CHAPTER 9: RESOURCE CONSIDERATIONS

Page

9.0 RESOURCE CONSIDERATIONS ---------- 9-1
9.1 Geospatial Data ---------- 9-4
9.2 Air Quality ---------- 9-7
9.2.1 Air Quality Evaluation Process ---------- 9-7
9.2.2 NEPA Document Sections ---------- 9-17
9.3 Geologic Resources and Soil ---------- 9-20
9.3.1 Geologic and Soil Resource Evaluation Process ---------- 9-20
9.3.2 NEPA Document Sections ---------- 9-22
9.4 Water Quality ---------- 9-24
9.4.1 Water Quality Evaluation Process ---------- 9-24
9.4.2 NEPA Document Sections ---------- 9-28
9.5 Floodplains ---------- 9-34
9.5.1 Floodplain Evaluation Process ---------- 9-35
9.5.2 NEPA Document Sections ---------- 9-38
9.6 Wetlands ---------- 9-41
9.6.1 Wetland Evaluation Process ---------- 9-41
9.6.2 NEPA Document Sections ---------- 9-47
9.7 Vegetation and Noxious Weeds ---------- 9-50
9.7.1 Vegetation Evaluation Process ---------- 9-50
9.7.2 NEPA Document Sections ---------- 9-56
9.7.3 Noxious Weeds ---------- 9-58
9.8 Fish and Wildlife ---------- 9-65
9.8.1 Fish and Wildlife Evaluation Process ---------- 9-65
9.8.2 NEPA Document Sections ---------- 9-73

9.9 Threatened/Endangered (T&E) Species ---------- 9-76
9.9.1 T&E Species Evaluation Process ---------- 9-77
9.9.2 NEPA Document Sections ---------- 9-81
9.10 Historic Properties ---------- 9-84
9.10.1 Reasons for Evaluation of Historic Properties Under NEPA ---------- 9-86
9.10.2 Collection and Evaluation of Baseline Information Under NEPA and Section 106 ------ 9-86
9.10.3 Other Issues to Consider ---------- 9-94
9.10.4 NEPA Document Sections ---------- 9-102
9.11 Paleontological Resources ---------- 9-104
9.11.1 Paleontological Evaluation Process ---------- 9-104
9.11.2 NEPA Document Sections ---------- 9-108
9.12 Land Use ---------- 9-111
9.12.1 Land Use Evaluation Process ---------- 9-111
9.12.2 NEPA Document Sections ---------- 9-113
9.13 Social Resources ---------- 9-116
9.13.1 Social Resource Evaluation Process ---------- 9-116
9.13.2 NEPA Document Sections ---------- 9-122
9.14 Economic Resources ---------- 9-124
9.14.1 Economic Evaluation Process ---------- 9-124
9.14.2 NEPA Document Sections ---------- 9-127
9.15 Environmental Justice, Title VI, and Limited English Proficiency (LEP) ---------- 9-131
9.15.1 Limited English Proficiency (LEP) ---------- 9-131
9.15.2 Evaluating Environmental Justice and Title VI under NEPA ---------- 9-132
9.15.3 NEPA Document Sections ---------- 9-144
9.16 Transportation Resources ---------- 9-149
9.16.1 Transportation Resources Evaluation Process ---------- 9-149
9.16.2 NEPA Document Sections ---------- 9-150

9.17 Residential/Business/Right-of-Way Relocation ---------- 9-164
9.17.1 Relocation and Acquisition Evaluation Process ---------- 9-164
9.17.2 NEPA Document Sections ---------- 9-168
9.18 Utilities and Railroads ---------- 9-171
9.18.1 Utilities and Railroads Evaluation Process ---------- 9-171
9.18.2 NEPA Document Sections ---------- 9-173
9.19 Section 4(f) Evaluation ---------- 9-174
9.19.1 Legislative Background ---------- 9-174
9.19.2 Section 4(f) Evaluation Process ---------- 9-175
9.19.3 Section 4(f) Documentation in NEPA Documents ---------- 9-182
9.19.4 Section 4(f) Evaluation Processing, Review, and Approval ---------- 9-186
9.20 Section 6(f) Evaluation ---------- 9-189
9.20.1 Reasons for Evaluation of Section 6(f) Under NEPA ---------- 9-189
9.20.2 Collection and Evaluation of Baseline Information Under NEPA ---------- 9-189
9.20.3 NEPA Document Sections ---------- 9-191
9.21 Farmlands ---------- 9-192
9.21.1 Farmland Evaluation Process ---------- 9-192
9.21.2 NEPA Document Sections ---------- 9-195
9.22 Noise ---------- 9-196
9.22.1 Noise Evaluation Process ---------- 9-196
9.22.2 NEPA Document Sections ---------- 9-202
9.23 Visual Resources/Aesthetics ---------- 9-206
9.23.1 Visual Resource/Aesthetic Evaluation Process ---------- 9-206
9.23.2 NEPA Document Sections ---------- 9-210
9.24 Energy ---------- 9-214
9.24.1 Energy Evaluation Process ---------- 9-214
9.24.2 NEPA Document Sections ---------- 9-216

9.25 Hazardous Materials ---------- 219

9.25.1 Hazardous Material Evaluation Process ---------- 220

9.25.2 Collection and Evaluation of Baseline Information ---------- 221

9.25.3 NEPA Document Sections ---------- 9-225

9.26 Cumulative Impacts ---------- 9-228

9.26.1 Cumulative Impact Process ---------- 9-231

9.26.2 NEPA Document Sections ---------- 9-235

9.27 References ---------- 9-237

ATTACHMENT A: WATER QUALITY TEMPLATE AND WATER QUALITY MODEL PROGRAM DECISION TREE

ATTACHMENT B: ENVIRONMENTAL JUSTICE CENSUS 2010 DIRECTIONS

LIST OF FIGURES

Figure 9-1 Air Quality and Transportation Planning Connection ---------- 9-11
Figure 9-2 Coordination Between NEPA and Section 106 ---------- 9-85
Figure 9-3 Section 106 / NEPA Merger Process ---------- 9-93
Figure 9-4 Cultural Resource Survey Forms – Which Forms to Use When ---------- 9-98
Figure 9-5 Section 4(f) Evaluation Process ---------- 9-177
Figure 9-6 Completing the Farmland Protection Act Analysis ---------- 9-194
Figure 9-7 Visual Resource Evaluation ---------- 9-211
Figure 9-8 Mitigation Process for CDOT Projects ---------- 9-227
Figure 9-9 Determining Cumulative Impacts ---------- 9-229

LIST OF TABLES

Table 9-1 CDOT Mitigation Tracking Spreadsheet with Example Text ---------- 9-3
Table 9-2 Summary of Impacts and Mitigation Table for NEPA Documents with Example Text ---------- 9-3
Table 9-3 National Ambient Air Quality Standards (2011) ---------- 9-9
Table 9-4 Potential Contaminants from Transportation Projects that May Impact Water Resources -------- 9-25
Table 9-5 CDOT Land Use Categories and Noise Abatement Criteria ---------- 9-199
Table 9-6 CDOT Hazardous Material Document Guidance Table ---------- 9-222

9.0 RESOURCE CONSIDERATIONS

This section provides Colorado Department of Transportation's (CDOT) preferences on how resources should be presented in the required chapters of National Environmental Policy Act of 1969 (NEPA) documents. Specific format and level of detail is discussed in Chapters 4, 5, and 6. The CDOT project team should decide which resources discussed in this chapter should be included in the NEPA document. The level of detail for each resource should be commensurate with the importance of the resource and the potential it has to affect the decision-making process for alternative decisions.

Each resource section in this chapter is subdivided into the following elements:

- Evaluation Process - Identifies who is responsible for evaluating a particular resource, what to evaluate, and where it should be considered (i.e., defines the study area for the project being proposed, and when they should evaluate it). Reasons for evaluating the resource under NEPA (why), how to collect and evaluate baseline information under NEPA and any other issues to consider are discussed.
- NEPA Document Sections - Identifies what should be included in the Affected Environment and Environmental Consequences chapter of a NEPA document for the resource, including mitigation measures. Additionally within each resource section, cross-references are made as appropriate to other parts of this Manual where additional detail on these aspects of NEPA can be found.

Other information that should be discussed for resources include study area boundaries and mitigation and monitoring commitments. More information is included below.

Presenting Resources in a NEPA Document

- When resources are not present or analyzed in the project area, briefly list those resources in the beginning of the Affected Environment and Environmental Consequences chapter, along with reasons for their not being considered further.
- There is no required order in which resources should be discussed. This is up to the project team to decide, but a recommended way is to discuss them by level of importance in the project area.

STUDY AREA BOUNDARIES

The study area for non-mobile physical resources such as geology and soils may be the same as the project footprint because impacts to the resource will only occur where it is disturbed. The study area for non-mobile biological resources such as vegetation may be slightly larger than the project footprint because emissions or effluents from project activities may indirectly impact plants. The study area for mobile resources may be larger and shaped differently than the project footprint. For example, the water resource study area may extend to the edge of the watershed(s) that contain the project footprint; wildlife study areas may vary by species and extend to the boundary of species' home ranges which can be as large as several states;

A "project area" or "project footprint" typically includes the area that will be directly impacted by the project. A "study area" includes the limits for resource analysis. Be sure to define terminology in NEPA documents.

or there may be multiple geographic extents for air quality analyses such as for hotspot, inventory or regional haze.

Mitigation and Monitoring Commitments

Mitigation measures and monitoring commitments for impacted resources should be identified in CDOT's Mitigation Tracking Spreadsheet (Table 9-1), which is a tool to track mitigation and monitoring commitments identified during the NEPA process. The intent of the form is to confirm that the environmental commitments identified and documented during NEPA are fulfilled during project construction. The Mitigation Tracking Spreadsheet is required for Environmental Impact Statements (EIS), Environmental Assessments (EA), and documented/non-programmatic Categorical Exclusions (CatEx). It is recommended as a tool for programmatic CatExs, but it is not required.

Mitigation and monitoring commitments are specific and include information regarding responsibility, monitoring, performance standards, and schedules for implementation. When developing mitigation and monitoring commitments, be sure to include design, construction, and maintenance staff to ensure that commitments are implementable. The first six columns of the Mitigation Tracking Spreadsheet (Table 9-1) should be filled out and included as the Summary of Impacts and Mitigation Table in NEPA documents (Table 9-2).

The Summary of Impacts and Mitigation Table from the NEPA document will be added into the full Mitigation Tracking Spreadsheet, which will follow the project through the design, construction, and maintenance phases.

CDOT's Mitigation Tracking Spreadsheet can be obtained here http://www.coloradodot.info/programs/environmental/resources/forms/CDOT%20Mitigation%20Tracking%20Spreadsheet_June%202012.xlsx/view

The mitigation commitment from the source document column of the Summary of Impacts and Mitigation table does not have to include the entire standard language that is identified in the technical report. A summary of the commitment identified in the technical report is appropriate.

