

Appendix A: IMPLAN Model

Economic Impacts of the Project

The economic benefits of the Public Benefits and Cost Study are estimated using IMPLAN Professional 2.0, an economic input-output modeling system.¹ For studies similar to this, IMPLAN represents an industry standard tool for gauging economic output, earnings, and employment impacts.

This model uses economic impact multipliers to estimate the secondary benefits to the economy resulting from direct benefits to specific industries. Direct impacts are equal to project expenditures. Indirect impacts are the second round expenditures on goods and services made by the project's support industries. Induced impacts reflect the changes that occur to household spending as incomes are affected by a project's direct and indirect impacts. For example, the project may make direct expenditures for aggregate materials for steel. The aggregate supplier subsequently purchases more materials and possibly hires an additional employee, which constitute the indirect impact. The new employee, in turn, makes purchases within the region, which subsequently constitutes the induced impact.

Some caution should be used in interpreting the IMPLAN results in this section as the estimates provided represent the maximum impact to the State. The State of Colorado may not experience as large of beneficial impact, depending on the relative mix of State and Federal funding used to pay for the project.

If the majority of project funding is Federal, Colorado will experience the maximum beneficial impact because Federal dollars represent a net increase in funds available for local projects. If the majority of the project is State-funded and state funds are scarce, the impacts to Colorado are not as clear because the funds used to finance the project may preclude other worthy projects in other parts of either State. Alternatively stated, if Federal funds are used to finance the majority of the project the entire state of Colorado benefits; if state and local funds finance the majority of the project, regions within the state are competing and some regions will benefit at the expense of others.

One of the advantages of using IMPLAN is an ability to tailor a specific regional economic model. As Table A-1 shows, the counties in the state of Colorado were divided into four models to represent Western Colorado, the Front Range, Western Colorado, and the entire State of Colorado.

¹ IMPLAN was originally developed by the Forest Service of the U.S. Department of Agriculture in cooperation with the Federal Emergency Management Agency and the Bureau of Land Management. Subsequent development and distribution of the model has been managed by the Minnesota IMPLAN Group, Inc (MIG). This model is widely accepted by resource agencies for economic impact assessment.

Table A-1

IMPLAN Models for the Public Benefits and Cost Study

Model	Included Counties
Western Colorado	Alamosa, Archuleta, Chaffee, Conejos, Costilla, Custer, Delores, Delta, Eagle, Fremont, Garfield, Gilpin, Grand, Gunnison, Hinsdale, Jackson, La Plata, Lake, Mesa, Mineral, Moffatt, Montezuma, Montrose, Ouray, Park, Pitkin, Rio Blanco, Rio Grande, Routt, Saguache
Front Range	Adams, Arapahoe, Boulder, Clear Creek, Denver, Douglas, El Paso, Jefferson, Larimer, Pueblo, Teller, Weld
Eastern Colorado	Baca, Bent, Cheyenne, Crowley, Elbert, Huerfano, Kiowa, Kit Carson, Las Animas, Lincoln, Morgan, Otero, Phillips, Prowers, Sedgwick, Sogan, Washington, Yuma
Statewide	All counties were included in this model.

The current mix of industries for each model is explicitly considered using county-level employment and earnings data, as reported through the Department of Commerce, Bureau of Labor Statistics. Approximately 520 sectors of the regional economy are considered separately in IMPLAN model.

For modeling purposes, the “Highway, Street, Bridge, and Tunnel Construction” sector was adjusted to represent annual rail construction activities occurring for this project.² Total construction costs were divided evenly among four construction years. IMPLAN results illustrate direct and indirect jobs created, as well as total wage earnings and tax impacts of each year of construction for the State of Colorado.

Low, midrange, and high scenarios were designed to represent the possible employment impact a new rail line would have to Eastern Colorado economic development.³ Six economic sectors were weighted to show a potential breakout of increased economic

² Concrete and cement weightings were replaced by steel and timber in the model.

³ The low scenario would increase direct labor by 100 jobs, the midrange scenario by 500, and the high scenario would increase total direct employment in the region by 2,000.

activity: heavy manufacturing, wholesale trade, scientific research and development, flour milling, animal food manufacturing, and animal slaughter. IMPLAN results show the impact each scenario would have not only on the economic sectors, but also on increase in final demand, impacts to the remainder of Colorado, and federal and state tax impacts.

A similar analysis was done for the Front Range. Four sectors were used to describe changes in economic activity: heavy manufacturing, other manufacturing, warehouse and distribution facilities, and scientific research and development. IMPLAN results illustrate the impact of the high, midrange, and low job creation scenarios on the four economic sectors, as well as increase in final demand, impacts to the remainder of Colorado, and federal and state tax impacts.

Appendix B: Interviews of Individuals Interested in Impacts to Economic Development in Eastern Colorado

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Interviewer	Nathan Macek, AECOM Consult

1. Due to the Railroad Project, what are the major influences the relocated rail line will have on communities in Eastern Colorado?

- Important to understand that economic impacts won't be for considerable amount of time. Will not see economic activity for several years down road
- First element is construction, which will result in jobs for region.
- Second is economic activity related to movement of infrastructure.
- This is huge project, may only happen every 100 years. Huge vision, need to carefully consider and do right. Compares to vision behind DIA effort.
- Depending on where hubs and connections are located, there will be spin-off activity. Much near Front Range, especially near DIA, but much in Eastern Colorado as well due to railroad and truck connections east of Front Range.
- From an agricultural standpoint, there will be increased opportunity to move produce, aided by increased infrastructure.

2. Due to the Railroad Project, what are the major influences the relocated rail line will have on agricultural businesses in Eastern Colorado?

- The biggest will be the increased ability to market commodities grown in the region.
- Similar benefits are selling products as well as bringing in additional products (such as fuel) that are consumed by growers. But this depends on whether there's an adequate depot to bring in and distribute these goods received by rail.
- The project brings opportunities, but he doesn't know what the structure of opportunities will be because this will driven by economy. The group needs to keep big-picture focus on the many opportunities. Too many are focused

on coal train right now, but need to focus on the variety of opportunities in addition to coal.

3. Due to the Railroad Project, what are the major influences the relocated rail line will have on the trucking firms in Eastern Colorado?
 - Depending on whether there is depot and infrastructure to transfer commodities to trucks, the project can enhance trucking. If no depot, rail will compete with trucks and will not enhance transport in the region. The project needs to make the market work.
 - There is a need to keep capacity in Denver to allow freight to get in to Denver by rail without transferring to truck. Would defeat purpose of project to place freight on truck instead of rail to ship directly into Denver, given congestion that trucks will generate.
4. Due to the Railroad Project, what are the major influences the relocated rail line will have on economic activity in Eastern Colorado?
 - a. Growth in existing businesses by type of business
 - Any businesses dealing with agriculture
 - Railroads themselves
 - Any place where there's hub infrastructure that takes commodities off rail lines and places on trucks, depending on type and coordination of activity
 - Grain elevators will see increased capacity to load and store from/to trains, depending on where train goes
 - Opportunities shaped by changes in economic needs for agricultural products—biodiesel or other emerging products that require agricultural production.
 - Notes that tremendous infrastructure now in place to support trucks, which is complement to improved rail infrastructure.
 - b. Existing business – added jobs
 - Any of above industries if poised for growth will add jobs.
5. Will Eastern Colorado communities lose any businesses due to the Railroad Project?
 - Hard question because cannot see that far down the line. Competition always healthy but may force economies of scale or other factors that mean end up losing a business or two. Possibility that some may be lost, but advantages outweigh the disadvantages. Not able to identify any business in particular because of how far down the road the project would be.

6. Do you think any new businesses to might come to eastern Colorado due to the Railroad Project?
 - a. New businesses (kinds of businesses)
 - To some degree businesses will still be oriented towards freight, so however moved from rail to truck to local carrier will still be required.
 - There will be opportunities, but don't know what they are. Tremendous opportunity for regional hub where rail and highways converge at a terminal. Consider moving freight movements out of Denver that don't require movement through Denver.
 - b. New business jobs
 - See comments above

7. Current range in value of land in dollars per acre
 - a. In the communities
 - Price goes up from rural land price, additional \$200-\$300 per acre
 - Land value depends on the ability of a community to shape itself to attract development, but right now the rail line is not near any communities, so not many towns poised to cash in on development from relocated rail.
 - b. Between the communities
 - Grassland \$150-\$250/acre
 - Farmland \$300-\$500/acre

8. Under economic development, is there likely to be any increase in the value of property in communities served by the relocated rail line? (increase from **what** to **what** \$s per acre)
 - a. In the communities
 - Will see increase, but how much is unknown. Will be market and demand driven.
 - Depends on who owns land, how good they are at marketing, and the interest of potential buyers.
 - b. Between the communities
 - See above comment

9. Over what timeframe do you think these impacts will occur?
 - Wheels turn slow, but may not see activity within 20 years. Probably within 50 years. Maybe in our lifetime, maybe not. Vision required to carry out project, as well as coordination between parties that stand to benefit

(government, railroads, and other entities). Need to examine from best-case, average, worst-case, and financial perspective.

10. Other comments

- When relocating railroads, it's critical to enable vehicular connectivity on either side of tracks for fire and medical emergency vehicles and law enforcement. Would be nice to have non-grade crossings near communities, such as Limon or Hugo (which has a hospital).
- Haven't discussed economic impacts to counties. Right now, counties are paid on the basis of railcars that pass through counties. Counties that rail passes through will receive benefits if this financial structure is retained, and this will have a definite economic impact on the coffers of county governments.

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Date	2/25/04
Interviewer	Nathan Macek, AECOM Consult

11. Due to the Railroad Project, what are the major influences the relocated rail line will have on communities in Eastern Colorado?

- Works with 8,000 square mile are, and project will principally impact Albert and Lincoln counties. Project will be economic tax base diversification and could contribute to additional traffic on the nearby shortline railroad, the old Rock Island line, which would help to make that railroad viable.
- Possible that could create more competitive freight rate for grain, but this impact is a longshot.
- Spinoff industry would likely be multimodal-related. A lot of spinoff business related to rail itself. Albert County is near rail, and is growing and could see a lot of growth related to this project.

12. Due to the Railroad Project, what are the major influences the relocated rail line will have on agricultural businesses in Eastern Colorado?

- It's possible the project could influence grain rates, because rates are market minus transportation costs, but this impact could be minimal. Possible that it could develop a corn market by rail, which don't currently have, and could lead to shipping grain to cattle ranches towards Gulf region, but tough to predict impacts. A lot depends on BN and UP, infrastructure that follows, and other unknowns.

13. Due to the Railroad Project, what are the major influences the relocated rail line will have on the trucking firms in Eastern Colorado?

- No trucking firms based in her region of Eastern Colorado, but there are independent truckers. It's a backhaul route, where products are trucked from Kansas to Colorado and back. Truck and rail cooperate to keep each other competitive. If a multimodal distribution center is built, both truck and rail could benefit, which would develop a credible trucking industry in the region.

14. Due to the Railroad Project, what are the major influences the relocated rail line will have on economic activity in Eastern Colorado?
- c. Growth in existing businesses by type of business
 - Spinoff would occur as railroads would relocate all facilities from Front Range to Eastern Colorado, which creates new jobs, housing demands, retail, etc. Not end-all to economic development questions in plains economy, but there are so many unknowns that it is hard to predict outcomes now.
 - d. Existing business – added jobs
 - See above answer
15. Will Eastern Colorado communities lose any businesses due to the Railroad Project?
- No. Can see no downsides to the project. Area we're talking about has no people, no towns. So rural, so vast, without businesses so nothing to lose here.
16. Do you think any new businesses to might come to eastern Colorado due to the Railroad Project?
- c. New businesses (kinds of businesses)
 - Yes: distribution, light manufacturing, multimodal facilities. All supported by existing economic development plans in these counties. Would strengthen economic development goals in these areas. Contribute in a positive way.
 - d. New business jobs
 - Jobs would be created in these industries
17. Current range in value of land in dollars per acre
- c. In the communities
 - Value varies considerably. Depends on what market will bear.
 - d. Between the communities
 - Region is mostly zoned agricultural
 - Acre of dryland farmland ranges from \$300/acre for scrub grassland (used for grazing) to \$700/acre for irrigated farmland (via deep well/sprinkler) used to grow produce.
18. Under economic development, is there likely to be any increase in the value of property in communities served by the relocated rail line? (increase from **what** to **what** \$\$ per acre)
- c. In the communities

- No idea how value of property would change based on project. In some cases, property may be less valuable for farming, or could be more valuable if useful for industrial development or other uses.
 - Agricultural land has been sold for subdivisions near the Front Range and farmers trade land to continue farming elsewhere.
 - Talk to a Realtor in Arapahoe County to gauge the change in value of land in newly developing areas.
- d. Between the communities
- See above comments

19. Over what timeframe do you think these impacts will occur?

- Ten to 25 years. Isn't going to happen overnight. Minimum is three to 25 years.

20. Other comments

- We see the project as all positive. People in her organization sit on the committee, and wherever the rail is put it will be positive. The area is so vast but the needs so great that benefits will be felt far away from railroad proper.
- Talk to Joe Kiley, the town manager of Limon. Sits on rail committee, which may be a conflict, but it makes him knowledgeable. 719/775-2346. He may have other leads to follow.

Name	Joe Kiley
Affiliation	Town of Limon
Title	Town Manager
Location	Limon, CO
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Fax	
E-mail	
Date	2/25/04
Interviewer	Nathan Macek, AECOM Consult

21. Due to the Railroad Project, what are the major influences the relocated rail line will have on communities in Eastern Colorado?

- Depends on decisions that are made about where intermodal sites go, where the railroads move and how they'll handle unit trains. If all they do is move additional trains through, there may be property tax benefit, but almost no economic effect at all.

22. Due to the Railroad Project, what are the major influences the relocated rail line will have on agricultural businesses in Eastern Colorado?

- Same issue—right now the major complaint from most rail storage facilities is that UP does not want to deal with anything that's not a unit train. Right now, Cargill loads most rail cargo out of Byers to fill a unit train, so grain gathered in Limon is trucked to Byers and load onto rail.

23. Due to the Railroad Project, what are the major influences the relocated rail line will have on the trucking firms in Eastern Colorado?

- Has the potential of a negative effect on trucking if they put in more facilities for handling unit trains, or allow broken trains to be used. In that case there won't be as much trucking taking place to the unit train ports.

24. Due to the Railroad Project, what are the major influences the relocated rail line will have on economic activity in Eastern Colorado?

- e. Growth in existing businesses by type of business
 - Don't think so. Unless new business comes in that creates spinoff, there will be no net effect to the existing businesses. Given that if the rail lines themselves would be more consumer friendly, there's potential for increased business.
- f. Existing business – added jobs

- See above
25. Will Eastern Colorado communities lose any businesses due to the Railroad Project?
- No, because the net effect of the project is probably just to put more trains through, which would not have any net effects on business.
26. Do you think any new businesses to might come to eastern Colorado due to the Railroad Project?
- e. New businesses (kinds of businesses)
 - There is potential for distribution and new kinds of businesses to locate, but success or failure depends on what railroads determine will be their threshold to stop a train and load cars.
 - If looking at all of Eastern Colorado, if Inland Port at Watkins, there will be dramatic increase in existing and new business in Watkins and Bennett areas.
 - f. New business jobs
 - See above
27. Current range in value of land in dollars per acre
- e. In the communities
 - Commercial land can be purchased undeveloped for \$1.50 to \$2.00 per square foot within the city.
 - f. Between the communities
 - Farmland is about \$400 per acre; pastureland is \$300 per acre.
28. Under economic development, is there likely to be any increase in the value of property in communities served by the relocated rail line? (increase from **what** to **what** \$s per acre)
- e. In the communities
 - If served by lines, and doesn't just have more trains going through, value will increase.
 - f. Between the communities
 - No guess as to dollar impacts
29. Over what timeframe do you think these impacts will occur?
- Given the quality of the north-south movement of goods, and the railroads working with the consumer better, benefits would be almost immediate upon opening of railway.

- Benefits would be ongoing as the amount of goods moving in and out of Colorado grow, if they're able to allow to ship by rail through several communities, the growth to the region would occur at the same rate as the growth in shipment of goods, which is projected to double between now and 2025. If just one inland port, effects will be exclusively at that inland port and its surrounding communities.

30. Other comments

- Front Range project is being very closely watched by the Ports to Plains community, because it creates a new linkage to Gulf ports, a new outlet for grains to be shipped overseas as California ports become unable to handle plains grains. This project has benefits to railroads as well as to deep-sea ports outside of Colorado and the U.S., which should be measured.

This telephone survey is being conducted by AECOM Consult working with DMJM+HARRIS and HDR on this study. To register your comments, please contact Nate Macek at 703/645-6849 or email nathan.macek@aecomconsult.com.

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Date	2/27/04
Interviewer	Nathan Macek

31. Due to the Railroad Project, what are the major influences the relocated rail line will have on communities in Eastern Colorado?

- Believe that any transportation corridor, whether rail or otherwise, is a number one priority for economic development. Cities grow around transportation corridors, and infrastructure makes it convenient for shipping goods and services and moving people.

32. Due to the Railroad Project, what are the major influences the relocated rail line will have on agricultural businesses in Eastern Colorado?

- If the corridor cuts through landowners property it would have large impact, but if followed existing right-of-way it would not have as major an impact.
- Potentially *could* create new markets for Colorado produce, but would depend on freight rates. Freight rates have a bigger impact than where the lines themselves lie.

33. Due to the Railroad Project, what are the major influences the relocated rail line will have on the trucking firms in Eastern Colorado?

- A lot of trucks right now piggyback on rail. Could have some impact, but cannot imagine it would be major.

34. Due to the Railroad Project, what are the major influences the relocated rail line will have on economic activity in Eastern Colorado?

- g. Growth in existing businesses by type of business

- Shipping of goods and services could result in storage and shipping jobs associated with the new transportation connection. Could create new opportunities for economic development activities.
- h. Existing business – added jobs
- Could see significant jobs in the construction sector, but would probably come from other parts of the state. Really can't answer the question because the impacts are too far away and too speculative.

35. Will Eastern Colorado communities lose any businesses due to the Railroad Project?

- Can't anticipate that this would happen. Loss of rail in the region has caused loss of jobs and revenues to the community, but having rail is essential for economic development and tax base.

36. Do you think any new businesses to might come to eastern Colorado due to the Railroad Project?

- g. New businesses (kinds of businesses)
- Could see some, because of convenience.
 - Could be any type of business that could be located in Denver could easily locate in eastern Colorado as long as access exists. Business follows transportation.
- h. New business jobs
- No idea of what the number of jobs could be, the potential is unlimited.

37. Current range in value of land in dollars per acre

- g. In the communities
- Frontage along a highway is about \$100,000 for a 100' x 100' lot. Other lots in town are anywhere from \$5,000 to \$15,000 for a similar sized lot in Lamar. Lower cost in smaller communities.
- h. Between the communities
- Depends on location, but grassland is about \$500 to \$650 per acre. Farmland is about \$1000 per acre at a minimum, slightly higher if irrigated.

38. Under economic development, is there likely to be any increase in the value of property in communities served by the relocated rail line? (increase from **what** to **what** \$s per acre)

- g. In the communities

- If business is created, the property values would rise, but no idea of what the number would be. Similar to growth in metropolitan areas. Depends on the size of the community and other factors.

h. Between the communities

- See above.

39. Over what timeframe do you think these impacts will occur?

- After construction, impacts will probably start to accrue within five years. Our experience on transportation dollars is that they are so limited, the development in anticipation of construction is a bigger issue than development after construction.

40. Other comments

- Hopes region has better luck attracting rail dollars than has with highway or air transportation dollars. Always want to see transportation connections improve.

41. Other suggested contacts

- Cardon Berry in Kiowa County has strong opinion regarding this issue.

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Date	2/26/04
Interviewer	Nathan Macek

42. Due to the Railroad Project, what are the major influences the relocated rail line will have on communities in Eastern Colorado?

- Trains would be carrying coal as well as other freight.
- If this project could intersect or tie into the Ports-to-Plains corridor, it would probably have a greater impact. Would probably tie in near Springfield, Colorado. A connection would be very important—tie as closely as can. Rail service into this area would be fantastic, and freeing up Front Range corridor would be fantastic if it could move people.

