of-way and would not impede the groundwater flow because the current pattern of water infiltration would be maintained along the right-of-way. The effects on groundwater quality and groundwater recharge would be the same as those from the TSM Alternative.

5.13.4.3 Impacts to Water Rights, Groundwater Wells, Public Drinking Water Sources, and Water Protection Zones

Table 5.13-1 below lists the impacts of the build alternatives on groundwater resources including water points of diversion, public drinking water sources, and source protection zones. These impacts are shown in Figure 5-27, Water Quality Impacts, at the end of this chapter.

Alternative C – MOS would affect three private water points of diversion (privately owned groundwater wells) and one municipal water point of diversion (public irrigation and municipal wells) owned by Sandy City Corporation. It would also encroach on water protection Zone 2 for the public drinking water source owned by the Draper Irrigation Company (see Table 5.13-1 and Figure 5-27, Water Quality Impacts, at the end of this chapter). Impacts to groundwater wells would not necessarily affect the overall groundwater quality, but they would inconvenience users of groundwater if a well was relocated or abandoned. As the final design of the project progresses, UTA will work directly with the owners and/or operators of any affected points of diversion to determine the exact nature of the impact and required mitigation measures (see Section 5.13.7.3, Mitigation Measures for Impacts to Water Rights, Groundwater Wells, Public Drinking Water Sources, and Water Protection Zones).

Table 5.13-1. Direct Impacts to Water Points of Diversion

Owner of Affected Water Point of Diversion	Location	Water Source	Uses	Impacts from Alternative	
				Alt. C – MOS	Alt. C – Full Build
Alfred Dewey	At proposed 11400 South Station	Groundwater	Private/domestic, irrigation, stock watering	X	X
Griffith and Marvetta Kimball	At proposed 11800 South Station	Groundwater	Private/domestic, irrigation, stock watering	X	X
Steven Ray Davis	At proposed 11800 South Station	Groundwater	Private/other use	X	X
Kenneth M. Histake	Crossed by UTA-owned right-of-way near 13000 South	Surface water	Private/domestic, irrigation, stock watering		X
Sandy City Corporation	Near proposed 11400 South Station	Groundwater	Municipal/industrial agriculture use	X	X

Owner of Affected Public Drinking Water Source	Location	Associated Source Protection Zone	Uses	Impacts from Alternative	
				Alt. C – MOS	Alt. C – Full Build
Draper Irrigation Company	NA	2	Community/public drinking water source	X	X
Jordan Valley Water Conservation District	NA	2	Community/public drinking water source		X

Source: Jensen 2008

5.13.5 Alternative C – Full Build

5.13.5.1 Impacts to Surface Water

The impacts to surface water from Alternative C – Full Build would be similar to those from Alternative C – MOS but would also include impacts to Willow Creek and Corner Canyon Creek as well as four unnamed ephemeral washes identified in Figure 5-27, Water Quality Impacts, at the end of this chapter. It is likely that the three affected streams (Dry Creek, Willow Creek, and Corner Canyon Creek) would receive stormwater runoff. However, none of the streams are currently listed on the 303(d) list of impaired waters.

The unnamed ephemeral washes are small and usually dry. Impacts to the ephemeral washes would be short term and would be mitigated by reconfiguring the washes to restore their hydrologic connection within the Jordan River watershed (see Section 5.13.7.1, Mitigation Measures for Impacts to Surface Water).

What are perennial and ephemeral drainages?

Perennial drainages are wet 9 months or more of the year, while *ephemeral* drainages are wet for less than 9 months of the year.

Alternative C – Full Build has a greater potential to affect water quality than Alternative C – MOS because it includes more impervious surface area due to the additional number of stations and park-and-ride lots.

As discussed in Section 5.13.4.1, Impacts to Surface Water, stormwater runoff from the new impervious areas would be controlled so that runoff does not substantially increase the flow rate of receiving waters. The current water quality of the receiving waters would not be reduced, and the beneficial uses of the receiving waters would be maintained.

5.13.5.2 Impacts to Groundwater

The impacts to groundwater from Alternative C – Full Build would be the same as those from Alternative C – MOS.

5.13.5.3 Impacts to Water Rights, Groundwater Wells, Public Drinking Water Sources, and Water Protection Zones

Alternative C – Full Build would affect four private water points of diversion (privately owned groundwater wells) and one municipal water point of diversion (public irrigation and municipal wells) owned by Sandy City Corporation. It would also encroach on water protection Zone 2 for the public drinking water sources owned by the Draper Irrigation Company and the Jordan Valley Water

Conservancy District (see Table 5.13-1 above, Direct Impacts to Water Points of Diversion, and Figure 5-27, Water Quality Impacts, at the end of this chapter). UTA will work with the owners of affected water sources to determine the exact nature of the impact and whether the water source would need to be replaced.

5.13.6 Construction Impacts to Water Quality

Excavating, grading, and other construction activities could reduce water quality during construction. These impacts would continue until the proposed project is completed and permanent protective measures are installed.

5.13.7 Mitigation Measures for Water Quality Impacts

5.13.7.1 Mitigation Measures for Impacts to Surface Water

UTA is consulting with USACE so that USACE can evaluate channel impacts and mitigation options and document the expected permits and mitigation. This consultation is documented in Appendix C, Wetland Verification Information, and will continue after the Final EIS and during the final design phase of the project.

To reduce water quality impacts at the proposed stations, stations will be designed to include proper stormwater runoff control and drainage features. City stormwater runoff control and drainage standards will be followed for managing stormwater discharges in Sandy and Draper. Affected ephemeral washes will be reconfigured as necessary to maintain drainage patterns and connectivity within the Jordan River watershed. In addition, discharges to rivers, creeks, or canals will meet Salt Lake County flood-control standards for stormwater facilities and new or replacement crossings.

At all stations, parking areas will be graded so that runoff will drain into detention basins fitted with oil/water separators. Additional pavement will be added at stations to maintain the flow rates of the receiving waters and to improve the quality of stormwater runoff before it is discharged to the receiving waters.

5.13.7.2 Mitigation Measures for Impacts to Groundwater

UTA and its construction contractors will obtain all appropriate permits in coordination with local, state, and federal agencies. See Section 5.21, Permits and Clearances, for more information.

5.13.7.3 Mitigation Measures for Impacts to Water Rights, Groundwater Wells, Public Drinking Water Sources, and Water Protection Zones

As the final design of the project progresses, UTA will work directly with the owners and/or operators of any affected points of diversion. If a point of diversion cannot be protected, UTA will ensure that well or surface diversion is replaced and that the abandoned well is properly closed.

5.13.7.4 Mitigation Measures for Water Quality Impacts due to Construction

To minimize the temporary impacts to water quality, a UPDES General Storm Water Discharge Permit will be required. As part of the requirements of the permit, the contractor will be required to develop and implement a Storm Water Pollution Prevention Plan. The plan will contain provisions for controlling the stormwater in the project area to reduce erosion and siltation.

5.14 Floodplain Impacts

5.14.1 Methodology

This section addresses the impacts from the Draper Transit Corridor alternatives on regulatory floodplains.

Impacts from the action alternatives were determined by comparing digital (GIS) stream data and flood insurance rate maps to the UTA-owned right-of-way and station area right-of-way boundaries in order to identify stream crossings and quantify the regulatory floodplain area affected. The first step in creating the floodplain and stream inventory was to identify the communities in the impact analysis area. Next, water bodies within the affected communities were identified.

What is a stream?

In Section 5.13, *stream* is used as a general term to refer to waterways such as rivers, creeks, canals, and washes.

The primary sources of data used to develop the floodplain and stream inventory are FEMA flood insurance rate maps, U.S. Geological Survey topographic maps, and information from local

governments. The inventory includes some streams that do not have a regulatory floodplain (that is, a floodplain is not identified on a FEMA flood insurance rate map). Canals are included in the inventory only if they have a regulatory floodplain.

5.14.2 No-Action Alternative

Under the No-Action Alternative, the Draper Transit Corridor Project would not be built, so no direct impacts to floodplains would occur as a result of the project. Other transportation projects identified in WFRC's long-range plan and by the local communities would be constructed, and these projects could cause impacts to floodplains. However, local floodplain regulations would be followed, and these regulations would minimize impacts.

How would the No-Action Alternative affect floodplains?

There would be no impacts to floodplains from the No-Action Alternative.

5.14.3 TSM Alternative

Impacts to floodplains from the TSM Alternative would be similar to impacts under the No-Action Alternative. No new construction would be necessary for the express bus service, new local feeder bus service, or new bus rapid transit service. Construction of the proposed park-and-ride facilities would not be constructed within or near regulatory floodplains or streams and would not affect resources within the floodplain evaluation area. Other transportation projects identified in WFRC's long-range plan and by the local communities would be constructed, and these projects could cause impacts to floodplains. However, local floodplain regulations would be followed, and these regulations would minimize impacts.

How would the TSM Alternative affect floodplains?

There would be no impacts to floodplains from the TSM Alternative.

5.14.4 Alternative C – MOS

Alternative C – MOS would encroach on floodplains as shown in Table 5.14-1. There is a shallow flooding area of Dry Creek designated by FEMA as Zone AE just north of the proposed 10600 South Station. Alternative C – MOS would cross Dry Creek and would affect about 0.04 acre of regulatory floodplain.

How would Alternative C – MOS affect floodplains?

Alternative C – MOS would affect about 0.04 acre of regulatory floodplains associated with Dry Creek.

Table 5.14-1. Impacts to FEMA-Defined Floodplains from Alternative C – MOS

Water Body	Existing Flood Zones	Flood Zone Impact (acres)
Dry Creek	Zone A, Zone AE, Zone X	Zone AE: 0.04

Source: FEMA 2008a

The exact locations and sizes of hydraulic structures, new culverts or extensions, and other storm drainage features are not known during this phase of the analysis. A more-detailed evaluation would be conducted during the final design phase of the project. However, new or replacement crossing culverts constructed for the project would be designed to accommodate FEMA flood flow rates, would not increase the flooding risk to surrounding landowners, and would not affect transportation facilities that are vital for providing emergency services.

Section 5.14.7, Mitigation Measures for Floodplain Impacts, discusses mitigation measures to address encroachment from Alternative C – MOS.

5.14.5 Alternative C – Full Build

The impacts from Alternative C – Full Build would be similar to those from Alternative C – MOS. However, Alternative C – Full Build would encroach into flood zones associated with Willow Creek and Corner Canyon Creek and would affect a total of 1.58 acres of regulatory floodplain (see Table 5.14-2).

How would Alternative C – Full Build affect floodplains?

Alternative C – Full Build would affect about 1.58 acres of regulatory floodplains associated with Dry Creek, Willow Creek, and Corner Canyon Creek.

Table 5.14-2. Impacts to FEMA-Defined Floodplains from Alternative C – Full Build

Water Body	Existing Flood Zones	Flood Zone Impact (acres)
Dry Creek	Zone A, Zone AE, Zone X	Zone AE: 0.04
Willow Creek (Little Willow Creek)	Zone A, Zone AE, Zone X	Zone AE: 0.52
Corner Canyon Creek	Zone A, Zone AE, Zone X	Zone A: 1.02
Total		1.58

Source: FEMA 2008a

As discussed in Section 5.14.4, Alternative C – MOS, new hydraulic structures on FEMA-designated streams would be designed to accommodate FEMA flood flow rates so that the flooding risk to adjacent landowners is not increased as a result of the project.

Section 5.14.7, Mitigation Measures for Floodplain Impacts, discusses mitigation measures to address encroachment from Alternative C – Full Build.

5.14.6 Summary of Floodplain Impacts

The minor impacts to natural floodplain values (that is, riparian wildlife habitat) described in Section 5.10, Ecosystem Impacts, combined with the minor floodplain encroachments described in the sections above, are not considered substantial. The floodwater elevations would not be raised enough to pose a substantial risk to human life. It is not likely that any future damage associated with the encroachment, including interruption of service of a vital transportation facility, would be very expensive or widespread. There would be no notable adverse impacts on natural and beneficial floodplain values.

5.14.7 Mitigation Measures for Floodplain Impacts

FEMA requires that construction within a floodway must not increase the base 100-year flood elevation. In accordance with FEMA, UTA will obtain all necessary permits for floodplain encroachments and will incorporate appropriate engineering design of all new structures that cross the regulatory floodplain. In addition, UTA will coordinate with the local municipalities to ensure that their requirements are incorporated into the design of the project.

What is a regulatory floodplain?

For the Draper Transit Corridor Project, a stream has a *regulatory floodplain* if the floodplain is identified by FEMA. Salt Lake County abides by the FEMA regulations associated with the management of the floodplain.

To maintain channel capacity for stormwater flow, Salt Lake County Flood Control permits will be required for either of the build alternatives. Compliance with these permits will allow streams to convey flood flow rates and will help maintain the existing water quality of the river and channels, since new structures will be designed to control erosion. See Section 5.21, Permits and Clearances, for more information.

5.15 Impacts to Hazardous Materials and Hazardous Waste Sites

5.15.1 Methodology

This section addresses the expected impacts of the Draper Transit Corridor Project on hazardous materials and known and potential hazardous waste sites in the hazardous waste site evaluation area (see Figure 3-15, Hazardous Waste Sites, at the end of Chapter 3, Affected Environment).

What is the hazardous waste site evaluation area?

The hazardous waste site evaluation area is the area within one-half mile of each side of the centerline of the UTA-owned right-of-way and within a one-half-mile radius around the proposed station locations.

The hazardous waste sites of concern in the evaluation area were identified using the process described in Section 3.14.2, Methodology. To determine the impacts of the project on these sites, the site locations were added to a GIS file. The footprints of the action alternatives were then added to the file and overlaid onto the site locations to determine which sites would be within the footprint of each alternative. For more information about this process and the types of hazardous waste sites, see Section 3.15, Hazardous Materials and Hazardous Waste Sites.

Even if a site is known or suspected to be contaminated, building one of the action alternatives would not necessarily affect the site, and the site would not necessarily affect the project. Hazardous materials and hazardous waste site impacts would occur only due to direct construction activities. More-detailed information regarding project design, to be developed during the final design phase of this project, would be used to determine the appropriate method(s) to be implemented to address hazardous/regulated material sites that would either be acquired or remain in proximity to the Draper Transit Corridor Project.

5.15.2 No-Action Alternative

Under the No-Action Alternative, the Draper Transit Corridor Project would not be built, so no direct impacts to or from hazardous waste sites or materials would occur as a result of the project. However, continued development adjacent to the UTA-owned right-of-way mainline and proposed station locations could disturb some sites.

5.15.3 TSM Alternative

There would be no direct impacts to or from hazardous materials or waste sites from the TSM Alternative. All known hazardous waste sites near the Draper Town Center park-and-ride lot are outside the construction boundaries. There are no known hazardous waste sites in or near the 14600 South park-and-ride lot parcel boundaries. Continued development adjacent to the UTA-owned right-of-way mainline and other proposed station locations could disturb some sites.

5.15.4 Alternative C – MOS

5.15.4.1 Impacts to Known Hazardous Waste Sites

There are 12 known hazardous waste sites in the hazardous waste site evaluation area (see Table 3.15-2, Hazardous Waste Sites of Concern in the Hazardous Waste Site Evaluation Area). However, only sites adjacent to or within the UTA-owned right-of-way or proposed station location footprints would be affected by Alternative C – MOS. Table 5.15-1 lists the two hazardous waste sites within the cut-and-fill footprint of the UTA-owned right-of-way that would be directly affected by Alternative C – MOS. There are no known hazardous waste sites within any of the proposed station parcel boundaries.

What are sites of concern?

Sites of concern are hazardous waste sites that have a reasonable chance of affecting or being affected by the proposed project.

Table 5.15-1. Impacts to Hazardous Materials and Waste Sites

Map ID[a]	Site Name and Location	Site Type and Status	Alternative				Probability of Environmental Degradation[b]
			No-Action	TSM	Alt. C – MOS	Alt. C – Full Build	
4	Draper Station (800 East 12000 South)	UST – closed	No	No	Yes	Yes	Low
8	Intermountain Farmers Association (960 East 12300 South)	LUST, UST – closed	No	No	Yes	Yes	Moderate

Sources: EDR 2007; DERR 2008; EPA 2008c

[a] The map IDs and their associated sites are shown in Figure 3-15, Hazardous Waste Sites, at the end of Chapter 3, Affected Environment, and Figure 5-28, Hazardous Waste Site Impacts, at the end of this chapter.

[b] Removed and closed USTs are considered to have a low probability of environmental degradation. Closed LUST sites and active UST sites are considered to have a moderate probability of environmental degradation.

As shown in Table 3.15-2, Hazardous Waste Sites of Concern in the Hazardous Waste Site Evaluation Area, both the Draper Station and

Intermountain Farmers Association sites are closed UST and/or LUST sites. Closed LUST sites can have residual contamination, or contamination might have been left in place if it did not pose a threat to human health or the environment. Removed or closed USTs typically indicate a site that has been remediated or that did not require remediation when the UST was removed or closed in place, since no leaking occurred.

Draper Station (UST; 4001102). The USTs at the Draper Station were associated with a UPRR facility adjacent to the UTA-owned right-of-way, which was originally owned and operated by UPRR. The facility and its related equipment have been removed. The site is considered permanently out of use (DERR 2008).

Intermountain Farmer's Association (LUST, UST; 4000417). The LUSTs associated with the Intermountain Farmers Association site were removed from the ground during the construction of 12300 South. The site is considered permanently out of use (DERR 2008).

Impacts from cut-and-fill activity during construction could affect any remaining contaminated soil or groundwater at these two sites. UTA is aware of possible residual soil contamination at these sites and would take appropriate steps to prevent construction workers from being exposed to or spreading hazardous chemicals when working near these properties.

5.15.4.2 Impacts to Other Hazardous Materials

Alternative C – MOS could affect and/or be affected by hazardous materials due to the historical presence of hazardous materials at various locations. Given the past use of chemicals by railroad companies, contaminants could be present along the UTA-owned right-of-way. Herbicides, lubricants, polychlorinated biphenyls (PCBs), and petroleum hydrocarbons could be present in the soil under the railroad tracks. Also, rail ballasts along the UTA-owned right-of-way might have originated as slag material from the various smelters in the Salt Lake City area and, therefore, could contain elevated levels of heavy metals.

5.15.5 Alternative C – Full Build

The impacts to hazardous materials and waste sites from Alternative C – Full Build would be the same as those from Alternative C – MOS.

5.15.6 Mitigation Measures for Impacts to Hazardous Materials

Further investigations will be performed in at-risk areas during the final design phase of the project. The investigations will focus specifically on areas (such as utility relocations, transit stations, park-and-ride facilities, and tunnel locations) where construction activities involve soil excavation and/or dewatering operations. If UTA considers it necessary, UTA will analyze soil and groundwater samples at those areas where evidence suggests that hazardous material spills have previously occurred where construction will occur within the railroad right-of-way.

If elevated concentrations of these contaminants are detected, UTA will take appropriate measures to remove or isolate the affected soil where construction or public contact is anticipated. UTA will follow the hazardous material contamination measures developed during the pre-construction phase of the project.

Engineering controls (such as dust mitigation, temporary soil covers, and groundwater extraction) and personal protective equipment for construction workers will be used to reduce the potential for public or worker exposure to hazardous materials as necessary.

5.16 Energy Impacts

How is energy use evaluated in this EIS?

Energy use is evaluated primarily in the form of vehicle fuel consumption.

This section addresses the impacts of the Draper Transit Corridor alternatives on energy consumption. NEPA regulations (40 CFR 1502.16) require an examination of the energy requirements of a proposed project and the potential of the project for conserving energy. This section describes how energy demands would be affected in the short term by construction and in the long term under the No-Action and action alternatives. Energy use is evaluated primarily in the form of vehicle fuel consumption.

Nationwide, passenger vehicles (automobiles, vans, and non-commercial light trucks), buses, and light-rail transit systems consume about 58.3%, 0.001%, and 0.008%, respectively, of all energy used. In addition, according to the U.S. Department of Transportation, 96% of the petroleum used in the U.S. in 2006 was used to meet the country's transportation needs (USDOT 2008).

Gross energy consumption in the U.S. is expected to increase 0.7% each year between 2008 and 2030. This projected low rate of growth is due to slower economic growth, greater use of more-efficient

appliances and vehicles, higher energy prices, and slow growth of energy-intensive industries (USDOE 2008).

5.16.1 Methodology

FTA provides a consistent and comprehensive set of criteria for evaluating major transit investments that would be built using federal discretionary funds under the Section 5309 New Starts program. FTA applies a multiple-measure method in which New Starts projects are analyzed against several evaluation criteria.