Table 9-1 CDOT Mitigation Tracking Spreadsheet with Example Text

							Mitigation Status		Agency Coordination		
Mitigation Commitment #	Mitigation Category	Impact from NEPA Document	Commitment from Mitigation Table in Source Document Use Exact Wording from Table in Source Document	Responsible Branch	Timing/Phase of Construction Mitigation to be Constructed	Location of Mitigation(s) in Plan Sheets/Specs Include All Page Numbers that Apply	Date Mitigation Completed	Name of Person Completing Mitigation	Agency Coordination Required? Yes or No	Name of Each Agency	Comments
1	Migratory Birds/Migratory Bird Treaty Act (MBTA)	Loss of migratory bird habitat and nests	Pre-construction survey required if construction occurs during migratory bird nesting and breeding season to identify migratory bird activity and/or nests.	CDOT Region XX Environmental	Design and Construction	Sheet # 17	8/1/2014	Jon Smith	Yes	N/A	

Table 9-2 Summary of Impacts and Mitigation Table for NEPA Documents with Example Text

#	Mitigation Category	Impact	Mitigation Commitment from Source Document	Responsible Branch	Timing/Phase that Mitigation will be Implemented
1	Migratory Birds/Migratory Bird Treaty Act (MBTA)	Loss of migratory bird habitat and nests	Pre-construction survey required if construction occurs during migratory bird nesting and breeding season to identify migratory bird activity and/or nests	E.g., Design Engineer, Construction Engineer, Environmental (Region/EPB), Utilities Staff, ROW Staff, Maintenance	E.g., Design, Construction, ROW, Post-Construction, Maintenance

9.1 Geospatial Data

Geographic information systems (GIS) assemble, store, manipulate, and display spatial data and have the ability to relate database information to reflect complex data relationships. GIS datasets are widely available from various federal, state, and local sources and can be utilized for numerous analyses throughout the NEPA process. GIS software is commonly used as a tool to convert datasets to-and-from Microstation, CDOT's design software platform, and to convert information between coordinate systems. The ability of GIS to relate database information to spatial locations is essential for performing overlay analyses. For example, a GIS user can determine the area of impact to property parcels from a proposed right-of-way footprint through overlay processes in GIS. GIS software has the ability to display data based upon database attribute information, allowing fast update of maps. Basic uses of GIS in the NEPA process (for transportation) include:

- Map Production – Creation of digital and hardcopy maps for public displays and published documents.
- Evaluation of Environmental Impacts – GIS can be used to calculate environmental impacts (e.g., area of wetland impacts, volumes of material removed, numbers of historic properties, etc.)
- Simulating Environmental Impacts – Realistic, three-dimensional "before and after" simulations and modeling of environmental impacts of a given project that support decision-making.
- Measurements – Provides basic tools for measuring areas, distances, and volumes in addition to more complex measures, such as change detection through time.
- Static and Interactive Displays – Enhance public meetings, small group meetings, open houses, conferences, workshops, and websites by conveying complex information in graphic displays. GIS could also be set up as a stand-alone interactive display for meeting participants to review and comment on proposed plans.
- Data Management – Layers of environmental and design information can be stored in a single GIS database with associated metadata and documentation of how the layers were created and used for a project.

When collecting and developing GIS data during early project development, the following types of data also aid in environmental clearances:

CDOT's GIS standards are found in *Corridor GIS Standards Guidance Document* (CDOT, 2001a).

- Baseline information, including locations of existing infrastructure, buildings, streams, jurisdictions, topography, vegetation, utilities and easements, wetlands, geologic hazards, soils, parks, and trails.
- Project design scenarios and alternatives

CDOT currently uses ESRI's ArcGIS software as their primary GIS platform. A number of online GIS applications have been developed by CDOT that provide useful spatial datasets and information for projects. These include:

- Project Locator Application (ProLo) – Allows users to find detailed information about Statewide Long Range Transportation Planning (SWLRTP) corridors and Statewide Transportation Improvement Program (STIP) projects throughout Colorado. The tool can be found at http://dtdapps.coloradodot.info/projectlocator/
- Data Access Application – Provides users with highway attribute information including geometrics, traffic counts, environmental information, and pavement information through multiple tools. Highway statistics, traffic reports, geographic data, and maps are also available for download. The application can be accessed at http://apps.coloradodot.info/dataaccess/

CDOT maintains its spatial data assets in Universal Transverse Mercator (UTM) projection, Zone 13. Commonly, corridor projects will utilize survey coordinate systems, created through modification of existing coordinate systems available in GIS. Where possible, survey control diagrams should be requested to allow GIS professionals to convert environmental and design layers between survey coordinates and standard GIS projections. This will help ensure the spatial accuracy of datasets and will allow design and environmental professionals to integrate the data into their respective analyses. This information should be documented and referenced in metadata for layers in survey coordinates.

Project managers should ensure that all information remains in separate layers to enable manipulation later in the project and to adhere to geospatial data specifications and protocols. To the extent possible, CDOT's standards for geospatial data and metadata are compliant with the US Federal Geographic Data Committee standards for quality, content, and transfer. CDOT's Corridor GIS Standards are to be referenced and utilized on all CDOT projects.

GIS servers host GIS resources, such as maps and aerial imagery, over an internet connection allowing layers to be accessed remotely without being downloaded locally. These services can be useful in providing the most up-

to-date information available from the data creator. Helpful GIS servers accessible in ArcGIS include:

- Federal Emergency Management Act (FEMA) National Flood Hazard Layer Web Map Service – Provides access to the National Flood Hazard Layer, which includes floodplain limits, letter of map revision (LOMR) locations, floodplain cross sections, etc. The web map service can be accessed through adding an ArcGIS web map server connection to http://www.fema.gov/national-flood-insurance-program-flood-hazard-mapping/national-flood-hazard-layer-nfhl
- U.S. Fish & Wildlife Service National Wetland Inventory Web Map Service – Supplies access to linear and polygon wetland data for the U.S. and U.S. territories, as well as riparian mapping where available. The web map service can be accessed through creation of a connection to the ArcGIS web map server, located at http://www.fws.gov/wetlands/Data/Web-Map-Services.html
- Denver Regional Council of Governments (DRCOG) Web Map Service – Provides a multitude of transportation and environmental resource data, including current year municipal boundaries. The web map service can be accessed by establishing a connection to http://drcog.org/services-and-resources/data-maps-and-modeling
- Colorado Parks and Wildlife's (CPW) Natural Diversity Information Source Map Server – Displays data of species habitat, movement areas, critical range, riparian mapping, potential fen and wetland areas, biodiversity data, and various other environmental data layers. The map service can be accessed through creation of an ArcGIS Server connection to http://ndis.nrel.colostate.edu/
- Natural Resources Conservation Service (NRCS) Web Map Service – Allows access to NRCS soil mapping for the US, where available. The web map service can be accessed by establishing a connection to http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

9.2 Air Quality

Air quality discussions address the emissions of air pollutants from transportation systems that can be harmful to human beings, other living organisms, or man-made materials. Emissions may also contribute to regional haze and alter certain characteristics and benefits provided by the atmosphere and degrade visibility. In essence, to protect the health of humans and other organisms, the structural integrity of man-made materials, and preserve visibility of scenic vistas, it is important to prevent degradation of air quality.

The sections below provide guidance on the treatment of air quality for CDOT's NEPA projects. The first section discusses the process for evaluating air quality. The second section discusses air quality information that should be included in each NEPA document. Additional information can be found in CDOT's *Air Quality Procedures* (CDOT, 2010).

9.2.1 Air Quality Evaluation Process

Air quality is primarily regulated under the 1970 Clean Air Act (Title 42 United States Code [USC] Chapter 85) and amendments from 1977 and 1990. The purpose of the Clean Air Act is to protect and enhance air quality to promote public health, welfare, and the productive capacity of the nation. The Clean Air Act addresses criteria air pollutants (regulated through the National Ambient Air Quality Standards [NAAQS]), the Prevention of Significant Deterioration (PSD) program, as well as Hazardous Air Pollutants (HAPs) added in the 1990 amendments.

The Clean Air Act provided the U.S. Environmental Protection Agency (EPA) the authority to designate "nonattainment" areas where air pollution levels were higher than the NAAQS. Areas that currently are or have been nonattainment are the subject of State Implementation Plans (SIPs) designed to move (or keep) the area into attainment of the NAAQS, which often places emissions control requirements on the transportation sector and mobile-source pollutant sources. These areas are subject to the Transportation Conformity Rule (40 CFR 93.104), which directs that federally-supported transportation activities must be consistent with (i.e., "conform to") the purposes of a SIP. Transportation projects outside of nonattainment and maintenance areas are not subject to these regulations.

Reasons for Evaluation of Air Quality under NEPA

NEPA and its implementing regulations (40 CFR 1500) mandate that transportation decisions involving a federal nexus or federal funds adhere to the NEPA regulations. NEPA requires that federal agencies use a systematic, interdisciplinary approach to decision-making when federal

actions may affect the quality of the human environment. In addition, CDOT has committed to complying with the intent and requirements of NEPA for state transportation activities, regardless of whether or not these activities are federally funded. These are described in CDOT's *Air Quality Program Book* (CDOT, 2012). Therefore, CDOT conducts air quality evaluations for its projects for a variety of reasons, including:

- To fulfill requirements of the Clean Air Act and amendments and EPA's Transportation Conformity Rule
- To protect the state's air quality and disclose the likely impacts of proposed projects
- To comply with CDOT's environmental stewardship policy, which ensures the statewide transportation system is constructed and maintained in an environmentally responsible, sustainable, and compliant manner

NAAQS Nonattainment Areas

Six "criteria" air pollutants have been identified that can be harmful to public health and the environment (Table 9-3). For each criteria pollutant, health-based (or primary) standards have been established to protect public health with an adequate margin of safety, and some welfare-based (or secondary) standards have been established to protect the public welfare (e.g., crops, vegetation, wildlife, buildings and national monuments, and visibility) from adverse effects of air pollution. The primary NAAQS represent a maximum pollutant concentration over a specific averaging time above which adverse effects on human health may occur. The NAAQS most directly related to transportation sources are: carbon monoxide; nitrogen dioxide; ozone; and, particulate matter.

Under the Clean Air Act, EPA may designate areas that are found not to be in compliance with one or more of the NAAQS (Table 9-3) as nonattainment areas. When air quality improvement actions within these areas have been shown to be successful over time in meeting the NAAQS, EPA may re-designate the areas to attainment/maintenance for the specific NAAQS. In either case, these areas are subject to SIPs that are designed to move (or keep) the area into attainment of the NAAQS, which often places emissions control requirements on the transportation sector and mobile-source pollutant sources. Therefore, projects within nonattainment or maintenance areas are subject to greater scrutiny of potential air quality effects than projects outside these areas. Note that some types of projects are exempt from air quality conformity (40 CFR 93.126 and 93.127), regardless of location.