43. Due to the Railroad Project, what are the major influences the relocated rail line will have on agricultural businesses in Eastern Colorado?

- Would mainly have an impact on grains—grain elevators positioned along routes or spurs could tie into the railroad. Feeder routes where trains could pick up produce at hubs would be key for the industry, including corn, wheat, milo.

44. Due to the Railroad Project, what are the major influences the relocated rail line will have on the trucking firms in Eastern Colorado?

- Truck terminals would exist where agricultural products, including grains and processed meats like beef and pork could be moved to distribution centers and loaded onto trains to move north and south.
- Distribution centers could bring in products, load onto trains, and ship out to rest of country.
- Would not hurt trucking industry, but could help.
- Might make freight rates more competitive if rail corridor in near vicinity.

45. Due to the Railroad Project, what are the major influences the relocated rail line will have on economic activity in Eastern Colorado?

- i. Growth in existing businesses by type of business
 - Could be some agricultural processing centers—packing plants, etc.—due to improved shipping.
 - Small retail could be generated by spinoff activity
 - Could provide stability when there is a drought or other events that hurt agriculture.
 - Manufacturing exists in Lamar, Colorado, and access to rail transportation could improve fortunes of these firms.
 - Growth in community could lead to improved air service to Denver. Improved rail north-south corridor that could induce Amtrak to improve north-south service through region could provide greater passenger transportation.
 - Have to move away from 100 percent dependence on agriculture as supporting industry.
- j. Existing business – added jobs
 - No idea. Has seen great out-migration in Prowers County in recent years, with 1, 2, or 0 percent growth in recent years. Has not lost population in recent years, unlike neighboring cities in region. Has strong infrastructure to support growth, but just trying to hold steady right now.
 - Would hope to see 5 to 10 percent growth as a result of improvements in the community, including Front Range Rail relocation and other project.

46. Will Eastern Colorado communities lose any businesses due to the Railroad Project?

- Wouldn't see why and businesses would be lost. May have to change the way they do business, but this would open up new opportunities.
- The growth goes where water is, as well as where the transportation connections are—look at growth in the I-25 corridor. But cannot just ship coal. Have to include other products as well.

47. Do you think any new businesses to might come to eastern Colorado due to the Railroad Project?

- i. New businesses (kinds of businesses)
 - Tourism could be attracted to the region if passenger component to rail—a lot of history in the region.

- Processing of agricultural products
 - Small manufacturing companies that require a good workforce and affordable transportation.
 - Main idea would be to strengthen ability of existing businesses to stay in business.
- j. New business jobs
- No idea of range in number of jobs that could be created.

48. Current range in value of land in dollars per acre

- i. In the communities
- Commercial lots on main streets sell for \$88,000 to \$150,000 per acre depending on location in town
 - Main street buildings range from \$25,000 to \$60,000, depending on location, for 2,500 square foot structure.
- j. Between the communities
- Dryland/grassland ranges from \$75 to \$150 per acre, depending on the quality of the grasses
 - Farmland ranges from \$175 to \$275 or \$300 per acre, depending on the condition of the soil
 - Irrigated land can sell anywhere from \$1,000 to \$2,000 acre
 - A lot of land is selling that is preserved for more than \$1,000 to \$2,000 per acre

49. Under economic development, is there likely to be any increase in the value of property in communities served by the relocated rail line? (increase from **what** to **what** \$s per acre)

- i. In the communities
- Where rail line would be located, would not directly impact Lamar. Could benefit Las Animas or other towns near the rail line
 - Ports to Plains truck route through town could have tremendous impact because would be like putting I-25 through town.
- j. Between the communities
- See above

50. Over what timeframe do you think these impacts will occur?

- “Not in my lifetime.” Probably longer than the next 20- to 25-years. Six years to improve I-25 corridor near Colorado Springs, so could be long time for a project like this.

51. Other comments

- None

52. Other contacts

- None

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Date	2/27/04
Interviewer	Nathan Macek, AECOM Consult

53. Due to the Railroad Project, what are the major influences the relocated rail line will have on communities in Eastern Colorado?

- Biggest impact will be increased freight traffic (rail and truck) projected into the next 20 years. Traffic is projected to double in the eastern plains even before rail is moved out of Denver metro area and into eastern Colorado, so traffic estimates would need to be revised.
- May have an economic impact in terms of facilities on the eastern plains, for crews or otherwise.

54. Due to the Railroad Project, what are the major influences the relocated rail line will have on agricultural businesses in Eastern Colorado?

- Fairly significant, because right now cargo is shipping to the closest port (Long Beach), but could cause increased north-south shipping through corridor. Could create new markets for grain based on improved transportation connections and reduced transport costs.
- Could be some increased grain production. If there were an improvement in transportation to ship the grain, the region has the capacity to increase production.

55. Due to the Railroad Project, what are the major influences the relocated rail line will have on the trucking firms in Eastern Colorado?

- May increase demand for trucking. Sees a lot occurring now as you look at north-south trade corridors. If expanded rail moves eastward, may see multimodal facilities where train and truck traffic interface. Could have significant impact on transportation, both rail and truck, as a result of the project.

56. Due to the Railroad Project, what are the major influences the relocated rail line will have on economic activity in Eastern Colorado?

- k. Growth in existing businesses by type of business
 - Agricultural businesses could expand due to expanded markets.
 - A lot of commodities that move by truck or train could be affected by the project, including manufactured goods delivered in the region or produced in the region.
 - l. Existing business – added jobs
 - Cannot make estimate as far as jobs that would be added—ask Joe Kiley
57. Will Eastern Colorado communities lose any businesses due to the Railroad Project?
- Not necessarily. Wouldn't lose because most business in eastern Colorado is agriculture. Most of what will happen is the creation of markets and production from new transportation connections. No losses as a result.
58. Do you think any new businesses to might come to eastern Colorado due to the Railroad Project?
- k. New businesses (kinds of businesses)
 - Possible that new businesses related to transportation could come in—warehouse facilities, elevators. Could be located in eastern plains. These are firms related to rail transport and dependent upon it.
 - l. New business jobs
 - Cannot make estimate as far as jobs created.
59. Current range in value of land in dollars per acre
- k. In the communities
 - Does not have this information
 - l. Between the communities
 - Does not have information—speak with Jo Downey
60. Under economic development, is there likely to be any increase in the value of property in communities served by the relocated rail line? (increase from **what** to **what** \$s per acre)
- k. In the communities
 - Does not have an estimate
 - l. Between the communities
 - Does not have an estimate

61. Over what timeframe do you think these impacts will occur?

- Impacts could occur fairly quickly if moved transport to the east. Looking at a 30-year timeframe is realistic as far as how long it would take to “move dollars through the system,” and complete the project.
- A lot of time and cost involved in upgrading facilities through Denver proper, which will occur before investment in the eastern counties.

62. Other comments

- Thinks that transportation is critical to development of the eastern plains. As rail and truck traffic moves east, the state needs to take the money to upgrade highways, which must work in concert with the upgrade of rail facilities. Need to make sure multimodal interconnections are adequate. Need to look at both modes of transportation.

63. Other contacts

- Joe Kiley, City Manager, Limon, CO, 719/775-2346
- Jo Downey, East Central Council of Local Governments, 719/348-5562 x 14

Appendix C: Eastern Colorado Grain Movements and Impacts

It is relatively certain that the Project will have impacts to the grain industry in eastern Colorado. However, because of the uncertainties in the grain industry and of the results of the Project, the levels of those impacts are relatively uncertain. The information below outlines the assumptions and methods used to approximate the level of those impacts.

Total Wheat and Corn Production

The production yields of any crop can be highly variable from year to year depending on the various environmental factors that can affect the many stages of crop growth. Yields during a prosperous year with good weather and plenty of rain can double or even quadruple the yields of a drought year or a year riddled with hail. To best represent the production of corn and wheat, the two major crops in eastern Colorado, the production yields for the last 30 years were collected and averaged.

Information on corn and wheat production was gathered from the NASS Agriculture Statistics Database from 1972 to 2002⁴. Data was collected for Adams, Arapahoe, Elbert, Kit Carson, Lincoln, Morgan, Phillips, Sedgwick, Washington, Weld, and Yuma counties. In some counties and years corn was either not produced or not reported. In the situation where data was not available for all years, the average was taken for only those years with available data.

After the average production was calculated for each county, the averages were summed to get the average production for eastern Colorado. The average production of wheat per year was approximately 58 million bushels. The average yearly corn production for eastern Colorado is slightly more than 89 million bushel. Total production for both crops is almost 147.5 million bushels.

Current Grain Transportation

In order to analyze and understand the possible impacts introducing rail can have on eastern Colorado grain movement, current conditions must be collected and compared to possible future conditions. Using the Commodity Flow Survey from TranStats, the percent of current rail use and truck use for grain transportation can be calculated. Currently, about 89 percent of grain is transported by truck and 11 percent is transported by rail. This equates to almost 147,000 trucks and 91 52-car trains per year, assuming a truck holds 850 bushels of wheat or 925 bushels of corn and a rail car holds 171,600 bushels of wheat or 183,820 bushels of corn.

In order to ship grain by truck it costs approximately 4.7 cents per ton-mile for wheat and 4.63 cents per ton-mile for corn. These truck shipping rates were calculated using a typical grain industry shipping rate of \$1.20 per loaded mile. An average loaded grain truck will hold 25.5 tons of wheat or 25.9 tons of corn. The assumed length of the trip is

⁴ NASS Quick Stats, <http://nass.usda.gov:81/ipedb/>

175 miles, equal to the length of new and double tracked segments of the Project in eastern Colorado.

Because no current north-south track exists in eastern Colorado, there are no available rail rates to compare to truck rates. Therefore, a rail rate had to be calculated using posted rates in the USDA Grain Transportation Report from January 1, 2004. The average cost to ship wheat by rail is 2.3 cents per ton-mile. The average cost to transport corn by rail is 2.4 cents per ton-mile. Table 1 below shows the rates and mileage used to calculate rail rates for eastern Colorado. Rates are assumed to be for 52-car trains composed of 4750 cubes holding approximately 100 tons of corn or 100 tons of wheat per car.

Table 1: Average Freight Rates

Based on rates for wheat and corn published in USDA Grain Transportation Report (Jan. 1, 2004)

<u>Wheat</u>								
	Origin	Dest.	\$/Car	\$/52 Cars	Miles*	\$/Mile	Tons/Car	\$/ton-mile
	KC	Galveston	\$ 1,820	\$ 94,640	845	\$ 2.15	100	\$ 0.0215
	Minneapolis	Portland	4,148	215,696	1,730	\$ 2.40	100	\$ 0.0240
	St. Louis	Houston	1,945	101,140	867	\$ 2.24	100	\$ 0.0224
	Kansas City	Laredo	2,280	118,560	976	\$ 2.34	100	\$ 0.0234
	Chicago	Albany	1,834	95,368	815	\$ 2.25	100	\$ 0.0225
	AVERAGE WHEAT		\$ 2,405	\$ 125,081	1,047	\$ 2.28	100	\$ 0.0228
	TRUCK WHEAT				175	\$ 1.20	25.5	\$ 0.0471
<u>Corn</u>								
	Origin	Dest.	\$/Car	\$/52 Cars	Miles*	\$/Mile	Tons/Car	\$/ton-mile
	Minneapolis	Portland	3130	\$ 162,760	1730	\$ 1.81	100	\$ 0.0181
	Chicago	Baton Rouge	2736	142,272	912	\$ 3.00	100	\$ 0.0300
	Council Bluffs	Baton Rouge	2170	112,840	1080	\$ 2.01	100	\$ 0.0201
	Evansville	Raleigh	1841	95,732	686	\$ 2.68	100	\$ 0.0268
	Des Moines	Laredo	2864	148,928	1169	\$ 2.45	100	\$ 0.0245
	AVERAGE CORN		\$ 2,548	\$ 132,506	1,115	\$ 2.39	100	\$ 0.0239
	TRUCK CORN				175	\$ 1.20	25.9	\$ 0.0463

* Miles are approximate miles using MapQuest distance between cities.

Highway Maintenance and Fuel Taxes

Taking semis off the road by converting some grain transportation to rail reduces the wear and tear on highways, which in turn lowers highway maintenance costs. Major north-south moving roads in eastern Colorado are minor arterials or principal arterials. Principal arterials make up about two-third of the roads and minor arterials make up about one-third of the roadways in eastern Colorado. Maintenance due to truck traffic costs 73.7 cents per truck-mile for minor arterials and 30.5 cents per truck-mile for principal arterials for combo 5-axle trucks⁵. Total maintenance cost savings were calculated by taking a weighted average cost per truck-mile (\$0.45) and multiplying it by

⁵ Based on information provided by Denver Tolliver during a personal interview.

the number of trucks taken off the road in each scenario and the length of the rail line in eastern Colorado (175 miles). Table 2 below shows the maintenance cost calculations.

Table 2: Average Maintenance Cost per Mile

Minor Arterial		0.737
Principal Arterial		0.305
% Minor		33.33%
% Principal		66.67%
Weighted Cost/Mile	\$	0.45

* From Denver Tolliver

Taking trucks off the highways also reduces fuel tax revenues by lowering diesel consumption. Fuel efficiency for a truck having a loaded capacity is approximately 5.6 miles per gallon⁶ and Colorado diesel taxes are 20.5 cents per gallon. Fuel tax revenues lost equal approximately 3.66 cents per truck-mile. To achieve the net savings of maintenance costs from removing trucks from the highway, lost fuel tax revenues were deducted from the maintenance cost savings.

Truck Related Employment

It is not anticipated that any truck related jobs would be lost from the conversion of some grain transportation from truck to rail. Trucking operations in eastern Colorado are composed mostly of independent owner-operators with one to two trucks. Therefore it is expected that these owner operators would simply use the trucks to haul other commodities or goods.

Another reason the trucking industry is not expected to experience a loss in jobs from this Project is because the number of trucks that are expected to be replaced with rail is lower than the variation in truck needs from one grain production year to the next. Running simple summary statistics on production yields show that the standard deviation of production is approximately 15.6 million bushels for wheat and 28.2 million bushels for corn. Using the assumed truck grain percentage of 89 percent means that the standard deviation of trucks is 16,353 for wheat and 27,118 for corn. None of the scenarios assume a reduction in the number of grain trucks being this high for either crop. Table 3 below shows the summary statistics of production.

⁶ This is a standard default fuel efficiency used in transportation studies. This was also the default value used in the Indiana Rail Plan by Parsons.

Table 3: Summary Statistics of Wheat and Corn Production

<i>Wheat</i>		<i>Corn</i>	
Standard Error	2,805,026.96	Standard Error	5,061,985.26
Median	57,734,500	Median	89,032,000
Mode	#N/A	Mode	#N/A
Standard Deviation	15,617,729.17	Standard Deviation	28,183,941.16
Sample Variance	2.43913E+14	Sample Variance	7.94335E+14
Kurtosis	-0.593115698	Kurtosis	-0.619892309
Skewness	0.375415398	Skewness	-0.457252308
Range	63,348,100	Range	97,924,000
Minimum	31,373,000	Minimum	32,109,000
Maximum	94,721,100	Maximum	130,033,000
Sum	1,801,051,700	Sum	2,769,395,900
Count	31	Count	31

SD Truck Grain (89%)	13,899,779	25,083,708
SD # of Trucks/Yr	16,353	27,118
SD Trucks/Day (260)	62.9	104.3
Total SD Truck Grain (89%)		38,983,487
Total SD # of Truck/Yr		43,470
Total SD Trucks/Day (260)		167.19

Income Taxes and Revenues

Shipping grain by rail rather than by truck has a shipping cost savings associated with it as previously described. When operational costs, such as grain shipping costs, are lowered, an operational net revenue increase is achieved. Because farmers pay income taxes based on their operational net revenues, there will be some additional income taxes paid associated with the lower shipping costs. To calculate the gains in income some assumptions had to be made:

- The net income of a farm operation in Colorado is the average of net farm incomes for 2001 and 2002 in 2004 dollars, \$29,489⁷.
- The applicable federal income tax rate is 15 percent.
- Colorado's income tax is a flat rate of 4.63 percent.
- It is assumed that the head of the household is filing.

⁷ Net farm income for 2001 and 2002 are from the ERS Rankings of states for total net farm income per operation. www.ers.usda.gov/Data/FarmIncome/receipts/Rankings/MISC/Nfi_vppa.wk1, accessed 2-20-04.

Appendix D: Environmental Overview and Noise

INTRODUCTION

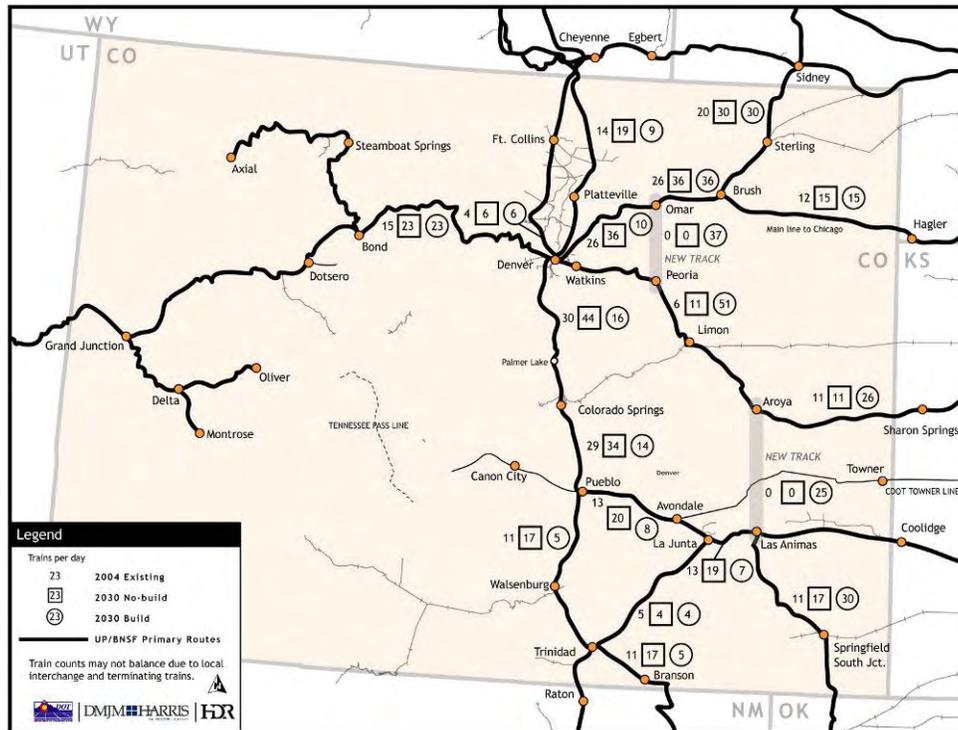
Appendix D: Environmental Overview, summarizes the results of a screening of archaeological and historic resources, Special Status Species, locations of known hazardous materials, wetlands, major rivers and creeks, and other water resources, noise, and demographics conducted for the Public Benefits and Costs Study of the Proposed BNSF/UP Front Range Railroad Infrastructure Rationalization Project. This screening represents the culmination of initial activities including collection of existing data, and surface level research on the likely presence of key environmental features. The level of analysis limits the conclusions that can be drawn from this technical report. All statements made are based on the best available data, and are not meant to be used as a final environmental determination of resource impacts or potential mitigation measures.

This study is not an environmental study, nor is it intended to predetermine any outcome of any environmental study that may be in progress or later undertaken related to this proposal. Furthermore, nothing prepared on behalf of this study shall preclude federal, state or local agencies or officials from fulfilling their responsibilities under the National Environmental Policy Act (NEPA), as codified in 42 U.S.C., section 4321, et seq., or any of NEPA's implementing regulations.

Study Location

The study area for the project is shown below.

Figure 1 – Study Area



ARCHAEOLOGICAL AND HISTORIC RESOURCES

This section describes the applicable legal and regulatory requirements related to historic and archeological resources in the study area, and provides an inventory of the historic districts, structures, and significant archeological resources in the study area.

A definitive corridor has not been established for the project. Therefore, the study area for historic and cultural resources is a variable swath generally consisting of an area of 10 to 15 miles on either side of a “line” drawn between Omar to Peoria, and between Aroya to Las Animas Junction, with additional research along the right-of-way and railroad property of the existing railroad facilities from approximately Peoria to Aroya. The study area along the existing railroad property was selected to account for potential disturbance by construction activities, the effects of noise and vibration, and visual impacts. The study area is within the counties of Adams, Arapahoe, Bent, Cheyenne, Kiowa, Lincoln, Morgan and Weld.