For this EIS, the project team assessed energy consumption using a performance measure from the New Starts program. This measure is defined as the difference in regional energy consumption (measured in British thermal units, or BTU) between an action alternative and the No-Action Alternative in the forecast year. This measure reflects the net impact on energy use as a result of changes in automobile and commercial travel in the region combined with the energy requirements for operating the proposed alternative. This measure reports BTU consumption for transportation operations only (transit, automobiles, and commercial vehicles) and does not consider energy consumed for construction, equipment manufacturing, or maintenance activities (maintenance of track, trains, and so on).

The measure of energy consumption was calculated using the following assumptions and data sources:

- The forecast year is 2030.
- The study area consists of the regional transportation network modeled for air quality and travel demand purposes.
- The difference in energy consumption, expressed in BTUs, was calculated using data from the following sources:
    - Forecast-year estimates of VMT by automobiles and transit vehicles under the reasonable alternatives are based on outputs of the regional travel demand model.
    - Default factors of energy consumption (BTU per vehicle-mile) were then applied to these VMT estimates to calculate and report the measure. The default energy consumption factors listed in Table 5.16-1 below are based on relatively recent estimates of the average energy consumption of transit systems and road networks in the U.S.

What is travel demand?

Travel demand is the expected number of transportation trips in an area. Travel demand can be met by various modes of travel, such as automobiles, buses, light rail, carpooling, and bicycling.

Table 5.16-1. Default Energy Consumption Factors by Vehicle or Transit Type

Vehicle or Transit Type	Energy Consumption (BTU per VMT)
Passenger vehicles (auto, van, light truck)	6,233
Transit bus (all vehicle types)	41,655
Rail (light or heavy)	77,739
Rail (commuter)	100,000

Source: Oak Ridge National Laboratory 1996

5.16.2 No-Action Alternative

5.16.2.1 Construction-Related Energy Impacts

Under the No-Action Alternative, vehicle fuel would be required for roadway maintenance and for any new road construction that is part of the ongoing commercial and residential development in the Draper Transit Corridor study area.

How would the No-Action Alternative affect energy use?

Under the No-Action Alternative, about 1.94 billion BTU of energy would be used in Salt Lake County on the roadway network.

5.16.2.2 Direct Energy Impacts

Residents in and near the project study area travel mostly by automobile and, to a lesser extent, by bus. Under the No-Action Alternative, residents would continue to rely on these less energy-efficient transportation methods. The projected growth in the project study area would increase the amount of vehicle-miles traveled by automobiles and buses, which would increase congestion and overall energy consumption.

Table 5.16-2 shows the energy consumption in Salt Lake County associated with the Draper Transit Corridor alternatives in 2030. Under the No-Action Alternative, about 1.94 billion BTU of energy would be used in Salt Lake County on the roadway network.

Table 5.16-2. Energy Consumed by Vehicles in Salt Lake County

		No-Action Alternative		TSM Alternative		Build Alternatives	
Energy Usage	Existing Conditions (2005)	Future Conditions (2030)	Percent Change from Existing Conditions	Future Conditions (2030)	Percent Change from No-Action	Future Conditions (2030)	Percent Change from No-Action
Billion BTU/day	1.18	1.94	64.18%	1.94	–0.11%	1.93	–0.14%

Sources: Oak Ridge National Laboratory 2007; Lobb 2008a

5.16.3 TSM Alternative

5.16.3.1 Construction-Related Energy Impacts

Under the TSM Alternative, vehicle fuel would be required for constructing the additional stations and park-and-ride lots and improving roads to accommodate the increased road usage. Additional energy would be required to light the park-and-ride lots.

How would the TSM Alternative affect energy use?

Direct energy consumption under the TSM Alternative would be the same as under the No-Action Alternative (about 1.94 billion BTU per day).

5.16.3.2 Direct Energy Impacts

The amount of VMT in the project study area under the TSM Alternative would be about 35.26 million miles per day, compared to 35.25 million miles per day under the No-Action Alternative (Lobb 2008b). Energy consumption under the TSM Alternative would be the same as under the No-Action Alternative (about 1.94 billion BTU per day).

5.16.4 Alternative C – MOS

5.16.4.1 Construction-Related Energy Impacts

Alternative C – MOS would require vehicle fuel for heavy construction machinery. In addition, traffic congestion at grade crossings would increase during construction, so more fuel would be used by idling vehicles.

How would Alternative C – MOS affect energy use?

Direct energy consumption under Alternative C – MOS would be about 1.93 billion BTU per day, slightly less than under either the No-Action or TSM Alternatives.

5.16.4.2 Direct Energy Impacts

Since VMT under Alternative C – MOS would be very similar to that under the No-Action Alternative, energy consumption would be about the same.

Energy would be required for traction power and other ancillary systems such as communications, signals, stations, and park-and-ride lots. Direct energy consumption under Alternative C – MOS would be about 1.93 billion BTU per day, slightly less than under either the No-Action or TSM Alternatives.

5.16.5 Alternative C – Full Build

Alternative C – Full Build (in combination with other transit and roadway projects in WFRC's long-range plan) is projected to reduce VMT in Salt Lake County by about 50,000 miles per day in 2030 compared to the No-Action Alternative (less than 1% of the total daily VMT in Salt Lake County). Direct energy consumption under Alternative C – Full Build would be about 1.93 billion BTU per day, slightly less than under either the No-Action or TSM Alternatives.

How would Alternative C – Full Build affect energy use?

Direct energy consumption under Alternative C – Full Build would be about 1.93 billion BTU per day, slightly less than under either the No-Action or TSM Alternatives.

5.16.6 Mitigation Measures for Energy Impacts

No mitigation measures would be required for energy use. However, several of the mitigation measures listed in Section 5.6, Air Quality Impacts (such as turning off construction equipment when not in use), would reduce construction-related energy consumption.

5.17 Construction Impacts

Constructing any of the action alternatives would cause temporary, construction-related impacts due to ground disturbance and the operation of construction equipment. Construction could also cause impacts to air quality, noise and vibration levels, visual and aesthetic resources, water quality, invasive species, utility service, and traffic. The nature and timing of these impacts would be related to the project's construction methods and phasing.

5.17.1 No-Action Alternative

There would be no construction impacts from the No-Action Alternative.

5.17.2 TSM Alternative

The construction impacts from the TSM Alternative would be associated with construction of the park-and-ride lots at the Draper Town Center and 14600 South Stations. These impacts would be similar to those described in Section 5.17.3, Build Alternatives. No new construction would be necessary for the express bus service, new local feeder bus service, or new bus rapid transit service.

5.17.3 Build Alternatives

Alternative C – MOS and Alternative C – Full Build would have the same types of construction impacts. These impacts, most of which would be temporary, would affect the following resources:

- Air quality
- Noise and vibration levels
- Visual and aesthetic resources
- Water quality
- Invasive species
- Utility service
- Traffic
- Economics
- Historic properties and paleontological resources

UTA will require contractors to follow construction specifications that will avoid or minimize impacts to sensitive areas within or adjacent to the construction zones. These specifications identify measures to address construction-related impacts including maintaining access to all homes and businesses, traffic control, construction noise and vibration, dust abatement, sediment and erosion control, prevention of groundwater contamination, steps to follow if hazardous materials are uncovered, and steps to follow if historic properties, including historic linear resource sites, are unearthed. UTA will establish a public information program during the construction phase to advise the public about construction scheduling, traffic detouring, and other concerns.

5.17.3.1 Air Quality Construction Impacts

Air quality impacts during construction would be limited to short-term increases in fugitive dust, particulates, and local pollutant emissions from construction equipment. The project would generate pollutant emissions from the following construction activities:

- Excavation related to cut-and-cover
- Mobile emissions from construction workers' vehicles as they travel to and from the project site
- Mobile emissions from delivering and hauling construction supplies and debris to and from the project site
- Stationary emissions from onsite construction equipment

PM_{10} emissions from construction activities are usually local and short-term and last only for the duration of the construction period. Construction emissions will be minimized through good construction practices such as watering exposed surfaces, minimizing the amount of exposed and disturbed surfaces, minimizing construction equipment and vehicle speeds, and properly maintaining vehicle engines.

5.17.3.2 Noise and Vibration Construction Impacts

The operation of machinery and other construction activities would increase noise levels. Construction noise varies greatly depending on the construction process, the type and condition of equipment used, and the layout of the construction site. Construction would cause temporary increases in noise levels in the neighborhoods adjacent to the UTA-owned right-of-way, but the impacts would be short term. Construction equipment could generate noise levels of 80 to 90 dBA near residences, or similar to that of a heavy truck or pneumatic drill at 50 feet.

Table 5.17-1 summarizes the available data on noise from construction equipment that could be used for this project. Impacts from construction noise depend on the sensitivity of the noise receptor, the magnitude of noise during each construction phase, the duration of the noise, the time of day the noise occurs, and the distance from the construction activities.

Table 5.17-1. Typical Noise Levels of Construction Equipment

Equipment Type	Typical Sound Level at 50 feet (dBA)
Backhoe	80
Bulldozer	85
Compactor	82
Compressor	81
Concrete mixer	85
Concrete pump	82
Crane, derrick	88
Crane, mobile	83
Loader	85
Pavement breaker	88
Paver	89
Pile driver, impact	101
Pump	76
Roller	74
Truck	88

Source: FTA 1995

The most substantial sources of construction vibration are pile driving, vibratory compaction, jack-hammering, and the use of tracked vehicles such as bulldozers.

UTA is committed to minimizing construction noise and vibration impacts in noise-sensitive areas as long as this would not place unreasonable restrictions on contractors.

5.17.3.3 Visual and Aesthetic Resources Construction Impacts

The short-term, construction-related impacts on visual and aesthetic resources would include construction vehicle activity and accompanying staging areas, stockpiling of excavated material, traffic congestion, and construction-related dust. Construction impacts would occur along the build alternatives' right-of-way and at station locations, but, because the project would be completed in phases, only specific segments would experience construction-related impacts at any given time.

During construction, the work zone would be cleared of vegetation. The exposed bare ground would likely contrast visually with the surrounding agricultural, residential, and/or commercial areas that the viewer is used to seeing. Visual quality from sensitive viewer locations (such as residences) would be temporarily reduced during construction and would include the presence of construction equipment and staging and storage areas. Until the construction is completed and the disturbed areas are revegetated or become part of the proposed light-rail right-of-way or station location, the construction areas would stand out.

5.17.3.4 Water Quality Construction Impacts

The main construction-related impacts on water quality would be due to construction in areas near surface water features such as creeks that cross the right-of-way. Typical construction activities such as clearing, grading, filling, demolition, and excavation could lead to the erosion of surface soil because there would be less vegetative cover and more exposed areas. The impacts on surface waters during construction could include altered drainage paths, increases in surface water flows, local flooding, and increases in the amount of pollutants discharged to receiving waters.

5.17.3.5 Invasive Species Construction Impacts

Construction operations would remove the existing surfaces and established vegetation, which would expose the underlying soils to the risk of being infiltrated by invasive weeds. Materials and equipment delivered to the job site could introduce invasive weeds into the area if seeds are present in imported soil or on equipment that is not properly cleaned.

5.17.3.6 Utility Service Construction Impacts

Although utility service would be maintained throughout most construction activities, utility service could be temporarily disrupted during construction. UTA would consult with all utility providers affected by construction, and the construction contractor would coordinate with all utility providers to minimize interruptions to utility service. The contractor would coordinate with IFA during construction regarding freight train service.

5.17.3.7 Traffic Construction Impacts

The primary construction impacts that would affect vehicle traffic, pedestrians, and bicyclists during construction of either of the build alternatives are the following:

- Temporary impacts to traffic, pedestrians, and bicyclists could include construction delays, rerouting, and temporary lane closures.
- Closures to portions of the Porter Rockwell Trail are likely during construction.
- Residents and businesses would be disrupted by construction at proposed station areas and along the proposed rail alignment. Construction impacts would not occur at all construction locations simultaneously but would be phased since construction activities would be phased.

5.17.3.8 Economic Construction Impacts

Construction activities could temporarily affect access to businesses in the construction area. Although access to properties would be maintained to the extent practicable, temporary detours would limit some access or change the route to some businesses. The resulting traffic congestion and motorists' perceptions of inaccessibility could discourage some shoppers from patronizing businesses in the

construction area. Studies suggest that sales can decline 10% to 60% depending on the nature of the business, the duration of construction, the length of time that the business has been in operation, the location of the business, the availability of alternate access routes to the business, and other factors.

The businesses most likely to be affected are those that cater to impulse shopping or "in-route" shopping. Fast-food restaurants and gas stations belong to this first group and are considered businesses that would be highly affected by construction. Destination businesses that have extensive competition, such as grocery stores, hardware stores, and "sit-down" restaurants, would be the next-most-affected group and are therefore considered businesses that would be moderately affected by construction.

Low-impact businesses include specialty and unique stores; these businesses are likely to be only slightly affected by construction. The fourth group of businesses, which includes offices, industrial parks, schools, and churches, is not expected to be affected. Construction activities would most likely not affect this group's day-to-day operations since consumer traffic generally does not sustain their business.

5.17.3.9 Construction Impacts on Historic Properties

During construction, additional historic properties might be discovered other than those identified during the historic property surveys (see Section 5.9, Impacts to Historic Properties, and Section 5.12, Paleontological Impacts).

5.17.4 Summary of Construction Impacts

The action alternatives would have temporary adverse impacts during construction. All of these temporary impacts can be mitigated using best management practices and other conventional design and construction procedures (see Section 5.17.5 below).

5.17.5 Mitigation Measures for Construction Impacts

The following mitigation measures will be implemented during construction.

5.17.5.1 Mitigation Measures for Air Quality Impacts due to Construction

Mitigation measures for air quality impacts due to construction will be developed as part of the Emission-Control Plan submitted to the State of Utah. Mitigation measures will include the following:

- **Fugitive-dust control.** The contractor will maintain a fugitive-dust-control plan in compliance with Utah Administrative Code R307-205. This plan will include wetting excavation areas, unpaved parking and staging areas, and onsite stockpiles of debris, dirt, or dusty material to reduce windblown dust.
- **Street sweeping.** The contractor will use street-sweeping equipment at paved site-access points.
- **Equipment emissions.** The contractor will shut off construction equipment when it is not in direct use to reduce emissions from idling.

Other mitigation measures that the contractor could implement to minimize air quality impacts include the following:

- Use newer, cleaner-emitting construction equipment and properly maintain the equipment.
- Install control equipment on diesel construction equipment (such as particulate filters or traps, oxidizing soot filters, and oxidation catalysts) to the extent that is feasible.
- Reroute truck traffic away from schools and neighborhoods when possible.

5.17.5.2 Mitigation Measures for Noise and Vibration Impacts due to Construction

UTA contractors will follow local noise ordinances, use best management practices, and implement noise-mitigation measures to address specific problems where they arise. These measures can include temporary barriers, adjusted schedules, and use of alternative equipment. UTA contractors will meet all municipal ordinances regarding construction noise; many of these include time-restricted use of equipment. All local noise ordinances will be followed for construction activities.

Vibration impacts during construction will be avoided by developing numeric limits for impacts and by monitoring construction activities to keep vibration impacts within the numeric limits. These limits and

monitoring requirements will be developed during the final design phase of the project and will be included in the construction specifications for the project.

5.17.5.3 Mitigation Measures for Visual and Aesthetic Resources Impacts due to Construction

The contractor will prepare and implement an appropriate seeding vegetation plan. The contractor will also be required to maintain and keep the storage area for equipment, materials, and other accessories in a reasonable condition of cleanliness and orderly placement to avoid an unpleasant appearance. The contractor will promptly remove unused or unnecessary traffic-control equipment. To minimize noise and light impacts at night, the contractor will conduct major construction activities in residential areas during the day.

5.17.5.4 Mitigation Measures for Water Quality Impacts due to Construction

To minimize temporary impacts to water quality, a UPDES General Storm Water Discharge Permit will be required. As part of the requirement of the permit, the contractor will be required to develop and implement a Storm Water Pollution Prevention Plan. The plan will contain provisions for controlling the stormwater in the project area to reduce erosion and siltation.

5.17.5.5 Mitigation Measures for Invasive Species Impacts due to Construction

Invasive-weed-control measures will be followed in order to prevent the introduction of invasive weed species into the construction site. These measures will include cleaning equipment before it enters the project area, avoiding unnecessary disturbance of areas known to be infested with invasive weeds, and using herbicides where appropriate to control weeds. Reseeding with native plants will mitigate direct-disturbance impacts and reduce the potential for weed invasions.

5.17.5.6 Mitigation Measures for Utility Service Impacts due to Construction

UTA contractors will contact and coordinate with the utility companies to reduce the disturbances to utility customers. UTA will coordinate with the freight-rail service operated by Intermountain Farmers Association to determine the timing of construction activities to reduce impacts on freight delivery. Construction

activities that will interrupt utility service to residents and/or businesses will be performed when the activities will have the least effects on utility customers. These times will be determined through coordination between UTA and the utility companies.

5.17.5.7 Mitigation Measures for Traffic Impacts due to Construction

UTA's contractors will develop and implement a traffic-management plan during construction to maintain access to residences, businesses, community facilities and services, and local roads. Construction signs indicating access points and signs indicating that businesses are still open will be used to reduce construction impacts to businesses along the right-of-way and at station locations. Construction sequencing and activities will be coordinated with emergency service providers to reduce delays and response times during construction.

In addition, a thorough public information program will be implemented to inform the public about construction activities and to reduce impacts. Information will include work hours and alternate routes.

5.17.5.8 Mitigation Measures for Economic Impacts due to Construction

To the extent possible, access to businesses will be maintained during the construction and post-construction phases of this project, as this is UTA's policy with respect to access issues on all transit projects. For each phase of the project, the project team will coordinate with property owners and businesses to evaluate ways to maintain access while still allowing efficient construction operations. This could entail sharing temporary access or identifying acceptable timeframes when access is not needed. Adequate signage will be placed in construction areas to direct motorists to businesses and industrial areas. Other potential mitigation measures for construction impacts include providing business access signs that identify business access points within the construction limits.

5.17.5.9 Mitigation Measures for Impacts to Historic Properties due to Construction

If historic properties are discovered during construction, activities in the area of the discovery will immediately stop. The contractor will notify UTA of the nature and exact location of the finding and will not damage or remove the resource. Work immediately adjacent to

the discovery will be delayed until UTA evaluates the extent and significance of the site. The course of action and the construction delay will vary depending on the nature and location of the discovery. Construction will not resume until the contractor receives written authorization from UTA to continue.

5.18 Indirect and Cumulative Impacts

5.18.1 Indirect Effects

CEQ regulations for implementing NEPA require that an EIS analyze the direct and indirect effects of the proposed action. *Indirect effects* are defined by the CEQ regulations (40 CFR 1508.8) as effects

> which are caused by the [proposed] action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to the induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

What are indirect effects?

Indirect effects are effects "which are caused by the [proposed] action and are later in time or farther removed in distance, but are still reasonably foreseeable."

For this project, indirect effects are defined as effects that could result from the project beyond direct impacts to property and resources within the project right-of-way and the construction footprint. The following resources have been considered for indirect effects: vegetation, water quality, economics, and growth.

5.18.1.1 Indirect Effects on Vegetation and Water Quality

The permanent conversion of undeveloped and partially developed land to other land uses would cause indirect effects to natural resources such as vegetation and water quality. The indirect effects would include sedimentation, invasion by noxious weeds, and hydrologic modifications. In general, implementing BMPs would reduce the effects of sedimentation. However, sedimentation could still occur when areas adjacent to streams, creeks, and other water bodies are left exposed after construction.

What is sedimentation?

Sedimentation is the accumulation of soil and other solids in water. Sedimentation can be a problem in streams and other water bodies because sediment can carry pathogens, pollutants, and nutrients downstream. Suspended solids can also adversely affect fish populations and recreation activities such as boating and swimming.

5.18.1.2 Indirect Economic Effects

Opportunities for economic growth and revitalization would be another indirect effect of the build alternatives. Transit stations tend to concentrate transit activity and increase pedestrian activity in the

area around the station. Increased pedestrian activity could increase the number of businesses near the stations. Also, increased access to transit would increase the number of job opportunities for people with mobility limitations, such as low-income residents, teenagers, residents with disabilities, senior citizens, and those without automobiles.

5.18.1.3 Indirect Effects on Growth

Since the build alternatives would be built on an established rail corridor rather than requiring the development of a new rail corridor, the potential for induced development from the project is small. Most of the area served by the existing rail network is already largely developed or is awaiting development. Future development is planned in some parts of the project study area, mostly around the proposed station locations and in accordance with city land-use plans. The Draper Transit Corridor Project would support this development but would not cause it.

What is induced development?

Induced development is development that occurs because a transportation project makes it easier for residents to live farther from destinations such as employment and shopping. Induced development can change the pattern of land uses, population density, or growth rates in a project's study area.

It is more likely that the build alternatives would encourage transit-oriented development, which tends to make it easier for residents to live closer to destinations such as employment and shopping.