Table 9-3 National Ambient Air Quality Standards (2011)

Pollutant	Primary NAAQS		Secondary NAAQS	
	Concentration	Averaging Time	Concentration	Averaging Time
Carbon Monoxide	9 ppm	8-hour	None	
	35 ppm	1-hour	None	
Ozone	0.075 ppm	8-hour	Same as Primary	
Particulate Matter (PM_{10})	150 µg/m^3	24-hour	Same as Primary	
Particulate Matter ($PM_{2.5}$)	12 µg/m^3	Annual	15 µg/m^3	
	35 µg/m^3	24-hour	Same as Primary	
Nitrogen Dioxide	53 ppb	Annual	Same as Primary	
	100 ppb	1-hour	None	
Sulfur Dioxide	75 ppb	1-hour	500 ppb	3-hour
Lead	0.15 µg/m^3	3 months	Same as Primary	

ppb = parts per billion
ppm = parts per million
µg/m^3 = micrograms per cubic meter

TRANSPORTATION PLANNING AND CONFORMITY

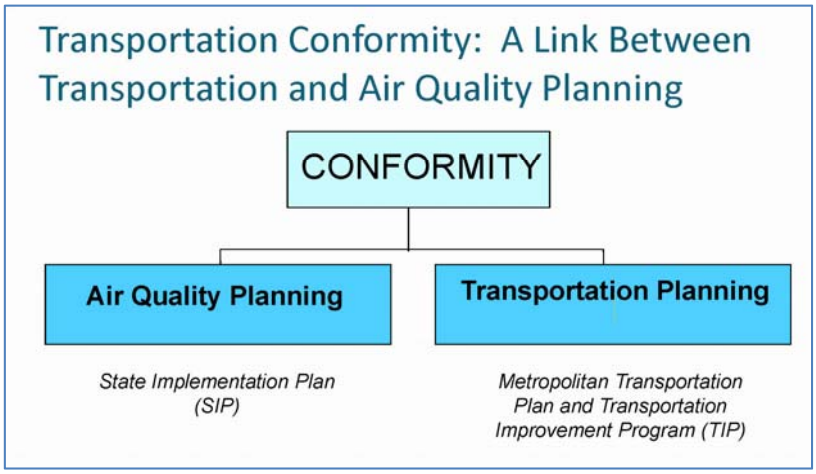
CDOT is not directly responsible for the transportation planning that must occur for the nonattainment and maintenance areas—that is the responsibility of the relevant MPOs or TPRs. However, CDOT does sponsor transportation improvement projects and thereby partners with the MPOs in identifying future changes to the regional transportation network that must be planned and analyzed as part of the regional planning process (Figure 9-1). The overall objective of this work is to ensure that transportation plans and projects, and their associated air pollutant emissions, are consistent with the purpose, goals and methods of the relevant nonattainment and/or maintenance SIPs.

Each SIP establishes air pollutant emissions budgets for the affected nonattainment or maintenance area. The budget is the overall air pollutant emissions limit for the regulated area and consists of several source

categories. To demonstrate that the SIP will achieve the emission levels necessary for transportation compliance, limits are established on the amount of emissions that mobile sources (on-road and transit) can emit. In the case of Limited Maintenance Plan areas, the final emissions budget generated at the start of the Limited Plan is maintained throughout the remainder of the SIP. For the on-road mobile source category (i.e., transportation projects) this limit is referred to as the motor vehicle emissions budget. The SIP may also contain corrective actions, such as vehicle emissions testing requirements.

There are two levels of analysis needed to demonstrate conformity for roadway improvements. The first level is regional, which means the project must be included in a fiscally constrained, air-quality-conforming plan or program to address potential long-term and regional air quality impacts from modifying the transportation system as described above. The second level is local, which means an individual project cannot contribute to any new local violations, increase the frequency or severity of any existing violation, or delay timely attainment of the NAAQS or any required interim emissions reductions or other milestones.

Figure 9-1 Air Quality and Transportation Planning Connection



AIR QUALITY ANALYSIS

There are several steps involved in a typical CDOT air quality analysis for NEPA. It should be noted that air quality analysis for NEPA purposes are distinct from air quality conformity analyses that may be required for areas subject to EPA designated non-attainment (and attainment/maintenance) status. These steps are not fixed because the required analyses can vary by project type and location. Typically, an analysis would be limited to a subset of air pollutants specifically related to transportation sources. The major steps include, and are described in more detail below:

- Determination of need for air quality analysis
- Scoping of analyses and methods
- Evaluation of project setting
- Conformity evaluations (regional and local/hot-spot)
- Other non-NAAQS pollutant analyses
- Emissions from construction
- Cumulative and/or indirect effects

Determination of Need for Analysis – The nature, scope and location of the proposed project should be reviewed to determine whether an air quality analysis is needed. Some projects are exempt from air quality conformity obligations (40 CFR 93.126). Projects outside designated nonattainment and

Is the project exempt from conformity determination?

Projects Requiring Analysis

- Projects funded and/or approved by FHWA or FTA
- Regionally significant projects (as determined by the MPO)

Exempt Projects

- State and locally funded projects
- Projects that are not regionally significant (as determined by the MPO)
- Categorically exempt under 40 CFR 93.126

maintenance areas may not require an analysis. Some projects can be screened out of a detailed air quality analysis because they are not a "project of air quality concern" or do not meet basic selection criteria (such as no poor intersection Levels of Service [LOS]). When applicable, the reason(s) a project was screened out of a detailed air analysis should be documented in the NEPA document.

Scoping of Analyses – When it has been determined that an air quality analysis is needed, formal scoping with the relevant air quality regulatory agencies may be needed to define the content, geographic footprint (study area), and methods of the analyses. The requirements of NEPA air quality analyses are a dynamic environment and change regularly. Typically, scoping will include the Federal Highway Administration (FHWA) and Colorado Department of Public Health and Environment's Air Pollution Control Division (APCD), but may include EPA, the MPO/TPR or other agencies—the scoping should be customized to the needs of the project.

Evaluation of Project Setting – This consists essentially of reviewing existing conditions data for the project location. The data may include regional NAAQS status, historical weather data and NAAQS pollutant monitoring data. Air quality information required for a NEPA document includes both general and project-specific information that is required to evaluate compliance with the regulatory standards discussed above. NAAQS status data for the region is available from EPA, APCD and (typically) the MPO. Data should be assembled for nearby air quality monitoring stations to display past trends in pollutant concentrations in the project vicinity and/or the air quality region. Nearby historical weather data may or may not be readily available—the location of the project is an important consideration. However, the University of Utah's MesoWest website is a useful resource for data from numerous weather stations from across Colorado, including CDOT's. A windrose is a common example of the summarized weather data. These data are needed to characterize the general project setting with an emphasis on air quality aspects that are likely to be impacted by the project.

Conformity Evaluations – This consists of the primary analytical tasks for the project. The primary transportation-related NAAQS pollutants are carbon monoxide, particulate matter (both PM_{10} and $PM_{2.5}$) and ozone. Carbon monoxide and particulate matter (only PM_{10} is an issue in Colorado currently) can be concerns at both the regional and local levels and must be analyzed for impacts at both levels. Due to the nature of ground-level ozone pollution, it is a regional concern and is not analyzed at the local level.

The regional conformity evaluations are not performed by CDOT nor are they performed for individual CDOT projects. The regional evaluations are

done by the MPO/TPR and APCD as part of the formal approval process for the regional transportation plans and programs described above. These are regularly updated to include new projects. To demonstrate project-level conformity, a proposed project must first be included in the fiscally constrained, air-quality-conforming transportation plan and program for the region. This must be accomplished before a formal conformity finding can be made and the final NEPA decision document can be signed for a project. For this to happen, project construction funding must be identified. Sometimes, project planning or NEPA evaluation needs to occur before the funding is identified. In such cases, the planning/evaluation activities for the project may proceed with regional conformity evaluation coming later when the funding has been resolved. However, inclusion in a fiscally constrained, air-quality-conforming plan and program is still required before the final NEPA decision document can be signed. In the case of multi-phase projects, only those components with approved funding can be cleared.

The local, or hot-spot, conformity analyses are performed by CDOT for individual projects. The analyses are needed because an individual project cannot contribute to any new local violations, increase the frequency or severity of any existing violation, or delay timely attainment of the NAAQS or any required interim emissions reductions or other milestones. A Memorandum of Agreement between APCD and CDOT governs the hot-spot evaluation process. Currently, these analyses apply only to carbon monoxide and PM_{10} emissions. Individual projects proposed within the relevant nonattainment or maintenance areas are reviewed to see if the criteria triggering carbon monoxide hot-spot analysis are met (93.123(a)), or if it may be a "project of air quality concern" for particulate matter (93.123(b)).

If the CO and/or PM_{10} criteria are met, the analyses include computerized dispersion modeling of the air pollutant to assess whether any locations may violate the relevant NAAQS or if NAAQS concentrations increase due to the proposed project. If not, the project meets the local conformity requirements. If it appears violations may occur, an interagency consultation should be conducted to determine resolution of the potential air quality issues. Note that for CO, 93.123(a) specifies that a qualitative discussion of likely CO impacts is required for project-level conformity, even if the criteria for quantitative (modeled) CO analysis are not met.

FHWA has established a carbon monoxide categorical hot-spot finding that may apply to some projects. This is an Environmental Protection Agency (EPA) approved test for screening of potential intersections and site parameters to meet compliance with project-level (micro-scale) carbon monoxide dispersion analysis for transportation conformity. Further detail on

the guidance is provided at http://www.fhwa.dot.gov/environment/air_quality/conformity/policy_and_guidance/cmcf/index.cfm.

A formal conformity determination for the project, covering both regional and local conformity, complying with the APCD/CDOT agreement is needed before the final NEPA document can be signed.

NAAQS-related Emissions Analyses- While it is not required for conformity, NEPA documents for some large projects also include an emissions inventory analysis for NAAQS pollutants and pollutants precursors for the project study area. The need and procedures for this are determined during project scoping.

Non-NAAQS Pollutant Analyses – In some cases, particularly large or controversial projects, project scoping may lead to analysis of non-NAAQS air pollutants, such as mobile-source air toxics, greenhouse gases or nitrogen deposition. Typically, these are pollutants that do not have established regulatory ambient air thresholds like a NAAQS. The methodologies for each of these analyses may vary between projects and should be resolved during scoping. These analyses are often performed for comparative, informational, or disclosure purposes as inventory analyses for the corridor. Dispersion modeling for these pollutants is not conducted, because the effects of these pollutants are not a function of localized concentrations near roadways; however, pollutant reduction recommendations may be part of a project.

There are seven priority mobile-source air toxic pollutants, which are organic chemicals often present in the exhaust of petroleum-fueled vehicles: benzene, acetaldehyde, formaldehyde, acrolein, 1,3-butadiene, diesel particulate matter plus diesel exhaust organic gases (diesel PM), naphthalene, and polycyclic organic matter. The primary greenhouse gas associated with transportation is carbon dioxide. Nitrogen deposition is primarily a concern for certain sensitive (primarily mountain) ecosystems.

Emissions from Construction – Most of CDOT's projects involve some form of construction. Construction emissions differ from regular traffic emissions in a number of ways. Construction activities may be sources of temporary emissions from fugitive dust or equipment exhausts. Adjoining properties in the project area would be near construction activities when the proposed project is built and may be affected. Analysis of these emission sources and effects may be included in a project through scoping, and the methodologies should be selected at that time. These analyses tend to be qualitative rather than quantitative.

Cumulative and Indirect Effects – NEPA requires assessment of the proposed action in combination with other actions that could result in cumulative environmental impacts. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions." Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time. Indirect effects are changes not caused as part of the proposed action, but are reasonably foreseeable and can be linked together to estimate future consequences, such as incremental population growth or land use changes. Climate change and greenhouse gas evaluations are included here.

AIR QUALITY CONFORMITY CONCURRENCE DOCUMENTATION

CDOT has an agreement with APCD regarding procedures for determining project-level conformity. The consultation process results in an Air Quality Concurrence Letter, signed by APCD.

Project air quality conformity clearances are documented according to one of the procedures discussed below. The results of the regional and project-level conformity analysis are incorporated into the NEPA document, at which point EPA and FHWA review the conformity determination. Because EPA oversees the conformity regulations and related guidance, every effort is made to ensure that EPA agrees that analyses comply with applicable requirements and that EPA comments have been addressed.