Regulatory Context

The National Historic Preservation Act established the National Register of Historic Places in 1966. The purpose of the National Register is to recognize important cultural resources in the United States. The list of properties is maintained nationally by the National Park Service and at the state level by the Office of Archaeology and Historic Preservation in the Colorado Historical Society.

The Colorado State Register of Historic Properties, known as the State Register, was created by statute in 1975 and implemented as a separate listing in 1990. The Colorado Historical Society’s Office of Archaeology and Historic Preservation administer the program. The State Register works in conjunction with the National Register of Historic Places listing program.

All resources that are in the National Register of Historic Places are automatically placed in the State Register. Properties may also be nominated separately to the State Register without inclusion in the National Register. Together both listings form the inclusive Colorado State Register of Historic Properties and are used as a planning tool to encourage preservation without undue restraint upon private property interests.

Study Methods

This technical report was conducted primarily using Internet sites to identify known historic, archeological, and cultural resources. The sites used include the following:

- <http://www.coloradohistory-oahp.org>
- <http://www.nationalregisterofhistoricplaces.com>

The study area is within the counties of Adams, Arapahoe, Bent, Cheyenne, Kiowa, Lincoln, Morgan and Weld. Elbert, Morgan, Elbert, Lincoln, Cheyenne, and Kiowa

have less than 1 percent of the land surveyed for cultural resources in the State of Colorado. Adams County has 6 percent, Arapahoe and Weld counties have 3 percent, and Bent County has 2 percent. Further, these counties are within the Platte and Arkansas River Basins, which comprise roughly 56 percent of the state's acreage, but contain only 30 percent of the total number of recorded prehistoric resources. These percentages reflect both the amount of public land and the number of federal undertakings within each county (*A Profile of the Cultural Resources of Colorado 2003*).

Inventory of Archaeological Resources

According to *A Profile of the Cultural Resources of Colorado 2003*, only Weld County has any Prehistoric Districts. These are Keota Stone Circles Archaeological District/Shull Tipi Rings located approximately 35 miles from Omar, and West Stoneham Archaeological District located approximately 47 miles from Omar.

Bent, Cheyenne, Elbert, Kiowa, and Lincoln have no *officially eligible* prehistoric sites. However, it is important to observe that the most recorded Paleonindian resources are in the eastern Plains counties including study area counties Cheyenne, Elbert and Kiowa. This lack of officially eligible sites is due to the limited amount of survey data from these regions. Distribution of archaeological sites also shows a concentration of Protohistoric sites and isolated finds in the eastern Plains counts including Kiowa County, which reflects the high concentration of Cheyenne and Arapaho Tribes that are known historically to have camped on tributaries of the Arkansas River.

Known archeological sites are not listed in this technical report. The exception of the Archaeological Districts within Weld County that are unique for this study area, but given the information cited in *A Profile of the Cultural Resources of Colorado 2003*, it is certain that such sites do exist in the study area and may become known as alternative routes for new tracks are selected and studied.

Inventory of Historic Resources

Historical resources have been recorded in all of Colorado's 64 counties and number in the thousands. The counties with the highest number of recorded historic resources are those in the Front Range including Denver, Boulder, Mesa and Pueblo. These counties or cities within them have performed historical surveys for planning and growth management. Thus, known sites within the study area appear to be limited when listed as they are here. Only sites listed in the National Register of Historic Places and/or Colorado State Register Properties that occur within a potential corridor for the new tracks or upgrades to existing railroad property have been documented in this technical report. No National Historic Landmarks or World Heritage List sites are located in the study area counties.

The primary data source for this section is the Directory of Colorado State Register Properties, Colorado Office of Archaeology and Historic Preservation, <http://www.coloradohistory-oahp.org>, and the National Register of Historic Places, <http://www.nationalregisterofhistoricplaces.com>.

Adams County

Adams County has 14 listed sites. None of the listed sites are within 50 miles of the potential corridor for new track.

Arapahoe County

Arapahoe County has five sites in Aurora, four sites in Cherry Hills Village, four sites in Englewood, one site in Greenwood Village, four sites in Littleton, and one site in Strasburg. The Strasburg site is the only site in the vicinity of the study corridor, and is between 10 and 12 miles west of Peoria. While this distance means it is unlikely to be affected in any way by the proposed project, the site is notable in this study because it is railroad related.

Comanche Crossing

East of Strasburg, near railroad milepost 602
National Register 08/10/1970, 5AH.163

“At this site on August 15, 1870, the last spike was driven into the first continuous transcontinental railroad. The completion of railroad bridges over the Missouri and Mississippi Rivers allowed all rail transport over this route. An unpretentious white monument marks the spot, which is named for a nearby creek crossed by the railroad. Listed under Railroads in Colorado, 1858-1948 Multiple Property Submission.”

Bent County

The town of Las Animas has 7 listings. While it is unlikely that the alignment would go through Las Animas to reach the Las Animas Junction, it is appropriate to note that the sites exist. Most of the sites are clustered near the intersection of 6th St. and Locust Ave. or on 600 or 700 blocks of Carson or Bent Avenues. One site that is located within two miles of Las Animas Junction is described below:

Las Animas Santa Fe Railroad Depot

333 8th St., Las Animas
State Register 05/14/1997, 5BN.415.

“The 1908 Depot is associated with both passenger and freight railroad transportation in the Las Animas area. It is a good intact example of the Santa Fe Railroad’s Standard Plan depot design.”

While it is not listed in the National Register, the Old Santa Fe Trail ran roughly parallel to and north of the Arkansas River. In the study area, it closely parallels US 50, which displays distinctive highway signs that mark the auto tour that parallels the trail. The National Park Service administers the Santa Fe National Historic Trail in partnership with other federal, state, and local agencies; non-profit organizations; and private landowners. Participating national historic trail sites display the official trail logo. The Santa Fe Trail Association is a major partner with the National Park Service. The association is a national organization dedicated to preserving resources, and fostering public awareness and appreciation of the Santa Fe National Historic Trail <http://www.nps.gov/safe/>. The nearest National Register site associated with the Santa Fe Trail is Boggsville (10/24/1986, 5BN.363), located several miles south of Las Animas on SH 101.

Also not on the National Register, Rixey School and historical marker are located at the intersection of US 50 and Fourteenth Lane North – not quite directly north of Las Animas Junction. This town site was platted in 1908, but never succeeded in getting it's own post office (http://www.coloradohistory.com/ghostsearchresults_ink.asp?TypeOfSearch=County&SearchString=bent).

Cheyenne County

Two sites are located approximately 8 miles east of Aroya in Wild Horse. At this distance and location the sites are not likely to be within the potential new track corridor.

Elbert County

In Elbert County, the study area follows the existing railroad property. Of the sites listed in the National Register or the State Register, three occur in the town of Elbert, one is in Elizabeth, and one is in Fondis. All of these towns are at least 38 miles or more from the railroad property in Elbert County.

However, as cited in *A Profile of the Cultural Resources of Colorado 2003*, Elbert County has a relatively large number of *officially eligible* sites. Many of these sites are rural properties such as abandoned commercial buildings and residential structures that are recorded and evaluated as part of an inventory resulting from the National Historic Preservation Act’s requirements for Federal Agencies. It is possible that these sites occur in the study area or that others may be discovered during the course of additional studies.

Kiowa County

Kiowa County has four State Register or National Register sites. Two of these are located in or near Eads, including the Sand Creek Massacre Site, which is in the National Register. Eads is approximately 13 miles east of the study area (21 miles east of Haswell), and the Sand Creek Massacre Site is approximately 15 miles east of Eads. Neither of these sites is likely to fall within a potential project area.

Haswell is almost exactly due north of Las Animas Junction and due south of Aroya, approximately half way between the two end points of the proposed new track corridor. Two historic sites are located within Haswell.

Haswell Jail

211 Main St.
State Register 05/14/1997, 5 KW.56

“Constructed in 1921, this small, 14 by 16 foot, concrete jail is one of the few public buildings ever constructed in Haswell. Not in use the 1940s, the unaltered building remains as a visible local landmark.”



Haswell Women’s Booster Club

211 E. 4th St.
State Register 12/11/1996, 5KW.49

“This building represents the successful efforts of the women of the community to plan and finance its construction in 1915. It served into the 1980s as the center of social activities for the surrounding area.”

In addition, the Haswell Cemetery, not listed in the registers, is approximately two miles south of town.

Lincoln County

Improvements to the rail lines within the Lincoln County section of the corridor are proposed to occur within existing railroad property. Lincoln County has six listed sites: two sites are in Genoa, which is 8 miles east of Limon, and not within the proposed area of improvements. A fourth site is located approximately 20 miles north of Limon and not within the proposed area of improvements.

The following sites are closely related to this existing property and are at least adjacent to it if not within it.

Limon Railroad Depot (Limon Heritage Museum)

899 1st St.

State Register 12/12/2001, 5LN.221

“The town’s location at the intersection of the Union Pacific Railroad and the Chicago, Rock Island and Pacific Railroad, and its designation as a division point on the latter, made Limon an important regional rail center and a major source of local employment. The 1910 wood frame depot is one of only three Rock Island depots in Colorado remaining in their place of operation. Modernized by the Rock Island in the late 1930s, the depot is important for its design adaptations that allowed it to effectively serve and manage traffic at a major rail junction into the 1950s. In 1990, the Mid-States Port Authority donated the building to the Limon Heritage Society, and it now serves as a museum.”

Hugo Union Pacific Railroad Roundhouse

Adjacent to Union Pacific RR right-of-way

State Register 05/14/1997, 5LN.195

“The 1909 roundhouse is associated with the operation and maintenance of the Union Pacific Railroad in eastern Colorado. It is Colorado’s most intact Union Pacific example and one of only four surviving roundhouses in the state.

Another site is located approximately two blocks north of the existing railroad property.

Hedlund House

617 3rd Ave.

State Register 03/12/1997, 5LN.100

“The circa 1877 Hedlund House is part of the first homestead filing in the Hugo area. The house is a wood frame structure typical of its place and period of construction.

Lincoln County has just one *officially eligible* historic site, which is consistent with the low number of recorded resources in these counties (*A Profile of the Cultural Resources of Colorado 2003*).

Morgan County

Three sites are located in Brush, some 28 miles east of Omar. Seven sites are located in Ft. Morgan, approximately 20 miles east of Omar.

Weld County

Weld County has 38 historic or archaeological sites; all but one site is 25 to 70 miles from Omar. Weld County also has five historic districts including the aforementioned West Stoneham Archaeological District. All of these districts, with the exception of Dearfield, are at least 40 miles from Omar. The town site of Dearfield is located approximately 8 miles northwest of Omar (11 miles northwest of Wiggins on Colo. Hwy. 34). At this distance and in this location the site is not likely to be within the potential new track corridor.

Further investigation of the potential for prehistoric cultural resources should be initiated once specific project planning begins. Special attention should be given to potential disturbance in the vicinity of streams, creeks, rivers, lakes, and other areas proximate to resources that could be used by prehistoric peoples. In addition, all towns through which the project would pass or that would be adjacent to the project have, or are likely to have, listed and unlisted but possibly eligible historic properties that may be affected. An assessment of the effects of the project on these properties would depend in part on the area of potential effect (APE) designated for the project when the project's alternatives are determined. In most cases, NRHP listed properties must be avoided by federally funded construction projects.

SPECIAL STATUS PLANT AND ANIMAL RESOURCES

This section describes the applicable legal and regulatory requirements related to special status plant and animal resources in the study area, and provides an inventory of those that could occur in the study area.

A definitive corridor has not yet been established. Therefore, the study area for special status plant and animal resources is the counties crossed by “lines” drawn between Omar to Peoria, and between Aroya to Las Animas Junction. While a line drawn southward from Omar to Peoria does not cross Weld County, it is included because Omar is located on the jurisdictional line between Morgan and Weld counties, and because it is possible that project alternatives could extend into Weld County. In addition, the proposed project includes improvements to existing railroad lines located in Elbert and Lincoln counties, therefore the study area is within the counties of Adams, Arapahoe, Bent, Cheyenne, Kiowa, Lincoln, Morgan and Weld.

Regulatory Context

Special Status species are those listed, or which are candidates for listing, as threatened or endangered under the federal Endangered Species Act, and the Colorado State endangered, threatened species, or state species of concern. A federally endangered species is any species that is in danger of extinction throughout all or significant portions of its range. A federally threatened species is any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. A candidate species is any species for which sufficient information indicating that formal listing under the Endangered Species Act may be appropriate (<http://midwest.fws.gov/endangered/glossary/index.html>).

A state endangered species is any species or subspecies of native wildlife whose prospects for survival or recruitment within the state are in jeopardy as determined by the [Wildlife] Commission (Colorado Revised Statutes 1994). A state threatened species is any species or subspecies of wildlife which, as determined by the [Wildlife] Commission, is not in immediate jeopardy of extinction, but is vulnerable because it exists in such small numbers or is so severely restricted throughout all or a significant portion of its range that it may become endangered (Colorado Revised Statutes 1994). A state species of concern is a species not listed as threatened or endangered, but is of concern to wildlife managers within the Colorado Division of Wildlife.

Study Methods

This technical report was conducted primarily using Internet sites to identify known special status plants and animals and comparing their range and habitat to that of the study area. The World Wide Web sites of all appropriate agencies were consulted including: US Fish and Wildlife Service, Colorado Division of Wildlife, the

Colorado Natural Heritage Program, the Colorado Natural Areas Program of Colorado State Parks, the Center for Plants Conservation, the Natural Resource Conservation Service, the Bureau of Land Management, Colorado State University, and the US Forest Service. The primary sites used include the following:

- <http://mountain-prairie.fws.gov>
- <http://herbarium.biology.colostate.edu/rare>
- http://ecos.fws.gov/tess_public/TESSWebpage
- <http://www.natureserve.org/explorer>
- <http://www.cnhp.colostate.edu/index>
- <http://www.mobot.org/CPC>
- <http://endangered.fws.gov/>
- <http://ndis.nrel.colostate.edu/>
- http://plants.usda.gov/cgi_bin/topics.cgi?earl=threat
- <http://www.co.blm.gov/botany/listedtbt>
- <http://wildlife.state.co.us/swa/>
- <http://midwest.fws.gov/endangered/glossary/index.html>

The Threatened and Endangered Species System (TESS) for federal species lists them in the following categories for Region 6 of the US Fish and Wildlife Service: Mammals, Amphibians, Fishes, Snails, Insects, and Flowering Plants. The federally listed species were then supplemented with Colorado listed species provided by the Bureau of Land Management. For plants, each federal and state listed species was then compared to comprehensive species lists for each county prepared by the Colorado State University Herbarium, which is concerned with the documentation of Colorado's vascular flora, including the natural variation based on geographic and ecological distribution. If the distribution of the plant or animal within the study area was not conclusive, other sources were consulted, until it could be determined which plants or animals could potentially be found within at least one of the counties of the study area in Eastern Colorado.

Inventory of Special Status Plants and Animals

The special status plants and animals, their status, and the counties in which they could reasonably be found are listed in Table 1.

Table 1: Special Status Species in the Study Area

Status	Common Name	Scientific Name	County of Potential Occurrence
BIRDS			

Status	Common Name	Scientific Name	County of Potential Occurrence
Federally Threatened, State Threatened	Bald Eagle	<i>Haliaeetus leucocephalus</i>	Adams, Arapahoe, Bent, Cheyenne, Elbert, Kiowa, Lincoln, Morgan, Weld
State Special Concern	Ferruginous Hawk	<i>Buteo regalis</i>	Adams, Arapahoe, Bent, Cheyenne, Elbert, Kiowa, Lincoln, Morgan, Weld
State Special Concern	Greater Sandhill Crane	<i>Grus canadensis tabida</i>	Adams, Arapahoe, Bent, Kiowa, Morgan, Weld
Federally Endangered, State Endangered	Interior Least Tern	<i>Sterna antillarum athalassos</i>	Adams, Arapahoe, Bent, Elbert, Kiowa, Lincoln, Morgan, Weld
Federal Candidate Species, State Threatened	Lesser Prairie Chicken	<i>Tympanuchus pallidicinctus</i>	Arapahoe, Bent, Cheyenne, Kiowa, Lincoln
State Special Concern	Long-billed Curlew	<i>Numenius americanus</i>	Adams, Arapahoe, Bent, Cheyenne, Elbert, Kiowa, Lincoln, Morgan, Weld
Federally Threatened, State Threatened	Mexican Spotted Owl	<i>Strix occidentalis</i>	Adams, Arapahoe, Weld
State Special Concern	Mountain Plover	<i>Charadrius montanus</i>	Adams, Arapahoe, Bent, Cheyenne, Elbert, Kiowa, Lincoln, Morgan, Weld
Federally Threatened, State Threatened	Piping Plover	<i>Caradrius melodus</i>	Adams, Arapahoe, Bent, Elbert, Kiowa, Lincoln, Morgan, Weld
State Endangered	Plaines Sharp-tailed Grouse	<i>Tympanuchus phasianellus jamesii</i>	Adams, Arapahoe, Cheyenne, Elbert, Lincoln, Morgan, Weld
Federally Endangered, State Endangered	Southwestern Willow Flycatcher	<i>Empidonax traillii extimus</i>	Adams, Arapahoe, Kiowa, Weld
State Threatened	Western Burrowing Owl	<i>Athene cunicularia</i>	Adams, Arapahoe, Bent, Cheyenne, Elbert, Kiowa, Lincoln, Morgan, Weld
State Special Concern	Western Snowy Plover	<i>Charadrius alexandrinus nivosus</i>	Adams, Arapahoe, Bent, Kiowa, Morgan, Weld
Federally Endangered, State Endangered	Whooping Crane	<i>Grus americana</i>	Adams, Arapahoe, Bent, Cheyenne, Elbert, Kiowa, Lincoln, Morgan, Weld
Federal Candidate Species	Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	Adams, Arapahoe, Bent, Elbert, Kiowa, Lincoln, Morgan, Weld

Status	Common Name	Scientific Name	County of Potential Occurrence
MAMMALS			
Federally Endangered, State Endangered	Black-footed Ferret	<i>Mustela nigripes</i>	Adams, Bent, Cheyenne, Elbert, Kiowa, Lincoln, Morgan, Weld
Federal Candidate Species, State Special Concern	Black-tailed Prairie Dog	<i>Cynomys ludovicianus</i>	Adams, Arapahoe, Bent, Cheyenne, Elbert, Kiowa, Lincoln, Morgan, Weld
State Special Concern	Northern Pocket Gopher	<i>Thomomys talpoides</i>	Arapahoe, Elbert, Lincoln, Weld
State Threatened	Northern River Otter	<i>Lutra canadensis</i>	Bent, Morgan, Weld
Federally Threatened, State Threatened	Preble's Meadow Jumping Mouse	<i>Zapus hudsonius preblei</i>	Adams, Arapahoe, Elbert, Morgan, Weld
State Special Concern	Swift Fox	<i>Vulpes velox</i>	Adams, Arapahoe, Bent, Cheyenne, Elbert, Kiowa, Lincoln, Morgan, Weld
State Endangered	Wolverine	<i>Gulo gulo</i>	Arapahoe
REPTILES			
State Special Concern	Common Kingsnake	<i>Lampropeltis getula</i>	Bent, Kiowa
State Special Concern	Couches Spadefoot	<i>Scaphiopus couchii</i>	Bent, Kiowa
State Special Concern	Common Garter Snake	<i>Thamnophis sirtalis</i>	Adams, Arapahoe, Morgan, Weld
State Special Concern	Massasauga	<i>Sistrurus catenatus</i>	Bent, Cheyenne, Elbert, Kiowa, Lincoln
State Special Concern	Midget Faded Rattlesnake	<i>Crotalus veridis concolor</i>	Adams, Arapahoe, Bent, Cheyenne, Kiowa, Lincoln, Morgan, Weld
State Special Concern	Plains Leopard Frog	<i>Rana blairi</i>	Bent, Cheyenne, Elbert, Kiowa, Lincoln
State Special Concern	Texas Blind Snake	<i>Leptotyphlops dulcis</i>	Bent
State Special Concern	Texas Horned Lizard	<i>Phrynosoma cornutum</i>	Bent, Cheyenne, Kiowa
State Special Concern	Tripliod Checkered Whiptail	<i>Cnemidophorus neotesselatus</i>	Bent
AMPHIBIANS			
State Special Concern	Northern Cricket Frog	<i>Acris crepitans</i>	Morgan, Weld
State Special Concern	Northern Leopard Frog	<i>Rana pipiens</i>	Adams, Arapahoe, Bent, Cheyenne, Elbert, Kiowa,

Status	Common Name	Scientific Name	County of Potential Occurrence
			Lincoln, Morgan, Weld
State Special Concern	Yellow Mud Turtle	Kinosternon flavescens	Bent, Cheyenne, Kiowa
FISHES			
Federal Endangered	Pallid Sturgeon	Scaphirhynchus albus	Adams, Arapahoe, Elbert, Morgan, Weld
Federal Candidate Species, State Threatened	Arkansas darter	Etheostoma cragini	Bent, Cheyenne, Elbert, Kiowa, Lincoln
PLANTS			
Federal Threatened	Ute Ladies' - tresses	Spiranthes diluvialis	Adams, Arapahoe, Morgan, Weld
Federal Threatened	Colorado Butterfly Plant	Gaura neomexicana var. coloradensis	Adams, Arapahoe, Weld

Source: <http://mountain-prairie.fws.gov>, <http://herbarium.biology.colostate.edu/rare>, http://ecos.fws.gov/tess_public/TESSWebpage, <http://www.naturserve.org/explorer>, <http://www.cnhp.colostate.edu/index>, <http://www.mobot.org/CPC>, <http://endangered.fws.gov/>, <http://ndis.nrel.colostate.edu/>, http://plants.usda.gov/cgi_bin/topics.cgi?earl=threat, <http://www.co.blm.gov/botany/listedtbt>, <http://wildlife.state.co.us/swa/>, and <http://midwest.fws.gov/endangered/glossary/index.html>.