5.18.2 Cumulative Impacts

The cumulative impact analysis was prepared according to the requirements of the NEPA regulations and guidance from CEQ, *Considering Cumulative Effects under the National Environmental Policy Act* (CEQ 1997). The CEQ regulations (40 CFR 1500–1508) that implement the procedural provisions of NEPA define cumulative impacts as:

> The impact on the environment which results from the incremental impact of the [proposed] action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal, or non-federal) or person undertakes such actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time.

What are cumulative impacts?

Cumulative impacts are "the impact on the environment which results from the incremental impact of the [proposed] action when added to other past, present, and reasonably foreseeable future actions."

Cumulative impacts include both direct and indirect impacts.

5.18.2.1 Methodology

According to CEQ's cumulative impacts guidance, the cumulative impact analysis should be narrowed to focus on important issues at the national, regional, or local level. The analysis should look at

other actions that could have similar effects and should analyze whether a particular resource has been historically affected by cumulative actions. The cumulative impacts analysis focuses on those issues and resources that could be affected by a combination of stress factors on the environment and does not address in detail those resources that would not experience additional impacts from the Draper Transit Corridor Project in combination with other projects in the study area.

The analysis considered the potential for cumulative impacts based on other projects in the Draper Transit Corridor study area. In addition, the analysis also considered major transportation, railroad, and land-use projects in the vicinity of the Draper Transit Corridor study area that could be directly or indirectly affected by the implementation of the Draper Transit Corridor Project. The timeframe for this analysis is now through 2030. Based on the potential for impacts from the Draper Transit Corridor build alternatives and other projects in the area, the following resources have been considered for cumulative impacts: farmland, wetlands, air quality, and historic properties.

In addition to several roadway and transit projects, five development projects in various stages of approval are located entirely or partially within the project study area. These transportation and development projects, which are considered in this cumulative impacts analysis, are described in Table 5.18-1 below (projects 16 through 20).

5.18.2.2 Cumulative Impact Evaluation Areas

The geographic scope of cumulative impacts is determined by the type of impact being analyzed. For wetland, farmland, air quality, and historic properties impacts, the evaluation area is Salt Lake County.

5.18.2.3 Other Actions Affecting the Resources, Ecosystems, and Human Communities of Concern

This section provides a brief overview of the past actions and present and reasonably foreseeable actions that contributed or could contribute to cumulative impacts. Many of the baseline conditions relevant to cumulative impacts are described in detail in Chapter 3, Affected Environment.

Several steps were taken to determine potential present and future actions to consider in the cumulative impacts analysis. These steps included reviewing WFRC's Transportation Improvement Plan and Regional Transportation Plan and coordinating with UDOT, WFRC, and the Cities in the project study area to help identify other projects that could result in cumulative impacts when combined with the Draper Transit Corridor Project. The present and reasonably foreseeable actions listed in Table 5.18-1 could result in cumulative impacts.

Table 5.18-1. Present and Reasonably Foreseeable Transit, Roadway, and Development Actions

Project or Action	Description	Project Status
1. North-South TRAX	North-south TRAX line from downtown Salt Lake City to 10000 South in Sandy.	Complete
2. FrontRunner North: Weber County to Salt Lake City Commuter-Rail Project (UTA 2005a)	Commuter rail on existing tracks from Pleasant View in Weber County to Salt Lake City in Salt Lake County. New station locations.	Complete
3. Airport to University West-East Light-Rail Project, Final Environmental Impact Statement, Salt Lake County (FTA and UTA 1999)	Light rail from Salt Lake City to the Salt Lake City International Airport.	Complete
4. 2008 Environmental Study Report for Airport TRAX Line (UDOT, Final Environmental Assessment for the Development of a Light-Rail Transit Line within the Salt Lake International Airport, July 2009)	Extension of the western section of the West-East Light-Rail Transit System.	Construction
5. West Valley TRAX Line: Salt Lake County (UTA 2007c)	New light-rail line from the 2100 South light-rail station to the West Valley City Center.	Construction
6. Mid-Jordan TRAX: Light-Rail Extension (Mid-Jordan Line), Salt Lake County (FTA and UTA 2005)	New light-rail line from the 6400 West light-rail station to South Jordan.	Construction
7. FrontRunner South: Commuter Rail, Salt Lake and Utah Counties (UTA 2007d)	New commuter-rail line in Salt Lake and Utah Counties.	Construction
8. 3500 South Roadway Widening and Bus Rapid Transit (BRT) (UDOT, 3500 South Environmental Study, Salt Lake County, April 2006)	Widen 3500 South between 2200 West and Bangerter Highway to three lanes in each direction with center-running BRT.	Planning
9. 10400 South (FHWA 2003)	Widen 10400 South from Bangerter Highway to Redwood Road.	Planning
10. 11400 South (FHWA 2005)	Improve transportation system around 11400 South from Bangerter Highway to 700 East.	Design

Table 5.18-1. Present and Reasonably Foreseeable Transit, Roadway, and Development Actions

Project or Action	Description	Project Status
11. 1300 East Corridor Project, Creek Road to Draper (UDOT, 1300 East Corridor Project, 10500 South to 11800 South, October 2006)	Improve 1300 East through Sandy.	Design
12. I-15, Salt Lake and Utah Counties (FHWA, I-15 Corridor Utah County to Salt Lake County Final Environmental Impact Statement and 4(f) Evaluation, June 2008)	Make capacity and safety improvements to I-15 in Salt Lake and Utah Counties. Roadway improvements are planned from 12300 South in Salt Lake County to the South Payson interchange.	Design-build procurement
13. Redwood Road, 10400 South to Bangerter Highway, Salt Lake County, Utah (UDOT, Redwood Road Environmental Study, Salt Lake County, March 2005)	Widen Redwood Road from just south of 10400 South in South Jordan to just south of Bangerter Highway in Bluffdale to include two travel lanes in each direction along with other improvements.	Construction
14. State Street, 10600 South to 9000 South	Widen State Street between 10600 South and 9000 South.	Complete
15. Mountain View Corridor (FHWA and UDOT, Mountain View Corridor Final Environmental Impact Statement and Section 4(f) Evaluation, Salt Lake and Utah Counties, September 2008)	Evaluation of a new freeway and transit corridor along the west side of the Salt Lake Valley. A transit component would operate from Herriman on the south to the Salt Lake City International Airport on the north and would follow an alignment mostly along 5600 West. The freeway, which would be west of Bangerter Highway, would extend from I-80 on the north to Utah Lake in Utah County on the south.	Planning
16. Dry Creek Development (west side of the UTA-owned right-of-way near 10200 South)	Develop 40 acres to include up to 500 single-family, multi-family, and townhome units; open space and cemetery; and retail, commercial, and office uses.	Planning
17. Future development at Highland Drive and 900 East	Future commercial development across Highland Drive from the proposed Highland Station.	Planning
18. Real Soccer Stadium	The Real Soccer Stadium includes a redevelopment project for the area from 9000 South to 9400 South and from State Street to I-15 in which commercial and retail, including the 20,000-seat stadium, are the dominant features.	Complete
19. Hospital Corporation of America (HCA)	A future Hospital Corporation of America (HCA) hospital is proposed to be built at 11800 South and Factory Outlet Drive in Draper.	Conceptual planning
20. Draper Town Center	In the future, the Intermountain Farmers Association (IFA) property (also called the Draper Poultrymen and Egg Producers' Plant) and City Hall will be focal points for the Draper Town Center.	Conceptual planning

5.18.2.4 Cumulative Impacts on Farmland

Both of the build alternatives would result in the loss of about 15 to 17 acres of farmland at and around the proposed 11800 South and Draper Town Center Stations. None of this farmland is considered to be prime, unique, or of statewide importance.

As described in Section 5.2, Agriculture and Farmland Impacts, continued regional growth and development will have cumulative impacts on farmland. However, this growth and development will occur with or without the Draper Transit Corridor Project. No data are available on the exact amount of agricultural land that will be converted to urban uses in Salt Lake County, but regional development will convert more than 50% of current agricultural land, or about 100,000 acres. Overall, due to the planned conversion of existing agricultural land to residential or commercial uses in the next 30 years, the cumulative impact on agricultural land is expected to be a nearly 50% loss of agricultural land. Overall, the Draper Transit Corridor Project would contribute to less than 1% of the total loss of farmlands in Salt Lake County.

5.18.2.5 Cumulative Impacts on Wetlands

The build alternatives would affect a minor amount of wetlands and/or waters of the U.S. Due to the tail tracks, Alternative C – MOS would affect about 0.15 acre of wetlands as well as one water of the U.S.—a small (less than 0.01 acre), ephemeral stormwater drainage in the 10600 South Station parcels. Alternative C – Full Build would affect 0.18 acre of one small wetland and would also affect five ephemeral drainages totaling about 0.02 acre of impacts. Both build alternatives would result in minor impacts to wetlands and/or waters of the U.S., and up to 0.2 acre of wetlands could be affected (direct impacts).

Although other planned transportation projects could also result in impacts to wetlands, urban growth, regardless of the construction of roads and rails, will likely cause the greatest impact to wetlands between 2009 and 2030. However, all projects that are subject to a Section 404 individual permit are required to identify the least environmentally damaging practicable alternative, which is the goal of the wetland assessment component of this EIS process. In addition, all projects are required to complete a wetland delineation from which mitigation is determined through avoidance, minimization,

and/or some form of creation, restoration, or enhancement of wetlands.

No data are available on the exact amount of wetlands to be converted to urban uses because each project is treated independently by USACE. UTA expects that all impacts resulting from the rail line and stations will have to be mitigated (through creation, restoration, or enhancement of wetlands) within the general vicinity of the project to satisfy the federal policy of no net loss of wetland acres and/or function.

5.18.2.6 Cumulative Impacts on Air Quality

The Draper Transit Corridor Project would slightly decrease regional PM_{10} and CO emissions. While the project would decrease these emissions by less than 1%, this project, together with the other current and future rail transit projects, could cumulatively decrease regional PM_{10} and CO emissions even further. Therefore, no adverse cumulative air quality impacts would occur.

5.18.2.7 Cumulative Impacts on Historic Properties

Continued growth in the southern Salt Lake Valley and associated development, along with the proposed improvements to the Draper Transit Corridor, could result in cumulative impacts to historic properties, specifically archaeological sites including historic linear resource sites. The Draper Transit Corridor Project would result in an adverse effect to two historic linear resource sites, no adverse effect to one historic linear resource site, and no adverse effect to one historic building, all of which are eligible for the NRHP. Other transportation projects in the Draper Transit Corridor Project study area could also affect historic properties; these projects are listed in Table 5.18-1 above, Present and Reasonably Foreseeable Transit, Roadway, and Development Actions. Management of historic properties under these projects would follow appropriate federal and state regulations.

Starting in the 1800s, modern development in Salt Lake County has resulted in impacts to historic properties as the land uses of the area have changed from undeveloped to developed. Historic properties are protected by a variety of state and federal laws. A number of sites in northern Utah have been lost to development, and this loss will continue at an increasing pace. Land development and an increase in recreation activities would result in the cumulative loss of historic

properties. However, given the overall small number of properties affected by the Draper Transit Corridor Project and the other development projects and the mitigation that is in place, there would be minor cumulative impacts to historic properties in the Draper Transit Corridor Project study area.

5.18.3 Mitigation Measures for Indirect and Cumulative Impacts

No mitigation measures are proposed.

5.19 Short-Term Uses versus Long-Term Productivity

The short-term use of the environment versus preserving its long-term productivity relates to converting the natural productivity of the land, viewed as a renewable use, to a developed use that has a relatively short economic life. Because the Draper Transit Corridor Project area is mostly developed, there is little remaining natural productivity such as wildlife habitat, vegetation, and wetlands.

A few remaining agricultural fields and open areas would be converted to a transportation use by the project. This use of the environment would generally be consistent with local land-use and transportation plans that demonstrate a need for the project. The Draper Transit Corridor Project would provide the following long-term productivity enhancements:

- Alternate choice of transportation throughout the region
- Enhanced transit and traffic capacity throughout the region
- Improved access to employment
- Reduced congestion at key intersections
- Improved safety conditions in the region
- Long-term improvements in economic conditions
- Enhanced potential for high-density, transit-oriented development

5.20 Irreversible and Irretrievable Commitment of Resources

The proposed transit site and facilities and the energy required to build and operate the facilities would require irreversible commitments of resources. For this project, irretrievable commitments of resources include the use of a considerable amount of fossil fuels, labor, and construction materials such as steel, cement, and aggregate. Additionally, large amounts of labor and natural resources would be necessary for fabricating and preparing the construction materials. These materials are generally not retrievable, but they are not in short supply, and their use would not have an adverse effect on the continued availability of these resources.

What is an irreversible and irretrievable commitment of resources?

The term *irreversible commitment of resources* refers to the use of nonrenewable resources including fossil fuels, manufactured structural materials, and land converted to long-term business and industrial use. Irretrievable commitments of resources cause the lost production or use of renewable resources such as timber, rangeland, or wildlife habitat.

5.20.1 No-Action Alternative

The No-Action Alternative, by definition, would not irreversibly or irretrievably commit resources. Although the No-Action Alternative would require a greater commitment of resources in the future due to its failure to improve the accessibility and efficiency of the transportation system, it would not by itself require a commitment of those resources.

5.20.2 Action Alternatives

Implementation of either of the build alternatives would involve a commitment of a range of natural, physical, human, and fiscal resources. Land required for the alternatives would be considered an irreversible commitment, although less land would be required for the TSM Alternative than for either of the build alternatives. However, while the build alternatives would require a greater commitment of land than the TSM Alternative, the majority of the land required for the build alternatives is currently already a railroad corridor and would, therefore, be an efficient use of already committed property. Additional property would be necessary at station locations.

The acquisition of property and the associated potential displacement of businesses in order to construct the proposed project and its stations would be an irreversible commitment of real property. Owners, residents, or tenants of these properties would be given opportunities to relocate (as discussed in Section 5.3.4.2, Impacts to

Housing and Relocations), but their existing properties would be converted to transit uses necessary to support the project.

The construction of the proposed project would also require a substantial expenditure of local and federal funds, which, once spent, would not be retrievable. The commitment of these resources is based on the premise that residents in the region would benefit from the improved quality of the transit system. These benefits would consist of improved accessibility and savings in travel time, both of which are anticipated to outweigh the commitment of these financial resources.

5.21 Permits and Clearances

Table 5.21-1 shows the permits and clearances that might be required for any of the action alternatives.

Table 5.21-1. Required Permits and Clearances

Permit	Granting Agency	Applicant	Application Time	Granting Time	Applicable Portion of Project
Section 401 Certification (Clean Water Act)	Utah Division of Water Quality	UTA	Final design	Concurrent with Record of Decision	Required if the project could result in any discharge into waters of the U.S.
UPDES Storm Water General Permit for Construction Activities	Utah Division of Water Rights	UTA	Final design	Before construction begins	Required to protect stormwater quality during construction phase. Storm Water Pollution Prevention Plan must be prepared for more than 1 acre of disturbance.
Salt Lake County Flood-Control Permit	Salt Lake County Public Works	UTA	Final design	Before construction begins	Required if hydraulic structures, new stream crossings, or culvert construction would be necessary.
Nationwide Permit 14 for Linear Transportation Facilities (Clean Water Act)	USACE	UTA	Final design	Before construction begins	Required if a proposed action would result in the discharge of dredged or fill materials in waters of the U.S., including wetlands.
Air Quality Fugitive-Dust-Control Plan	Utah Division of Air Quality	Contractor	Construction phase	Before construction begins	The fugitive-dust rule (UAC R307-309) addresses storage and handling of aggregate materials and construction/ demolition activities on sites greater than 0.25 acre.
Memorandum of Agreement	Utah SHPO, Advisory Council on Historic Preservation	UTA	Concurrent with Final EIS	Final EIS	Impacts to NRHP-eligible properties, mitigation of archaeological sites including historic linear resource sites.
Construction-related permits for all of the above (potentially)	Various agencies	Contractor	Construction phase	Before construction begins	Impacts associated with offsite activities such as construction staging, borrow areas, and so on.

5.21.1 Section 401 Certification, Clean Water Act

EPA is the agency with regulatory authority for the federal Clean Water Act, but in July 1987, EPA delegated portions of this authority to the State of Utah. The Utah Division of Water Quality is the governing agency for issues related to water quality, including the Section 401 certification and the Section 402 NPDES permits.

If the construction or operation of facilities could result in any discharge into a water body, UTA must request certification from the Division of Water Quality that the proposed project would not violate state or federal water quality standards.

5.21.2 UPDES Storm Water General Permit for Construction Activities

Construction of any of the three action alternatives would disturb more than 1 acre and so would require a UPDES construction phase permit. These permits are issued in response to the 1987 reauthorization of the Clean Water Act, which requires EPA to institute an NPDES permitting program for storm drainage systems or to approve state programs. EPA approved Utah's version of this program (UPDES) in 1987.

Obtaining the UPDES permit requires development of a Storm Water Pollution Prevention Plan that includes a Temporary Erosion and Sediment Control Plan. The Temporary Erosion and Sediment Control Plan identifies BMPs as well as site-specific measures to minimize erosion and prevent eroded sediment from leaving the work zone.

5.21.3 Salt Lake County Flood-Control Permit

UTA would be required to obtain a Flood-Control Permit from Salt Lake County if the project would require installation of structures or bridges, stormwater discharge, utility line crossings, bank stabilization, or any other activity that occurs within 20 feet of the top of the channel bank of any countywide flood-control facility.

If a project involves a canal or natural stream that is listed in the Salt Lake County Flood-Control Ordinance, a flood-control permit from Salt Lake County would be required.

5.21.4 Nationwide Permit 14 for Linear Transportation Facilities (Clean Water Act)

UTA is required to obtain a Nationwide Permit 14 if the proposed project would result in the discharge of dredged or fill materials in waters of the U.S., including wetlands, provided the discharge does not cause the loss of more than 0.5 acre of waters of the U.S. The Draper Transit Corridor Project could affect about 0.2 acre of wetlands and about 0.02 acre of drainage canals. A Pre-Construction

Notification (PCN) is required for all fill exceeding 0.10 acre. The PCNs must include a compensatory mitigation plan as well as delineation of all special aquatic sites, which include wetlands. Features such as stormwater management facilities and wetlands mitigation projects integrally related to the project can be constructed under this permit as long as they meet any applicable general and local condition requirements.

5.21.5 Air Quality Fugitive-Dust-Control Plan

The Fugitive Emissions and Fugitive-Dust Rule (UAC R307-309) requires a fugitive-dust-control plan from all sources of air pollution whose activities or equipment have the potential to produce fugitive dust (that is, airborne dust) in Davis, Salt Lake, and Utah Counties.

Fugitive-dust-control plans minimize fugitive dust onsite from pits, yards, storage areas, and areas of operation and prevent the degree of opacity from exceeding 20% on-site and 10% at the property boundary. The fugitive-dust rule addresses storage and handling of aggregate materials and construction/demolition activities on sites greater than 0.25 acre including roads, mines, and tailings piles and ponds. Sources of air pollution will develop their dust-control plans and submit them to the Executive Secretary of the Utah Division of Air Quality no later than 30 days after the source becomes subject to the rule.

What is air quality opacity?

With regard to air quality, *opacity* is the amount of light that is blocked by something, such as dust in the air. Opacity is measured as a percentage: 0% means that all light passes through, while 100% means that no light passes through. As more particles are present, the opacity percentage increases.

5.21.6 Memorandum of Agreement

Section 106 consultation usually results in a Memorandum of Agreement, which describes the measures that the lead agency will take to avoid, minimize, or mitigate the adverse effects of a project. For the Draper Transit Corridor Project, FTA has consulted with the Utah SHPO and potentially affected Native American tribes and will develop a Memorandum of Agreement for evaluating cultural resources that would be affected by the proposed project and for implementing required mitigation.

5.21.7 Construction-Related Permits for All of the Above (Potentially)

The contractor would be responsible for obtaining all construction-related permits and other environmental clearances for activities occurring within construction areas and borrow areas located outside the right-of-way.