In PM_{10} areas, project conformity determinations must also document that the project will comply with applicable control measures in the SIP (93.117).

Exempt Project – The Environmental Programs Branch (EPB) or Region Air Quality Specialist sends a brief memo or email to the CDOT project manager stating that the project is exempt from a conformity determination according to the conformity regulation.

Categorical Exclusion (CatEx) Projects that Pass the LOS Screening Test – The EPB or Region Air Quality Specialist writes a memo to the project file stating that all intersections affected by the project will operate at LOS C or better during both the opening and future years, and hot spot modeling is not required. If the project uses federal funding, it must be included in the fiscally constrained, air-quality-conforming plan and appropriate funding identified in the approved program before the clearance can be finalized and before the project can be advertised for construction. A copy of the memo should be sent to the CDOT project manager. Coordination/concurrence with APCD is not required.

Two examples are a Safe Routes to School pedestrian improvement project or a median modification project which does not involve capacity increase or new turning motions.

Modeled CatEx Projects – The EPB or Region Air Quality Specialist writes a memo to the project file summarizing the results of the hot-spot analysis and stating that the project will not cause or contribute to a violation of a NAAQS. An air quality clearance cannot be issued if the hot-spot analysis shows that there would be an exceedance of a NAAQS. The project must be included in the fiscally constrained, air-quality-conforming plan and appropriate funding identified in the approved program before the clearance can be finalized and before the project can be advertised for construction. A copy of the memo should be sent to the CDOT project manager. Coordination/concurrence with APCD is required to obtain pollutant emission factors and background concentrations.

An example is a new left turn lane added to a signalized intersection that will operate at a level of service D or worse.

Environmental Assessment (EA)/Environmental Impact Statement (EIS) Projects that Pass the LOS Screening Test – All EA/EIS projects in nonattainment and maintenance areas require coordination with APCD and interagency scoping consultation. If the project passes the LOS screening test (for CO) or is found not to be a "project of air quality concern" (for PM_{10}), the EPB or Region Air Quality Specialist sends a letter to APCD stating this fact and requests concurrence that the project complies with the conformity provisions of the Clean Air Act. The project must be included in the fiscally constrained, air-quality-conforming plan and appropriate funding identified in the approved program before the clearance can be finalized and before the project can be advertised for construction.

Modeled EA/EIS Projects – For EA/EIS projects in non-attainment and maintenance areas having intersections that do not pass the LOS screening test (for CO) and/or is found to be a "project of concern" (for PM_{10}), CDOT and APCD will jointly determine the appropriate level of hot-spot modeling and other analyses needed through an interagency consultation process. Complex projects will develop a methodology protocol in conjunction with APCD and other agencies policy and technical modeling staff to detail parameters and modeling responsibilities unique to the project analyses.

The EPB or Region Air Quality Specialist or project consultant, as appropriate, prepares a technical report describing the project and summarizing the results of the hot-spot modeling and other analyses. The technical report is sent to APCD for review. A final technical document and a letter requesting concurrence are submitted to APCD prior to the ROD. The

project must be included in the fiscally constrained, air-quality-conforming plan and appropriate funding identified in the approved program before the clearance can be finalized and before the project can be advertised for construction.

9.2.2 NEPA Document Sections

When a formal analysis of air quality is required for a project, it is typically documented in a technical report as well as in a NEPA document. All CDOT projects that include an air quality analysis require a stand-alone report or memorandum that will be summarized in the main NEPA document. Air quality topics for the Affected Environment and Environmental Consequences chapter of NEPA documents are discussed below.

TECHNICAL REPORT

The air quality technical report must describe the methods and findings from the project air quality impacts analysis and the findings from any abatement action evaluations. Different levels of air quality reports are acceptable—an EIS would require a more thorough report than a CatEx—but technical documentation is required if a formal air quality analysis is performed. More information is available in CDOT's *Air Quality Procedures Manual* (CDOT, 2010).

The technical report must include discussion of each of the steps of the air quality analyses and the findings for each analysis. A project is considered "cleared" when a final analysis has been submitted and reviewed by the EPB and/or Regional Air Specialist. All comments submitted during these reviews must be resolved before the analysis can be finalized.

AFFECTED ENVIRONMENT

Documentation needs for the Affected Environment chapter of EAs and EISs are discussed in this section. The level of detail will vary with the importance of the airshed that the project affects. At a minimum, the Affected Environment chapter should contain a discussion of the following elements:

General Project Setting – Identify the local setting of the project with respect to air quality. For example, is the project located in an urban versus rural or a light industry versus heavy industry area, and what are the major sources of emissions generated from those settings?

Climate and Meteorological Parameters – Parameters such as maximum, minimum, and average temperatures and precipitation; annual distribution of temperature and precipitation; wind speed, direction, and seasonal distribution; likelihood of inversion and dispersion; and nearest Prevention of

Significant Deterioration Class I areas (if relevant to the project) should be reviewed to assess how air quality may be affected by the project.

Sensitive Receptors – Discuss the nearby receptors that may be sensitive to air quality conditions. This includes places such as homes and schools.

Status of the Airshed – Determine whether the project is located in a nonattainment or maintenance area, and if so, which one(s). Identify whether the problem pollutants are carbon monoxide, PM_{10}, and/or ozone and how they could affect the air shed. Describe the historical regional air quality trends and outlook. Determine whether the project is in a fiscally constrained, air-quality-conforming plan and program.

Environmental Consequences

Documentation for the Environmental Consequences section of EAs and EISs are discussed in this section. The content will vary with the scope of the project, the nonattainment or maintenance area it is located in (if any), and the pollutants analyzed. At a minimum, the Environmental Consequences section should compare the air quality effects of each alternative carried forward for detailed analysis and address the following:

- Summarize the proposed changes to transportation and traffic circulation (e.g., changes in vehicle miles travelled and speeds occurring as a result of the project)
- Discuss if the proposed action(s) are exempt or were screened out of detailed air quality analysis
- Summarize the air quality impact analyses performed
- Describe whether the relevant NAAQS calculations/results were found to be in conformity
- Discuss predicted future trends in concentrations for each of the project alternatives, and how the alternatives affect concentrations (e.g., why are the modeling results different for the various alternatives)
- Summarize any non-NAAQS evaluations that were performed
- Discuss potential pollutant emissions from project construction, if consideration of construction emissions is agreed to in scoping
- Discuss any project mitigation actions or emission reduction commitments

The air quality mitigation discussion typically focuses on mitigation measures available during the construction and operation phases, such as:

- Dust suppression during construction
- Equipment typically installed to reduce emissions from construction vehicles and vehicles using a project roadway
- Sand sweeping as part of winter maintenance practices

Other types of mitigation that may be incorporated to improve air quality include transportation control measures (TCMs). TCMs include any measure that is specifically identified to reduce emissions or concentrations of air pollutants from transportation sources. TCMs are typically targeted at reducing vehicle use or changing traffic flow or congestion conditions. Examples include:

- Traffic signal optimization projects designed to improve traffic flow
- Transportation demand management options such as High Occupancy Vehicle lanes
- Multimodal transportation options and programs to encourage their use
- Agreements with major corporations for promotion of flexible work schedules
- Fringe and transportation corridor parking facilities serving multiple-occupancy vehicle programs or transit service
- Any actions intended to reduce the number of vehicles on the roads or improve the LOS by spreading peak time traffic over a longer time span

Some of these mitigation approaches may be incorporated into the project alternatives at the time of their design, while others, such as the transportation system management mitigation options, may be added as post-design mitigation or during project operation. Additional mitigation strategies are available in CDOT's *Air Quality Action Plan* (CDOT, 2012a).

Appendix F contains required language and guidance for analyzing mobile source air toxics (MSAT). This appendix should be referenced for all projects.

Impacts and mitigation should be listed in a Summary of Impacts and Mitigation Table at the end of the resource evaluation chapter of the NEPA document. The first six columns of CDOT's Mitigation Tracking Spreadsheet should be used as this summary table (Table 9-2). CDOT's Mitigation Tracking Spreadsheet (Table 9-1) can be retrieved from http://www.coloradodot.info/programs/environmental/resources/forms/CDOT%20Mitigation%20Tracking%20Spreadsheet_June%202012.xlsx/view.

CDOT's *Air Quality Action Plan* can be obtained here: https://www.codot.gov/programs/environmental/air-quality/120523%20CDOT%20Air%20Qual%20Action%20Plan.pdf/view

9.3 Geologic Resources and Soil

Geologic features include outcrops; unique rock formations; and potential mining and energy resources. Mineral ores, petroleum, natural gas, sand, and gravel are resources related to geologic features. Impacts to geologic and soil resources from transportation projects must be assessed, as well as impacts from these resources on the project. To the extent possible, CDOT projects are designed to avoid areas containing unique geologic features and to blend into the landscape. This is to ensure the sustainability and stability of the project, as well as the preservation of these features for their value to society. Geologic features that may impact the project include formations that are unstable or erode easily, extreme topography, areas of former or active underground mining, and faults or areas of seismic activity. Soil resources include soil types and mining resources such as sand and gravel. Soil features that may affect the project include soil erodability and permeability.

The two sections below provide guidance on the treatment of geologic and soil resources for CDOT's NEPA projects. The first section discusses the process for evaluating geology and soil. The second section discusses geology and soil information that should be in each NEPA document.

9.3.1 Geologic and Soil Resource Evaluation Process

The evaluation of the geology and soils in the proposed project area is initiated by the CDOT Project or Geotechnical Engineer. Geologic and soil resources should be evaluated at all locations where they will be disturbed by the project, including cut-and-fill locations and construction staging areas. These resources should be evaluated early in design and again at approximately the 30 percent design phase.

Reasons for Evaluation of Geologic/Soil Resources Under NEPA

CDOT evaluates geologic/soil resources to:

- Ensure that geologic/soil resources are identified and that their natural and economic values, as well as their visual aesthetics, are protected
- Identify potential negative impacts that the geology or soils could have on the project if not identified and included in the design
- Comply with CDOT's environmental stewardship policy, which ensures that the statewide transportation system is constructed and

Baseline Geologic/Soil Information to Include in NEPA Documents

- Extreme topography
- Unique geologic features
- Engineering properties of soil and geologic formations (e.g., expanding or erodible soils)
- Faults and seismic activity
- Resources that result from the geology/soils in the project area, for example, minerals (coal), energy (petroleum or natural gas), sand and gravel, and so on.
- Rockfall activity
- Snow avalanche potential
- Potential visual/aesthetic values of geologic features can be acknowledged in the Soils and Geology Affected Environment discussion, but the related impacts should be addressed in the Visual Resources/Aesthetics discussion.

maintained in an environmentally responsible, sustainable, and compliant manner

There are no state or federal laws that apply specifically to geologic or soil resources, although some local agencies may have restrictions regarding building on certain types of soils, such as expanding soils.

Collection and Evaluation of Baseline Information

The baseline information for geologic resources is provided in the Foundation Investigation Report (FIR), and the baseline information for soils is provided in the preliminary soil survey and Pavement Design Report. The FIR and Pavement Design Report are prepared at approximately the 30 percent design phase. Other information sources that describe geologic and soil resources include:

- Natural Resource Conservation Service (NRCS) soil survey reports
- US Geologic Survey (USGS) or Colorado Geologic Survey reports of geologic investigations
- Geotechnical reports prepared for the project
- Assessments of mineral and energy resources

Baseline information that is necessary for conducting the impact assessment is shown in the sidebar. This information should be used to evaluate both the potential impacts of the project on the geologic/soil resources and the potential impacts of the geologic/soil resources on project features.