Bald Eagle

Haliaeetus leucocephalus

Bald eagles are seldom seen far from water - large rivers, lakes and seacoasts. In Colorado they are often found near reservoirs, especially where there are abundant fish. In 2001, there were about 51 nesting pairs of bald eagles in the state. Two decades ago, bald eagles were extremely rare in Colorado and throughout the Continental United States (http://wildlife.state.co.us/species_profiles/baldeagle.asp).

Ferruginous Hawk

Buteo regalis

In Colorado, Ferruginous Hawks are found primarily on the eastern plains, in the grassland and lowland riparian habitat types. Small numbers of these hawks nest in northwestern Colorado and the San Luis Valley. Ferruginous Hawks nest in isolated trees or small groves of trees, and on other elevated sites such as rock outcrops, buttes, large shrubs, haystacks, and low cliffs. Nests are situated adjacent to open areas such as grassland or shrubsteppe. These hawks are closely associated with prairie dog colonies, especially in winter. Although they do breed in Colorado, Ferruginous Hawks are more common during winter (November to March) (<http://www.rmbo.org/pif/bcp/phy36/grasland/feha.htm>).

Greater Sandhill Crane

Grus canadensis tabida

Approximately 1,700 Greater Sandhill Cranes nest in Colorado, Idaho, Montana, Utah and Wyoming. The Rocky Mountain population is migratory and spends the winter months in the Lower Rio Grande River Valley in central to south-central New Mexico. Migrants occur on mudflats around reservoirs, in moist meadows, and in agricultural areas, and are abundant in the spring and fall in the San Luis Valley. (<http://ndis.nrel.colostate.edu/wildlifesp.aspx?SpCode=040701>).

Interior Least Tern

Sterna antillarum athalassos

The least tern is the smallest of the North American terns. The interior least tern feeds largely on small fish that it catches in the shallow water of rivers and lakes. The birds hover over the water and dive to catch their prey. They will eat almost any type of fish, if of the appropriate size. Sandbars, once common to the Missouri, Loup, Niobrara and Platte rivers, have been largely eliminated, leaving the interior least tern with few suitable nesting areas. The species now utilizes the spoil piles left at sandpits as alternative nesting grounds. These spoil piles result from commercial sand and gravel mining operations along rivers. In Colorado, the least tern has bred in the southeastern portion of the state, generally in the La Junta-Lamar area. The preferred nesting habitat is on sandy or pebbly beaches, well above the water line, around lakes and reservoirs or on sandy soil sandbars in river channels (http://wildlife.state.co.us/species_profiles/leastern.asp, and <http://www.nwf.org/watersheds/platte/tern.html>).

Lesser Prairie Chicken

Tympanuchus pallidicinctus

Lesser Prairie-Chickens reside from southeastern Colorado east to southwestern Kansas south of the Arkansas River, south through western Oklahoma and the Texas panhandle, and west to southeastern New Mexico. Within Colorado, they occupy the grassland habitat type, primarily in Baca County, with some birds residing in Kiowa and Prowers counties. Lesser Prairie-Chickens prefer grasslands with some shrubs; they will also use CRP land. Vegetation found in a suitable habitat includes sand sagebrush and shinnery oak with bluestem (historically) or mixed grass, including sand dropseed, side-oats grama, three-awn, blue grama, or bluestem. Leks are located in areas of sparse vegetation, typically on knolls or ridges (<http://www.rmbo.org/pif/bcp/phy36/grasland/feha.htm>).

Long-billed Curlew

Numenius americanus

In Colorado, the Long-billed Curlews breed throughout the eastern plains, with the population concentrated in the southeast. Curlews breed in shortgrass and mixed-grass habitats, and occasionally in idle cropland. After hatching, the adults move the chicks to areas of taller grasses and scattered forbs and shrubs for protection from predators and weather extremes; dense forbs or shrubs are avoided, due to low visibility and difficulty of travel for chicks. Proximity to standing water seems to be a

necessary feature, even though the birds are rarely seen actually using the water. The water is often from human sources (windmill overflow, stock ponds, etc.). As with Mountain Plovers, curlews may be attracted to the low vegetation profile and high insect population associated with livestock near such water sources, rather than an attraction to the water itself. They occasionally nest in idle croplands such as wheat stubble. Curlews winter along the California coast, the Baja peninsula, central and southern Texas, and throughout Mexico. They feed on insects and other invertebrates (<http://www.rmbo.org/pif/bcp/phy36/grasland/feha.htm>).

Mexican Spotted Owl

Strix occidentalis

Mexican Spotted Owls inhabit local areas from southern Utah and southern Colorado south into central Mexico. Recent nesting in Colorado has been confirmed in only three areas: Mesa Verde, the Wet Mountains, and near Pikes Peak. Mexican Spotted Owls nest in steep canyons with dense stands of large ponderosa pine or pinyon-juniper with Douglas-fir, and in mature to old-growth mixed-conifer forest with high canopy closure and open understory. Favored stands generally are multi-storied, with snags and downed logs. They nest in tree cavities or on cliff ledges. Members of this subspecies are nonmigratory, although individuals sometimes move to lower elevations in winter. Their diet primarily consists of small- to medium-sized mammals, especially woodrats and white-footed mice (*Peromyscus* spp.); they also take voles, rabbits, and some birds (<http://www.rmbo.org/pif/bcp/phy62/ppine/meso.htm>).

Mountain Plover

Charadrius montanus

Mountain Plovers breed from southern Alberta south through western Oklahoma and western Texas, and west through central New Mexico. In Colorado, populations are concentrated in and around the Pawnee and Comanche National Grasslands and in South Park. Small numbers of plovers nest in North Park and the San Luis Valley. They are often found where vegetation height and density have been reduced through grazing by livestock or prairie dogs. Plovers will forage and nest in agricultural fields that are bare or contain short vegetation, but will abandon the nests if the vegetation grows too tall (i.e., above about 5 cm; 2 in). Plovers winter in southern California, and southern Texas into northern Mexico (<http://www.rmbo.org/pif/bcp/phy36/grasland/moup.htm>).

Piping Plover

Charadrius melodus

The piping plover is one of three small plovers that can be found in Colorado. In Colorado, piping plovers occur as migrants, arriving around the first of April. Most have passed through by the end of May. They can be found in the eastern part of the state. The Arkansas and South Platte River drainages are the best areas to find these birds. Nesting habitat in Colorado is on sandy lakeshore beaches, sandbars within riverbeds or even sandy wetland pastures. An important aspect of this habitat is that

of sparse vegetation. The plover depends on its coloration for camouflage and protection (http://wildlife.state.co.us/species_profiles/pipingplover.asp).

Plains Sharp-tailed Grouse

Tympanuchus phasianellus jamesii

Sharp-tailed Grouse currently reside in an area that forms a triangle from east-central British Columbia southeast to southwestern Manitoba, and south in a narrowing band to eastern Colorado. In Colorado, birds of the subspecies *jamesii* reside in Douglas County, northern Weld County, and Logan County. Plains Sharp-tailed Grouse inhabit a mix of tall and short grasses interspersed with stands of shrubs, including Gambel oak, threelobed sumac, willows, and sand sagebrush, especially where the shrubs form a dense cover with a relatively open understory. The woody cover is especially important for brood cover. The Weld County population occupies CRP lands where tall grasses mix with shorter native species and agricultural fields (<http://www.rmbo.org/pif/bcp/phy36/grasland/feha.htm>).

Southwestern Willow Flycatcher

Empidonax traillii extimus

The southwestern willow flycatcher occurs, as its name implies, throughout most of the southwestern United States. It is a Neotropical migrant songbird, i.e., one of many birds that return to the United States and Canada to breed each spring after migrating south to the Neotropics (Mexico and Central America) to winter in milder climates (<http://biology.usgs.gov/s+t/noframe/b156.htm>). The Southwestern Willow Flycatcher breeds in dense riparian habitats along rivers, streams, or other wetlands. The vegetation can be dominated by dense growths of willows, seepwillow, or other shrubs and medium-sized trees. One of the most important characteristics of the habitat appears to be the presence of dense vegetation, usually throughout all vegetation layers present. Almost all Southwestern Willow Flycatcher breeding habitats are within close proximity (less than 20 yards) of water or very saturated soil. This water may be in the form of large rivers, smaller streams, springs, or marshes. Ultimately, the breeding site must have a water table high enough to support riparian vegetation (<http://www.usgs.nau.edu/swwf/wiflhab.html>).

Western Burrowing Owl

Athene cunicularia

The burrowing owl is a small, ground-dwelling bird that is highly visible to humans. This brown, long-legged owl can frequently be seen in the daytime bobbing up and down while perched on a fence post or the mound of a prairie dog burrow. Contrary to what their name implies, these little owls do not dig their own burrows, but will instead use an abandoned rodent burrow, usually from a prairie dog. In Colorado, burrowing owls are a migratory species, and can be found almost anywhere there are prairie dog burrows from late March or early April through October. During winter, Colorado owls migrate to Mexico and Central America. Burrowing owls are primarily found in grasslands and mountain parks, usually in or near prairie dog towns. The burrowing owl also uses well-drained, steppes, deserts, prairies and agricultural lands (http://wildlife.state.co.us/species_profiles/burrowingowl.asp).

Western Snowy Plover

Charadrius alexandrinus nivosus

The Western Snowy Plover is a small sandpiper-like shorebird that inhabits beaches, lagoons and salt-evaporation ponds on coasts and barren sparsely vegetated salt flats and braided river channels inland. Nests are often located near some conspicuous feature like driftwood, a stone or tumbleweed. Inland populations feed at saltpans, spoil sites and along the edges of saltpans, salt marshes and lagoons. Inland feeding is usually done in very shallow water or over wet mud or sand. Some foraging also occurs on dry flats and playas. The species lives in elevations from sea level to 10,000 feet inland (Colorado). This species is moderately widespread with spotty distribution. Avid walkers and runners, the species uses this locomotion technique in feeding, courtship, agonistic interactions, nest exchange, retreat from nest when approached and most activities associated with care of young. Western Snowy Plovers will fly when they or their chicks are directly threatened. This species has been significantly impacted by the expansion of human activity into nesting areas (http://www.azgfd.com/w_c/edits/documents/Charalni.d.pdf).

Whooping Crane

Grus americana

The whooping cranes live in mudflats around reservoirs and in agricultural areas. While wintering, they live on salt flats that are dominated by coastal salt grass. Their nesting grounds are wetland communities dominated by bulrush, and in agricultural areas. In Colorado, whooping cranes occur only as migrants, stopping over in the San Luis Valley on their way to and from their wintering grounds, and can be seen there for four to six weeks during February and March and in the western valleys, especially Mesa, Delta and Gunnison counties. The whooping crane is a casual migrant on the eastern plains (http://wildlife.state.co.us/species_profiles/whoopingcrane.asp).

Yellow-billed Cuckoo

Coccyzus americanus

The cuckoos inhabit lowland riparian forests and urban areas with tall trees. They are a rare spring and fall migrant and summer resident on eastern plains west to Morgan and Otero counties, and rare west to foothills. Uncommon local summer resident in western valleys, they are found primarily from Mesa County southward. The yellow-billed cuckoo sometimes occurs in mountain parks (four records) and in foothills and lower mountains (four records). Numbers of this species fluctuate widely from year to year (<http://ndis.nrel.colostate.edu/wildlifesp.aspx?SpCode=040277>).

MAMMALS

Black-footed Ferret

Mustela nigripes

Black-footed ferrets have historically occupied areas ranging from the shortgrass and midgrass prairie to semidesert shrublands. Presently they are known to exist only in a

remnant-restored population in the Shirley Basin of Wyoming and in captive breeding populations at various locations across the country. Black-footed ferrets eat prairie dogs, mice, ground squirrels, rabbits, birds, reptiles, and insects. No live ferrets have been found, although evidence suggests they inhabit Colorado (<http://ndis.nrel.colostate.edu/wildlifesp.aspx?SpCode=050120>).

Black-tailed Prairie Dog

Cynomys ludovicianus

Black-tailed prairie dogs form large colonies or "towns" in shortgrass or mixed prairie. Black-tailed prairie dogs consume large quantities of annual forbs, and native grasses and sedges. Western wheatgrass, buffalo-grass, grama, Russian-thistle, pigweed, and ragweed are common food items. During late fall, winter, and spring, these prairie dogs frequently dig and eat roots of forbs and grasses. Black-tailed prairie dogs are not uncommon in most of the counties of the eastern plains, especially those immediately along the Front Range. Some of the highest densities presently found in Colorado are on lands held by developers adjacent to or within urban areas such as Denver, Boulder, and Aurora (<http://ndis.nrel.colostate.edu/wildlifesp.aspx?grp=Prairie>).

Northern Pocket Gopher

Thomomys talpoides

These mammals are found in many different habitat types including agricultural and pasture lands, semidesert shrublands, and grasslands at lower elevations upwards into alpine. Gophers use all parts of plants, and diets vary on a seasonal basis partly in response to availability and partly because of quality and succulence. Roots and tubers provide most of the winter diet, whereas spring and summer diets are usually 60 to nearly 100 percent leaves and stems. Grasses are seasonally and locally. Northern pocket gophers are common in a variety of habitats above about 1,525 m (5,000 ft) in elevation (<http://ndis.nrel.colostate.edu/wildlifesp.aspx?SpCode=050047>).

Northern River Otter

Lutra canadensis

River otters inhabit riparian habitats that traverse a variety of other ecosystems ranging from semidesert shrublands to montane and subalpine forests. The species requires permanent water of relatively high quality and with an abundant food base of fish or crustaceans. Minimum estimated water flows are 10 cubic feet (0.28 cubic meter) per second. Slow-swimming fishes, and those in greatest abundance, are principal prey. They occur in the Colorado, Gunnison, Piedra, and Dolores rivers. Tracks and other sign of otters have also been found in the Poudre and Laramie drainages in Larimer County (<http://ndis.nrel.colostate.edu/wildlifesp.aspx?SpCode=050109>).

Preble's Meadow Jumping Mouse

Zapus hudsonius preblei

The Preble's meadow jumping mouse (*Zapus hudsonius preblei*) lives primarily in heavily vegetated riparian habitats. It is known to occur in seven counties along the Front Range of Colorado and in two counties in Wyoming. Historical records indicate that it was formerly present in a few additional counties in both states. Much of the remaining habitat for the mouse occurs in areas with known or potential aggregate resources (sand and gravel) (<http://rockyweb.cr.usgs.gov/frontrange/virtour/ftcoll4.htm>).

Swift Fox

Vulpes velox

The swift fox is an animal of grasslands. It occupies shortgrass and midgrass prairies over most of the Great Plains, including eastern Colorado. In northeastern Colorado, the swift fox appears to be most numerous in areas with relatively flat to gently rolling topography. However, habitat occupied on the Pinion Canyon Maneuver Site in southeastern Colorado is more diverse. Swift foxes are almost entirely carnivorous. Studies over much of their range indicate that jackrabbits compose the bulk of the diet, supplemented by ground squirrels, prairie dogs, and many species of ground-nesting birds (<http://ndis.nrel.colostate.edu/wildlifesp.aspx?SpCode=051063>).

Wolverine

Gulo gulo

The wolverine is the largest land species of the "mustelid" or weasel family, and adults can weigh over 50 pounds. In appearance it has more characteristics of a badger or skunk than a weasel, and feeds primarily by scavenging on carrion. Wolverines inhabit boreal forests, mountains or open plains and brushlands. Generally, their range extends from Alaska and Northern Canada south through the Cascades and Sierra Nevada Mountains in California, Colorado, Idaho, Montana, Oregon, Utah, Washington and Wyoming. The range in the Great Lakes region and northeastern U.S. is difficult to determine because historic records are sketchy. The wolverine is very rarely seen due to vast territories, scarcity, and its acute senses of smell and hearing. Sources: <http://mountain-prairie.fws.gov/pressrel/00-22.htm>, "Gulo gulo" (On-line), Animal Diversity Web. Accessed January 30, 2004 at http://animaldiversity.ummz.umich.edu/site/accounts/information/Gulo_gulo.html, and <http://www.enature.com/fieldguide/showRguide.asp?rguideID=714&speciesID=4029>

REPTILES

Common Kingsnake

Lampropeltis getula

In southeastern Colorado, the common kingsnake has been found near irrigated fields on the floodplain of the Arkansas River, in rural residential areas in plains grassland, near stream courses, and in other areas dominated by shortgrass prairie. Common king snakes feed on a wide range of vertebrate prey typically including rodents, birds,

bird eggs, lizards, snakes (including rattlesnakes), reptile eggs, and amphibians. Little is known about predators of the common kingsnake. This species is known to occur in southwestern Colorado in western Montezuma County at elevations of about 4,600–5,200 feet and in southeastern Colorado at about 3,800–5,000 feet (<http://ndis.nrel.colostate.edu/wildlifesp.aspx?grp=Snakes>).

Common Garter Snake

Thamnophis sirtalis

In Colorado, the common garter snake inhabits marshes, ponds, and the edges of streams. For the most part, it is restricted to aquatic, wetland, and riparian habitats along the floodplains of streams. Common garter snakes feed opportunistically on frogs, toads, fishes, and earthworms. In Colorado, the known diet of adults includes various fishes, small metamorphosed bullfrogs, northern leopard frogs, other larval and adult amphibians, and earthworms. This species occurs in northeastern Colorado along the South Platte River and its tributaries at elevations below 6,000 feet and in the North Fork Republican River drainage in Yuma County at about 3,500–3,600 feet, and is widely distributed along the eastern base of the Front Range (<http://ndis.nrel.colostate.edu/wildlifesp.aspx?grp=Snakes>).

Massasauga

Sistrurus catenatus

Massasauga habitat in Colorado consists of dry plains grassland and sandhill areas. Found from the Great Lakes region of southern Ontario and western New York southwest through the Midwest and central and southern Great Plains to southeastern Arizona, northern Mexico, and southern Texas, the massasauga occurs in southeastern Colorado at elevations below about 5,500 feet (<http://ndis.nrel.colostate.edu/wildlifesp.aspx?grp=Vipers>).

Midget Faded Rattlesnake

Crotalus veridis concolor

The Midget Faded is one of the smallest rattlesnakes of the species *verities*, and mainly resides in the basins of the southwestern states, such as eastern Utah, extreme western Colorado, and extreme southwestern Wyoming where it is rocky and arid. Midget Faded rattlesnakes eat lizards and small mammals such as mice or rats (<http://ntri.tamuk.edu/herpetarium/viperidae/c.v.concolor/cvconcolor.html>).