Figure 5-1. Farmland Impacts

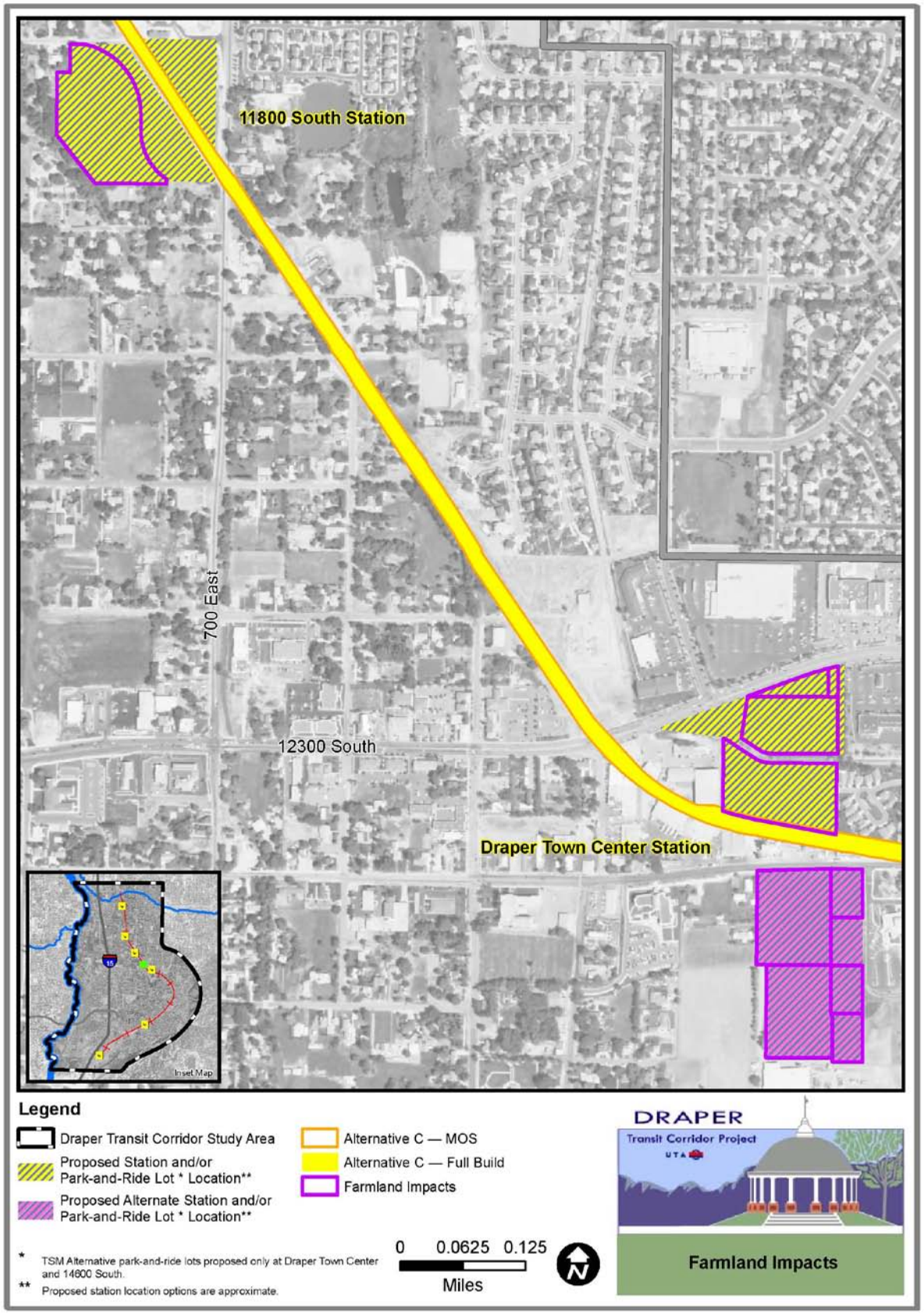


Figure 5-2. Potential Business Relocations

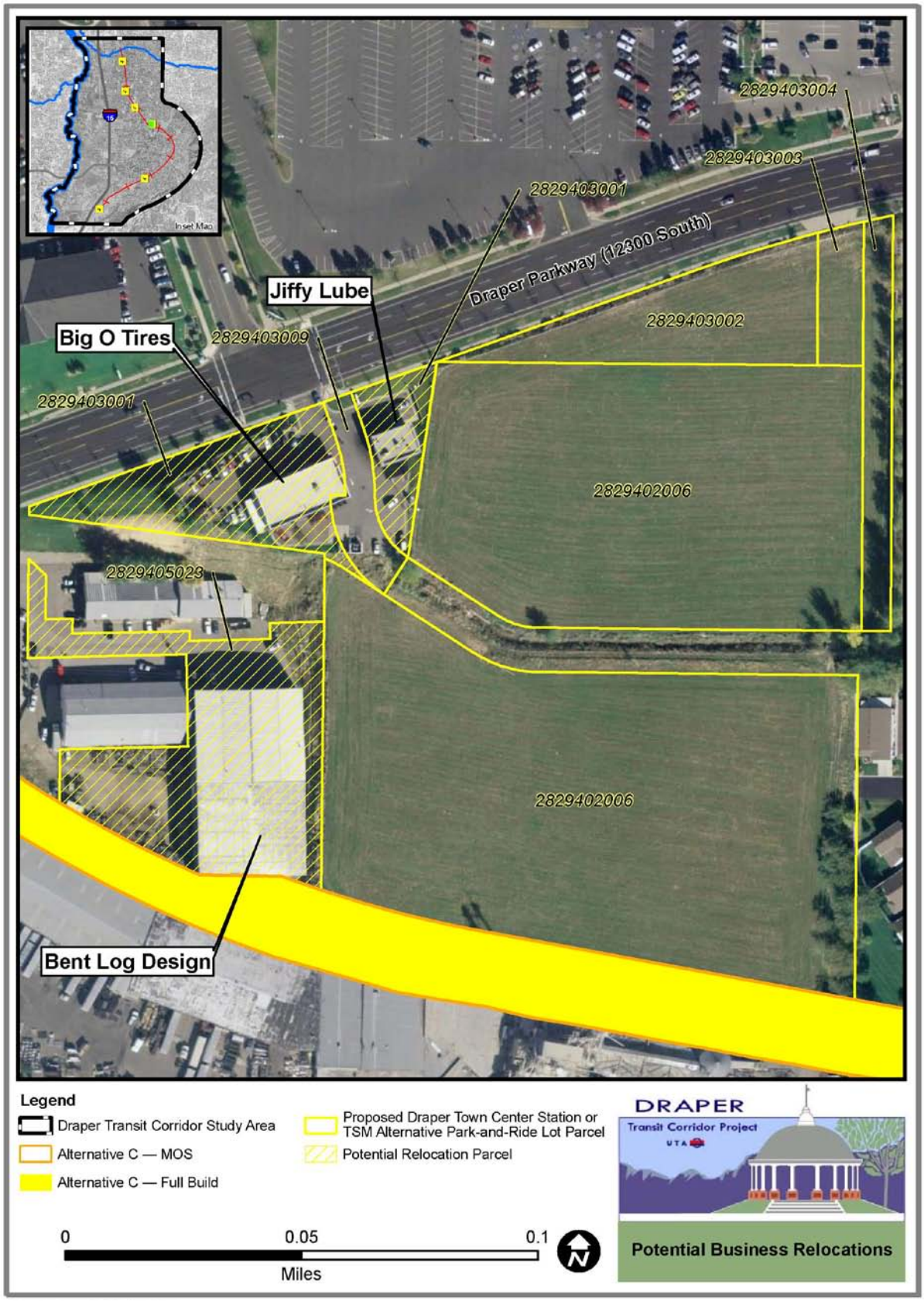


Figure 5-3. Potential Residential Relocations

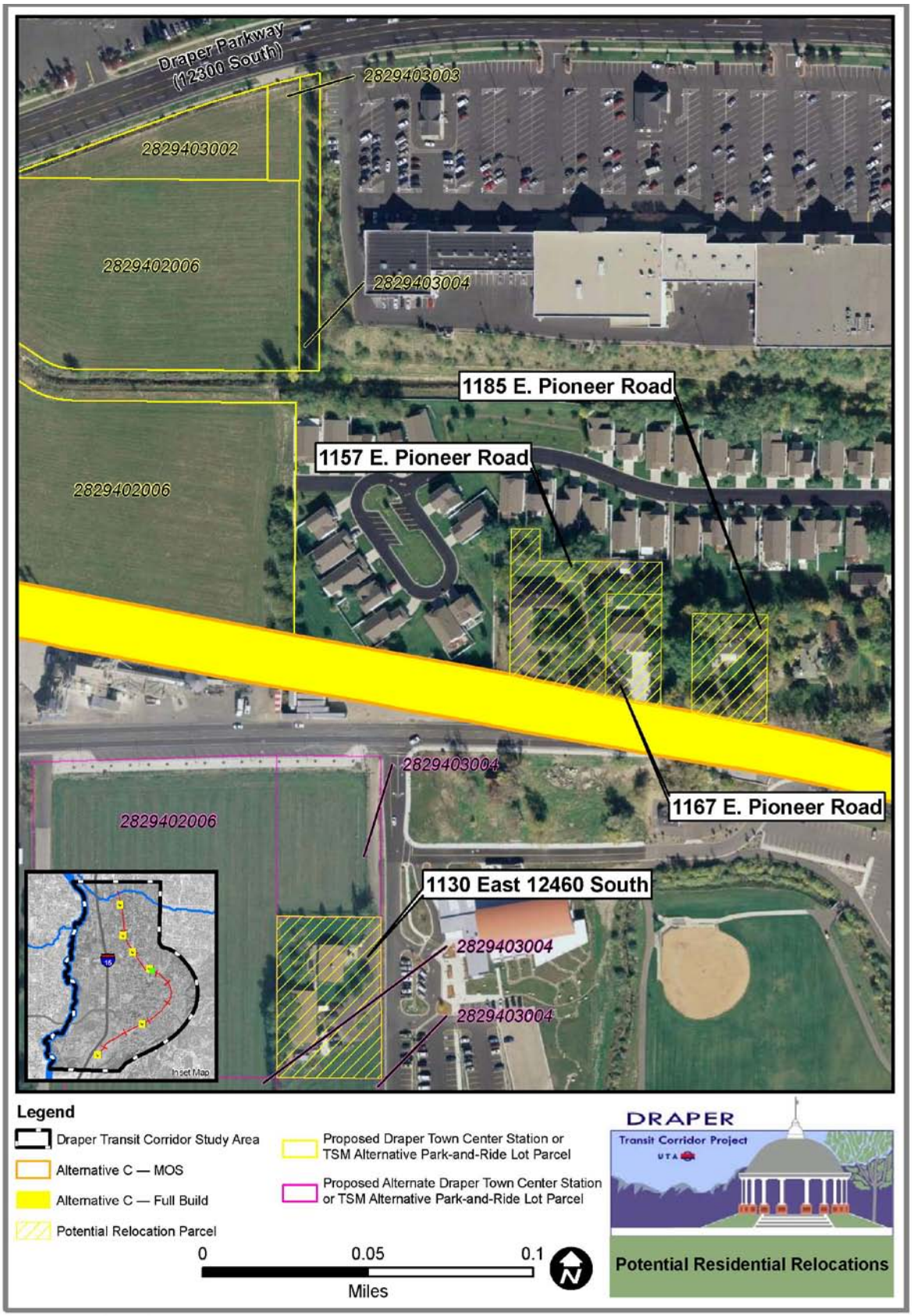


Figure 5-4. Potential Noise Barrier Locations (Map 1 of 7)

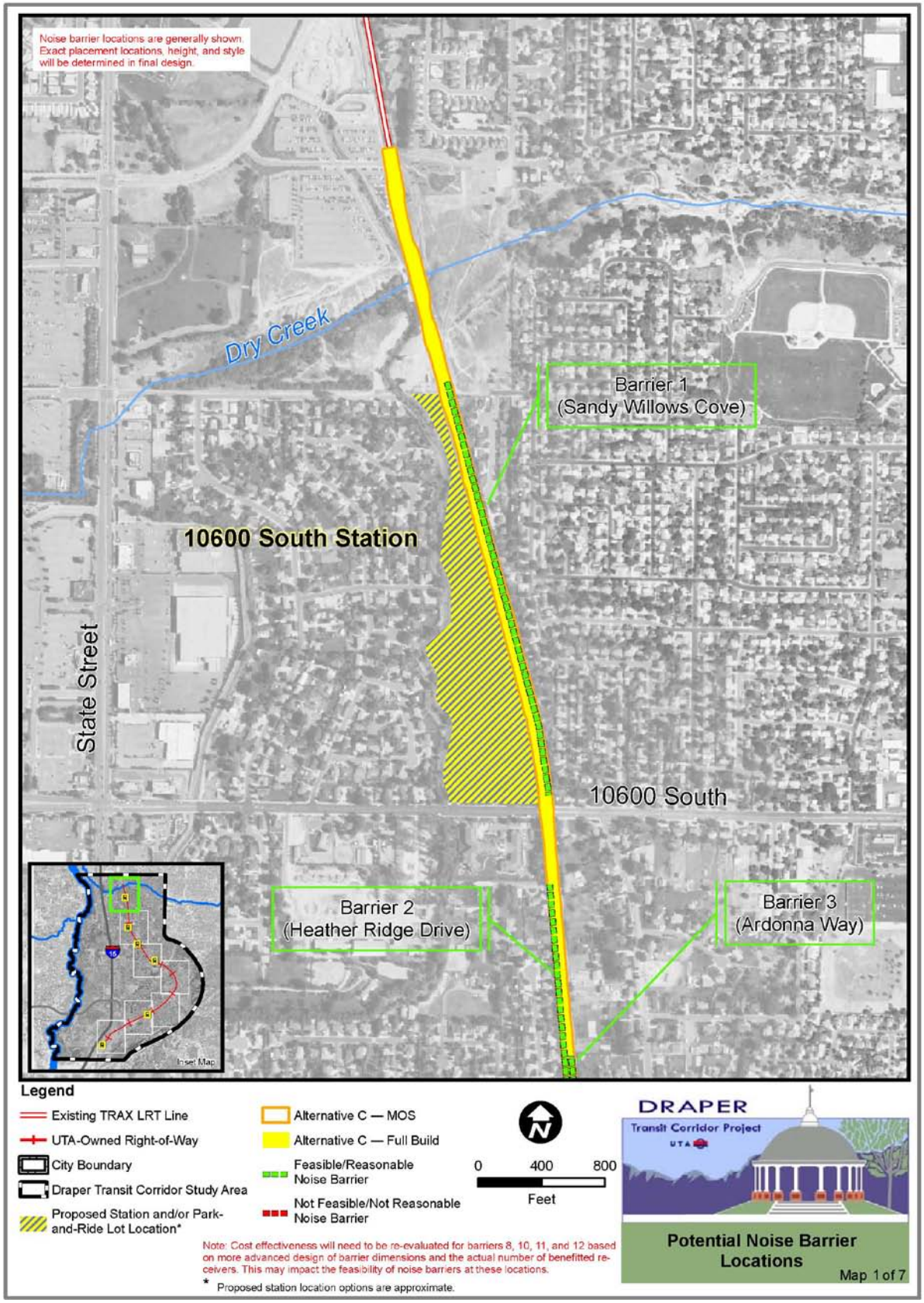


Figure 5-5. Potential Noise Barrier Locations (Map 2 of 7)

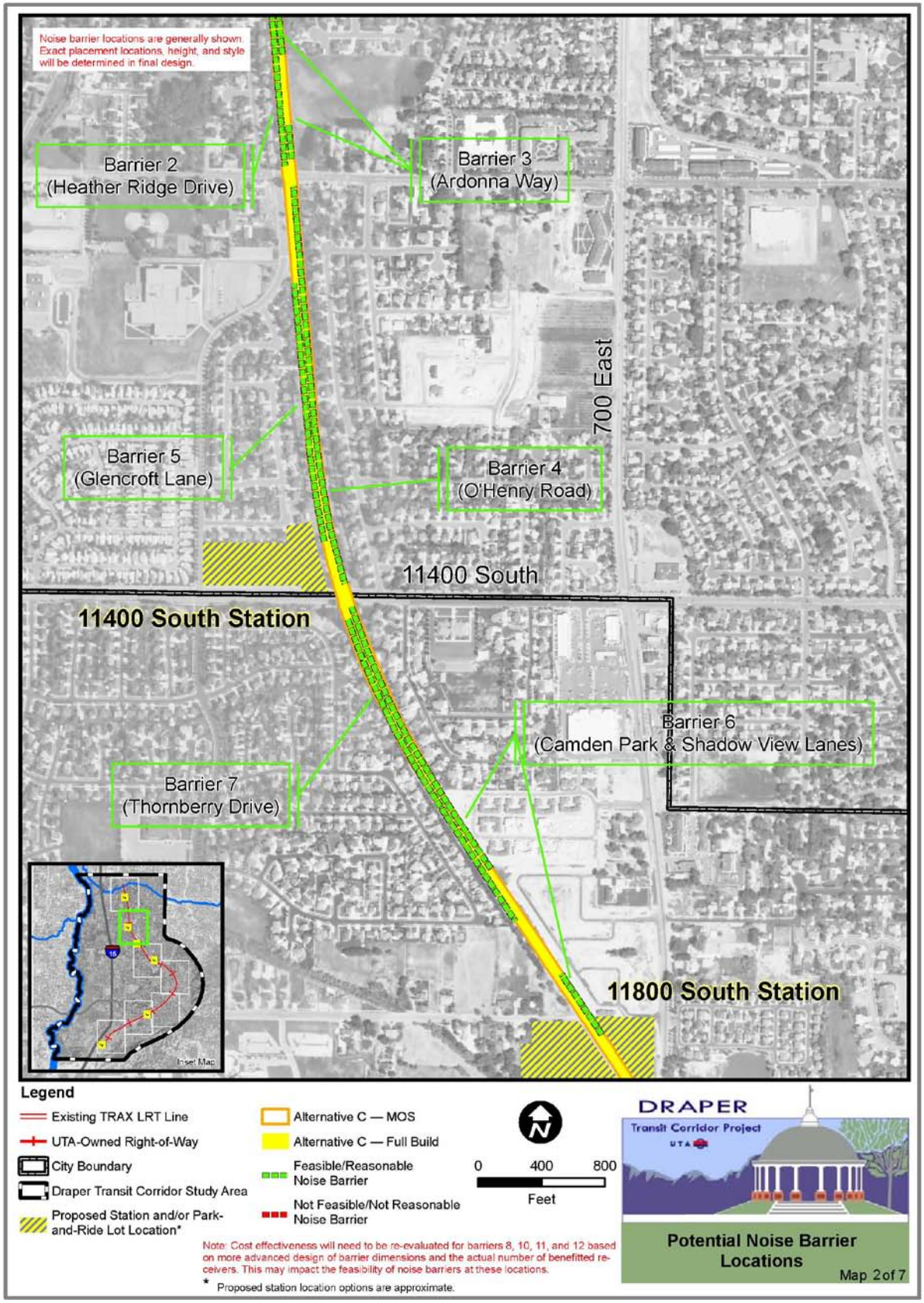


Figure 5-6. Potential Noise Barrier Locations (Map 3 of 7)

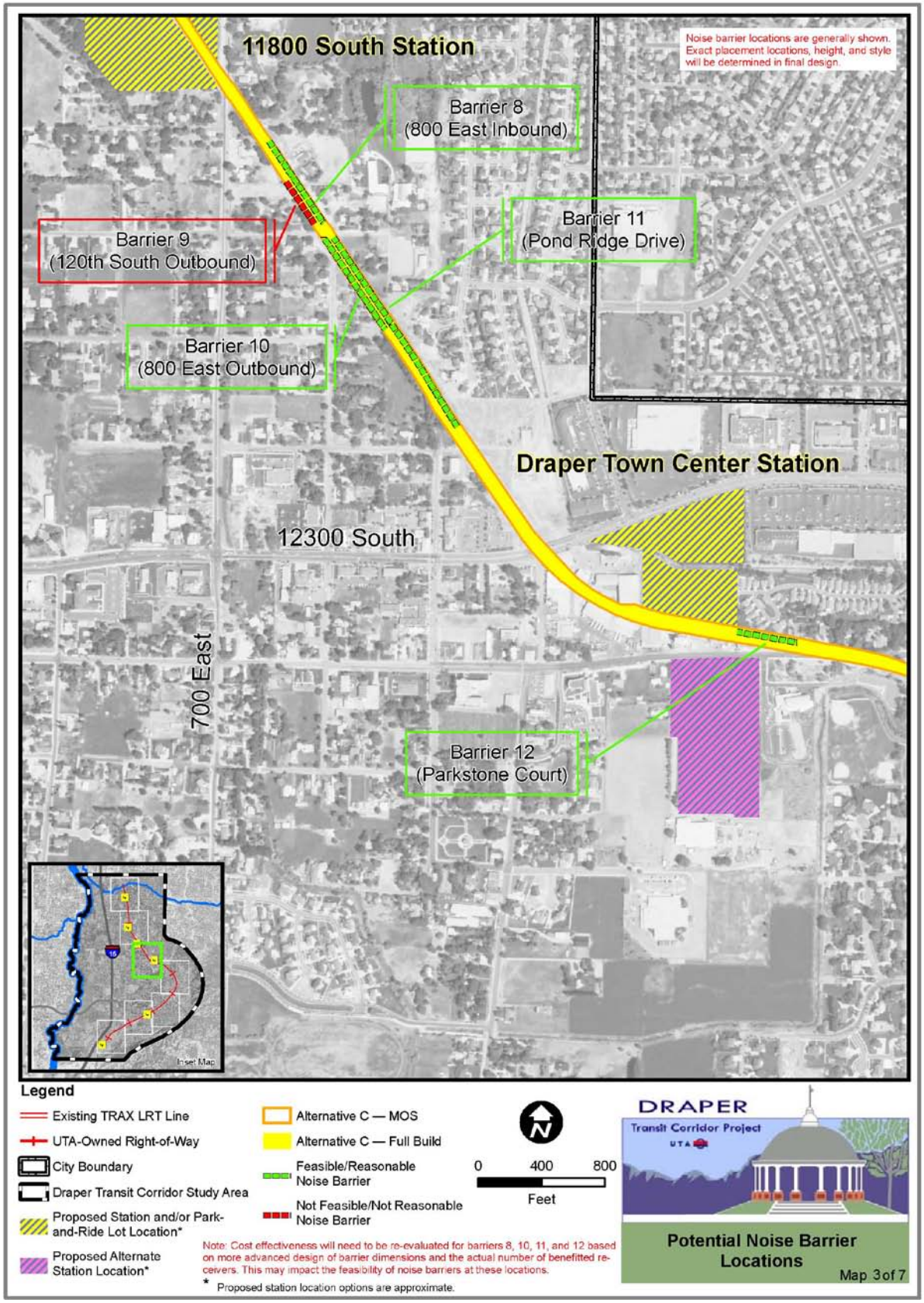


Figure 5-7. Potential Noise Barrier Locations (Map 4 of 7)