Whenever possible, project features will be moved or altered to avoid adverse impacts to geologic/soil resources or to avoid adverse impacts from these resources on project features. If project features cannot be moved, CDOT will attempt to modify the project features or modify the design of the project to account for geologic/soil features that may impact the project. Required mitigation measures may be discussed in the FIR or Pavement Design Report.

Other Issues to Consider

Construction of a transportation project does not require any permits related to the geology or soils, nor are any consultations with other state or federal agencies necessary.

9.3.2 NEPA Document Sections

The content of the sections on geologic resources in the Affected Environment and Environmental Consequences chapter is discussed below.

AFFECTED ENVIRONMENT

The Affected Environment chapter of the NEPA document describes the existing conditions and uses of the geologic/soil resources within the project area. A discussion of the following should be included as necessary:

- A general description of the physical setting of the project area such as topography and geomorphology
- A graphic using a geologic column to help emphasize any recent seismic activity, major outcrops, and surface or important strata
- A general statement regarding the soil types and thickness, hydrologic soil types, and permeability, with focus on geologic or soil units relevant to project
- A description of how and where these geologic or soil features interface with project features, using one or more maps to illustrate the project features and the attributes of interest
- A discussion and description of any unique features present (such as Garden of the Gods in Colorado Springs), cross-referenced to Section 9.23 (Visual Resources and Aesthetics)

The level of detail in this discussion should be consistent with the extent of anticipated impacts to or from the geologic and soil resources. If the project alternatives will not affect any geologic/soil resources this should be clearly stated in the document; no additional discussion of geologic and soil resources is required.

ENVIRONMENTAL CONSEQUENCES

In this chapter, describe how the proposed road construction or other project features may impact or be affected by the geologic/soil resources described in the NEPA document. Examples of potential impacts to geologic resources include:

- Places where unique outcrops may have to be re-graded and will no longer provide the same view of geologic strata
- Areas containing sand and gravel deposits that will not have mining capability once the road is constructed

Mitigation Planning Information to Include in NEPA Document

- Mitigation required for each alternative
- Basis for the mitigation decisions and flow chart of the decision process
- Appropriateness, reasonableness, and timing of the mitigation measures relative to project planning and implementation
- Coordination required to obtain agreement on mitigation measures
- Implementation and monitoring of mandated mitigation measures
- Reasonableness and reliability of the mitigation measures

Geologic resources could also impact the project. This information can be illustrated easily on maps that show an impact where features such as expansive soils, unstable geologic formations, old mine tunnels, and/or seismically active areas overlap with proposed project features. Examples of such impacts include:

- Unstable slopes that may adversely affect proposed project features, such as road design and alignment
- Old mine tunnels that could collapse as a result of the project

Include tables showing the engineering properties of soils in the project area and their appropriateness for the various types of construction planned for the project.

After evaluating where the project may affect geologic/soil resources or where the geology or soils may impact project features for each alternative, discuss the types of mitigation measures available to alleviate these potential impacts. Examples of mitigation measures can include moving a project feature to avoid expansive soils or redesigning the roadbed in an area to account for the expansive soils. Visual quality mitigation methods might include various methods of blasting rock so that drill marks are not left visible or creating planting pockets for landscaping to provide a visual (and possibly even a safety-enhancing) screen in front of exposed rock surfaces. Review the FIR or Pavement Design Report for mitigation measures identified during project design. Include the information shown in the sidebar in the NEPA document, as appropriate.

Impacts and mitigation should be listed in a Summary of Impacts and Mitigation Table at the end of the resource evaluation chapter of the NEPA document. The first six columns of CDOT's Mitigation Tracking Spreadsheet should be used as this summary table (Table 9-2). CDOT's Mitigation Tracking Spreadsheet (Table 9-1) can be retrieved from http://www.coloradodot.info/programs/environmental/resources/forms/CDOT%20Mitigation%20Tracking%20Spreadsheet_June%202012.xlsx/view.

9.4 Water Quality

Evaluation of water quality includes consideration of surface water, groundwater, climate, topography, geology, land use and beneficial uses as defined by the Water Quality Control Commission (WQCC). Because these components are complex and interrelated, their assessment is best accomplished by evaluation on a watershed scale. Although floodplains and wetlands are also considered water resources, these important resources are discussed separately in Chapter 9 of this Manual: floodplains are discussed in Section 9.5 and wetland resources are discussed in Section 9.6.

Transportation projects can impact water resources used for drinking, recreation, agriculture, and wildlife habitat. These impacts can occur during both the construction and maintenance/operation phases. Potential contaminants that may impact water resources from transportation projects are shown in Table 9-4.

This section discusses how and why CDOT evaluates water quality as part of NEPA projects and outlines information that should be included in the Affected Environment, Environmental Consequences, and Mitigation sections of NEPA documents.

9.4.1 Water Quality Evaluation Process

The evaluation of water resources is initiated by the CDOT Region Planning and Environmental Manager (RPEM) in consultation with the Project Engineer. Depending upon the project, the RPEM may conduct the water resource evaluation in-house or contract with a consultant to prepare the evaluation. CDOT evaluates water quality impacts for each proposed alternative, including the No Action Alternative.

The water resources evaluation should begin shortly after project scoping to identify sensitive surface water, groundwater, and/or drinking water supplies. It is very important to include CDOT maintenance personnel in the evaluation early on to accurately disclose effects from maintenance practices, identify existing conditions that require correction and to assist in determining the type, need and maintenance access for permanent best management practices (BMPs).

Table 9-4 Potential Contaminants from Transportation Projects that May Impact Water Resources

Construction Phase	
Source	Pollutants
Adhesives	Phenols, formaldehydes, asbestos, benzene, naphthalene
Cleaners	Metals, acidity, alkalinity, chromium
Plumbing	Lead, copper, zinc, tin
Painting	VOCs, metals, phenolics, mineral spirits
Wood	Biological Oxygen Demand (BOD), formaldehyde, copper, creosote
Masonry/concrete	Acidity, sediment, metals, asbestos
Demolition	Asbestos, aluminum, zinc, dusts, lead
Yard operations and maintenance	Oils, grease, coolants, benzene and derivatives, vinyl chloride, metals, BOD, sediment, disinfectants, sodium arsenate, dinitro compounds, rodenticides, insecticides
Landscaping and earthmoving	Pesticides, herbicides, fertilizers, BOD, alkalinity, metals, sulfur, aluminum sulfate
Materials storage	Spills, leaks, dust, sediment
Operation Phase	
Source	Pollutants
Leaks, spills, accidents	Oil, gasoline, diesel, grease, VOCs, chemicals, other potentially hazardous materials
Vehicle traffic	Oils, grease, gasoline, diesel, benzene and derivatives, aromatic hydrocarbons, coolants, rust (iron), heavy metals (lead, zinc, iron, chromium, cadmium, nickel, copper), rubber, asbestos
Winter sanding	Sediment
Deicing	Calcium, sodium, magnesium, chloride
Landscape maintenance	Herbicides, pesticides, fertilizers, BOD, alkalinity, metals, sulfur, aluminum sulfate
Adhesives	Phenols, formaldehydes, asbestos, benzene, naphthalene
Cleaners	Metals, acidity, alkalinity, chromium
Painting	VOCs, metals, phenolics, mineral spirits

Reasons for Evaluation of Water Quality under NEPA

CDOT conducts water resource assessments to:

- Comply with CDOT's Environmental Stewardship Policy, which ensures that the statewide transportation system is constructed and maintained in an environmentally responsible, sustainable, and compliant manner
- Comply with Federal Acts and Executive Orders, State Laws, and FHWA technical guidance

The regulations and certifications applicable to water resource evaluations are summarized below.

Clean Water Act (401, 402)

The Clean Water Act (CWA) established the basic structure for regulating discharges of pollutants into navigable waters. It provides the statutory basis for the National Pollutant Discharge Elimination System (NPDES) permit program and the basic structure for regulating the discharge of pollutants into waters of the US.

Safe Drinking Water Act (40 CFR Parts 141–143)

The Safe Drinking Water Act (SDWA) protects public health by regulating the nation's public drinking water supply and protecting drinking water and its sources. CDOT is a stakeholder in the Colorado Source Water Assessment and Protection (SWAP) program mandated by the SDWA.

Erosion and Sediment Control on Highway Construction Projects (25 CFR 650 Subpart B)

All highways funded in whole or in part by FHWA must be designed, constructed, and operated according to standards that will minimize erosion and sediment damage to the highway and adjacent properties and abate pollution of surface and groundwater resources.

Colorado Water Quality Control Act (Colorado Revised Statutes [CRS] Title 25, Article 8)

The Colorado Water Quality Control Act protects and maximizes the beneficial uses of state waters and regulates water quality.

EPA has delegated authority for enforcement of the CWA and SDWA to the CDPHE. Under this authority, the Colorado Water Quality Control Act was passed and the WQCC was created to provide regulations to be implemented by CDPHE to keep Colorado in compliance with the CWA.

A complete list of Colorado's water quality regulations are contained on the CDPHE WQCC's website at http://www.cdphe.state.co.us/op/wqcc/index.html.

The webpage contains links to common sources of information used in CDOT NEPA documents such as Surface Water Classifications and Standards, Groundwater Classifications and Standards, Point Source Discharge Regulations, Watershed Protection Regulations, Drinking Water Regulations, and Implementation of the Clean Water Act Section 303(d) Requirements.

Based on requirements promulgated under Section 402 of the CWA, the WQCC has implemented Regulation 61 identifying CDOT as a regulated Municipal Separate Storm Sewer System (MS4). By definition a separate storm sewer system includes not only a storm drainage system but also ditches, gutters, or other similar means of collecting and conveying stormwater runoff that do not connect with a wastewater collection system or wastewater treatment facility.

COLORADO DISCHARGE PERMIT SYSTEM (CDPS)

Section 402 of the CWA outlines the regulations for complying with the NPDES (implemented by Colorado as the Colorado Discharge Permit System or CDPS). Under NPDES, states were required to "phase in" EPA regulations that were aimed at reducing point source pollution to Waters of the State. These regulations encouraged states to develop a variety of programs to reduce point source and stormwater runoff pollution from construction projects during both the construction and operation phases of those projects. In 1990, EPA issued the Phase I MS4 Permit. Under the Phase I regulations, a MS4 that served greater than 100,000 people was required to obtain a permit. CDOT was included in Phase I as a MS4 permittee. The area covered by the Permit included the roadways owned and operated by CDOT located within the cities that served greater than 100,000 people (i.e., Denver, Lakewood, Aurora, and Colorado Springs).

The CDOT *New Development and Redevelopment Program* provides direction, criteria, and procedures to ensure that permanent BMPs are incorporated, as appropriate, into CDOT projects. Projects that will fall within CDOT jurisdiction, but are initially constructed by others, such as local governmental entities, also must comply with BMP requirements. It should be noted that some construction projects may occur in areas where multiple MS4 permits apply. If this is the case, the MS4 with the most stringent requirements apply.