Texas Blind Snake

Leptotyphlops dulcis

This snake prefers damp, loose soil among and under rocks. Termites and ants, including the egg, larval, pupal, and adult stages of both, dominate its diet. Little is known about predation. It is found from Southeastern Arizona, central and southern New Mexico, southeastern Colorado, and southern Kansas south through Oklahoma and Texas to north-central and northeastern Mexico (<http://ndis.nrel.colostate.edu/wildlifesp.aspx?grp=Snakes>).

Texas Horned Lizard

Phrynosoma cornutum

The Texas horned lizard is a ground-dwelling species that inhabits plains grassland in Colorado, especially where there are large patches of bare ground. The soil may be sandy, gravelly, or loamy. Little information exists on predation on Texas horned lizards. This lizard is found in Colorado, Kansas, and southwestern Missouri south through southeastern Arizona, New Mexico, Oklahoma, Arkansas, and Texas to northern Mexico. It occurs chiefly south of the Arkansas River at elevations below about 6,000 feet in southeastern Colorado (<http://ndis.nrel.colostate.edu/wildlifesp.aspx?SpCode=030173>).

Tripliod Checkered Whiptail

Cnemidophorus neotesselatus

Typical habitat in Colorado for this ground-dwelling species consists of the bottoms, slopes, and escarpments of rocky canyons, often where grassland or grassy-weedy associations meet open juniper woodland. These lizards feed opportunistically on available invertebrates. Predators are poorly known. Its distribution is discontinuous from southeastern Colorado (extending north to the vicinity of the Ninemile Valley of the Purgatoire River at Higbee, Otero County) south through extreme western and southwestern Oklahoma, New Mexico, possibly extreme southeastern Arizona, western Texas, and well into Chihuahua, Mexico (<http://ndis.nrel.colostate.edu/wildlifesp.aspx?SpCode=030174>).

AMPHIBIANS

Couches Spadefoot

Scaphiopus couchii

Couches spadefoot inhabits the shortgrass prairie ecosystem in Colorado. It spends most of its life burrowed in the soil and is exceptional among toads in being able to survive long periods of time in the soil. Foods eaten in Colorado are not known. Elsewhere, this toad feeds opportunistically. Predators undoubtedly include various mammals, birds, and snakes. Its range includes the southwestern United States and much of northern Mexico, and it is known to occur in Colorado in Otero County at elevations of about 4,000-4,500 feet (<http://ndis.nrel.colostate.edu/wildlifesp.aspx?grp=Toads>).

Northern Cricket Frog

Acris crepitans

In Colorado, the northern cricket frog occurs along the sunny, muddy, or marshy gently sloping edges of permanent or semi permanent ponds, reservoirs, and streams, and along irrigation ditches, in pastures, and in sand-hill country. Cricket frogs eat various small invertebrates obtained on shore or in the water. Typical predators probably include bullfrogs, amphibious snakes, and various predatory birds, mammals, and aquatic arthropods. The northern cricket frog occurs in much of the central and eastern United States, north to the southern Great Lakes region, east to southern New York and western Florida, south to the Gulf Coast and extreme northern Mexico, and west to eastern New Mexico and eastern Colorado. In Colorado, it is known from the North Fork and South Fork of the Republican River in

Yuma County (about 3,500–3,600 feet) and perhaps also from the South Platte River drainage in Weld and Morgan counties
(<http://ndis.nrel.colostate.edu/wildlifesp.aspx?grp=Frogs>).

Northern Leopard Frog

Rana pipiens

Typical habitats of the northern leopard frog include wet meadows and the banks and shallows of marshes, ponds, glacial kettle ponds, beaver ponds, lakes, reservoirs, streams, and irrigation ditches. Little information is available on northern leopard frog food habits in Colorado, but invertebrates undoubtedly dominate the diet of adults. Reported predators of metamorphosed frogs in Colorado include the great blue heron, burrowing owl, northern water snake, and western terrestrial garter snake. This species occurs throughout Colorado, excluding most of the southeastern and east-central portions of the state
(<http://ndis.nrel.colostate.edu/wildlifesp.aspx?grp=Frogs>).

Plains Leopard Frog

Rana blairi

The plains leopard frog inhabits the margins of streams, natural and artificial ponds, reservoirs, creek pools, irrigation ditches, and other bodies of water in plains grassland, sandhills, stream valleys, or canyon bottoms. The diet includes various invertebrates and probably occasional small vertebrates. Known predators include western terrestrial garter snakes or blackneck garter snakes. This frog occurs in the Great Plains portion of the Arkansas River drainage in southeastern Colorado and in the Republican River drainage in northeastern Colorado and at elevations principally below 5,000 feet in the southwestern portions of Las Animas and Pueblo counties
(<http://ndis.nrel.colostate.edu/wildlifesp.aspx?grp=Frogs>).

Yellow Mud Turtle

Kinosternon flavescens

Typical habitat of the yellow mud turtle in Colorado includes permanent and intermittent streams, permanent ponds, isolated temporary ponds and rain pools far from permanent water, irrigation ditches, soggy fields, and the surrounding grasslands and sandhills. These turtles eat annelid worms, leeches, flatworms, nematodes, insects, various crustaceans, centipedes, millipedes, spiders, a wide variety of insects, snails, amphibian larvae, fishes (usually dead or dying), animal carcasses, and plant material. Predatory fishes and water snakes probably prey on small mud turtles. Adults likely are attacked occasionally by the usual assortment of larger predatory animals. This turtle occurs in eastern Colorado in the Republican, Arkansas, and Cimarron River drainages at elevations below 5,000 feet
(<http://ndis.nrel.colostate.edu/wildlifesp.aspx?grp=Turtles>).

FISHES

Pallid Sturgeon

Scaphirhynchus albus

The pallid sturgeon is a large bottom dwelling fish found in the Missouri-Mississippi River drainage, which includes the Platte River. It prefers waters with strong currents and a firm sand bottom. Its natural habitat includes backwaters, side channels, sloughs and the main channels of rivers. Historically, the pallid sturgeon ranged from the Missouri River in central Montana to St. Louis; the Yellowstone River of eastern Montana; and the Mississippi River from St. Louis to the Gulf of Mexico. The pallid sturgeon feeds on fish and invertebrates like insects, crustaceans and worms. Since 1970, fewer than 20 pallids have been spotted, most near the mouths of the Niobrara, Platte, Elkhorn and Little Nemaha rivers. The resurrection of dams over the years has been especially problematic for the species, as they interfere with the pallid's reproductive processes. They also cause alterations in river temperatures by varying the natural flow of the water. The pallid sturgeon is simply not suited for the lowered temperatures, altered flow or decreased turbidity now present in its native waters (<http://www.nwf.org/watersheds/platte/sturgeon.html>).

Arkansas darter

Etheostoma cragini

The Arkansas darter is a three-inch cousin of the walleye and yellow perch. The species is found in the Upper Arkansas, Fountain Creek, Horse Creek, Upper Arkansas at John Martin, Big Sandy Creek, Rush Creek, Black Squirrel Creek and Chico Creek drainages. Their distribution has not changed significantly based on comparisons of historic data, particularly since 1979. Darter populations in Colorado persist in large, deep pools during late summer low-water periods when streams may become intermittent. The Arkansas darter prefers shallow, clear, sandy streams with spring-fed pools and abundant rooted aquatic vegetation. Arkansas darters feed on a variety of aquatic insects and some plant material, including small seeds (http://wildlife.state.co.us/species_profiles/arkansasdarter.asp).

PLANTS

Colorado Butterfly Plant

Gaura neomexicana var. *coloradensis*

The Colorado butterfly plant is a rare short-lived perennial herb. The only known populations of the [Colorado butterfly plant](#) are mostly on private land within a small area in southeastern Wyoming, western Nebraska, and north-central Colorado. With less than 50,000 reproducing individuals, only 10 of the 14 current populations are considered stable or increasing. The plant is found in moist areas of floodplains and stands 2-3 feet tall with one or a few reddish, fuzzy stems and white flowers that turn pink or red with age (<http://mountain-prairie.fws.gov/pressrel/00-31.htm>).

Ute Ladies'-tresses

Spiranthes diluvialis

This orchid is a perennial herb with a flowering stem, 2-5 dm tall, arising from a basal rosette of grass-like leaves. The flowers are ivory-colored, arranged in a spike at the top of the stem. It blooms mainly from late July through August. It is known from sporadic occurrences in lower-elevation wet meadow habitats in the interior

western United States. It occurs in moist to very wet meadows along streams or in abandoned stream meanders that still retain ample ground water, and near springs, seeps, and lakeshores. Currently, the largest documented population - with about 5500 plants - is in Colorado. The riparian habitat on which this species depends has been drastically modified by urbanization and stream channelization for agriculture and development. Most surviving populations are small and appear to be relict in nature (<http://www.natureserve.org/explorer/servlet/NatureServe?searchName=Spiranthes+divulvialis>).

No special status snails or insects are potentially present in the study area.

In addition to State Wildlife Areas, The Colorado Natural Heritage Program (CNHP) tracks and ranks Colorado's rare and imperiled species and habitats, and provides information and expertise on these topics to promote the conservation of Colorado's valuable biological resources (<http://www.cnhp.colostate.edu/index.html>). CNHP has listed the following sites in the vicinity of the study area:

- West Bijou Creek at Byers (Adams County)
- Cedar Point (Elbert County)
- Big Sandy Creek Sandhills (Lincoln County)
- Eads Sandhills (Kiowa County)
- Adobe Creek Basin (Kiowa County)



The Division of Wildlife's existing easements and leases protect habitat on a total of 248,000 acres. The Division also owns 230 properties, totaling 369,518 acres, and leases an additional 481,333 acres of state school trust that wildlife requires to survive. Division properties not only protect wildlife, habitat but also provide the public with opportunities to hunt, fish, and watch wildlife (<http://wildlife.state.co.us/swa/>). State Wildlife Areas in the vicinity of the study area include:

- Kinney Lake State Wildlife Area (formerly known as Hugo SWA, From Hugo, go 14 miles south on Hwy. 109, then 2.5 mile east on Co. Rd. 2J, then 1 mile east to property, Lincoln County).
- Adobe Creek Reservoir State Wildlife Area (Blue Lake) (From Las Animas on US 50, go 11 miles north on County Road 10 to the reservoir. Kiowa County).
- John Martin Reservoir State Wildlife Area (Bent County. From Las Animas, 16 miles east on U.S. 50, 2 miles south of Hasty).

- Purgatoire River State Wildlife Area (Bent County. From Las Animas, 1 mile south on Highway 101, 1 mile southwest on County Road 10).

Potential constraints or issues to the project involving threatened or endangered species will vary with the habitat and species affected. Issues of concern should be addressed on a habitat and/or species-specific basis once project alternatives have been developed.

MAJOR CREEKS AND RIVERS, WETLANDS, AND OTHER SURFACE WATER RESOURCES

This section briefly describes the applicable legal and regulatory requirements related to water resources in the study area, and provides a short inventory of the major creeks and rivers, wetlands, and other surface waters in the study area.

Study Area

A definitive corridor has not yet been established. The study area for locations of major creeks and rivers, wetlands, and other surface waters for the Omar to Peoria section is a variable swath generally consisting of an area two to four miles on either side of a “line” drawn between Omar to Peoria, but tending to stay on the west side of the primary channels of Bijou Creek. Both Omar and Peoria are on the west side of this creek. The study area for the section from Aroya to Las Animas Junction, is a variable swath generally consisting of an area four miles on either side of a “line” drawn between Aroya and Las Animas Junction, except south of Adobe Reservoir when the study area narrows to a 4-mile wide swath directly north of Las Animas Junction in order to avoid John Martin Reservoir. As all construction activities will be done within the existing railroad property, no additional research along the right-of-way and railroad property of the existing railroad facilities from Peoria to Aroya was conducted. The study area includes land the counties of Adams, Arapahoe, Bent, Cheyenne, Kiowa, Morgan and Weld.

Regulatory Context

Sections 401 and 402 of the Clean Water Act mandate that state and federal water quality standards be met for activities that result in the discharge of materials to “Waters of the U.S.” Section 401 of the CWA requires that anyone intending to discharge dredge material for fill in a waterway or wetland obtain a 401 Certification. The U.S. Army Corps of Engineers (USACE), in accordance with Executive Order 11990, “Protection of Wetlands” and Section 404 of the Clean Water Act regulates the “Waters of the U.S.,” which includes wetlands that will potentially be affected by a project. The 1987 *U.S. Army Corps of Engineers Wetland Delineation Manual* and the EPA define “Waters of the U.S.” (40 CFR 122.2) and “Navigable Waters” (40 CFR 110.1) as follows:

- (a) All waters that are currently used, were used in the past, or may be susceptible to use in interstate commerce, including all waters that are subject to the ebb and flow of the tide,
- (b) Interstate waters, including interstate wetlands,
- (c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, and wetlands, the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce,

- (d) All impoundments of waters otherwise defined as navigable waters under this section,
- (e) Tributaries of waters identified in paragraphs (a) through (d) of this definition, including adjacent wetlands.

The USACE's manual also details criteria used to identify and delineate wetlands for purposes of Section 404, and the impacts that would require a Section 404 permit. Other regulations that are designed to protect water quality include the following:

- EPA's total maximum daily load (TMDL) program, which provides guidelines for identifying impaired waters and determining pollution sources in support of Section 303(d) of the Clean Water Act.
- Section 402 of the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) which requires a permit for all construction activities that would result in the disturbance of five or more acres of the total land area, including areas that are part of a larger common plan or development.
- Section 10 of the Rivers and Harbors Act of 1899, which concerns activities affecting navigable Waters of the U.S., including construction of structures in, under, and over navigable waters, as well as the excavation and deposition of material in navigable waters.
- Executive Order 11988, "Floodplain Management" and U.S. Department of Transportation (USDOT) Order 5650.2, "Floodplain Management and Protection" which prescribes policies and procedures for the avoidance, minimization, and mitigation of floodplain impacts.
- The National Wild and Scenic Rivers Act of 1968, as amended, was enacted to preserve certain rivers with exemplary natural, cultural or recreational features in a free-flowing condition, and to protect them for the benefit and enjoyment of present and future generations.
- The Federal Aviation Administration's (FAA) advisory Circular No. 150/5200-33 recommends limiting wildlife use of wet areas within an airport's approach or departure airspace, aircraft movement areas, loading ramps, or aircraft parking areas.

Study Methods

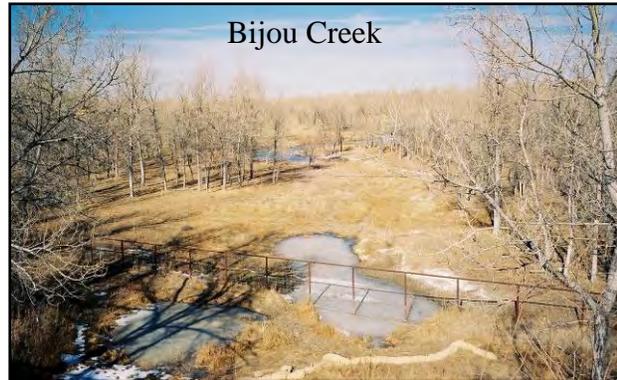
Water resources of the study area in this technical report were identified with minimal field reconnaissance using USFWS National Wetland Inventory maps, both electronic and paper. No floodplain studies or soil studies were conducted. No wetlands were delineated.

Inventory of Water Resources

Wetlands, major creeks and rivers, and other surface waters in the study area were found to occur in Adams, Arapahoe, Bent, Cheyenne, Elbert, Kiowa, Lincoln, Morgan, and Weld counties.

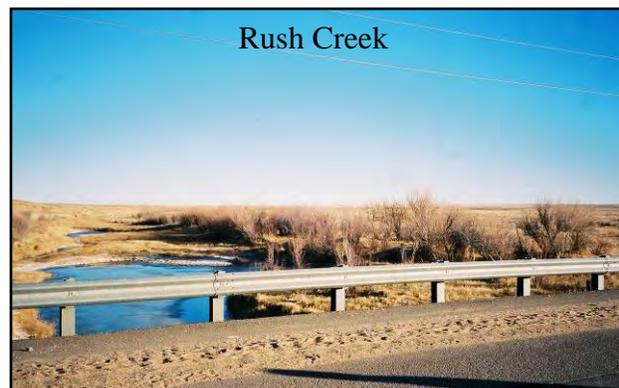
Major Creeks and Rivers

The corridor section from Omar to Peoria has one significant creek, Bijou Creek and its branches West Bijou Creek, Middle Bijou Creek, and East Bijou Creek, and a number of smaller, but also important creeks. These include Antelope Creek, Kiowa Creek. These resources flow generally toward the South Platte River, crossing the study area in a south to north pattern.



In the Omar to Peoria section, the main channel of Bijou Creek will probably not need to be crossed. However, Kiowa Creek (immediately south of Omar), Antelope Creek, West Bijou Creek, and Rattlesnake Creek (just north of US 40/287), though they trend northward, will have to be crossed.

The corridor section from Aroya to Las Animas Junction has fewer creeks, but it includes the Arkansas River and the Purgatoire River, which flows into the Arkansas about one-quarter mile west of Las Animas Junction. Whereas the creeks in the Omar to Peoria section flow towards the north in the study area, the creeks and rivers in the Aroya to Las Animas section flow toward the east in the study area. These creeks include Rush Creek, and Big Sandy Creek. Rush Creek flows into Big Sandy Creek south of Chivington (in Kiowa County) and Big Sandy Creek flows into the Arkansas River about 8 miles east of Lamar (Prowers County). The study area also includes the Fort Lyon Canal, which runs north of and roughly parallel to US 50.



In the Aroya to Las Animas Junction section, new track will be required to cross Big Sandy Creek and Rush Creek, as well as the Arkansas River.

Table 2 presents the major creeks and streams within the study area. It includes the stream name, its type, and its classification using the National Wetland Inventory (NWI) maps. These maps used *Classification of Wetlands and Deep-Water of the United States* (an Operational Draft), Cowardin, et al, 1977, to define the types of streams as follows:

- **Perennial streams** – a watercourse that flows throughout the year, or most of the year, in a well-defined channel.
- **Intermittent streams** – a watercourse that flows only at certain times of the year, conveying water from springs or surface sources, or a watercourse that does not flow continuously, when water losses from evaporation or seepage exceed available stream flow.

Table 2: Table of Major Creeks and Streams in the Study Area

Stream Name	Stream Type	Cowardin System Class*
Kiowa Creek	Intermittent	R4SBW
Antelope Creek	Intermittent	R4SBW
East Bijou Creek	Intermittent	R4SBW
West Bijou Creek	Intermittent	R4SBW R4SBJ
Middle Bijou Creek	Intermittent	R4SBW
Bijou Creek (main channel)	Intermittent	R4SBW R4SBJ
Rattlesnake Creek	Intermittent	R4SBW
Big Sandy Creek	Intermittent	R4SBW
Rush Creek	Intermittent	R4SBW
Fort Lyons Canal	Intermittent	R4OWKF
Arkansas River	Perennial (lower) Intermittent Perennial (lower)	R2OWZ R4OWF R2FLW
Purgatoire River	Perennial (lower) Perennial (lower)	R2SBF R2FLW

*NOTES:

Ecological System

R = Riverine

Ecological Subsystem

2 = Lower Perennial Riverine System

4 = Intermittent Riverine System (always denotes an SB designation)

Class

SB = Streambed

FL = Flat

OW = Open Water

After the above designations, the following Non-Tidal Water Regimes apply:

F = Semipermanent

J = Intermittently Flood

K = Artificial

W = Intermittently Flooded, Temporary

According to “Notes to the User” of the NWI maps, “Some areas designated R4SB, R4SBW or R4SBJ (intermittent streams) may not meet the definition of wetlands.”

SOURCE: National Wetland Inventory maps

Wetlands

All of the creeks and rivers in the study area have some associated wetlands. In addition, wetlands are scattered throughout the landscape in areas that are not adjacent to the creeks or rivers. Wetlands generally include swamps, marshes, and bogs. Federal agencies similarly define wetlands as “areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions. In parts of the study area that are intensively farmed or ranched, most of the wetlands have been “farmed” as indicated on the NWI maps “Pf”.