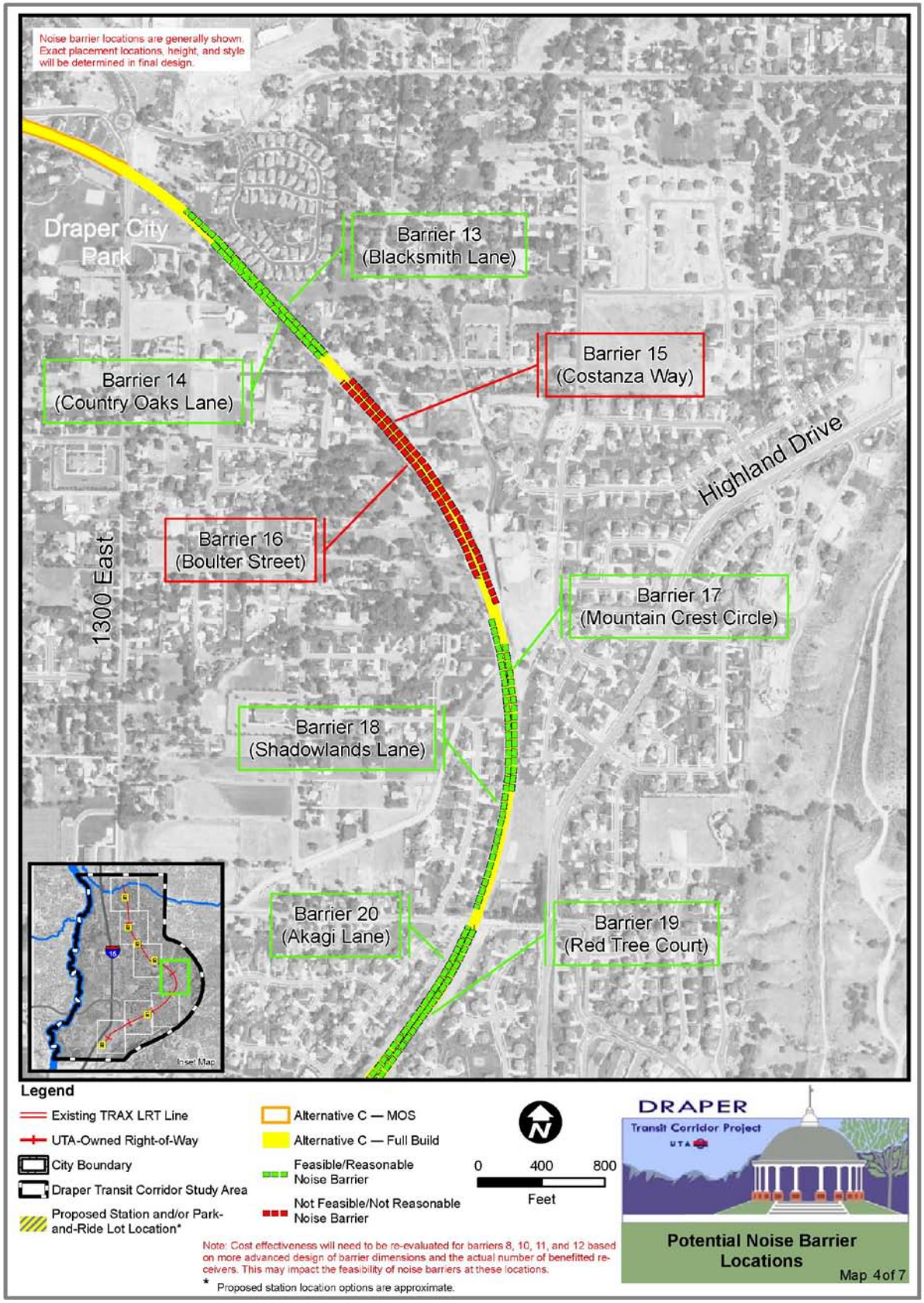


Figure 5-8. Potential Noise Barrier Locations (Map 5 of 7)

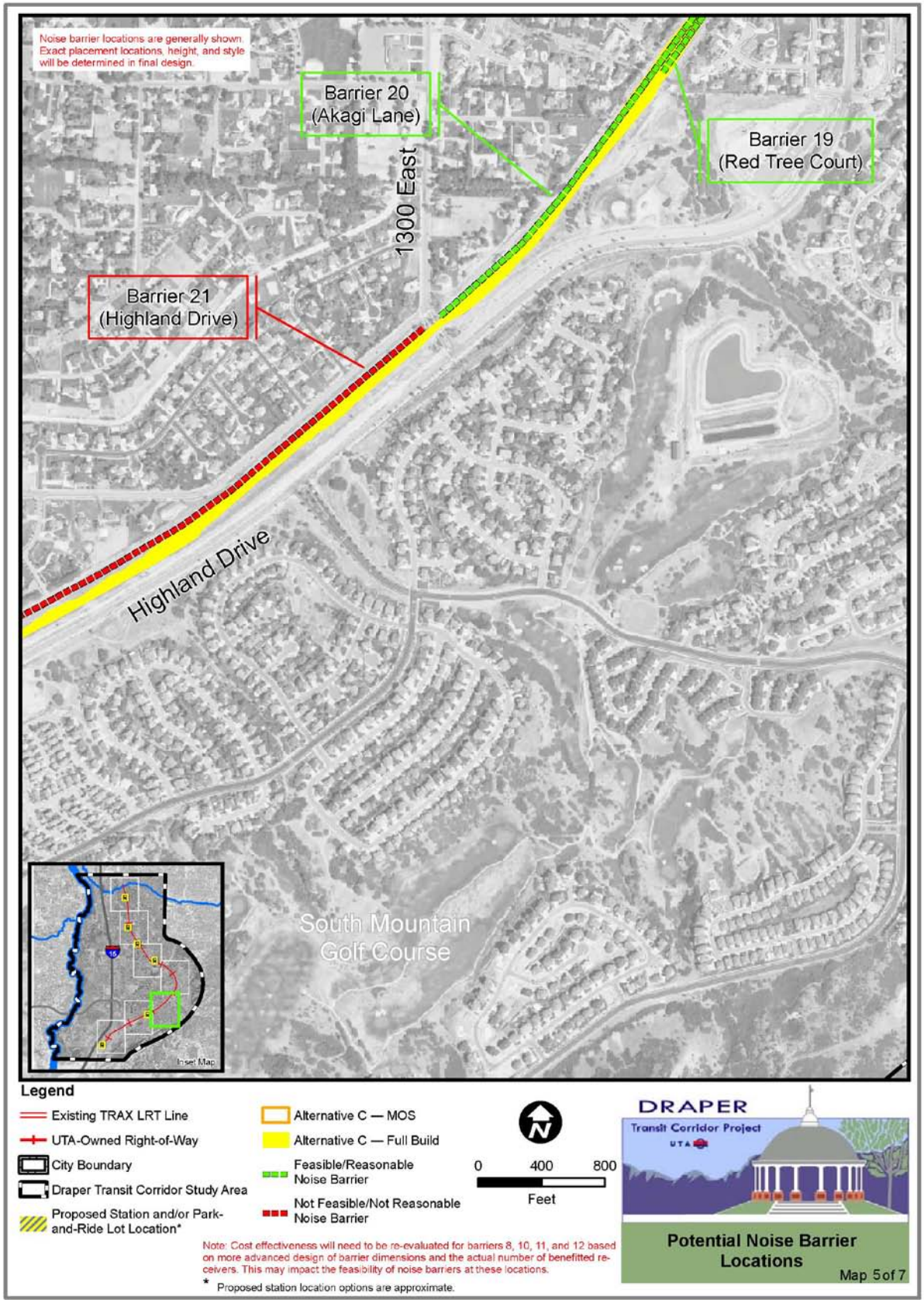


Figure 5-9. Potential Noise Barrier Locations (Map 6 of 7)

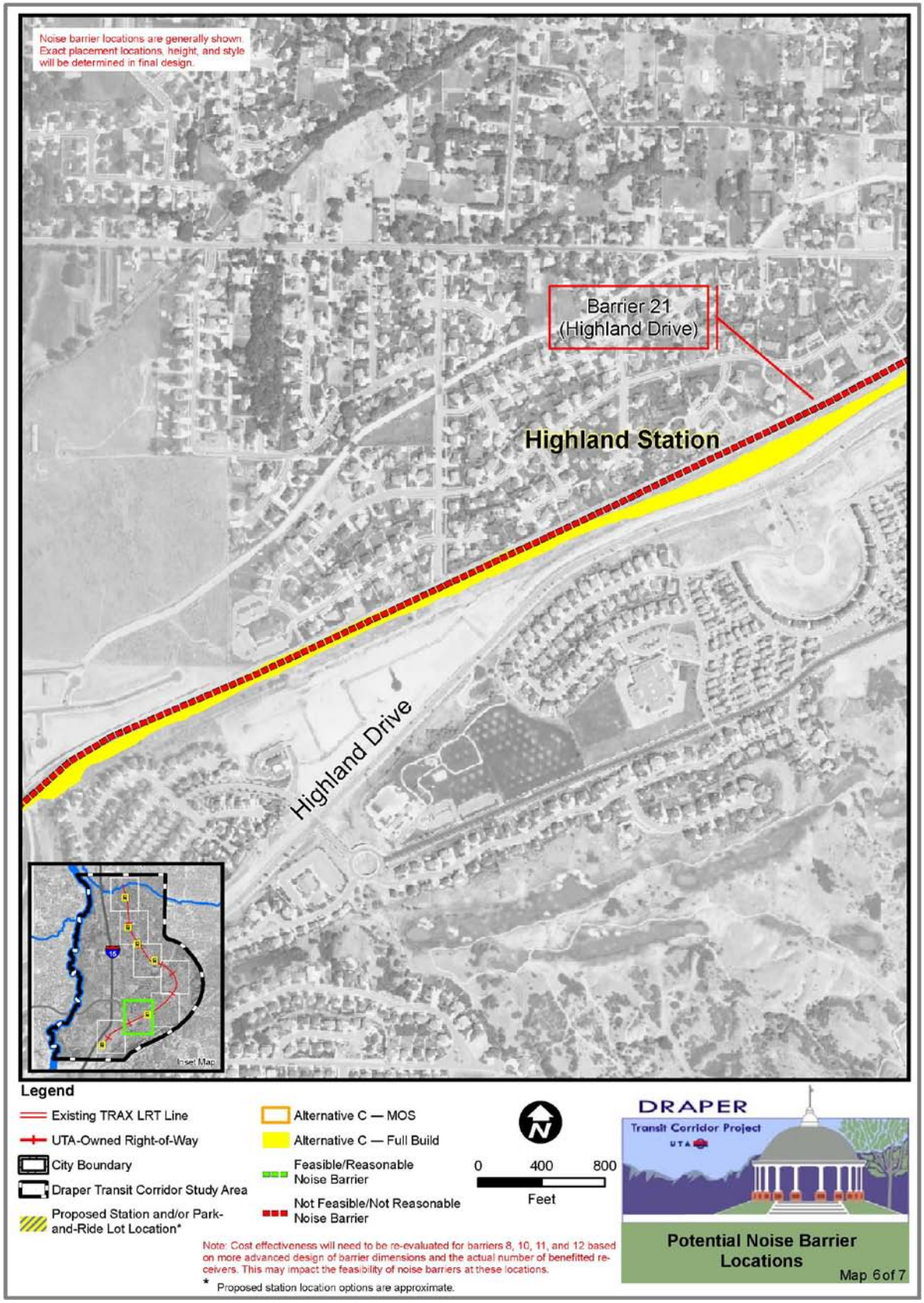


Figure 5-10. Potential Noise Barrier Locations (Map 7 of 7)

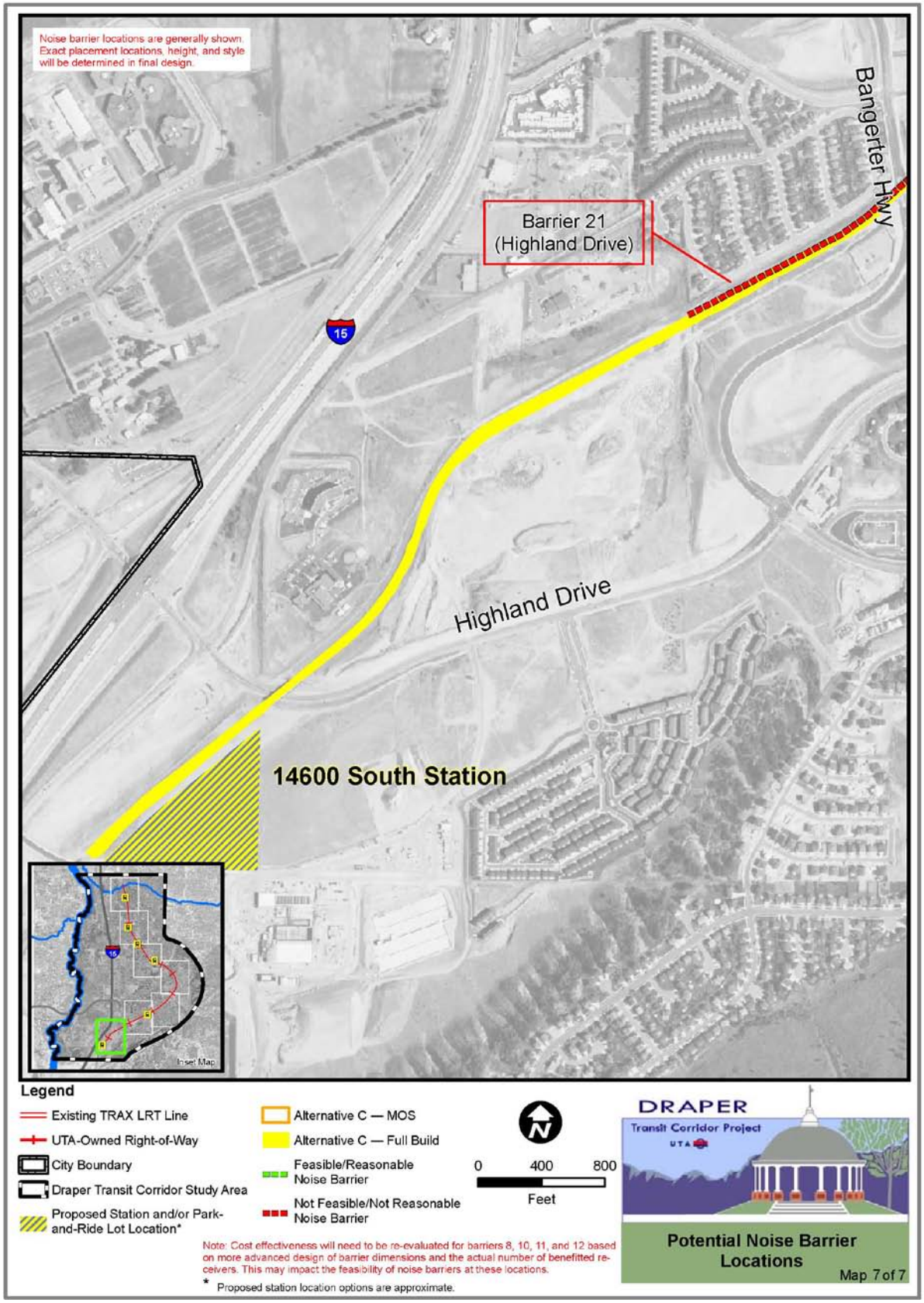


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Figure 5-11. Noise Impacts Before and After Mitigation (Map 1 of 14)

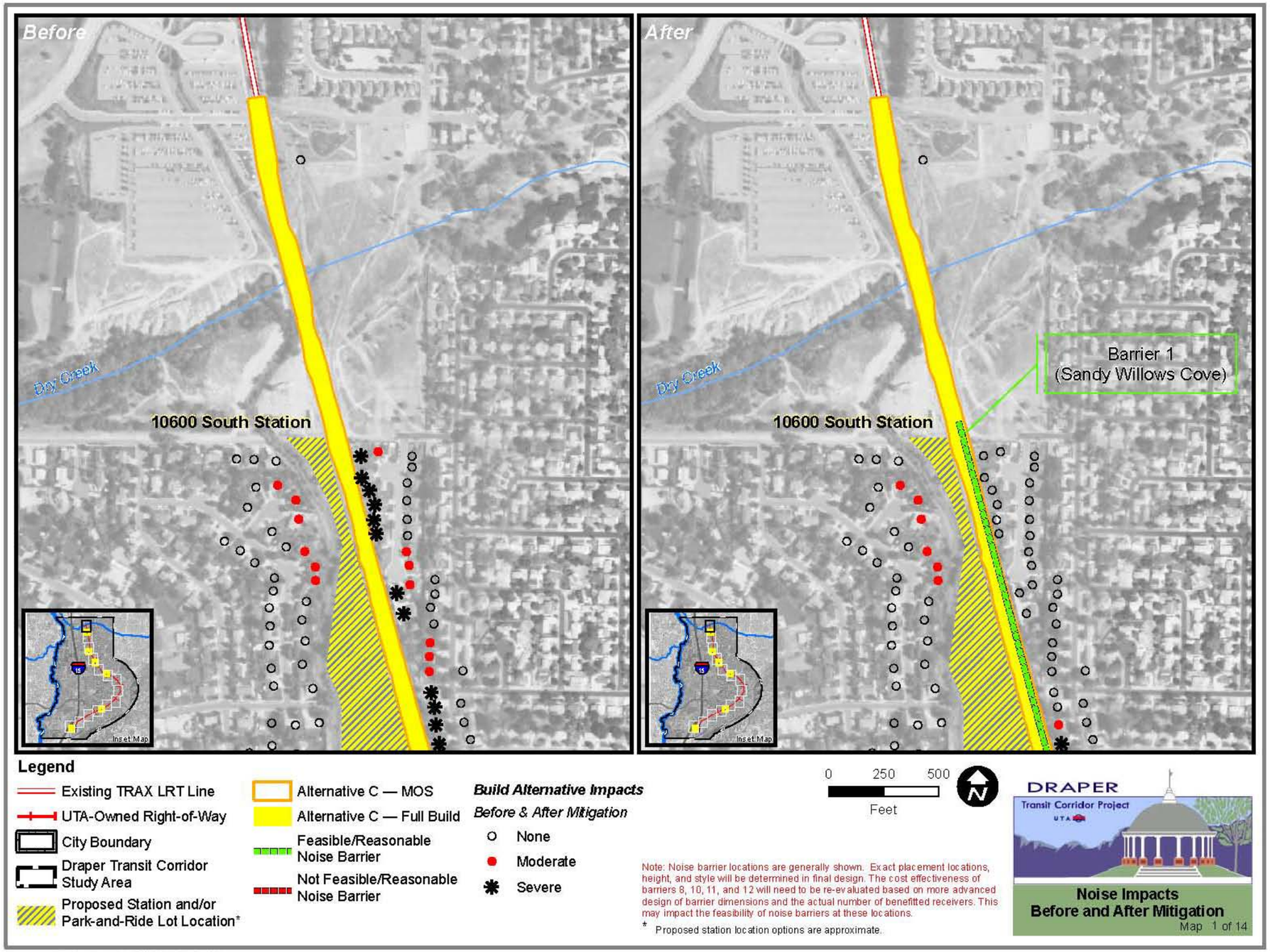

Figure 5-12. Noise Impacts Before and After Mitigation (Map 2 of 14)