In 1999, MS4s serving urbanized areas were required to obtain Phase II MS4 Permits that required them to develop a program to reduce point source pollution to Waters of the State. CDOT's MS4 Permit area of coverage was expanded to include Phase II permits. Phase II also reduced the minimum size of construction projects requiring a CDPS permit from five acres of disturbed area to one acre or more of disturbed area.

Construction projects that disturb one acre or greater or are part of a larger common plan of development require a CDPS Construction Stormwater Permit from the Water Quality Control Division (WQCD) and a Stormwater Management Plan (SWMP). The SWMP is prepared in the final design

The CDOT MS4 Permit *New Development and Redevelopment Program*, current Phase I/II CDPS permit, SWMP preparation guidance, *Erosion Control and Storm Water Quality Guide*, *Drainage Design Manual*, and a map illustrating the locations of the Phase II areas in Colorado are available on the CDOT Water Quality website at http://www.coloradodot.info/programs/environmental/water-quality

phase of the project prior to the submission of CDPS construction permit application submitted to the WQCD at least 30 days prior to construction.

Sites that must discharge groundwater from a construction site to a surface water body also require a CDPS Dewatering Permit. If a project feature will require permanent dewatering, the Project Engineer and RPEM should coordinate the necessary permits through CDPHE's WQCD.

9.4.2 NEPA Document Sections

Water quality modeling and documentation in the Affected Environment and Environmental Consequences chapter of EAs and EISs is discussed below. The requirement for permanent BMPs must be considered in Phase I/II MS4 areas for Categorical Exclusions (CatEx) that disturb greater than one acre or are part of a larger common plan of development. SWMPs must be prepared for every CatEx, regardless of the size of the disturbance area. CatExs that are expected to disturb one acre or more or are part of a larger common plan of development must have a SWMP and apply for a CDPS Construction Permit with the WQCD at least 30 days prior to construction.

AFFECTED ENVIRONMENT

Documentation needs for the Affected Environment chapter of EAs and EISs are discussed in this section. The level of detail will vary with the importance of the watershed that the project affects and the potential impact. At a minimum, the Affected Environment chapter should contain a discussion of the following elements:

Introduction and Table of Common Highway Runoff Pollutants – The introduction should briefly describe why water quality is analyzed in NEPA documents. Areas to focus on include WQCC regulations and CDPS. A table of common highway pollutants should be included similar to Table 9-4.

General Watershed Information – This includes the name of receiving waters and the larger tributaries. Lakes, reservoirs, and special basins under WQCC Regulations 71-75 in the project area should also be identified. Flow regimes should be discussed for all surface waters. If available, a reference to the sub-basin map should be made if that work is completed as part of the hydraulic or floodplain report. The presence of a Wild and Scenic River also needs to be mentioned. Percent impervious surface, percent agricultural land, topographic relief and any other land accounting for 20 percent or more of the total watershed area should be noted. Topographic relief and all areas of impervious surface and agricultural land uses should be noted regardless of size. All land uses that affect water quality at the project location should be noted.

Scoping Summary – Federal, state, and local agencies provide very useful information regarding drinking water sources, wastewater treatment facility locations, water quality monitoring data, MS4 permit requirements, and fish and wildlife habitat during the scoping phase. This information should be summarized in this section.

Soils – Soil types should be mentioned if there is a history of erosion or deposition problems in the project area. To encourage infiltration of stormwater, certain highly permeable soil types should be flagged for infiltration BMPs.

Historic and Current Development – Mining, industrial sites, agriculture, water diversions, and stream channelization are important topics to cover in this part. If most of this information is contained in the Land Use section of the NEPA document, a simple reference can be made.

WQCC Regulations – The author should list all the WQCC regulations that apply to the watershed in the study area. This includes Surface Water Classifications and Standards, Groundwater Classifications and Standards, Point Source Discharge Regulations (CDPS), Watershed Protection Regulations, Drinking Water Regulations, and Implementation of the CWA Section 303(d) Requirements (impaired waters list and monitoring list).

CDOT New Development and Redevelopment Program Requirements – Waters that meet the definition of sensitive waters in CDOT's Phase I/II MS4 Permit must be identified. These are defined as:

- Water quality segments listed on the CDPHE's most recent 303(d) list (WQCC Regulation #93) or for which a total maximum daily load (TMDL) has been developed that limits the amount of the specified pollutant that is likely to be present in discharges from CDOT activity
- Water quality segments listed on the CDPHE's most recent Monitoring and Evaluation List (WQCC Regulation #93) for a pollutant that is likely to be present in discharges from CDOT activity
- Water quality segments designated as outstanding waters, including wetlands
- Water quality segments classified as Aquatic Life Class 1
- Water quality segments designated for Water Supply use where the potential exists for the CDOT discharge to impact this use
- Water quality segments designated by federal or state agencies as a Threatened or Endangered (T&E) Species Habitat

It should also be noted if the project falls into one of the Phase I/II and expanded permitted areas listed in CDOT's MS4 Permit. A brief discussion regarding the construction and post construction requirements of CDOT's New Development and Redevelopment Program should be provided. A conclusion on whether or not to investigate permanent BMPs as part of the project should be made. When the project is joint lead (i.e., with Regional Transportation District [RTD]), or a local agency project, the author should briefly disclose the requirements of their MS4 Permits and make a determination of which permit has the most stringent requirements.

Drinking Water Sources, Wellhead Protection Areas – General locations of these resources should be identified if they occur in the study area or could be affected by the project action. The best source of information on these resources is from local governments or water supply agencies. They are also covered in WQCC Regulations 41 and 42.

Fish and (T&E) Species Habitat – The presence of Gold Medal Trout Streams and Wild Trout Waters should be discussed. Also, the presence of T&E habitat within any stream or riparian corridor needs to be disclosed.

Groundwater – Depth below ground, private wells used for drinking water, and protected groundwater areas listed in WQCC Regulation 42 should be discussed for this topic. The CDOT project team should decide on the radius to use for those wells that should be considered. Typically wells within the project study area should be considered.

Graphics – The Affected Environment chapter should include a map of all surface water and important groundwater features in the project vicinity. This map should be of sufficient scale to include important segments of surface waters upstream and downstream of the project. Labels for Use Classification, Impairment, monitoring and evaluation (WQCC Regulation 93), Gold Medal Trout Streams, Wild Trout Waters, and T&E habitat should be included with each segment. The map should also illustrate the boundaries of Phase I/II and expanded MS4 Permit areas. Features such as drinking water supplies, wastewater treatment facilities, and wellhead protection areas can be added with the consent of the agency with jurisdiction.

ENVIRONMENTAL CONSEQUENCES

This section discusses documentation needs for the Environmental Consequences section of EAs and EISs. The level of detail will vary with the importance of the watershed that the project affects. At a minimum, the Environmental Consequences section should compare the effects of each alternative carried forward for detailed analysis in the following 11 categories:

Impervious Surface – Impervious surface is calculated for each alternative, including the No Action Alternative. Percentages or acres should be compared in a graph or table. Other dominant land uses should be analyzed along with impervious surface. If possible, include a measure of the connectedness of the impervious surface areas and their configuration and proximity within the watershed landscape. Long narrow areas oriented perpendicular to surface flow will have a different effect than an area of the same configuration oriented parallel to surface flow. Discuss the potential for downstream and upstream increases in backwater elevations from increased impervious surface areas (volume) and increased velocities of discharge (rate), including increased potential for and effects of flash floods.

Stream Modifications – Stream channelization, relocation, and bank stabilization for each alternative is discussed. The author should disclose any major differences in stream segment impacts (linear feet). Changes in flow regimes (temporary or permanent) as a result of the project need to be discussed. Discuss the potential for increased erosion of streambeds and drainage areas causing increased sediment loads, both of these effects from higher discharge velocities in drainage channels and streams that are caused in-turn by larger impervious surface areas to be drained.

Stream Crossings – The number of stream crossings for each alternative is analyzed. Special attention should be given to new crossings.

Fish and T&E – Effects to Gold Medal Trout Streams, Wild Trout Waters, and T&E species are disclosed. References to the Fish and T&E sections of the NEPA document should be made.

Drinking Water Supplies and Wastewater Treatment Facilities – Pollutant loading from roadway runoff that has the potential to affect downstream drinking water supplies and wastewater treatment facilities needs to be addressed for each alternative. Address the potential for impairment of any designated uses of receiving streams, especially “aquatic life class 1” uses, which will most always be adversely affected by very low levels of heavy metals and polyaromatic hydrocarbons (PAHs) in highway runoff.

Use Classifications, Impairment/Monitoring Status – Possible changes in stream segment Use Classifications, TMDL, and monitoring status due to highway runoff need to be discussed.

Water Quality Modeling – In certain instances, water quality modeling will be used to evaluate relative differences in pollutant loading among alternatives. The need to use a model is determined on a project-by-project basis. The decision to model is made by the RPEM in consultation with EPA, FHWA, and EPB. Written concurrence from EPA and FHWA on whether or not to model is suggested.

Monitoring Needs – It is rare to conduct water quality monitoring for CDOT projects during the NEPA phase. In instances where the RPEM determines that it is necessary, this information should be included in the Environmental Consequences section. Conclusions from the monitoring data should be documented regarding expected effects from each alternative on the receiving water. Monitoring data may also be necessary when determining the need to use a water quality model.

Construction – The area of disturbance should be discussed for each alternative when there are noticeable differences between alternatives.

Maintenance – The effects of maintenance practices for the study area should be covered. Any major differences between the alternatives should be discussed.

Conclusion of Effects – The conclusion should restate the biggest water quality concerns associated with each alternative and identify the alternative with the least expected impact on water quality.

Once effects are assessed in the Environmental Consequences section, mitigation measures need to be evaluated. BMPs eliminate or reduce the identified impacts during construction, as well as during operations and maintenance. When BMPs are installed and maintained correctly, they are very effective at mitigating water quality effects resulting from highway runoff. BMPs expected to be part of a proposed action or alternative as a mandate or requirement, can be set forth as part of the proposed description of the proposed action or alternative.

In an attempt to streamline the NEPA process and to assure EPA that potential water quality impacts were given due consideration during planning of highway construction projects, FHWA, EPA and CDOT established a committee to develop a template for water quality sections of NEPA documents. The template is presented in Attachment A.

The Water Quality Model Program Decision Tree (Attachment A), also developed by FHWA, EPA, and CDOT, is a standardized method of assessing whether or not a given project is broad enough in scope that it would require modeling to determine the potential for adverse impacts to water quality and what remediation may be required. If your project does not fit into a category on the Decision Tree, talk to your Region and/or EPB Water Quality staff and project stakeholders (for example, FHWA) to determine the appropriate path.

The Decision Tree has yet to be tested in real world situations and thus is still in the development stage and will not be finalized until a 2-year trial period has been completed.

Permanent BMPs

The New Development and Redevelopment Program Manual outlines a process for determining the need for and type of permanent BMPs. Refer to the Manual for details in determining the need for and type of permanent BMPs. The process should be followed in close coordination with CDOT's regional hydraulic engineer, CDOT Maintenance, the RPEM, and CDOT's Landscape Architect. General locations and possible types of permanent BMPs are described in the mitigation section of the EA and EIS. Special attention should be given to site access for regular maintenance needs. Detailed design for BMPs is not necessary for a FONSI or ROD. For CatExs, exact locations and design details are usually provided in Final Office Review (FOR) plans and prior to RPEM signature of CDOT's Form 128.