Table 3 describes the wetland systems associated with the creeks and rivers that cross the study area. No field investigations have been conducted, and no wetlands have been delineated. No attempt has been made to identify or classify the functions or values of these wetlands. However, it is helpful to use the Cowardin System Classifications to describe the dominant vegetation, hydrology, and soils of the wetlands in the study area to assist in the early identification of potential constraints in route selection or construction impacts.

Table 3: Wetlands Associated with Creeks and Rivers in the Study Area

Stream Name	Associated Wetlands Cowardin System Classes*	Description
Kiowa Creek (directly south of Omar, and only in the study area)	PEMA PEMW PEMC	Palustrine, Emergent Palustrine, Emergent Palustrine, Emergent
Antelope Creek (only in the study area)	PEMW POWKF	Palustrine, Emergent Palustrine, Open Water
East Bijou Creek (only in the study area)	PEMC PFOW PEMW PSSW PSS/FLW PFO/SSW PFO/FLW	Palustrine, Emergent Palustrine, Forested Palustrine, Emergent Palustrine, Scrub/Scrub Palustrine, Scrub/Scrub, Flat Palustrine, Forested, Scrub/Scrub Palustrine, Forested, Flat
West Bijou Creek (only in the study area)	PSS/FLW PFOW PSSW	Palustrine, Scrub/Scrub, Flat Palustrine, Forested Palustrine, Scrub/Scrub
Middle Bijou Creek (less than 1 mile east of Peoria and only in the study area)	PFOW PSS/FLW PSSW	Palustrine, Forested Palustrine, Scrub/Scrub, Flat Palustrine, Scrub/Scrub
Bijou Creek (main channel, and only in the study area)	PSS/FLW PSSW PFOW	Palustrine, Scrub/Scrub, Flat Palustrine, Scrub/Scrub Palustrine, Forested

Stream Name	Associated Wetlands Cowardin System Classes*	Description
	PEMY PEMW	Palustrine, Emergent Palustrine, Emergent
Rattlesnake Creek (about 2 miles directly north of Peoria, and only in the study area)	PFOW	Palustrine, Forested
Big Sandy Creek (directly south of Aroya and only in the study area)	PFOW PEMW PFLW	Palustrine, Forested Palustrine, Emergent Palustrine, Flat
Rush Creek (within the study area)	PFOW PEMW PFLW	Palustrine, Forested Palustrine, Emergent Palustrine, Flat
Fort Lyons Canal (within the study area)	PEMW PFOW PSS/EMW	Palustrine, Emergent Palustrine, Forested Palustrine, Scrub/Scrub, Emergent
Arkansas River (within the study area and east of Fort Lyon and John Martin Reservoir)	PFO/SSW PEMW PSS/EMW PSSC PSSW PEMY PSS/EMKW (approaching John Martin Reservoir and Fort Lyon Veterans Hospital (now a correctional facility))	Palustrine, Forested, Scrub/Scrub Palustrine, Emergent Palustrine, Scrub/Scrub, Emergent Palustrine, Scrub/Scrub Palustrine, Scrub/Scrub Palustrine, Emergent Palustrine, Scrub/Scrub, Emergent
Purgatoire River (within one-half mile of Las Animas Junction)	PFO/SSW	Palustrine, Forested, Scrub/Scrub

*NOTES:

Ecological System

P = Palustrine

Class

EM = Emergent (“are only found in the Riverine Tidal and Riverine Lower Perennial Ecological Subsystems. All other classes are found in all Riverine Ecological Subsystems”)

FO = Forested

SS = Scrub/Scrub

After the above designations, the following Non-Tidal

Water Regimes apply:

A = Temporary

C = Seasonal

F = Semipermanent

J = Intermittently Flood

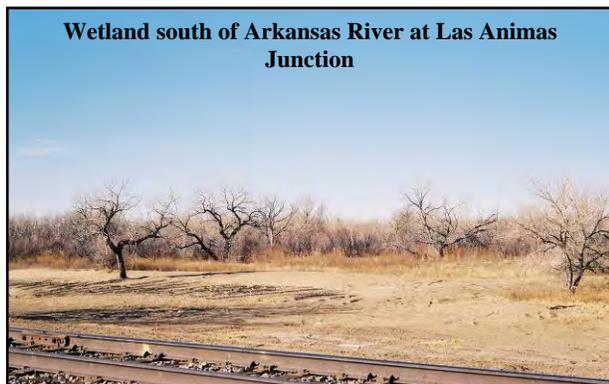
K = Artificial

W = Intermittently Flooded Temporary

Y = Saturated/Semipermanent/Seasonals

According to “Notes to the User” of the NWI maps, “Some areas designated R4SB, R4SBW or R4SBJ (intermittent streams) may not meet the definition of wetlands.”

SOURCE: National Wetland Inventory maps



Other Wetlands

As noted above, many wetlands found on the NWI maps have been farmed, and are not apparent to the casual viewer. Many more of these exist in the Omar to Peoria section of the project, where irrigated farming is a significant land use. For example, a particularly dense area of these PF wetlands is located in a triangular area formed by US 40/287 on the bottom (between Byers and Peoria), West Bijou Creek on the west (to its confluence with East Bijou Creek), and East Bijou Creek on the east. With this in mind, only the largest mapped wetlands that are not part of the creeks in the table above will be described below.

Omar to Peoria Section

Nile Reservoir (Abandoned)

This abandoned reservoir is approximately 2 miles south of the Adams/Morgan county line and is located between Adams County Road 50 N and Bijou Creek – a narrow space about two miles wide. This palustrine, shrub/shrub, flat intermittently flooded wetland (PSS/FLW) is approximately one mile long and one-half mile wide. Another large wetland is just southeast and is possibly another reservoir remnant. It is about one-half mile long and one-quarter mile wide in places. This wetland is palustrine, shrub/shrub intermittently flooded (PSSW).

Sherman Ranch Slough

Located southwest of the intersection of 72nd Avenue and Adams County 48 Road, this relatively large wetland (about one-half mile long and one-eighth mile wide) drains toward, but perhaps not into, East Bijou Creek via a confluence with a linear drainage/wetland to the north and west of the slough. The slough is comprised of palustrine, emergent wetlands (primarily PEMC with PEMW). The unnamed drainage/wetland is also palustrine, emergent with one area of palustrine, flat (PEMC and PFLW).

Aroya to Las Animas Junction Section

Long Lake

One significant wetland and its associated “ponds” are located within the study area, is “Long Lake” in Kiowa County. Kiowa County Road 19 bisects it approximately 22 miles north of Las Animas. Long Lake is lacustrine, littoral, flat and intermittently flooded (L2FLJ) surrounded by palustrine, emergent, intermittently flooded areas (PEMJ). The nearby ponds in this system are mostly palustrine, emergent, intermittent wetlands (PEMJ, PEMW, L2FLJ, PFLC, PFLJ, and PFLW).



Kiowa County Road bisecting Long Lake wetland

About one mile west of the study area (15 miles north of Las Animas), but proximate enough to be considered a constraint, is Adobe Creek Reservoir (Blue Lake). Its system consists of an area of lacustrine, limonitic, open water, that is artificial and intermittently

exposed (L10WKG), surrounded by an area that is lacustrine, littoral, flat, artificial and intermittently flooded on a temporary basis (L2FLKW). The reservoir also has palustrine wetlands associated with it (PSS/EMKW, and PEMKW).

Other Water Resources

State Wildlife Areas

Several major surface waters in the study area are under the jurisdiction of the Colorado Division of Wildlife. The Division of Wildlife's existing easements and leases protect habitat on a total of 248,000 acres. The Division also owns 230 properties, totaling 369,518 acres, and



leases an additional 481,333 acres of state school trust that wildlife requires to survive. Division properties not only protect wildlife habitat, but also provide the public with opportunities to hunt, fish, and watch wildlife (<http://wildlife.state.co.us/swa/>). State Wildlife Areas in the vicinity of the study area include:

- Kinney Lake State Wildlife Area (formerly known as Hugo SWA, From Hugo, go 14 miles south on Hwy. 109, then 2.5 mile east on Co. Rd. 2J, then 1 mile east to property, Lincoln County)
- Adobe Creek Reservoir State Wildlife Area (Blue Lake) (From Las Animas on US 50, go 11 miles north on County Road 10 to the reservoir. Kiowa County)
- John Martin Reservoir State Wildlife Area (Bent County. From Las Animas, 16 miles east on U.S. 50, 2 miles south of Hasty).
- Purgatoire River State Wildlife Area (Bent County. From Las Animas, 1 mile south on Highway 101, 1 mile southwest on County Road 10).

Potential constraints or issues to this project involving rivers, creeks, lakes or wetlands could include the possibility of increased runoff or accident spills adversely affecting sensitive stream systems and associated wetlands. Impacts to threatened or endangered aquatic species could also be a concern. As the project progresses, project specific wetland studies should be undertaken. If it is determined that significant waters of the U.S. will be impacted by any proposed improvements to the existing rail lines or by any of the proposed new facilities, certain regulatory requirements must be met, such as the Section 404 permitting process.

HAZARDOUS AND CONTAMINATED MATERIALS SITES

This section briefly describes the applicable legal and regulatory requirements related to potentially hazardous materials in the study area, and provides a brief inventory of the recognized hazardous and contaminated materials sites in the study area.

A definitive corridor has not yet been established. Therefore, the study area for locations of potentially hazardous materials is a variable swath generally consisting of an area 10 to 15 miles on either side of a “line” drawn between Omar to Peoria, and between Aroya to Las Animas Junction, with additional research along the right-of-way and railroad property of the existing railroad facilities from Peoria to Aroya. The study area along the existing railroad property was selected to account for potential disturbance by construction activities. The study area is within the counties of Adams, Arapahoe, Bent, Cheyenne, Kiowa, Lincoln, Morgan and Weld.

Regulatory Context

The primary goals of the Resource Conservation and Recovery Act (RCRA) are to protect human health and the environment from the potential hazards of waste disposal, to conserve energy and natural resources, to reduce the amount of waste generated, and to ensure that wastes are managed in an environmentally sound manner. The Office of Solid Waste (OSW) operates under authority of the Resource Conservation and Recovery Act (RCRA). OSW protects human health and the environment by ensuring responsible national management of hazardous and nonhazardous waste (<http://www.cqs.com/esuper.htm>).

The Environmental Protection Agency was empowered to accept reports of toxic spills and pollution, and created the Comprehensive Environmental Response, Contamination and Liability Information System (CERCLIS) database. In general, CERCLIS sites are those where serious hazards exist or have existed which are threats to health. Most states have reporting mechanisms for hazardous waste problems, and only the most serious of these incidents are reported to EPA for the Superfund list. Hazardous waste cleanup at Superfund sites is much more than pumping contaminated groundwater or digging up polluted soils. Superfund locates, investigates and cleans up the worst hazardous waste sites throughout the United States. Because of its encompassing nature, the Superfund Program attempts to get interested parties and other stakeholders involved as much as possible, as early as possible. EPA supports site cleanups with numerous programs and initiatives designed to work with the Superfund program to improve their efforts (<http://www.cqs.com/esuper.htm>).

Study Methods

This technical report was conducted primarily using Internet sites to identify known and recognized locations, or sites, of potentially hazardous materials. The sites used include the following:

- Colorado Department of Public Health and Environment (CDPH) Hazardous Materials and Waste Management Division Geographical Information System Files
- http://www.cqs.com/super_co.htm
- http://www.co.weld.co.us/departments/health/environmental/composting/health_composting_facilities.html
- <http://www.cdphe.state.co.us/hm/lflist.pdf>
- <http://www.cdphe.state.co.us/hm/transfer.pdf>
- http://www.cqs.com/super_co.htm
- <http://www.bentcounty.org/abc/cities/lasanimasfrm.htm>
- <http://www.cha.com/Hospitals/hospitals.shtml>
- <http://www.epa.gov/superfund/programs/index.htm>

Initial research was conducted by downloading the Geographic Information System Files of the Colorado Department of Public Health, Hazardous Materials and Waste Management Division. Active solid waste and RCRA sites for each of the counties that fall within the study area were identified. Some sites appear to be inactive at this time. The study area is within the counties of Adams, Arapahoe, Bent, Cheyenne, Kiowa, Lincoln, Morgan and Weld. These identified sites were then compared to a list of Colorado Superfund Sites to determine if any listed present or former waste sites need to be monitored, if further research would need to be done in subsequent project stages, and if the state of the site might impact the proposed projects.

Superfund is the Federal government's program to clean up the nation's uncontrolled hazardous waste sites. None of the sites are listed in the National Priorities List or are proposed to be placed in the National Priorities List.

This report does not identify the locations of Underground Storage Tanks (USTs) or Leaking Underground Storage Tanks (LUSTs).

This report is not a Phase I Environmental Site Assessment. Note it has been performed in general conformance with the scope and limitations of American Society for Testing and Materials (ASTM) Standard E-1527-00. This document is not a stand-alone Phase I ESA; rather it is a high level preliminary investigation of the potential for encountering hazardous and contaminated materials during future planning and construction efforts of the proposed project. Once alternative routes have been selected, more in-depth investigations must be made.

- Data collection focused on easily available public information;
- No sampling of air, soil, surface water, or groundwater was performed;
- No field reconnaissance or personal interviews were conducted;
- The project team did not review information regarding environmental liens and activity or use limitations for the sites in the study area;

- No pole-and pad-mounted transformers in the study area were inventoried, and no specific details regarding the PCB content of any pole-and-pad mounted transformer was requested.
- No formal asbestos/lead-paint study was performed on buildings/structures within the study area.
- Geological conditions in the study area were not researched.

Inventory of Known Hazardous Materials Sites

Using all of the sources listed above, known hazardous and contaminated materials sites in the study area were found to occur in Bent, Cheyenne, Elbert, Kiowa, Lincoln, Morgan, and Weld counties. Unknown hazardous materials sites may be encountered during future phases of this project. The sites found are described below.

Bent County

- Las Animas Landfill is located approximately 2 miles north of US 5 on CR 10. It is not on CDPH Active Solid Waste Facilities list.
- Fort Lyon Correctional Facility is a small quantity generator at the western end of John Martin Reservoir. In addition, the Fort Lyon VA Medical Center Landfill, was found to be Superfund Site COD 983801549, but it is not on CDPH Active Solid Waste Facilities list. The medical center was converted to a correctional center in 2001.
- Hasty Solid Waste Disposal Site, south of US 50 approximately 15 miles east of Las Animas, is not on CDPH Active Solid Waste Facilities list.
- McClave Solid Waste Disposal Site, located approximately 20 miles east of Lamar, and approximately 1 mile south of US 50. It is not on CDPH Active Solid Waste Facilities list.

Cheyenne County

- Wild Horse Solid Waste Disposal Site, is located near US 40, 7 miles east of Aroya. It is not on the CDPH Active Solid Waste Facilities list.
- Kit Carson Landfill is located near US 40, about 20 miles east of Aroya. It is not on the CDPH Active Solid Waste Facilities list.

Elbert County

Improvements to the rail lines within the Elbert County section of the corridor are proposed to occur within existing railroad property. The following site is close to this existing property.

- Agate Solid Waste Landfill is just west of the existing railroad tracks, and is not on the CDPH Active Solid Waste Facilities list.

Kiowa County

- Haswell Solid Waste Disposal Landfill is located 2 miles south of SH 96 and Main in Haswell. This landfill is on the CDPH Active Solid Waste Facilities list.
- Eads Solid Waste Disposal Landfill, 3 miles south of Eads on CR 40, is on the CDPH Active Solid Waste Facilities list.
- Colorado Interstate Gas Company is a Small Quantity Generator located approximately 7 miles north of Wiley, Colorado.

Lincoln County

Improvements to the rail lines within the Lincoln County section of the corridor are proposed to occur within existing railroad property. The following sites are close to this existing.

- Limon Solid Waste Landfill, north of the existing railroad tracks in the southeast quadrant of Limon, not on the CDPH Active Solid Waste Facilities list.
- Hugo Solid Waste Landfill, approximately 1 mile north of the existing railroad tracks, not on the CDPH Active Solid Waste Facilities list.

Morgan County

- Roggen Disposal, located near US 6, 8 miles west of Omar, is not on the CDPH Active Solid Waste Facilities list. It is unlikely that the project would start this far west of Omar, but the site appears to be near existing railroad tracks.
- Public Service Company Round-Up Comp. Station is a Small Quantity Generator that is located near SH 52, approximately 8 miles south of Wiggins.
- OK Farms Composting Facility, SH 52 approximately 6 miles west of potential project line, is not on the CDPH Active Solid Waste Facilities list.
- Wiggins Transfer Station located at 16427 Ladd Street, Wiggins, and approximately 5 miles northwest of Omar, is on the CDPH Active Transfer Stations list.

Weld County

- Keenesburg Landfill, Weld County Road 59, 20 miles west of Omar, is not on the CDPH Active Solid Waste Facilities list. It is identified as Superfund site #COD 980806251. It appears that remediation was done in 1999. It is unlikely that the project would start this far west of Omar, but if it does, more research on the status of this site would be necessary.

- Buffalo Ridge Landfill, located at 11655 CR 59 about 17 miles east of Omar, is on the CDPH Active Solid Waste Facilities list.
- Keenesburg Pilot Composting Facility, 3 miles north of SH 52 and 14 miles west of Omar, is not on the CDPH Active Solid Waste Facilities list.
- The Prospect Implement Company, a Small Quantity Generator, is near the intersection of SH 52 and SH 79.

Constraints posed by these sites depend to a great extent upon the types and locations of the project's improvements to existing facilities and proposed new facilities. Disturbing these sites could result in groundwater and/or airborne contamination of the surrounding area. Any railroad improvement affecting these sites would require compliance with the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) of 1980. It is recommended that an investigation of abandoned landfills, leaking underground storage tanks, the Emergency Response Notification System (ERNS), and other hazardous material databases be conducted in conjunction with project specific planning.

DEMOGRAPHICS

The objective of this section of the report is to begin to identify the demographic characteristics of the study area in anticipation of future Environmental Justice studies.

Executive Order 12989 *Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations* requires federal agencies to incorporate consideration of environmental justice into the NEPA evaluation process. The purpose of the Order is to ensure that low-income and minority households and minority business enterprises do not suffer a disproportionate share of adverse environmental impacts resulting from federal actions that are not offset by project benefits. The order also requires that these communities have adequate access to and opportunity for participation in project planning.

The US Department of Transportation defines “minorities” in its guidelines on implementation of the Environmental Justice Order, and the EPA offers additional guidance. The Colorado Department of Transportation (CDOT) is responsible for the allocation of resources that come to Colorado transportation projects from federal programs. Thus, CDOT strives to integrate Environmental Justice into its programs and planning activities.

Study Method

Racial Minorities

Data was collected to the census tract level from the U.S. Bureau of the Census, Census 2000 ([HTTP://factfinder.census.gov](http://factfinder.census.gov)). 2000 Census Tracts are the lowest level of geography to be analyzed, and this data is the basis for the minority population and households by income. Minority populations are defined as all races other than White-Non Hispanic.

Low Income Minorities

Low-income households are calculated through the use of Housing and Urban Development’s (HUD) low-income thresholds established for each county in Colorado combined with total households by income as determined in the 2000 Census (<http://www.hudser.org/datasets/il/fmr00/hud00co.txt>). Two thresholds are provided by HUD; moderate and low income. Moderate incomes are defined as 80% of the county’s median (50% above and 50% below) income, and low income represents 50% of the county’s median income. The low-income threshold was chosen for the “first level” analysis described below.

As a first level of analysis, the percent of minority populations within a given census tract was compared to the percent of minority populations for the State of Colorado (<http://dola.colorado.gov/demog/QTables/>). Then, the percent of low-income households within a census tract was compared to the percent of low-income households in the county where the census tract is located. The comparisons are shown in Table 4.