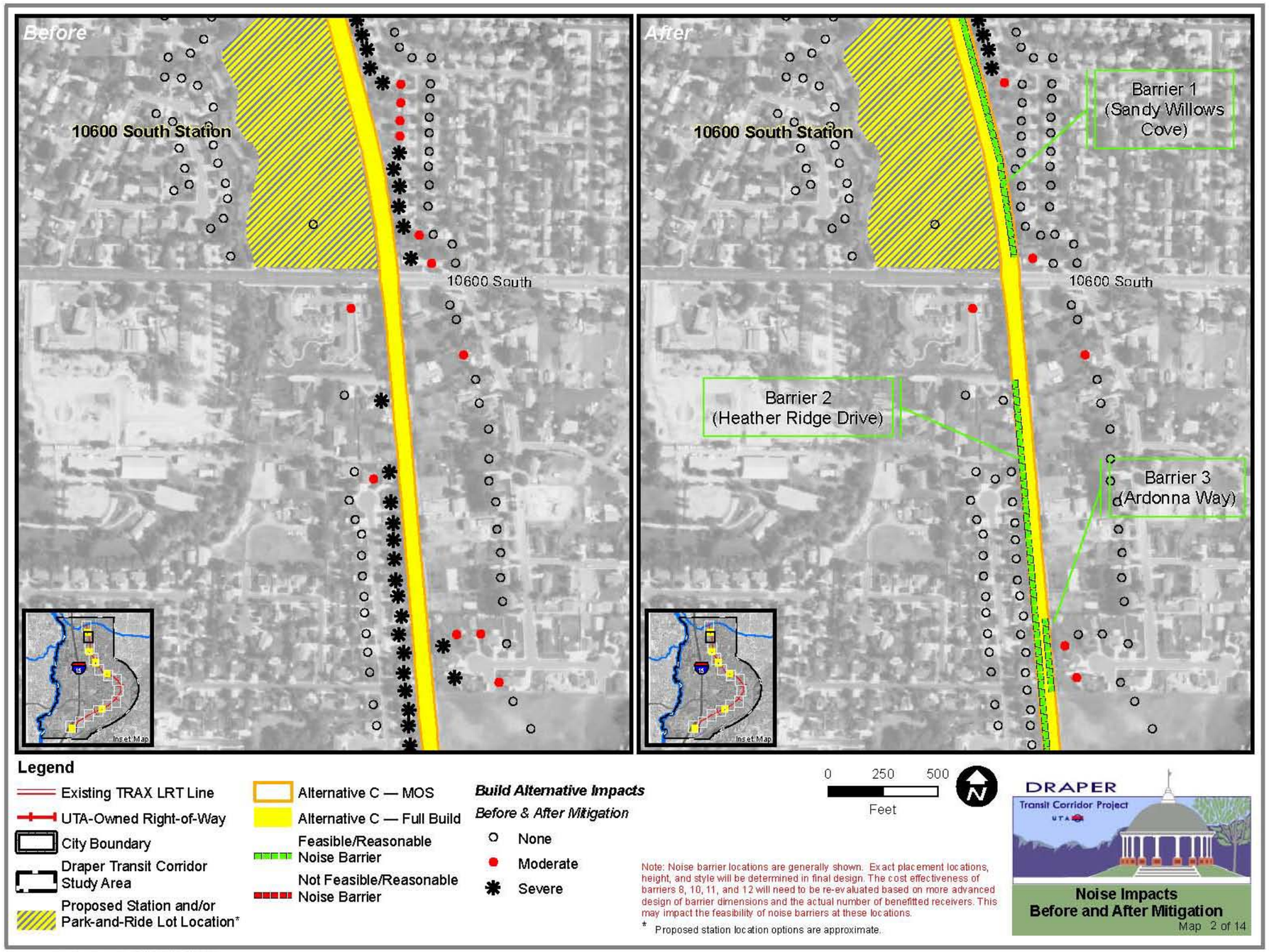

Figure 5-13. Noise Impacts Before and After Mitigation (Map 3 of 14)

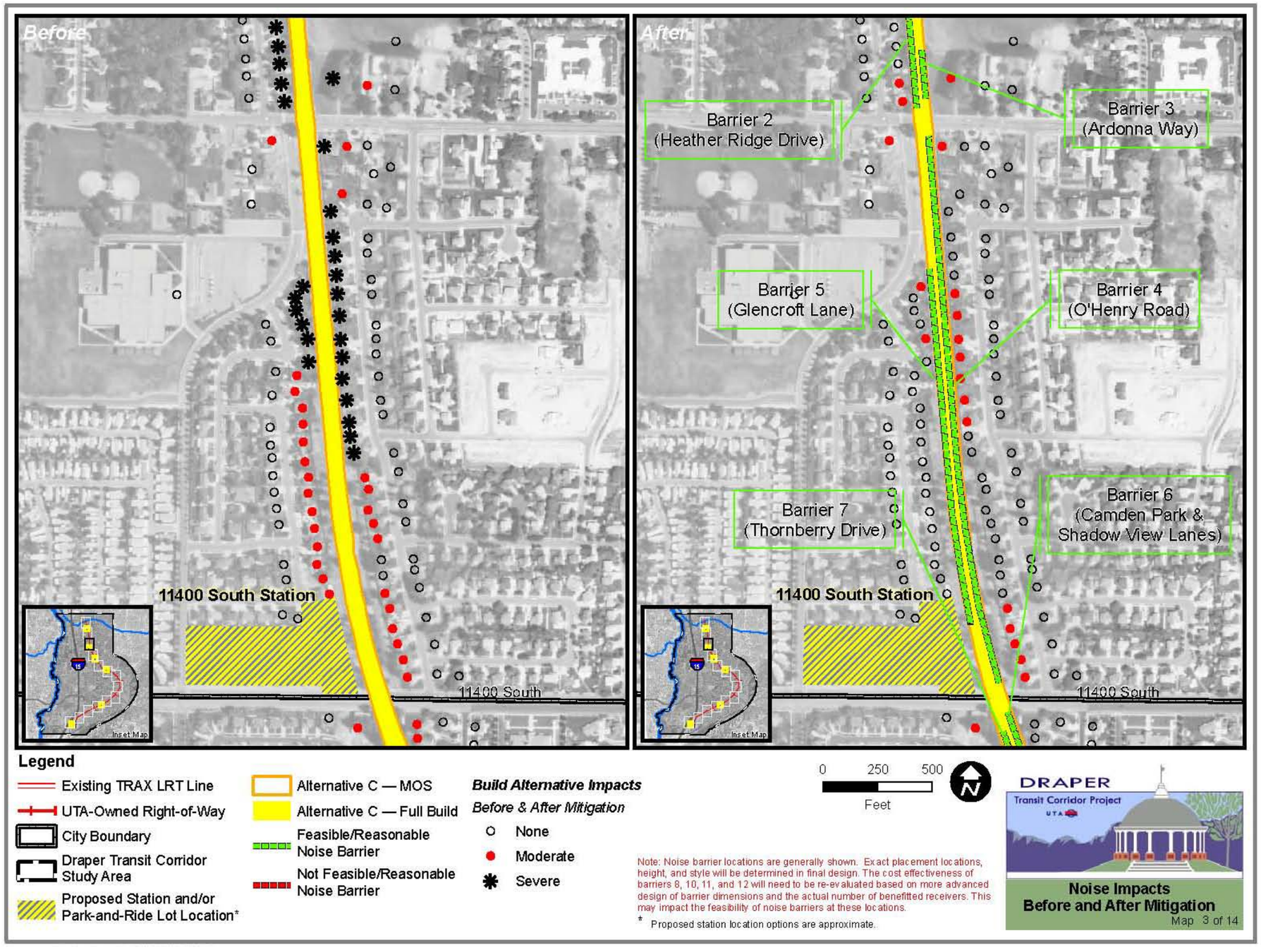

Figure 5-14. Noise Impacts Before and After Mitigation (Map 4 of 14)

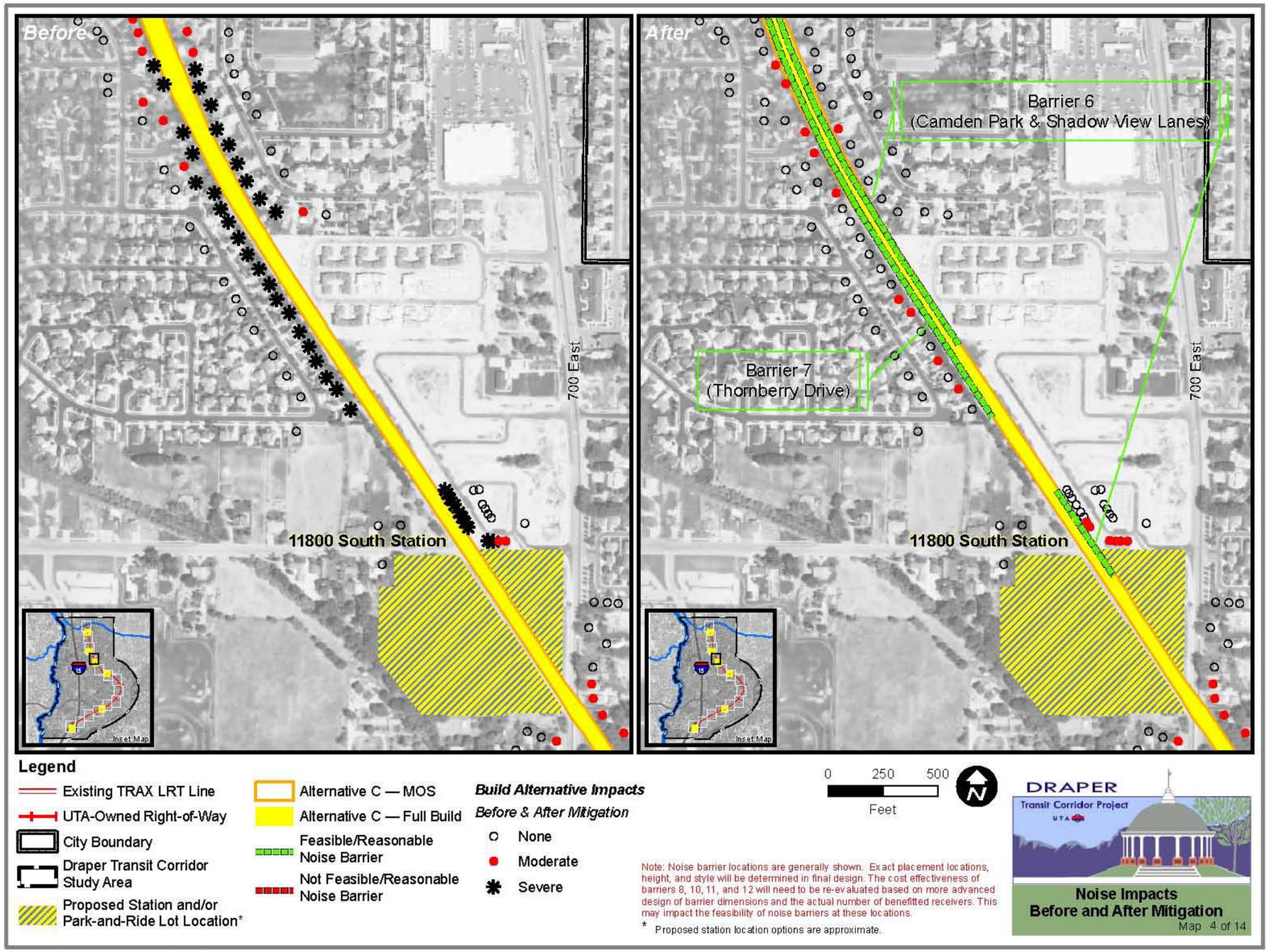

Figure 5-15. Noise Impacts Before and After Mitigation (Map 5 of 14)

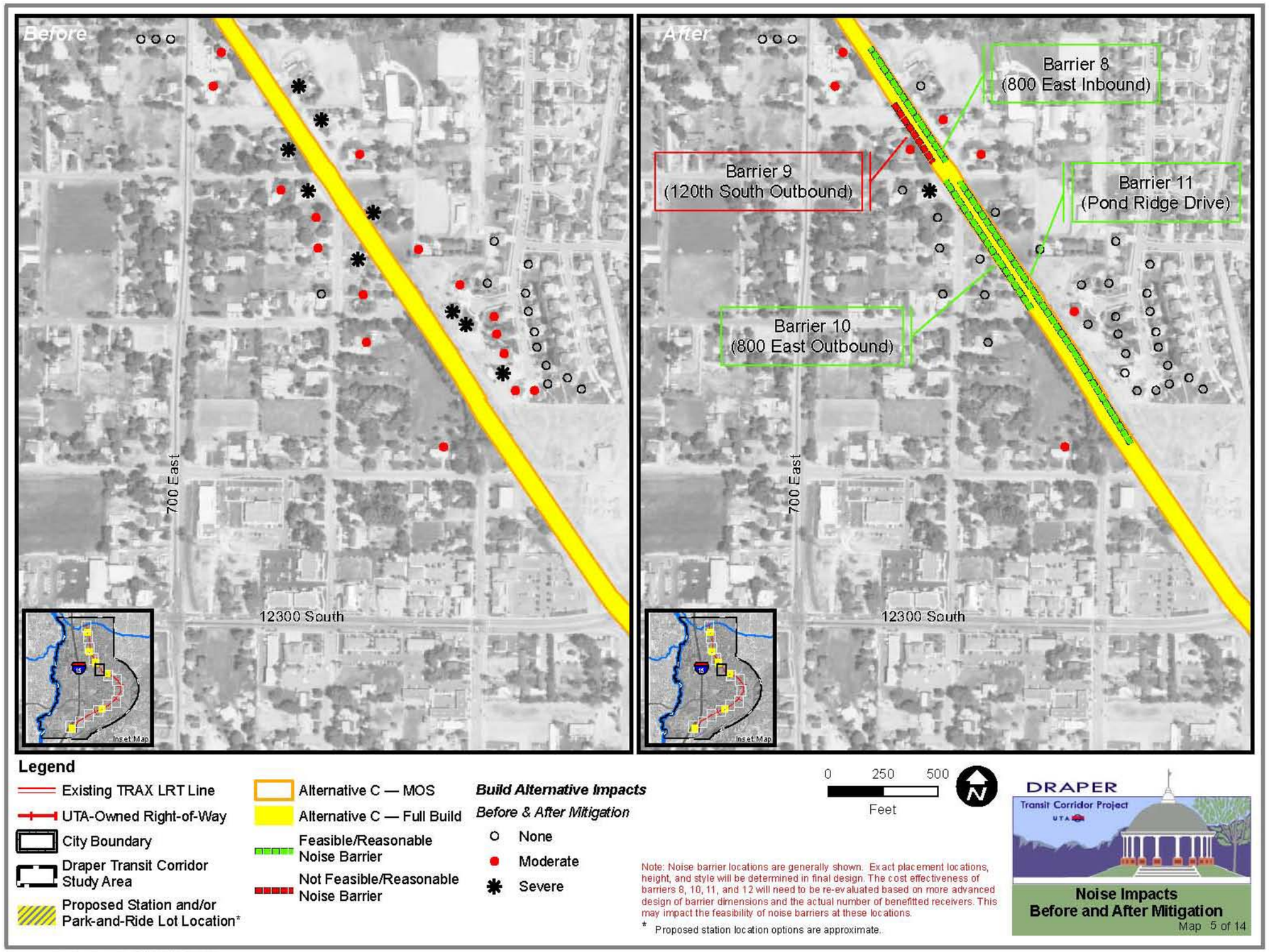

Figure 5-16. Noise Impacts Before and After Mitigation (Map 6 of 14)

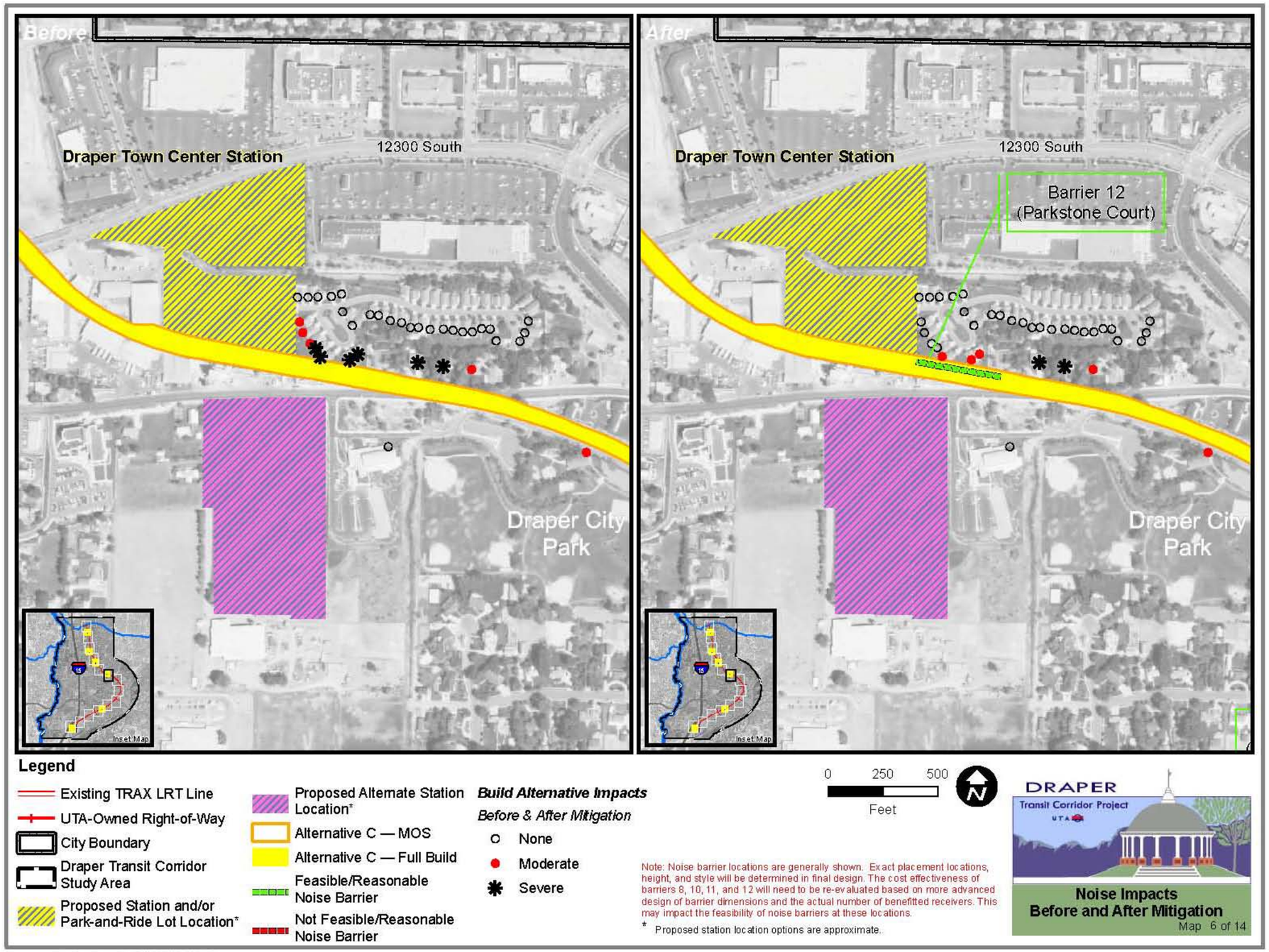

Figure 5-17. Noise Impacts Before and After Mitigation (Map 7 of 14)