Construction BMPs

Construction BMPs and a SWMP to address erosion and sedimentation on construction sites are needed for every project in CDOT right-of-way (including access permits). There is no requirement to list all the construction BMPs for a project in an EA, EIS, or CatEx. These BMPs, along with project specifications, are included as part of the FOR plan set in final design. If the project disturbs one acre or more or is part of a larger common plan of development, the project will also require a CDPS construction permit from the WQCD. The permit should be applied for at least 30 days prior to construction. The mitigation section of EAs and EISs should simply state that temporary BMPs will be included in the final design phase of the project.

Maintenance

Mitigation for maintenance activities should also be evaluated and discussed in the EA or EIS. Interviews with CDOT maintenance personnel that are responsible for the project area are very useful in determining sweeping, trash collecting, plow training, technology advances in deicing applications, and product storage practices.

Mitigation

Impacts and mitigation should be listed in a Summary of Impacts and Mitigation Table at the end of the resource evaluation chapter of the NEPA document. The first six columns of CDOT's Mitigation Tracking Spreadsheet should be used as this summary table (Table 9-2). CDOT's Mitigation Tracking Spreadsheet (Table 9-1) can be retrieved from http://www.coloradodot.info/programs/environmental/resources/forms/CDOT%20Mitigation%20Tracking%20Spreadsheet_June%202012.xlsx/view.

Design criteria relating to permanent BMPs are also addressed in the following documents:

CDOT *Drainage Design Manual* http://www.coloradodot.info/programs/environmental/water-quality/documents/drainage-design-manual

Urban Storm Drainage Criteria Manual, Volume 1 & 2 & 3. http://www.udfcd.org/downloads/down_critmanual_home.htm

9.5 Floodplains

A floodplain is the lowland adjacent to water bodies such as a river, creek, stream, or lake. Floodplains are designated by the size and frequency of floods large enough to cover them. Flood frequency is often described by the potential occurrence in a given year (percentage probability of flooding each year). For example, the 100-year flood has a one percent chance of occurring in any given year. Following are a few important definitions related to floodplains (Modified from: *Metropolitan Sewer District, Louisville, KY* and Federal Emergency Management Agency (FEMA) General Provision Definitions (44 CFR 59.1).

Regulatory or Base Flood – The flood having a one percent chance of being equaled or exceeded in any given year. The 100-year flood has become the accepted national standard for regulatory purposes. For regulatory purposes, the floodplain is divided into two areas based on water velocity: the floodway and the flood fringe.

Floodway or Regulatory Floodway – The floodway is the area of the floodplain that should be reserved (kept free of obstructions) to allow floodwaters to move downstream.

Flood Fringe – The flood fringe is the portion of the floodplain outside of the floodway, which usually contains slow-moving or standing water. Because development in the fringe will not normally interfere as much with the flow of water, floodplain regulations typically allow development in this area but require that structures are protected.

Encroachment – An activity within the floodplain or floodway including fill placement, new construction, substantial improvements.

Floodplains possess significant natural values and serve numerous important functions. These include water resources (natural moderation of floods, maintenance of water quality, and groundwater recharge), living resource services (fish, wildlife, and plant resources), cultural resource services (open space, natural beauty, scientific study, outdoor recreation), and cultivated resource services (agriculture, aquaculture, and forestry).

The two sections below provide guidance on the treatment of floodplains for CDOT's NEPA projects. The first section discusses the process for evaluating floodplains. The second section discusses floodplain information that should be in each NEPA document.

9.5.1 Floodplain Evaluation Process

CDOT evaluates the potential footprint of the alternative for all transportation projects to ensure that they would not encroach upon or alter floodplains and cause future flooding or other adverse impacts.

The floodplain evaluation should be completed when alternatives for the proposed action are first being designed and developed. Baseline information about floodplains should be obtained and addressed prior to initiating the NEPA process.

REASONS FOR EVALUATION OF FLOODPLAINS UNDER NEPA

CDOT conducts floodplain assessments to:

- Ensure that floodplains are identified and their services and functions are protected to the maximum extent possible
- Comply with CDOT's Environmental Stewardship Policy, which ensures that the statewide transportation system is constructed and maintained in an environmentally responsible, sustainable, and compliant manner
- Comply with federal acts and executive orders
- The regulations, advisories, and orders listed in the sidebar are directed toward the treatment of floodplains under NEPA. The intent of these regulations is to avoid or minimize highway encroachments within 100-year (base) floodplains, where practicable, and to avoid supporting land use development that is incompatible with floodplain services. Under the requirements of Executive Order 11988 *Floodplain Management* (Executive Order 11988, 1977), all federal-aid projects must make diligent efforts to:
    - Avoid support of incompatible floodplain development
    - Minimize the impact of highway actions that adversely affect the base floodplain
    - Restore and preserve the natural and beneficial floodplain services
    - Be consistent with the standards/criteria of the National Flood Insurance Program (NFIP) of FEMA

In addition to federal and state laws and regulations, local jurisdictions may have ordinances and regulations that must be followed. The CDOT Project Engineer must coordinate with counties, cities, and other jurisdictions in the study area to ensure any proposed encroachment or alteration of a floodplain meets their requirements.

Significant Impacts

If a preferred alternative includes a significant impact of floodplain encroachment refer to Executive Order 11988 *Floodplain Management* (Executive Order 11988, 1977).

Collection and Evaluation of Baseline Information

Early collection of baseline floodplain information ensures that alternatives that may encroach on or alter floodplains are identified early. The alternatives can then be designed to avoid such areas or minimize impacts to them. The CDOT Hydraulic Engineer will prepare a Hydraulic Study (FHWA, 23 CFR 650A), which will include the following information commensurate with the significance of the flood risk or environmental impact:

- Practicality of alternatives to any longitudinal encroachments
- Risks associated with implementation of the action
- Impacts of incompatible floodplain development
- Measures to minimize floodplain impacts
- Measures to restore and preserve the natural and beneficial floodplain services impacted

The magnitude of the study will vary depending on the level of significance of the base floodplain encroachments, which are described briefly below.

- Significant Encroachment – May result in a high probability of loss of human life, will likely cause future damage that could be substantial in cost or extent (including interruption of service or loss of vital transportation facilities), or will cause a notable adverse impact on natural and beneficial floodplain services.
- Minimal Encroachment – There is floodplain involvement but the impacts on human life, transportation facilities, and natural and beneficial floodplain services are not significant and can be resolved with minimal efforts.
- No Encroachment – There are floodplains in the vicinity of the proposed alternatives, but there is no floodplain encroachment.
- No Involvement – There are no floodplains in the vicinity of the proposed alternatives.

Bridge piers are considered as a floodway encroachment

If a proposed project will involve a regulatory floodway, the CDOT Hydraulic Engineer or designee must work with local agencies and FEMA to ensure the project is developed consistent with local floodway plans and floodplain management programs. This coordination effort must be documented in the CatEx, EA, or EIS. An additional requirement for projects is coordination with the appropriate US Army Corps of Engineers (USACE) district regulatory office. For example, when a project might encroach on a regulatory floodplain, the CDOT RPEM or resource specialist must contact the local

floodplain authority early in the planning process to enable USACE's floodplain management concerns to be addressed and incorporated into the initial project design (prior to platting).

A transportation project may affect floodplains by encroaching upon or altering the floodplain. CDOT's policy on floodplains is to prevent unnecessary use and development of floodplains or use that may result in hazards.

CDOT's specific procedures for evaluating impacts to floodplains are discussed in Section 2.09 of the CDOT Project Development Manual (CDOT, 2001b).

Design solutions should minimize impacts to the floodplain and be developed cooperatively with USACE, FEMA, and the affected communities. Once the alignment of the project alternatives is available, the CDOT project engineer must determine if one or more of the project alternatives could impact a regulatory (100-year) floodplain or increase flood risks in a NFIP community. Circumstances that would require coordination with the affected NFIP community and FEMA include the following (FHWA, 1982):

- A proposed crossing encroaches on a regulatory floodway and would require an amendment to the floodway map
- A proposed crossing encroaches on a floodplain where a detailed study has been performed but no floodway is designated and the maximum 1-foot increase in the base flood elevation would be exceeded
- A local community is expected to enter into the regular (non-emergency) flood insurance program within a reasonable period and detailed floodplain studies are underway
- A local community is participating in the emergency flood insurance program and base flood elevation in the vicinity of insurable buildings is increased by more than one foot

If insurable buildings are not affected, it is sufficient to notify FEMA of changes to base flood elevations as a result of highway construction. Once the impact analysis is complete, evaluate the potential mitigation measures available to eliminate or reduce the impacts.

For information regarding the USACE's role in floodplain management, please refer to the USACE Water Resources Management website at http://www.iwr.usace.army.mil/

Other Issues to Consider

Along the Colorado Front Range, USACE has also determined that an unacceptable cumulative degradation of floodplain functions and services is occurring and it is working to reduce this problem. Therefore, it is unlikely

that USACE will approve a Section 404 permit that fills part of an existing 100-year floodplain to increase developable land along the Colorado Front Range.

9.5.2 NEPA Document Sections

The content of the sections on floodplains in the Affected Environment and Environmental Consequences chapter is discussed below.

AFFECTED ENVIRONMENT

The floodplain description and map should have sufficient detail to allow determination of whether the project alternatives may, or will encroach upon or impact these floodplains. If a preliminary evaluation of potential impact shows that no project impact on floodplains could possibly occur, no further information on floodplains is required in the Affected Environment chapter.

If the project may or will encroach on or alter a floodplain, more detailed information must be provided in the NEPA document's Affected Environment chapter, as follows:

- Discuss the uses of the floodplain, such as flood control and groundwater recharge; cross-reference uses by other resources to their respective sections.
- Provide a map showing the floodplain within the project area, including all locations where the project may cross these floodplains. All 100-year (base) floodplains should be identified, if present.
- Illustrate the base (100-year) floodplain by using Federal Insurance Administration (FIA) maps and studies, including Flood Insurance Rate Maps (FIRM) and flood hazard boundary maps, if available. Other sources include the USGS, USACE, the NRCS, the Bureau of Land Management (BLM), and the US Forest Service (USFS) if previously mentioned maps are not available.
- Summarize information from the project hydraulic engineer on hydraulic studies conducted for the alternatives and hydrologic factors that affect the floodplains in the area crossed by the proposed project.

If no impacts were identified in relationship to the CDOT project, state this in the NEPA document and conduct no further analysis.

Affected Environment Chapter of NEPA Document

- Summary of natural services, uses, and functions of floodplain
- Map showing floodplains within project area and alignment of project alternatives, specifically identifying boundaries of 100-year floodplain
- Summary of information from hydraulic or hydrologic studies conducted by CDOT or others

ENVIRONMENTAL CONSEQUENCES

Summarize the results of CDOT's project location hydraulic study briefly in the NEPA document. Discuss alternatives that have the same floodplain impacts together and contrast those that differ so that similarities and differences in alternative floodplain impacts are clear. The Environmental Consequences section of the NEPA document for floodplains should identify the number and location of encroachments, as well as any incompatible floodplain developments and their potential impacts. Both direct (construction and operational) and indirect impacts must be assessed.