Table 4: Percentages of Minorities and Low Income Households in the Study Area Census Tracts

Census Tract	Geographic Location	Total Census Tract Population	Percent Non-White Minorities in the Census Tract*	Median Household income	HUD Low Income Threshold for Family of Four	Percent Low Income Households in County	Percent Low Income Households In Census Tract
25.02	Eastern Weld County	4,829	18.9%	\$44,750	\$22,450	13.1%	12.0%
2	Western Morgan County	2,393	19.8%	\$36,821	\$21,650	16.9%	12.9%
84.02	Adams County north and east of Strasburg	2,389	7%	\$50,333	\$31,050	13.7%	11.7%
71.01	Arapahoe County including Strasburg, Byers, Deer Trail	3,996	6.4%	\$46,383	\$31,050	11.9%	11.2%
9911	Eastern Elbert County	1,880	7%	\$35,662	\$25,850	8.5%	18.8%
9917	Lincoln County including Limon	3,718	22%	\$33,047	\$21,150	15.8%	15.5%
9918	Lincoln County including Hugo	2,369	5.5%	\$30,958	\$21,150	15.8%	16.0%
9906	Cheyenne County	2,231	9.5%	\$37,054	\$23,500	15.0	15.0%
9901	Kiowa County	1,622	5.7%	\$30,494	\$21,900	19.1%	19.1%
9867	Bent County	4,739	36.7%	\$28,125	\$21,150	17.3%	17.3%

* Percent of Non-White Minorities in Colorado is 25.5%.

Source: U.S. Census Bureau, Census 2000 and Department of Local Affairs, Colorado Demography Section

The percent of minorities in two of the Census Tracts in the study are very high when compared to those of neighboring tracts in the study area. These could be inflated by the census of correctional institutions located in the area. For example, the 2000 Census found 941 males living in a correctional institution in Census Tract 9917 (Lincoln County). These males make up 25% of the total population (3,719) of the 9917 Census Tract. Of the 941 males, 538 are non-white minorities that make up 14.5% of the total population of the Census Tract. Table 5 shows the percentage of Non-White minorities living in correctional facilities in Bent and Lincoln counties.

Table 5: Non-white Minorities Living in Correctional Institutions in the Study Area

Census Tract	Total Males in Correctional Institutions	Percent that are Non-White Minorities
9917 (Lincoln County)	941	57.3%
9867 (Bent County)	688	60.0%

Source: U.S. Census Bureau, Census 2000

Future studies based on route alternatives will determine the location of Environmental Justice populations and whether any would be disproportionately affected by the alternative. More detailed analyses of the potential impacts of railroad improvements on minority and low-income communities should occur during specific project planning.

NOISE AND VIBRATION

This section examines potential noise and vibration impacts of relocating rail freight traffic outside of the Front Range corridor. Relocating rail traffic away from developed urban areas has the potential to reduce noise and vibration levels in areas located adjacent to the existing rail lines. The extent of actual reductions would depend on existing noise levels, as well as the contributing factors to existing noise levels (i.e., roadway traffic, airport noise and general urban noise levels). Screening level analysis per FTA guidelines (*Transit Noise and Vibration Impact Assessment, Federal Transit Administration, April 1995*) was used to evaluate noise impacts for existing conditions, as well as 2030 no build and build scenarios relative to freight rail traffic relocation.

Rail Noise and Vibration

Sounds that disrupt normal activities, or otherwise diminish the quality of the environment are considered noise. Excessive noise has potential to disrupt routine activities, and can affect overall quality of life, especially in residential areas. In general, most residents become highly irritated/annoyed when noise interferes significantly with activities such as sleep, interpersonal or telephonic conversation, noise-sensitive work, watching television or listening to the radio or recorded music. In addition, some land uses, such as outdoor concert or pavilions or recreational sports venues, are inherently incompatible with high noise levels.

Train traffic produces both noise and vibration effects that have the potential for disturbing sensitive receptors located in close proximity to sources such as schools, churches, recreational facilities and housing. Freight trains typically generate higher noise levels and greater vibration effects than passenger trains because they are heavier and require additional locomotives and cars.

Rail vehicles in motion generate noise. Diesel locomotives generate diesel engine exhaust noise, air turbulence noise, and gear noise. Additional noise is generated by the interaction of the wheels with the rails. The interaction of steel wheels and rails generates three types of noise: (1) rolling noise due to continuous rolling contact, (2) impact noise when a wheel encounters a discontinuity in the running surface, such as a rail joint, turnout or crossover, and (3) squeal generated by friction on tight curves.

Ground-borne vibration is also a potential concern for people who live near rail lines. Train wheels rolling on the rails create vibration energy that is transmitted through the track support system and transit support structures, which in turn excites the adjacent ground and creates vibration waves that propagate through soil and rock. These vibrations then can impact and vibrate the walls and floors of nearby structures. The vibration of floors and walls can cause the rattling of windows and dishes, as well as create an audible rumble.

Description of Noise Levels

Various parameters are used to quantify noise from transportation sources including a sound's loudness, duration, and tonal character. "A-weighting" (energy-average) is an attempt to take into account the human ear's response to audible frequencies. The equivalent sound level is the steady-state description of the time-varying noise. The A-weighted sound level contains the same amount of acoustic energy as the actual time-varying sound level over a specified period of time. The A-weighted decibel (dBA) is commonly used to describe the overall noise level. Because the decibel is based on a logarithmic scale, a 10-decibel increase in noise level is generally perceived as a doubling of loudness while a 3-decibel increase in noise is just barely perceptible to the human ear.

If the time period is one hour, the descriptor is the hourly equivalent sound level, $L_{eq}(h)$. Hourly Equivalent Sound Level ($L_{eq}(h)$) is a descriptor that accounts for all changes in the A-weighted sound levels over a 1-hour time period. The loudest hour of operation, i.e. the worst case or most impact, is used to calculate $L_{eq}(h)$ for evaluation purposes. $L_{eq}(h)$ is a useful noise descriptor because: 1) $L_{eq}(h)$ correlates well with effect of noise on speech and communication; 2) $L_{eq}(h)$ increases with the duration of transit events; and 3) $L_{eq}(h)$ takes into account the number of transit events in a hour. Day-Night Sound Level (L_{dn}) is used for the cumulative 24-hour exposure and accounts for the daily fluctuations in A-Level noise for all sound sources. L_{dn} is useful in determining the overall impact of a rail project for several reasons including: 1) L_{dn} increases with the increased duration of transit events; 2) L_{dn} accounts for all transit events in a 24-hour period; 3) L_{dn} takes into account the increased sensitivity to noise during the night, and 4) L_{dn} allows quantitative comparisons of transit noise with all other community sources. Noise impacts during the night are weighted heavier than noise impacts during the day when calculating L_{dn} . L_{dn} is used to assess noise impact for residential land uses.

Sensitive Receivers

Noise impacts are evaluated with respect to sensitive receivers. These are locations where noise may be detrimental to the enjoyment and functional use of the property.

Residential areas are usually the primary sensitive receivers considered in a noise analysis, but other areas such as schools, parks, hotels and commercial centers also should be considered as sensitive receivers. Table 6 shows the Land Use categories and description along with the metrics used to evaluate Noise Impact Criteria.

Table 6: Land Use Categories and Metrics for Rail Noise Impact Criteria		
Land Use Category	Noise Metric (dBA)	Description of Land Use Category
1	Outdoor $L_{eq(h)}$ *	Tracts of land where quiet is an essential element to their intended purpose. This category includes land set aside for serenity and quiet, and such land uses as outdoor amphitheaters and concert pavilions, as well as National Historic Landmarks with significant out door use.
2	Outdoor L_{dn}	Residences and building where people normally sleep. This category included homes, hospitals and hotels where a nighttime sensitivity to noise is assumed to be of utmost importance.
3	Outdoor $L_{eq(h)}$ *	Institutional land uses with primarily daytime and evening use. This category included schools, libraries and churches where it is important to avoid interference with such activities such as speech, mediation and concentration on reading material. Buildings with interior spaces where quiet is important, such as medical offices, conference rooms, recording studios and concert halls fall into this category. Places for mediation of study associated with cemeteries, monuments, and museums. Certain historical sites, parks and recreational facilities also are included.
Note: $L_{eq(h)}$ for the noisiest hour of rail activity during hours of noise sensitivity.		

The occurrence of annoyance due to ground-borne vibration and noise is relatively rare. As a result, there has been only limited research of human response to building vibration and structure-borne noise. Based on available research, however, criteria have been established for ground-borne noise (expressed in terms of A-weighted sound level) and ground-borne vibration (expressed in terms of route mean square (rms) velocity levels in decibels for three land use categories). A fourth use category identifies special buildings that may be highly sensitive to vibration and noise, but do not fit into any of the first three categories. Table 7 shows the Land Use categories and description along with the metrics used to evaluate Ground-borne Noise and Vibration Criteria.

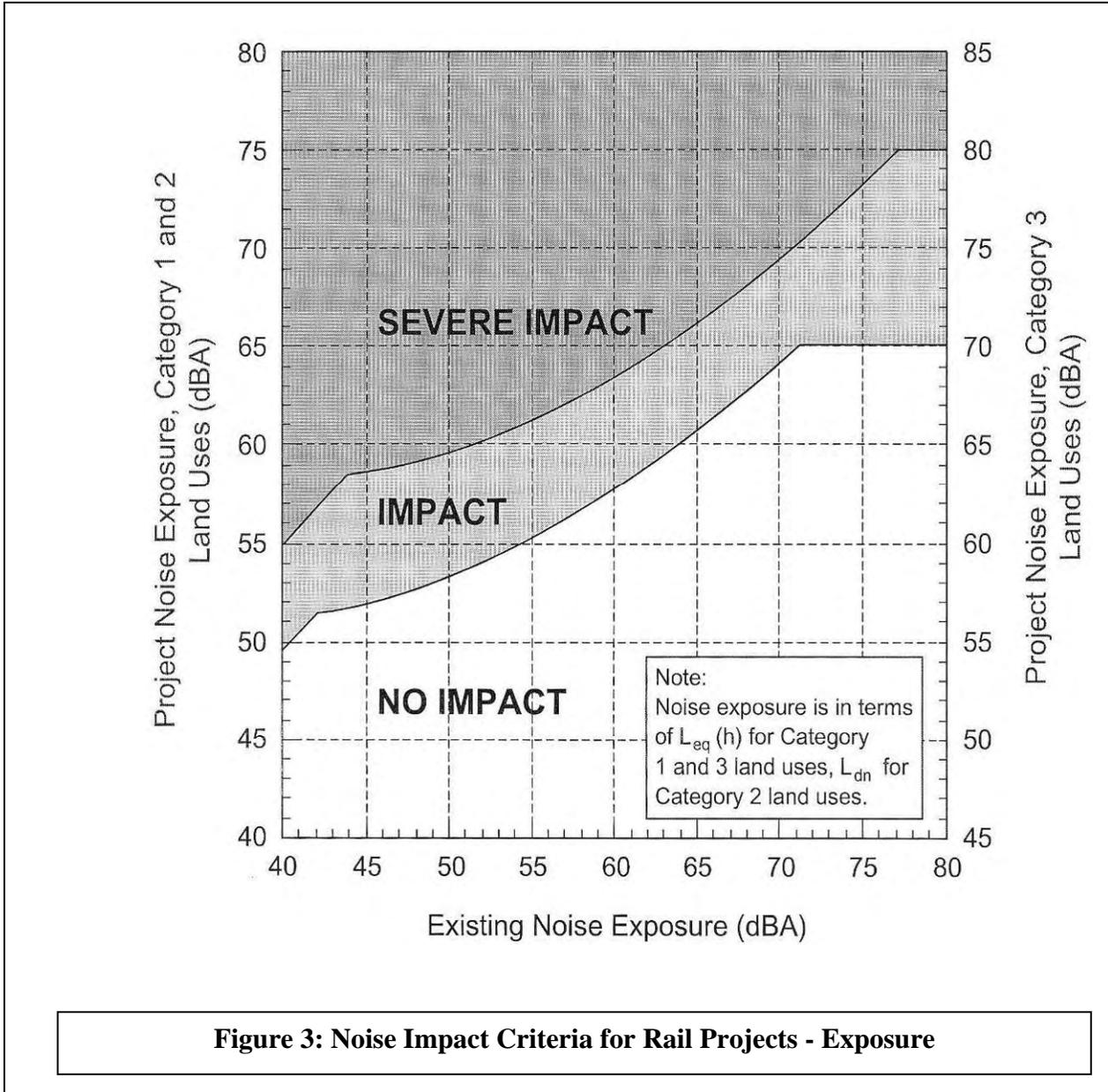
Table 7: Land Use Categories and Metrics for Ground-borne Vibration and Noise Impact Criteria

Land Use Category	Vibration/ Noise Metrics	Description of Land Use Category
Vibration Category 1: High Sensitivity	VdB (VdB re 1 micro inch/sec)/ dB A (dB re 20 micro Pascals)	Buildings where low ambient vibration is essential for operations within the building, which may be well below levels associated with human annoyance. Typical land uses for Vibration Category 1 include: vibration-sensitive research and manufacturing, hospitals with vibration-sensitive equipment, and university research operations. Electron microscopes, high-resolution lithographic equipment and some normal optical microscopes are examples of equipment used in vibration-sensitive operations. Computer chip manufacturing is an example of a vibration-sensitive industry.
Vibration Category 2: Residential	VdB (VdB re 1 micro inch/sec)/ dB A (dB re 20 micro Pascals)	All types of residential land uses and any buildings where people sleep, such as motels and hotels, are covered under Vibration Category 2. There is no differentiation made between different types of residences, as building occupants have no means to reduce their exposure to ground-borne vibration.
Vibration Category 3: Institutional	VdB (VdB re 1 micro inch/sec)/ dB A (dB re 20 micro Pascals)	Schools, churches and offices that do not have vibration sensitive equipment, but still have the potential for interference to normal activities due to ground-borne vibration and noise.
Vibration Category 4: Special Buildings	VdB (VdB re 1 micro inch/sec)/ dB A (dB re 20 micro Pascals)	The Special Buildings Vibration Category is for concert halls, TV and recording studios, and theatres that can be very sensitive to vibration and noise but do not fit into any of the first three categories.

Noise Impact Criteria

In general terms, noise impact criteria describe the noise environment considered acceptable for a given situation. For rail projects, the criterion for the onset of “Impact” varies according to the existing noise levels and the predicated project noise level, and is determined by the threshold at which the percentage of people highly annoyed by the project noise starts to become measurable. The corresponding criterion for Severe Impact similarly varies according to the existing noise level as well as the project noise level, but is determined by a higher, more significant percentage of people highly

annoyed by project noise. Figure 3, Noise Impact Criteria for Transit Projects, shown below, is based on a comparison of existing outdoor noise levels and future outdoor noise levels from the proposed project.



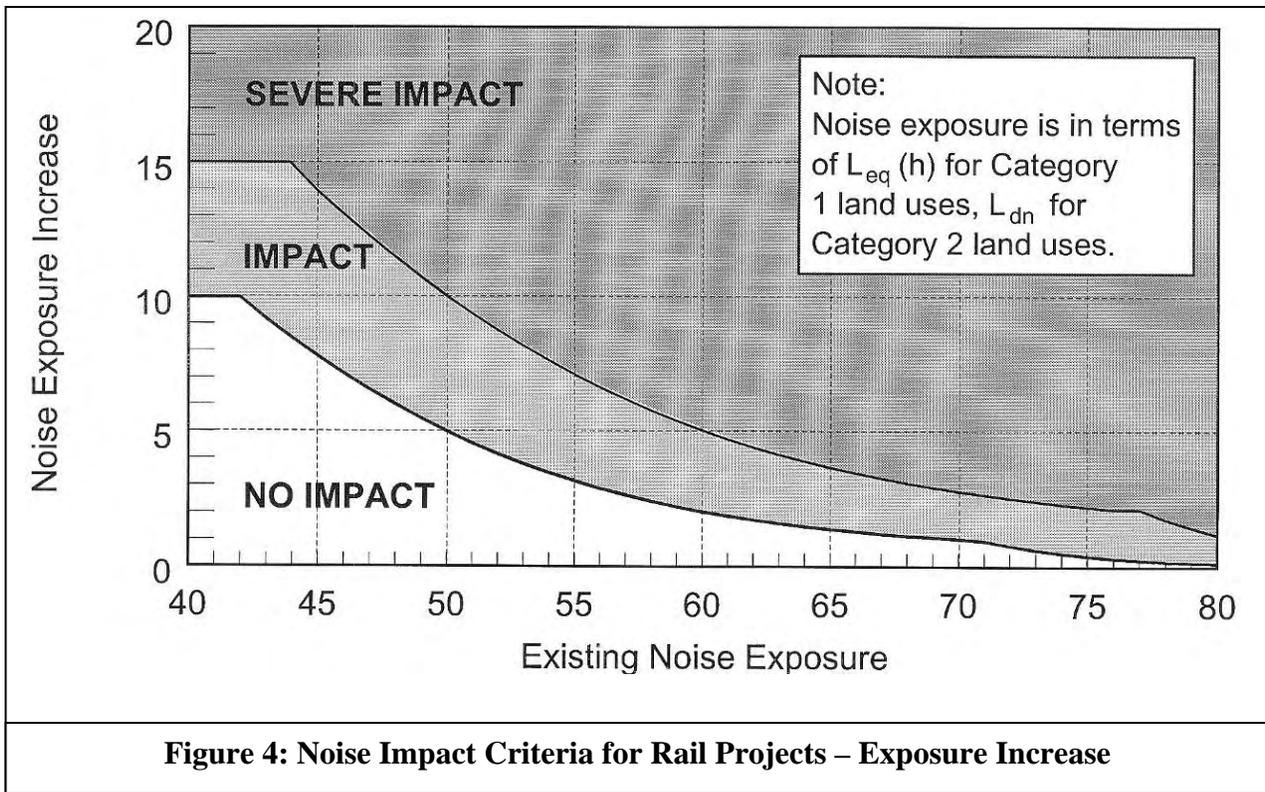


Figure 4: Noise Impact Criteria for Rail Projects – Exposure Increase

Figure 4 delineates impacts based on increase over existing noise levels. The chart shows the relationship between existing noise levels and the effect a projects increase in noise levels will have. In general, the lower the existing noise level, the more project noise impact can be tolerated. However, when existing noise levels are high enough to be annoying, any additional noise increase is noticeable and can have an impact.

Vibration Impact Criteria

The criteria for environmental impact from ground-borne vibration and noise are based on the maximum level for a single event. The impact criteria, as presented in Table 8, account for variation in project types, as well as the frequency of events that can differ widely. Though drawn from passenger rail systems, these criteria can also be applied to freight trains using a modified approach.

The main difference between passenger and freight trains is the amount of time a freight train’s vibration event lasts, up to several minutes versus 30 seconds. Freight train locomotive vibration is usually 5 – 10 decibels higher than the rail cars, but lasts only a few seconds. A dual approach is recommended to evaluate freight train ground-borne vibration and noise impacts. The vibration event from the rail car and the vibration event from the locomotive should be analyzed separately. Due to the fact that the locomotive vibration event is of such small duration, the infrequent event criteria should be applied to locomotive vibration evaluation. For rail car vibration events that last for several minutes, the frequent event criteria should be applied.

Table 8: Ground Based Vibration and Noise Impact Criteria

Land Use Category	Ground-Borne VIBRATION Impact Levels (Vdb, re:10 ⁻⁶ inch/sec)		Ground-Borne NOISE Impact Levels (dB re: 20 Pascals)	
	Frequent Events ⁽¹⁾	Infrequent Events ⁽²⁾	Frequent Events ⁽¹⁾	Infrequent Events ⁽²⁾
Category 1: Buildings where low ambient vibration is essential for interior operations	65 VdB ⁽³⁾	65 VdB ⁽³⁾	(4)	(4)
Category 2: Residences and buildings where people normally sleep	72 VdB	80 VdB	35 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use.	75 VdB	83 VdB	40 dBA	48 dBA
Special Buildings:				
Concert Hall	65 VdB	65 VdB	25 dBA	25 dBA
TV Studios	65 VdB	65 VdB	25 dBA	25 dBA
Recording Studios	65 VdB	65 VdB	25 dBA	25 dBA
Auditoriums	72 VdB	80 VdB	30 dBA	38 dBA
Theaters	72 VdB	80 VdB	35 dBA	43 dBA
Notes:				
<ol style="list-style-type: none"> 1. “Frequent Events” is defined as more than 70 vibration events per day 2. “Infrequent Events” is defined as fewer than 70 vibration events per day 3. This value is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration sensitive manufacturing or research equipment will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC system and stiffened floors. 4. Vibration sensitive equipment is not sensitive to ground-borne noise 				

Inventory

A land use inventory was prepared for a 750' screening corridor, to either side of potentially impacted rail segments. The potential for sensitive receivers to be impacted by noise and/or ground-borne noise and vibration was initially evaluated based on presence of absence of sensitive receiver land uses within the screening corridor. The width of corridor was determined based on conservative application of FTA-recommended distances. The recommended screening distances, as shown in Table 9 below, are designed to be large enough to encompass all potentially impacted locations. Resulting data is summarized in Tables 10, 11 and 12, below.