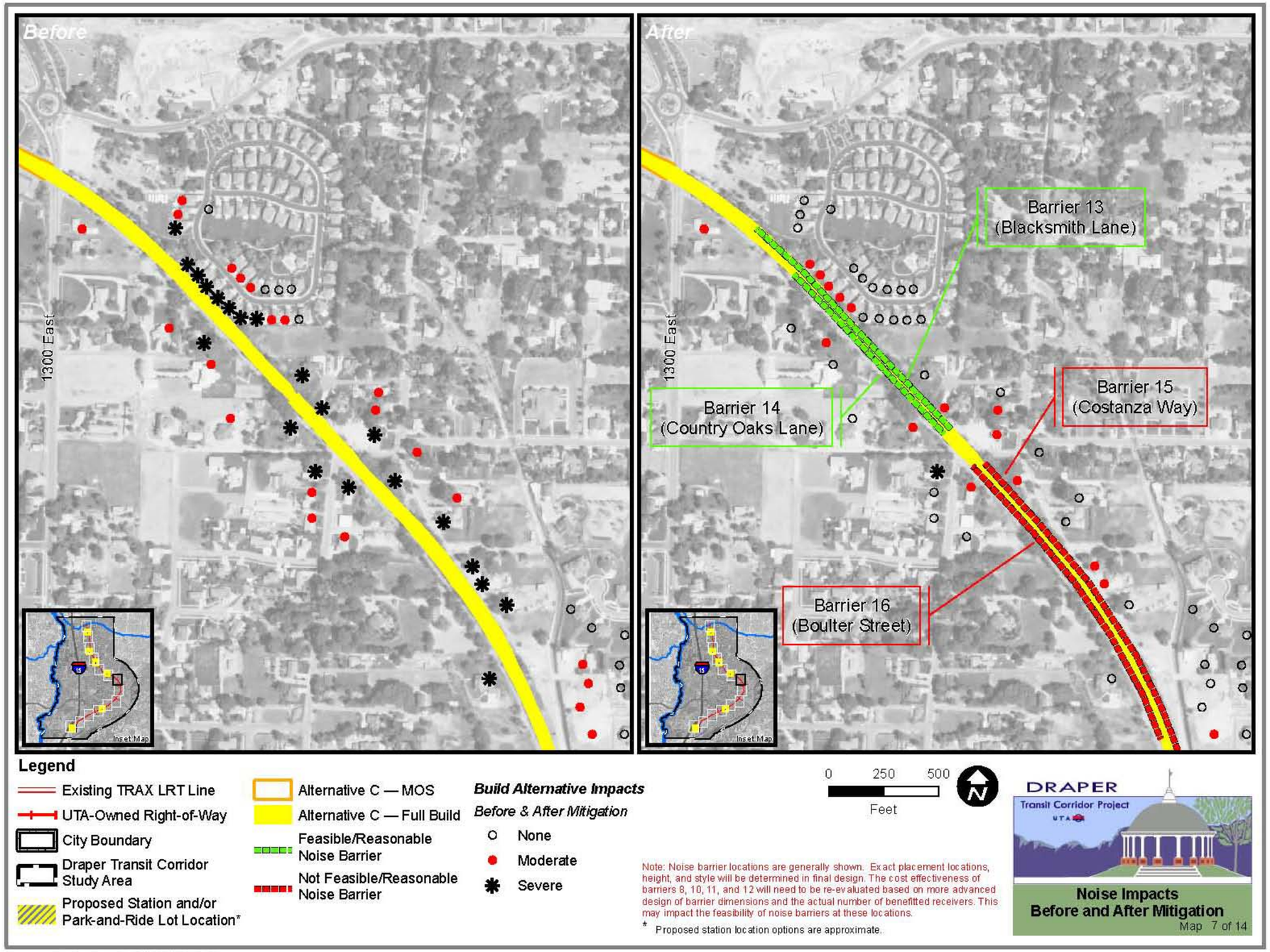

Figure 5-18. Noise Impacts Before and After Mitigation (Map 8 of 14)

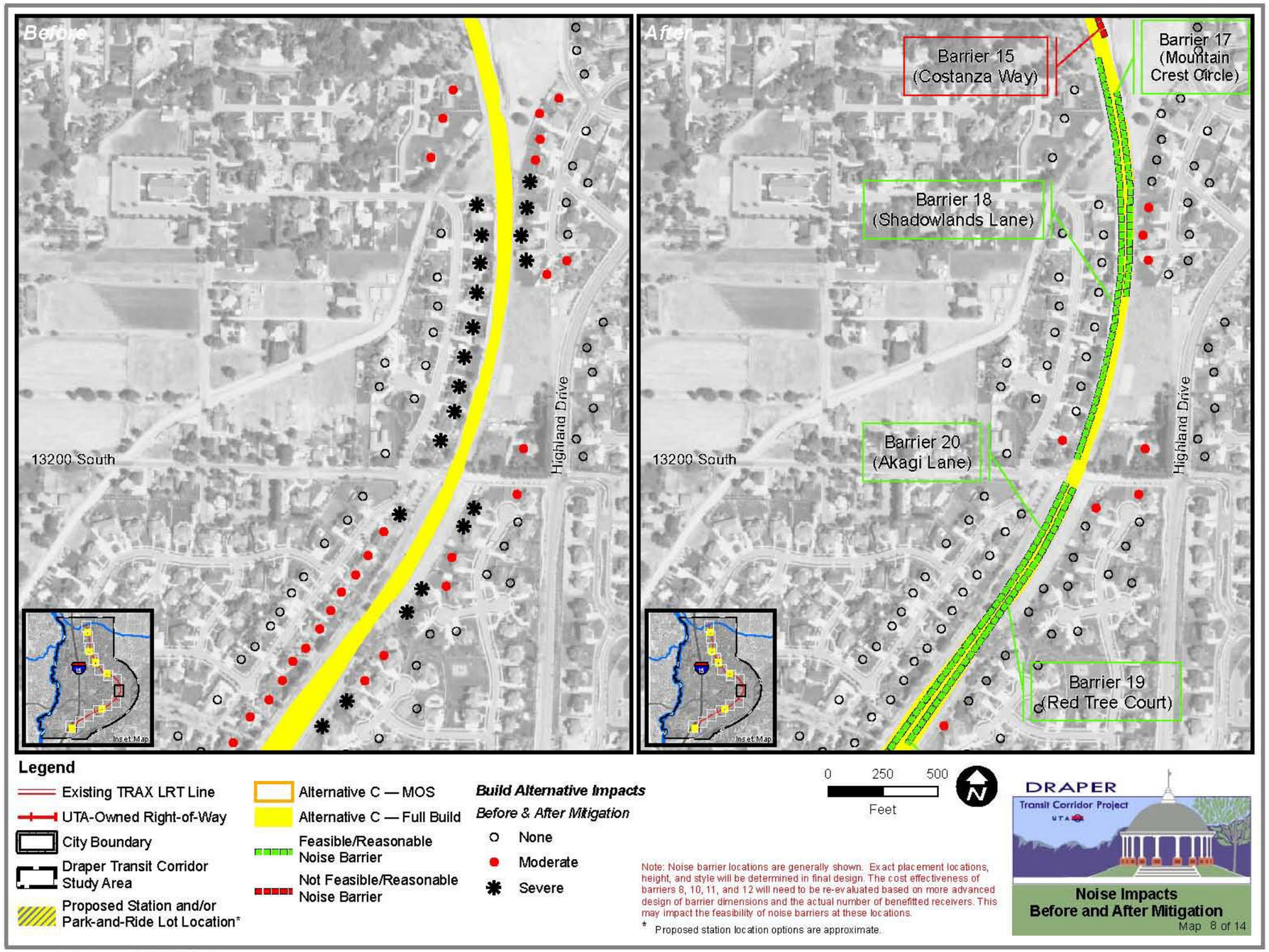

Figure 5-19. Noise Impacts Before and After Mitigation (Map 9 of 14)

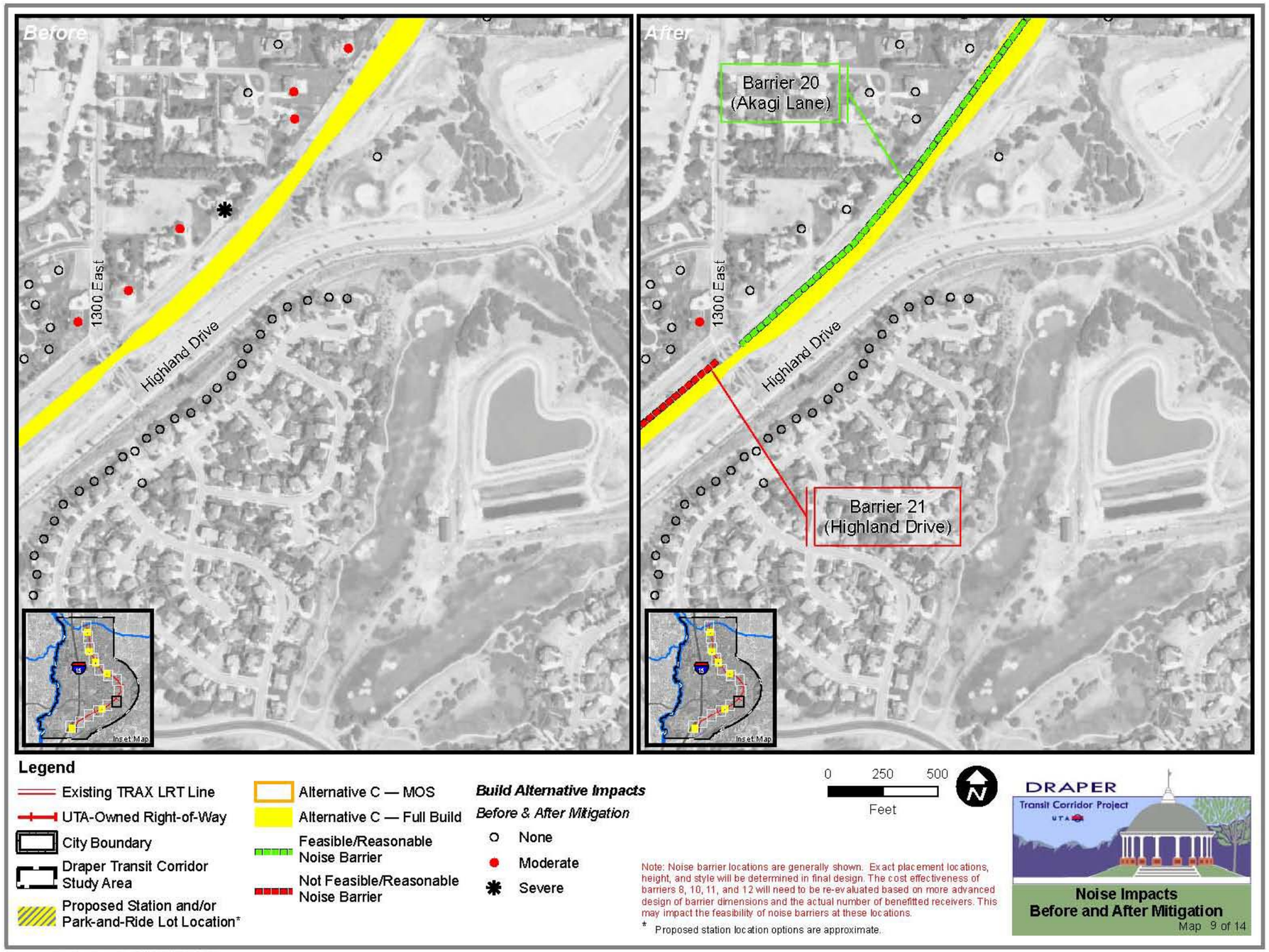

Figure 5-20. Noise Impacts Before and After Mitigation (Map 10 of 14)

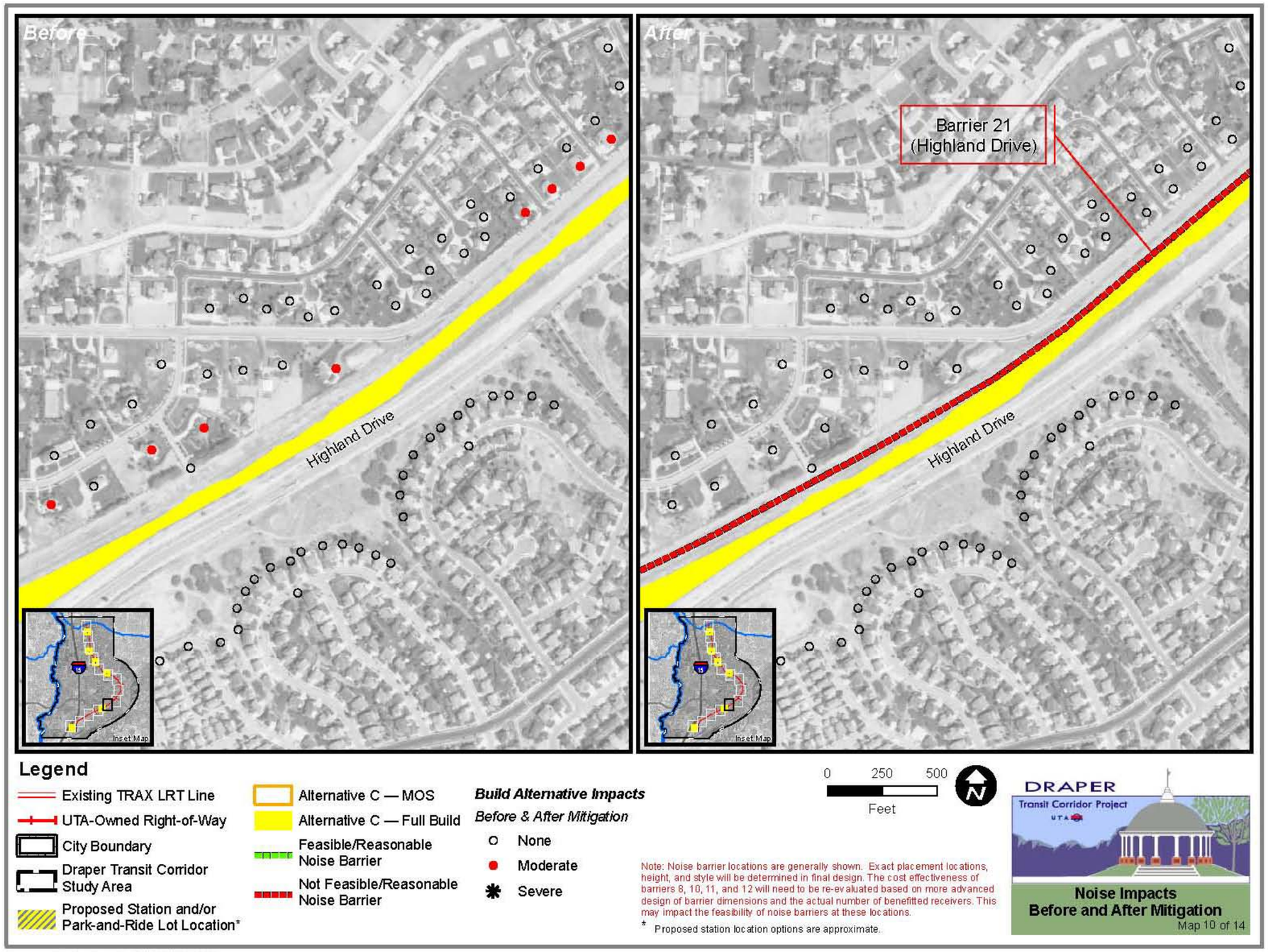

Figure 5-21. Noise Impacts Before and After Mitigation (Map 11 of 14)

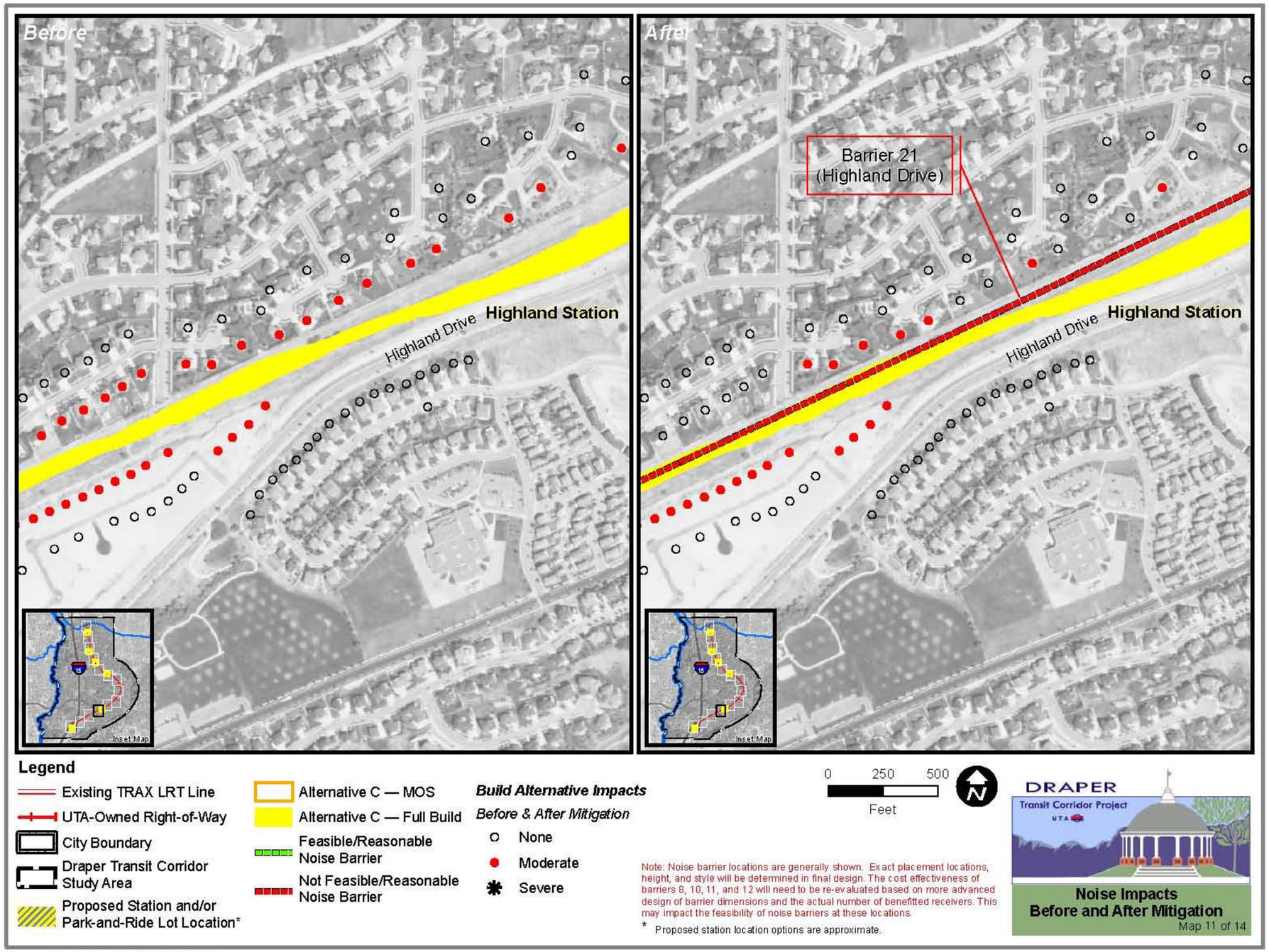

Figure 5-22. Noise Impacts Before and After Mitigation (Map 12 of 14)

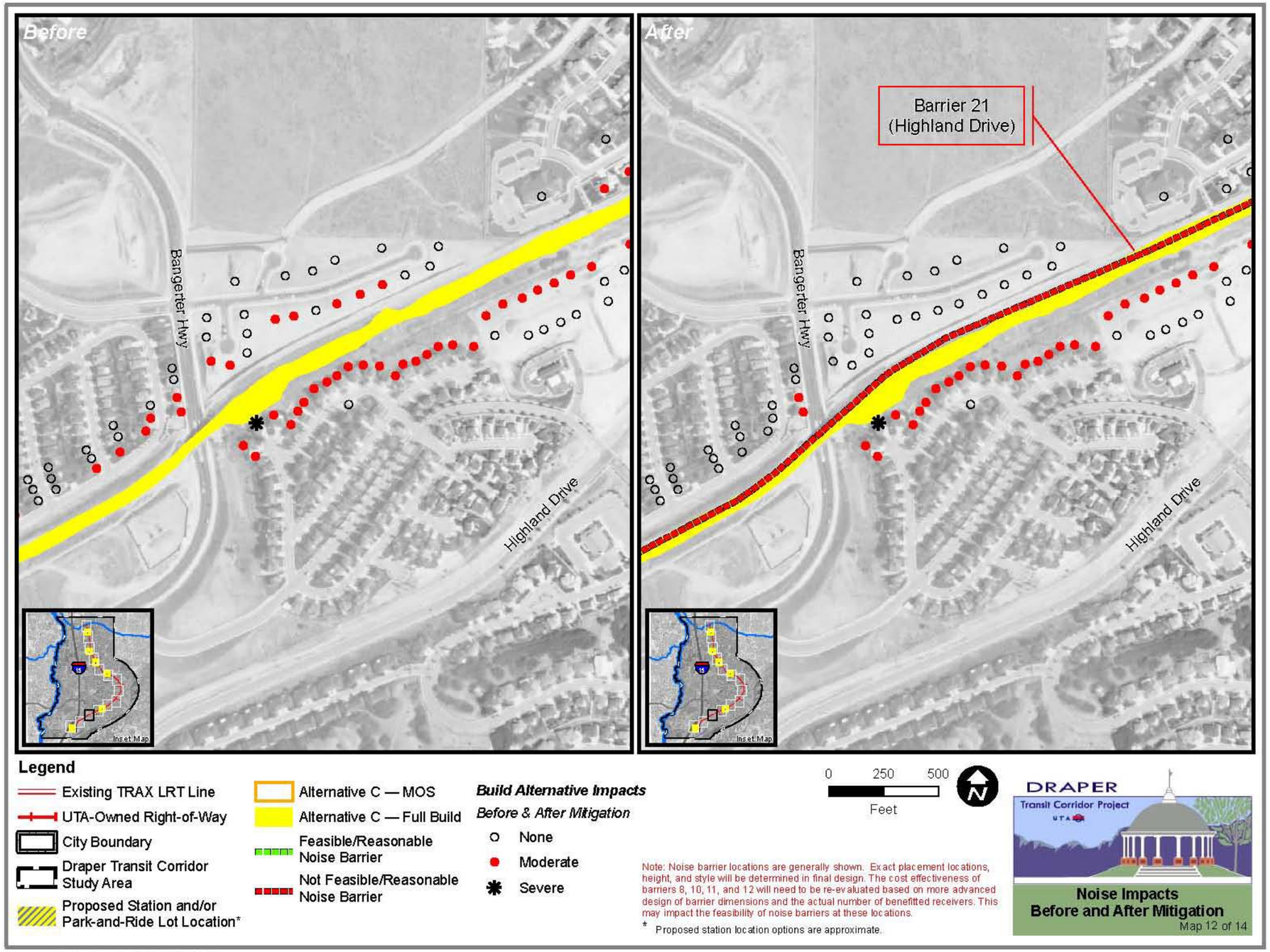

Figure 5-23. Noise Impacts Before and After Mitigation (Map 13 of 14)