Type Of Project	Screening Distances (ft)	
	Unobstructed	Obstructed
Rail Mainline	750	375
Rail Station	450	225
Yards/Shops	2000	1000
Ancillary Facilities (Power Substations)	200	100

Note: Screening distances apply from the center of the guide-way.

Data on train operations was also collected. Rail operations data included; existing and forecast 2030 build and no build train volumes by rail segment, operations schedules (day vs. night), operating speeds, average train length, average number of locomotives per train and average number of cars per train.

LUCO DE	Description of Land Use Code	Total ACRES/ LUCODE
11	Residential	1011.1310
12	Commercial and services	796.8050
13	Industrial	291.4090
14	Transportation, communication, utilities	1956.2320
16	Mixed urban or built-up land	619.6320
17	Other urban or built-up land	173.1920
21	Cropland and pasture	18532.9020
22	Orchards, groves, vineyards, nurseries and ornamental horticultural areas	16.6970
23	Confined feeding operations	205.0870
24	Other agricultural land	39.9250
31	Herbaceous rangeland	836.3190
32	Shrub and brush rangeland	74.8050

33	Mixed rangeland	9138.1860
53	Reservoirs	102.8950
61	Forested wetland	65.5960
62	Non-forested wetland	64.0590
76	Transitional areas	0.1090

Table 11: Land Use Inventory for 750 ft Buffer – Existing UP Segments

LUCODE	Description of Land Use Code	Total ACRES/ LUCODE
0	No Data	4.9300
11	Residential	2777.0260
12	Commercial and services	4675.8600
13	Industrial	2039.6140
14	Transportation, communication, utilities	7854.8270
16	Mixed urban or built-up land	1387.0960
17	Other urban or built-up land	945.3390
21	Cropland and pasture	15949.4460
22	Orchards, groves, vineyards, nurseries and ornamental horticultural areas	87.2170
23	Confined feeding operations	18.0360
24	Other agricultural land	53.2820
31	Herbaceous rangeland	30238.2620
32	Shrub and brush rangeland	1536.2790
33	Mixed rangeland	4283.4940
41	Deciduous forest land	54.7190
42	Evergreen forest land	1647.6880
43	Mixed forest land	2.4460
53	Reservoirs	28.6490
61	Forested wetland	646.8670
62	Non-forested wetland	266.1690
75	Strip mines, quarries, gravel pits	83.7150

Table 12: Land Use Inventory for 750 ft Buffer – New Segments

LUCODE	Description of Land Use Code	Total ACRES/ LUCODE
14	Transportation, communication, utilities	62.4430
21	Cropland and pasture	9562.9770
31	Herbaceous rangeland	2919.4710
33	Mixed rangeland	2806.5200
61	Forested wetland	344.7280
62	Non-forested wetland	684.3030
71	Dry salt flats	20.7310
73	Sandy areas, not beaches	6.9420

Study Methods

Noise Impact Assessment

Using a Federal Transit Authority (FTA)-based noise model, a screening level noise analysis was performed. The existing and proposed rail corridors were evaluated. The screening procedure takes into account noise impact criteria, type of project and noise-sensitive land uses. For screening purposes all noise sensitive land uses are considered in a single category.

If any sensitive land uses are identified within the screening distances, then a General Noise Assessment should be conducted. A General Noise Assessment is used to evaluate noise impact and propose mitigation measures where necessary. A General Noise Assessment can provide the appropriate level of detail for "corridor" or "sub-areas" of a project during the planning of a major transportation project. For purposes of this study, the FTA model was applied to establish noise levels at 150 feet from the center of the rail. Both existing and new segments were modeled, as applicable, for Existing, 2030 No Build, and 2030 Build train volume scenarios.

Ground-borne Noise and Vibration Impact Assessment

Freight rail operations involve steel-wheel/steel-rail interaction. Therefore, there is the potential for vibration impacts associated with existing rail operations, and as a result of relocation of freight rail traffic. Per FTA guidelines, there potential vibration impacts for land uses with 750 feet either side of the rail line centerlines were identified. This approach is conservative, making dual use of land use data assembled for noise impact screening. Recommended ground-borne noise and vibration screening distances passenger and freight rail projects are shown in Table 13, below.

Table 13: Screening Distances (feet) for Vibration Assessments			
	Land Use Category		
	Category 1	Category 2	Category 3
Conventional Railroads	600	200	120
Source: FTA 1995			

General Vibration Assessment

If any sensitive land uses are located within the distance specified above, then a General Vibration Assessment should be performed. The General Vibration Assessment uses generalized data to develop a curve of vibration level versus distance as function of distance from the track. The vibration level at a specific location is estimated from the Vibration level versus Distance curve and then adjustments are made to account for such factors as vehicle speed, track and wheel condition, and track support system. A General Vibration Assessment does not consider the frequency spectrum of the vibration impact. A general Vibration Impact versus Distance graph is presented in Figure 5.

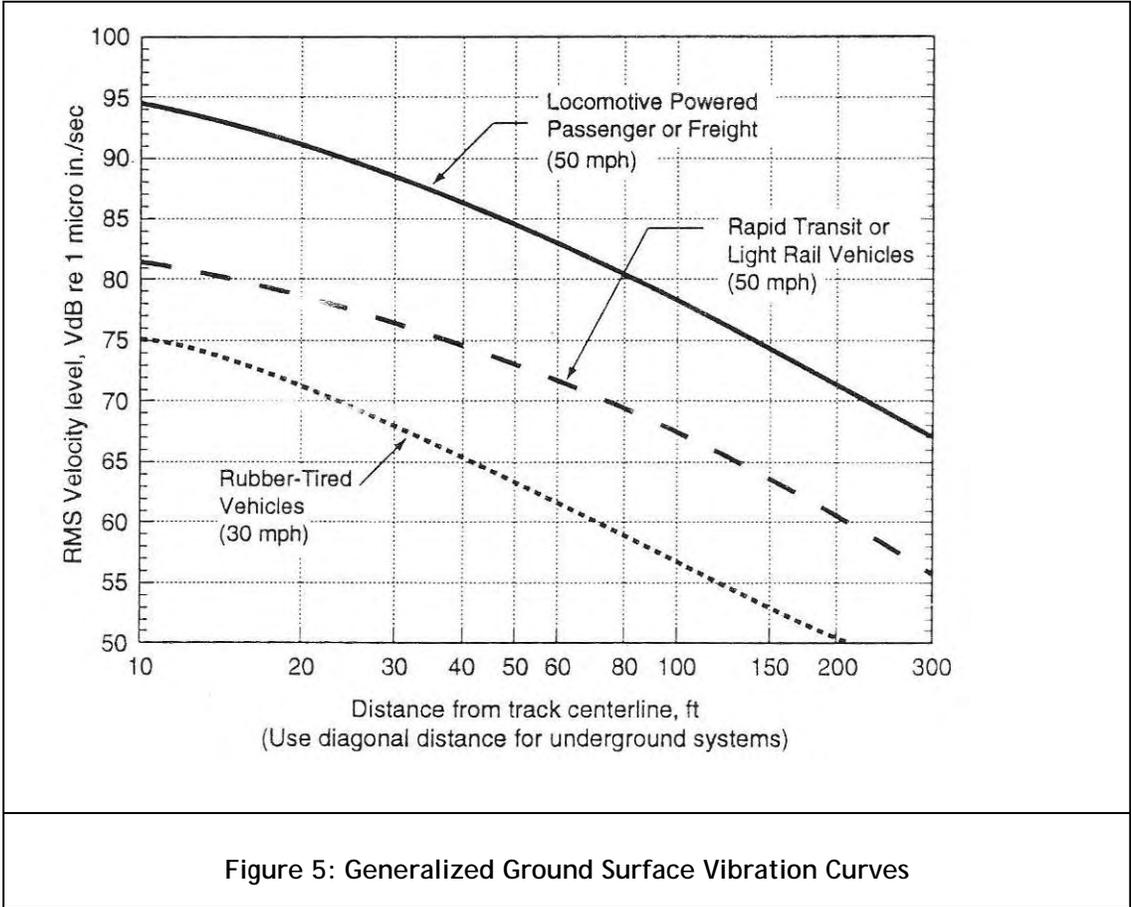


Figure 5: Generalized Ground Surface Vibration Curves

For most intercity passenger and freight trains powered by diesel or electric locomotives, the upper curve in Figure 5 should be used to initially determine vibration levels at a specific site. After the curve has been chosen, then adjustments are made using the data in Table 14 to arrive at an estimated vibration level. Adjustment values from Table 14 are added or subtracted to the RMS (VdB) value derived from Figure 5. When considering the adjustments based on wheel and rail condition, only the largest adjustment is applied.

Table 14: Adjustment Factors for Generalized Predications of Ground-Borne Vibration

<i>Factors Affecting Vibration Source</i>				
Source Factor	Adjustment to Propagation Curve			Comment
	Vehicle Speed	Reference Speed		
Speed		50 mph	30 mph	Vibration level is approximately proportional to $20 \cdot \log(\text{speed}/\text{speed}_{\text{ref}})$. Sometimes the variation with speed has been observed to be as low as 10 to 15 $\log(\text{speed}/\text{speed}_{\text{ref}})$.
	60 mph	+1.6 dB	+6.0 dB	
	50 mph	0.0 dB	+4.4 dB	
	40 mph	-1.9 dB	+2.5 dB	
	30 mph	-4.4 dB	0.0 dB	
20 mph	-8.0 dB	-3.5 dB		
Vehicle with stiff primary suspension		+8 dB		Transit vehicles with stiff primary suspensions have been shown to create high vibration levels. Include this adjustment when the primary suspension has a vertical resonance frequency greater than 15 Hz.
Resilient Wheels		0 dB		Resilient wheels do not generally affect ground-borne vibration except at frequencies greater than about 80 Hz.
Worn Wheels or Wheels with Flats		+10 dB		Wheel flats or wheels that are unevenly worn can cause high vibration levels. This can be prevented with wheel truing and slip-slide detectors to prevent the wheels from sliding on the track.
Worn or Corrugated Track		+10 dB		If both the wheels and the track are worn, only one adjustment should be used. Corrugated track is a common problem, however, it is difficult to predict the conditions that cause corrugations to occur. Rail grinding can remove rail corrugations. Mill scale on new rail can cause higher vibration levels until the rail has been in use for some time.
Crossovers and Other Special Trackwork		+10 dB		Wheel impacts at special trackwork will significantly increase vibration levels. The increase will be less at greater distances from the track.
Jointed Track		+5 dB		Jointed track causes higher vibration levels than welded track. The difference depends on the condition of the rail joints.
Floating Slab Trackbed		-15 dB		The reduction achieved with a floating slab trackbed is strongly dependent on the frequency characteristics of the vibration.
Ballast Mats		-10 dB		Actual reduction is strongly dependent on frequency of vibration.
High Resilience Fasteners		-5 dB		Slab track with track fasteners that are very compliant in the vertical direction can reduce vibration at frequencies greater than 40 Hz.
Resiliently Supported Ties		-10 dB		Resiliently supported tie systems have been found to provide very effective control of low-frequency vibration.
Type of Transit Structure	Relative to at-grade tie & ballast:			The general rule is the heavier the structure the lower the vibration levels. Putting the track in cut may reduce the vibration levels slightly. Rock based subways will create higher-frequency vibration.
	Elevated structure		-10 dB	
	Open Cut		0 dB	
	Relative to bored subway tunnel in soil:			
	Station		-5 dB	
Cut and Cover		-3 dB		
Rock-Based		-15 dB		

Rail Noise Impacts

Noise modeling indicated the following:

- Land uses along the new rail segments, as well as along existing segments to which rail traffic is to be relocated, are predominantly in agricultural and rangeland. The new corridor includes less than one tenth the acreage of sensitive land uses present within the existing freight corridor.
- Per FTA model results, noise levels for the existing freight corridor may be expected to decrease by approximately 3 dBA at 150 feet by shifting freight traffic to the new routing.
- Per FTA model results, noise levels for existing segments of the proposed freight corridor may be expected to increase by approximately 6 dBA at 150 feet to 69 dBA.

Rail Ground-borne Noise and Vibration Impacts

- Land uses along the new rail segments, as well as along existing segments to which rail traffic is to be relocated, are predominantly in agricultural and rangeland. The new corridor includes less than one tenth the acreage of land uses that may include sensitive receivers for ground-borne noise and vibration than is present within the existing freight corridor.
- Assuming an average train speed of 30mph, the FTA frequent-event vibration impact threshold for residential land use is 72 vdB (ground-borne vibration). The screening analysis results indicate that this level would occur at a distance of 150 feet from the tracks.
- Modeling passenger trains as infrequent events, and assuming that passenger trains travel at 79 mph, the FTA vibration impact threshold for residential land use is 80 VdB. The screening analysis results indicate that this level would occur at a distance of 120 feet from the tracks.

Table 15: Rail Noise Impacts Summary

Rail Noise Impacts Summary – Reduced Traffic Segments									
Rail Segment	Description	Land Use in 750' Buffer Corridor		Rail Source Noise (Ldn (dB) @ 150')			Number of Trains/ Day		
		Urban/ Built Up Land (Acres)	Category 1,2 & 3 Land Uses (Acres)	Existing	2030 No Build	2030 Build	Existing	2030 No Build	2030 Build
Segment 6	BNSF - Omar to Hudson	996.8960	35.8550	69 dB	70 dB	68 dB	26	45	18
Segment 7	BNSF/UP – Hudson to Sand Creek Junction, Sand Creek to DRI Junction	1495.1940	577.8810	72 dB	72 dB	68 dB	46	45	18
Segment 8	BNSF/UP - Sand Creek Junction to 19 th Street Junction, DRI Junction to DRGW Junction	860.0640	345.2740	69 dB	70 dB	65 dB	52	45	18
Segment 33	UP - Burnam to Blakeland	1912.5550	1385.8540	70 dB	71 dB	67 dB	30	36	16
Segment 34	UP - Blakeland to Colorado Springs	2466.5780	1141.8950	70 dB	71 dB	67 dB	30	36	16
Segment 35	UP – Colorado Springs to Bragdon	2215.7070	1098.7100	70 dB	71 dB	67 dB	30	42	14
Segment 36	UP – Bragdon to Pueblo	825.3510	246.3690	70 dB	71 dB	67 dB	30	42	14
Segment 37	UP – Pueblo to Walsenburg	968.3030	346.5590	70 dB	67 dB	67 dB	30	15	8
Segment 38	UP – Walsenburg to Trinidad	974.2470	327.6330	67 dB	67 dB	67 dB	16	15	8
Total Land Use (Acres)		12714.895	5506.03						
Average Build Rail Noise Decrease (dB)						-3 dB			
Average Decrease in Traffic (Trains/Day)									-21
Rail Noise Impacts Summary – Increased Traffic Segments									
Rail Segment	Description	Land Use in 750' Buffer Corridor		Rail Source Noise (Ldn (dB) @ 150')			Number of Trains/ Day		
		Urban/ Built Up Land (Acres)	Category 1,2 & 3 Land Uses (Acres)	Existing	2030 No Build	2030 Build	Existing	2030 No Build	2030 Build
Segment 25	UP - Sandown Junction to Peoria	1914.1220	320.1380	63 dB	65 dB	69 dB	6	11	26
Segment 26	UP – Peoria to Aroya	3467.2570	169.1620	63 dB	65 dB	69 dB	6	11	26
New Segments	Omar to Peoria, Aroya to Las Animas	62.4430	0.0000	48 dB	48 dB	69 dB	0	0	25
Total Land Use (Acres)		5443.82	489.30						
Average Build Rail Noise Decrease (dB)						+6 dB			
Average Decrease in Traffic (Trains/Day)									+26
Notes:									
<ol style="list-style-type: none"> Rail Noise levels were calculated using an FTA-based noise model <i>Transit Noise and Vibration Impact Assessment, Federal Transit Administration, April 1995</i>). For screening purposes rail source noise assumed unobstructed transmission at 150' from the center of the rails. All model runs assumed an average train length of 6256, with 3 locomotives and 100 rail cars, and a 30 mph freight train speed. The number of trains per day was obtained for data provided by the railroads, with an even distribution assumed throughout the day. The computed average decreases in rail noise and number of trains/ day do not include the minimally affected Walsenburg to Trinidad segment. Computed averages increases in rail noise and number of trains/ day were computed only using only existing segments. Land use quantities were computed for a 750'-wide buffer to either side of the rail centerline (total 1500' wide). 									

OTHER RESOURCES AND POTENTIAL CONSTRAINTS

This section includes a brief discussion of land use, socioeconomics, geology and soils, and groundwater resources which are not covered in other sections, but which may become issues as the project progresses. These resources or issues are being introduced here to bring awareness to areas that will require further analysis in the future.

A definitive corridor has not been established, but the resources and issues discussed in this section occur or could occur between Omar to Peoria, and between Aroya to Las Animas Junction, with additional areas along the right-of-way and railroad property of the existing railroad facilities from Peoria to Aroya. The study area is within the counties of Adams, Arapahoe, Bent, Cheyenne, Kiowa, Lincoln, Morgan and Weld.

Land Use

Agriculture

Much of the land in the study area is used for farming or ranching. Adding railroad infrastructure where none has existed before would convert agricultural and residential land uses to transportation uses. Impacts could include disruption of irrigation and cultivation patterns, relocation of agricultural facilities, disruption of fencing, and creation of non-economical land remnants. As the project progresses, these land use patterns will need to be studied.

Local Plans

Several communities are within the study area. These communities already have active railroad operations, some of which will now experience increased train frequency. Haswell may experience the effects of a new line that would be constructed from Aroya to Las Animas Junction. The eastern areas of Las Animas would experience the effects if a new north-south line connecting to the existing east-west line at Las Animas Junction. In addition, the increased frequency of train traffic may affect public parks, open space, wildlife areas, historical resources, or schools. Community plans and policies were not analyzed in the preparation of this environmental scan. It is possible that this project will not “fit” in with community plans and policies and run the risk of being slowed or even stopped in response to community opposition. As the project progresses, these plans will need to be studied.

Socioeconomics

Relocations

Some relocation is likely to be required as a result of the project. These may include commercial, industrial, residential, parklands, and public facilities. Some of these uses, such as gas stations, may harbor hazardous or contaminated materials. Because the project route alternatives have not yet been developed, relocations have not been addressed in this document, but analysis will need to be done in the future.

Community Cohesion and Access to Facilities

Depending on the route selected, the eastern areas of Las Animas could experience disruptions to community cohesion and access to community facilities or public services with a new north-south line connecting Aroya to the existing east-west line at Las Animas Junction. As the project progresses and alternative routes are studied, these effects will need to be analyzed.

Other issues

Other potential concerns relate to changes in public safety, traffic flow, and income and employment effects that could occur as a result of this project. Many state and county roads would be crossed in areas that are now farms and ranches.

Income and employment effects would involve analysis of short-term income and employment benefits that accrue during the construction of the project. Other concerns would be the effects to property values, and long-term employment opportunities generated by the project.

Geology and Soils

The following resources and potential constraints have not been included in this report: Physiographic regions, soil associations, mineral extraction facilities, characteristics and location of groundwater recharge areas, level of seismic activity, or soil characteristics. In addition, the Farmland Policy Protection Act protects prime farmland soils. Consultation with state and local agriculture and pollution prevention agencies should take place during alternatives analysis.

Water Resources

Water resources data has two parts: Surface water and groundwater. No groundwater data has been collected for this report. Potential concerns for groundwater include increased runoff or accident spills that may adversely affect sensitive aquifers or aquifer systems. Contamination of ground water may have an impact on threatened or endangered species, spring dominated stream species, and public water supplies. As the project progresses and alternative routes are studied, these potential effects will need to be considered.