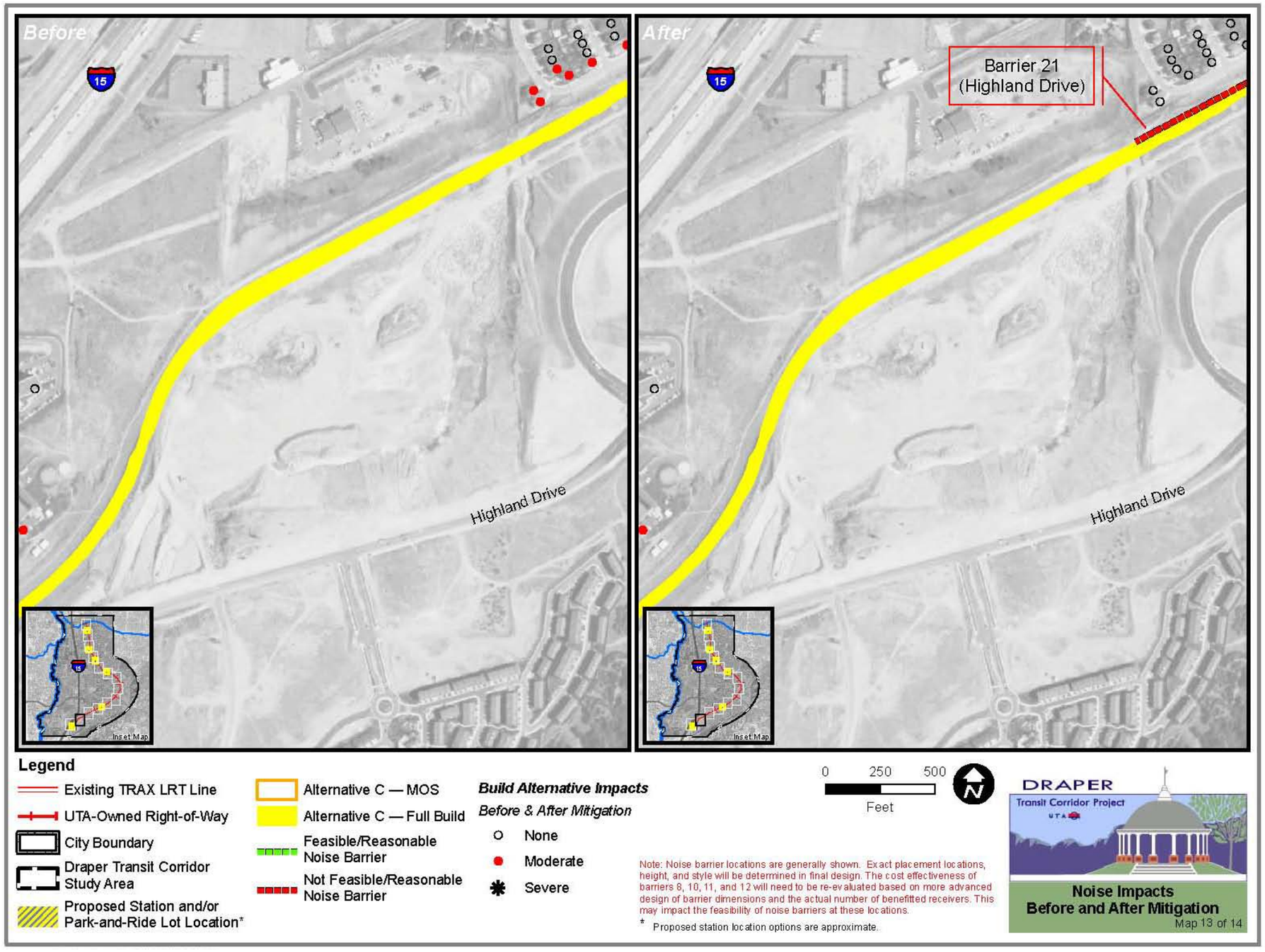

Figure 5-24. Noise Impacts Before and After Mitigation (Map 14 of 14)

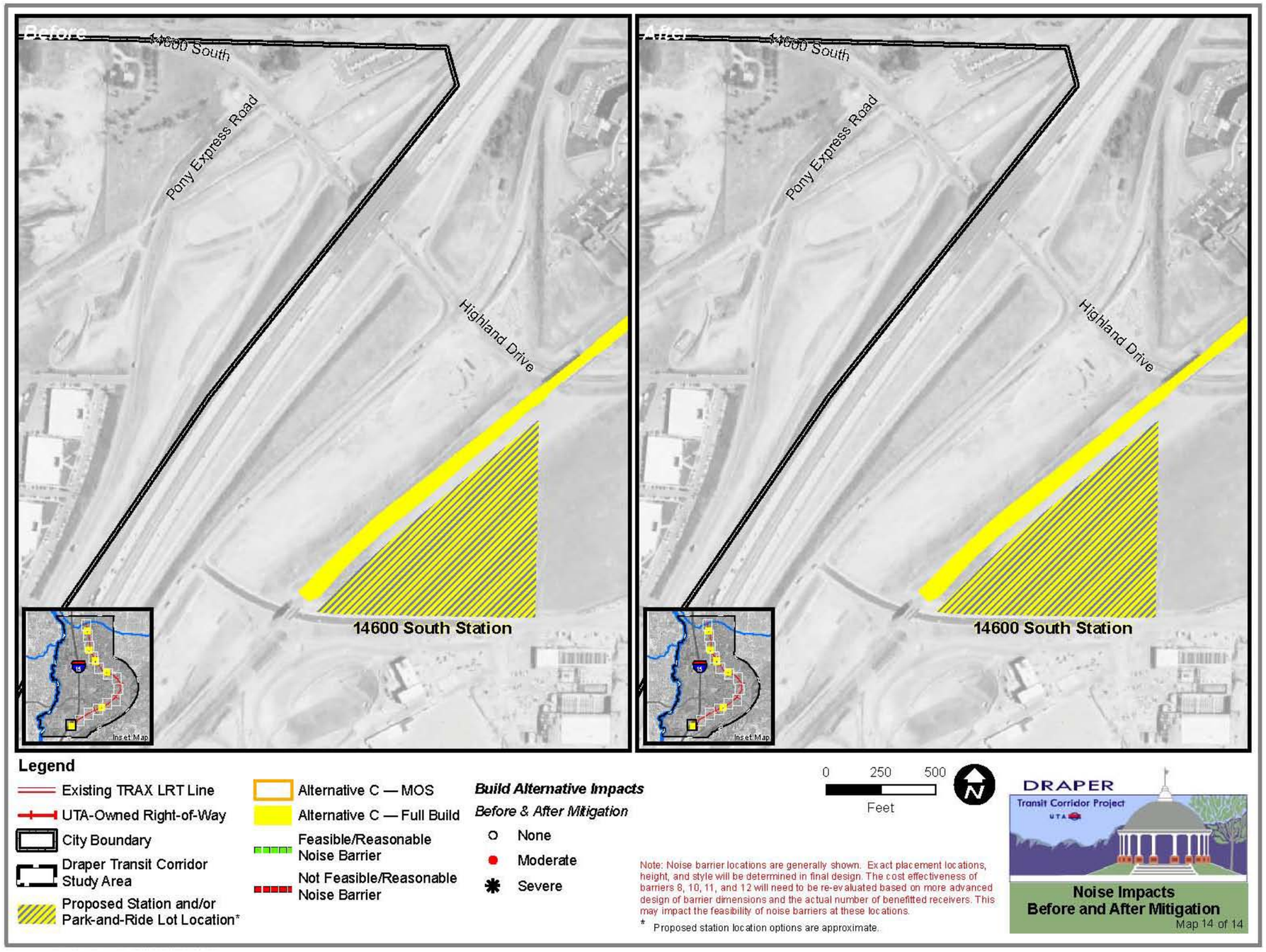

Figure 5-25. Impacts to Wetlands and Waters of the U.S.

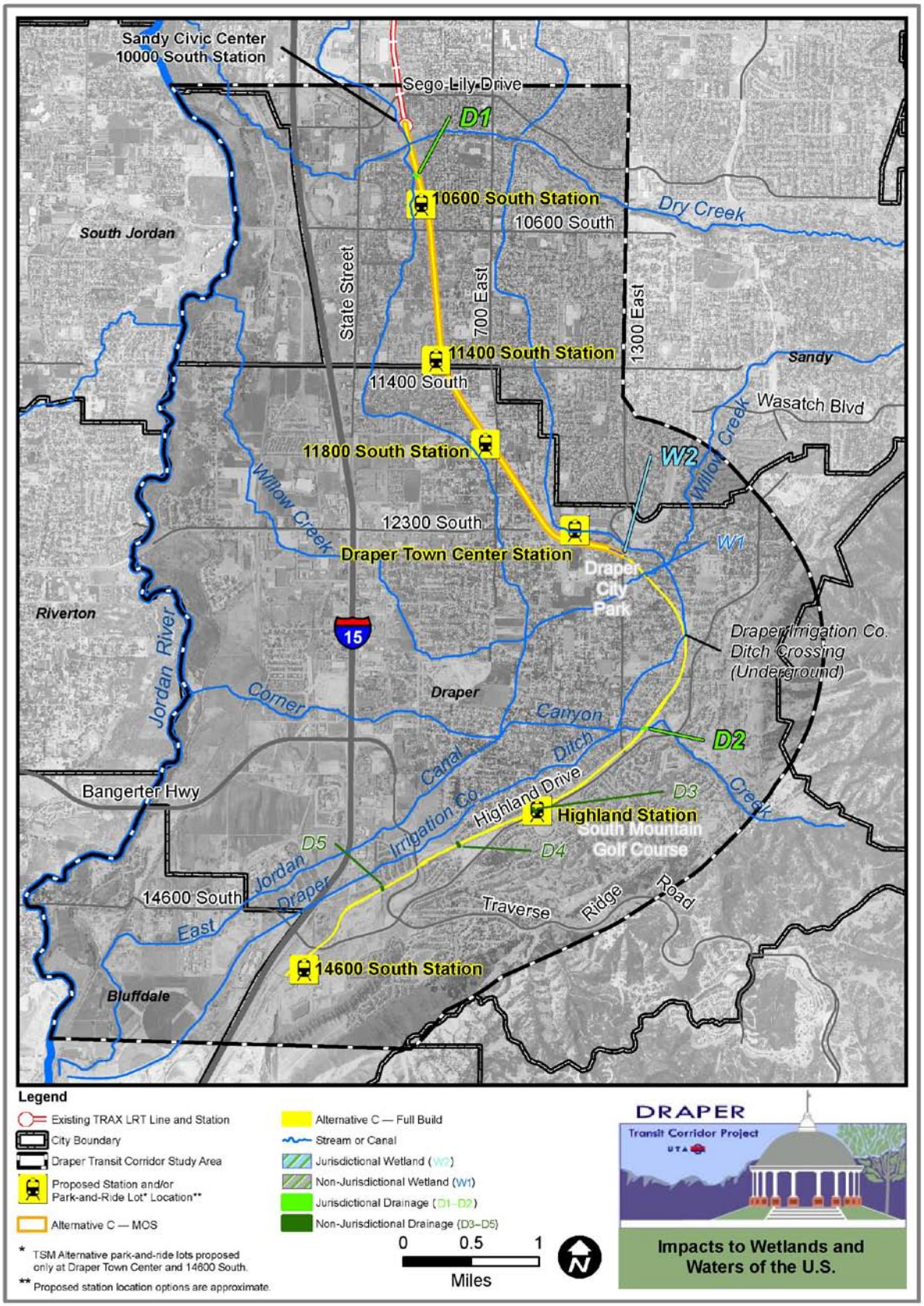

Figure 5-26. Wetland Impacts

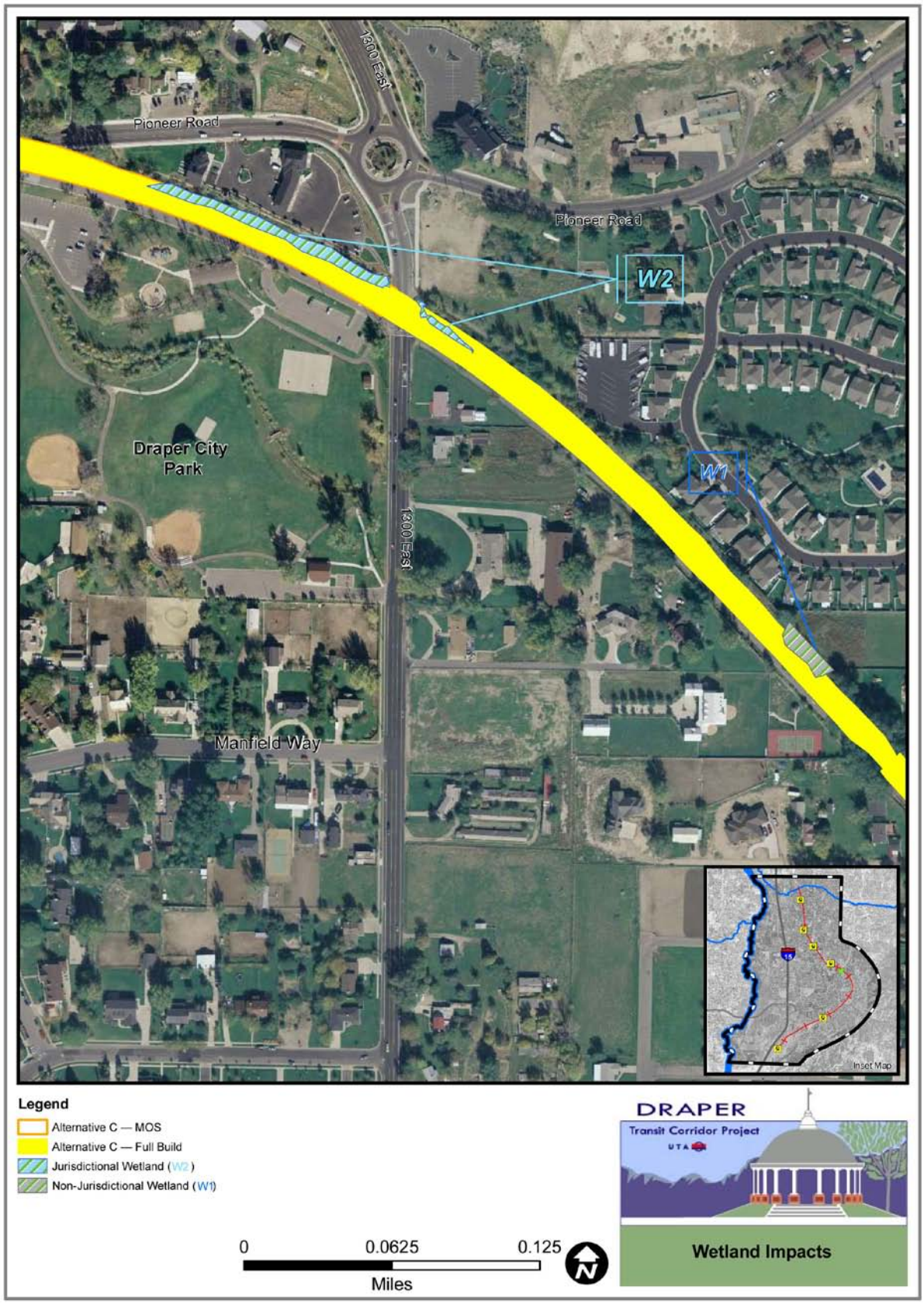

Figure 5-27. Water Quality Impacts

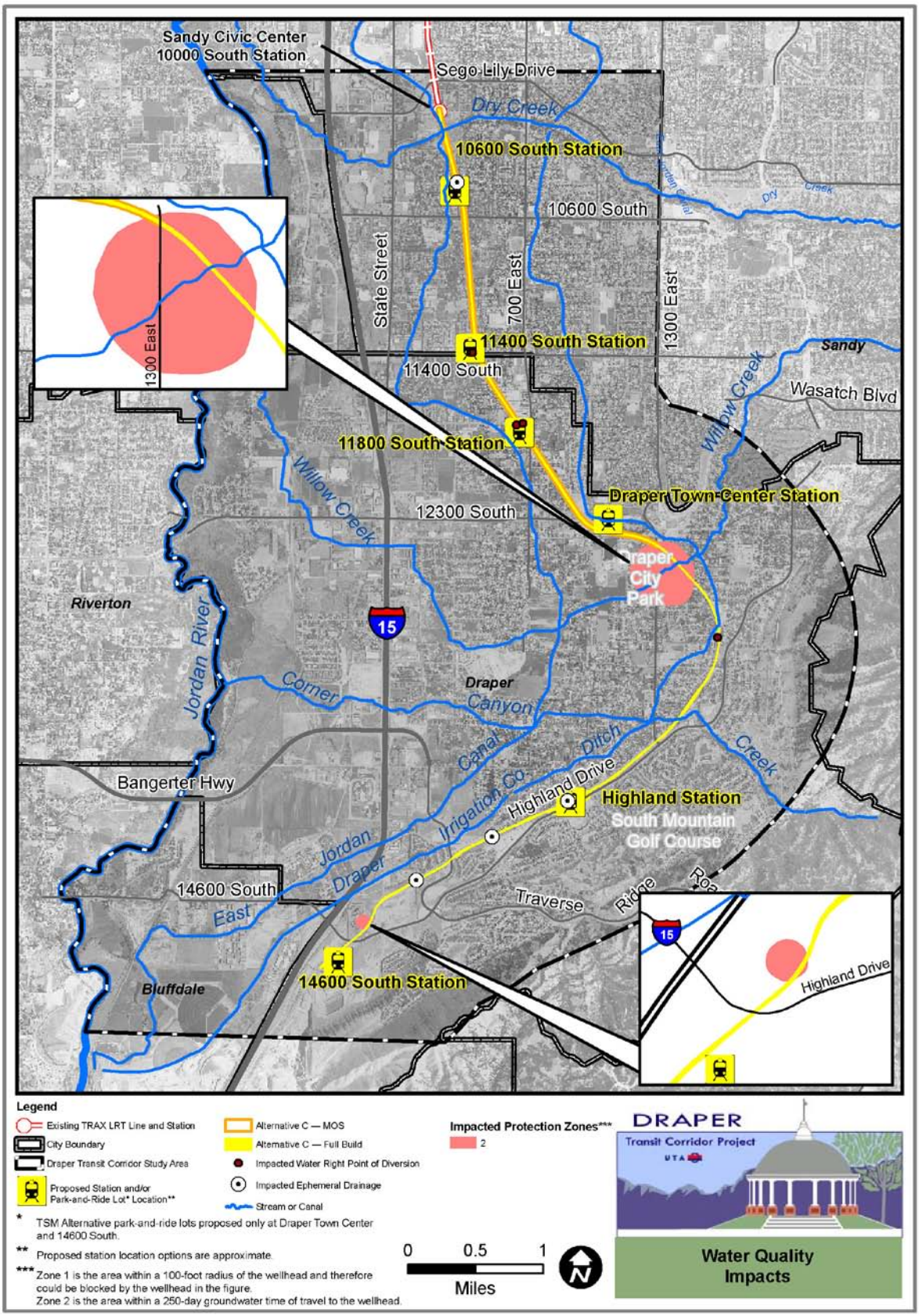

Figure 5-28. Hazardous Waste Site Impacts