If any proposed alternative supports incompatible floodplain development or results in a floodplain encroachment that significantly affects the human environment (EIS only), has impacts for which the significance is not clearly established (EA), or requires a commitment to a minimum structure size or type, the EA or EIS should include an evaluation and discussion of practicable alternatives to the significant encroachment or proposed structure. If an alternative encroaches upon a floodway, the following questions must be addressed in the NEPA document:

- Can the encroachment be located so that it is consistent with the floodway/floodplain?
- Can the floodway/floodplain be revised to accommodate the proposed project?
- Can the floodway/floodplain be avoided?

For each alternative encroaching on a designated or proposed regulatory floodway, the draft NEPA document should provide a preliminary indication of whether or not the encroachment would be consistent with or require a revision to the regulatory floodway. If any alternative results in a floodplain encroachment or supports incompatible floodplain development having significant impacts, or requires a commitment to a particular structure size or type, include an evaluation and discussion of practicable alternatives to the structure or encroachment in the NEPA document.

If the preferred alternative includes a floodplain encroachment having significant impacts, the final NEPA document must include a finding that this alternative is the only practicable alternative and refer to Executive Order 11988 *Floodplain Management* (Executive Order 11988, 1977), and National Flood Insurance Act (23 CFR 650, Subpart A). This finding should be included in a separate subsection entitled "Only Practicable Alternative Finding."

Environmental Consequences Section of NEPA Document

- Summarize results of Hydraulic Study
- If there is no impact, state this and conduct no further analysis
- Identify number, location, and impacts of encroachments and incompatible floodplain developments
- Provide more detailed information on location and impacts for encroachments or incompatible development having significant impacts
- Include exhibits showing alternatives, base floodplains, and where applicable, regulatory floodways

The discussion in this section must include the following information:

- Reasons why the proposed action must be located in the floodplain
- Alternatives considered and why they were not practicable
- Statement indicating that the action conforms to applicable state or local floodplain protection standards

Impacts and mitigation should be listed in a Summary of Impacts and Mitigation Table at the end of the resource evaluation chapter of the NEPA document. The first six columns of CDOT's Mitigation Tracking Spreadsheet should be used as this summary table (Table 9-2). CDOT's Mitigation Tracking Spreadsheet (Table 9-1) can be retrieved from http://www.coloradodot.info/programs/environmental/resources/forms/CDOT%20Mitigation%20Tracking%20Spreadsheet_June%202012.xlsx/view.

Impact Mitigation Section of NEPA Document

- If an alternative encroaches on a regulatory floodway/floodplain, indicate if it would require revision to the regulatory floodway (impacts to floodplains may require a CLOMR)
- For alternatives with significant impacts, provide a discussion of practicable alternatives Discuss common mitigation measures for impacts
- Include a section in final EIS discussing the "only practicable alternative" if the preferred alternative includes an encroachment having significant impacts

9.6 Wetlands

Based on the definition used by USACE in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987), the term "wetlands" is defined as: "those 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. Wetlands generally include swamps, marshes, bogs, and similar areas."

Wetlands are important because, among other roles, they support aquatic organisms, act as water reservoirs, and trap the particulates and chemicals that might be present in surface sheet flows before they can directly enter streams and rivers. They also serve as a source of water for terrestrial organisms, enhance ecosystem diversity, and provide an ecotone between aquatic and terrestrial environments.

The two sections below provide guidance on the treatment of wetlands for CDOT's NEPA projects. The first section discusses the process for evaluating wetlands. The second section discusses wetland information that should be in each NEPA document.

Wetlands are:

- Important to aquatic and terrestrial organisms
- Key components of hydrologic systems as reservoirs and for filtration
- Wetland attributes
- Highly regulated
- Type
- Acreage
- Plant/animal inhabitants and uses
- Potential uses by humans
- Jurisdictional status
- Water quality
- Functions

9.6.1 Wetland Evaluation Process

The EPB or regional wetland specialist, depending on availability, is responsible for wetland evaluation. The EPB wetland specialist is responsible for USACE consultation and FHWA coordination, development of CDOT process and policy relative to wetlands, wetland evaluation within certain CatEx projects, reviewing NEPA documents, and supporting the regional wetland specialists, as needed. The regional wetland specialists are responsible for wetland evaluation on most project development activities. The regional wetland specialist coordinates with the EPB wetland specialist for policy and process decisions, for document review, and for permitting and coordination with other agencies.

Wetlands within the watershed(s) that are affected by a project are studied on a case by case basis. Those that may be impacted directly (e.g., crossed by a road alignment, or spanned by a bridge with footings in the wetland) or indirectly (e.g., down drainage from project activities and the potential recipient of silt or chemicals transported by surface water flow) by any of the project alternatives should be delineated and their jurisdictional status determined in coordination with USACE. This means collection of information on the hydrology, soils, and vegetation of a wetland to define its boundaries.

Wetlands should be identified as early in project development as possible so alternatives can be designed to avoid and minimize impacts. Wetland delineation should be done during the growing season; winter and drought conditions should be avoided. Once a wetland is delineated, the jurisdictional status of each wetland and its boundaries must be approved by USACE, often as part of a field visit to the site with the wetland specialist. If the project impacts require an individual permit, USACE should be involved under the NEPA/404 merger process and agreement for transportation projects in Colorado (FHWA, USACE, CDOT, 2008) in all EISs and certain EAs. Therefore, wetlands should also be delineated as early in the process as possible so that involvement of USACE will be timely.

Reasons for Evaluation of Wetlands Under NEPA

CDOT evaluates wetlands for several reasons:

- Wetlands provide important habitat components for many aquatic, avian, and wildlife species, including state and federally listed T&E species
- To comply with CDOT's environmental stewardship policy, which ensures that the statewide transportation system is constructed and maintained in an environmentally responsible, sustainable, and compliant manner
- Federal agencies have a responsibility under Executive Order 11990
- To enable compliance with several legal mandates that pertain to the protection of wetlands and water quality under the CWA
- To satisfy the CDOT NEPA/404 Merger process

Because of their importance, wetlands are protected under the CWA, which requires that the jurisdictional status of wetlands be determined and a Section 404 permit be obtained if jurisdictional wetlands are to be impacted by a discharge. Section 401 and 402 certifications may also be required if wetlands would potentially receive specified discharges. USACE is responsible for determining whether a wetland is jurisdictional or non-jurisdictional and for issuing the appropriate Section 404 permit.

As part of their CWA responsibilities and before issuing a permit, USACE must ensure compliance with the CWA. The CWA guidance requires, among other things, that the NEPA preferred alternative be the Least Environmentally Damaging Practicable Alternative (LEDPA). The purpose of Executive Order 11990 *Protection of Wetlands* (Executive Order 11990, 1977), is to "minimize the destruction, loss or degradation of wetlands and to

Wetland Legislation

- Clean Water Act
- Department of Transportation Order 5660.1A
- Colorado Senate Bill 40
- Executive Order 11990, Protection of Wetlands
- 23 CFR 771
- 23 CFR 777
- Technical Advisory T6640.8A

preserve and enhance the natural and beneficial services of wetlands." It requires federal agencies, in planning their actions, to consider alternatives to wetland sites and limit potential damage if an activity affecting a wetland cannot be avoided. Project alternatives that avoid wetland impacts are to be selected for further consideration to the exclusion of project alternatives that do not avoid wetland impacts based on Executive Order 11990. FHWA has similar requirements (FHWA, 23 CFR 777).

Because of the need to fulfill requirements of both NEPA and CWA when wetland impacts are expected, the NEPA/404 Merger process was developed. This merger process serves to facilitate early and ongoing integration and coordination of CWA and NEPA requirements.

Collection and Evaluation of Baseline Information

The study area considered for wetland resources should include where ground disturbance actually occurs. Wetlands and drainages located downstream or in the vicinity of the project should also be included in the study area. In some cases upstream reaches of drainages should be considered if they might be affected by downstream uses (i.e., damming). This wetland study area should be presented on a figure in the NEPA document. The location of the project within the watershed (upper or lower) should be noted.

To be responsive to wetland-specific regulations, all wetlands within the project area should be identified, characterized (e.g., according to wetland type based, acreage, plant/animal inhabitants and uses of special interest, and functions and services [Cowardin, 1979]), and mapped. In addition, wetland jurisdictional status should be determined in consultation with the USACE. Sources of wetland information and mapping include:

- National Wetlands Inventory (planning level)
- Colorado Natural Heritage Program (CNHP)
- USGS National Wetlands Research Center
- Topographic maps
- Aerial photographs of the project area
- Conversations with local agency personnel and adjacent land owners familiar with the wetland project area

The jurisdictional boundary of wetlands in the project area must be determined by field survey if not previously completed. The survey should be conducted in accordance with the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987). Supplements to the *Corps of*

USACE Coordination

- Early and frequent communication and coordination to ensure mutual informational needs are met
- Delineation of wetlands at a seasonally appropriate time
- USACE determination of jurisdiction
- Incorporation of sufficient data to ensure LEDPA is among alternatives considered in detail

Engineers Wetlands Delineation Manual are being developed and must be used in the appropriate Region concurrently with the 1987 manual. Based on these protocols, the extent and location of each wetland within the project area must be mapped and described. The presence or absence of wetland-affiliated T&E species or critical habitat will be a component of consultation with US Department of Interior (DOI) Fish and Wildlife Service (USFWS) under the Endangered Species Act (ESA) (Section 9.9).

Because wetland delineations should be performed when the ground is clear of snow and wetland vegetation is well developed, it is best that the delineation be done in the late spring and early to mid-summer. Once the field work is complete, a report and map of the wetlands must be submitted to USACE for their approval. In addition, a USACE representative typically reviews the delineation report in the field to determine the jurisdictional status for each wetland.

The final determination of whether an area is a wetland and whether the proposed activity requires a permit must be made by the appropriate USACE District Office. Because this may be a lengthy process and because unavoidable project impacts on wetlands must be mitigated, it is important to complete the wetlands delineation as early in the project process as possible. Avoidance of impacts to all wetlands is always an important factor in identifying and selecting project alternatives, as well as in identifying potential impacts from alternatives that are carried through the NEPA process.

Once USACE has approved the delineation report, including any required modifications, the wetland impacts of the project may be assessed. Direct impacts are typically quantified on the basis of acreage and functions disturbed. Precise acreages must be determined for any wetlands that would be impacted by a discharge because complete avoidance is not possible. These data are best determined by overlaying project alternatives with the wetland locations and displayed in tabular form.

In addition, the potential for indirect impacts to wetlands from surface runoff, eroded soil, or chemicals must be identified and discussed. This includes the types, extent, and timing of earth disturbances that could result in surface runoff and erosion and any chemicals that will be present in the project area during construction and operation. This can be determined by overlaying the project alternatives, wetland locations, and topography and drainage patterns.

Functional Assessment of Colorado Wetlands (FACWet) website at http://rydberg.biology.colostate.edu/FACWet/index_files/Page387.htm

National Wetlands Inventory website at http://www.fws.gov/wetlands/index.html

Colorado Natural Heritage Program website at http://www.cnhp.colostate.edu/

USGS National Wetlands Research Center website at http://www.nwrc.usgs.gov/

In conducting the analysis of wetland impacts, the following FHWA guidance should be incorporated (FHWA, 1987):

- In evaluating the impact of the proposed project on wetlands, address the importance of the impacted wetland(s) and its severity. Merely listing the number of acres taken by the various alternatives of a highway proposal does not provide sufficient information upon which to determine the degree of impact on the wetland ecosystem.
- In evaluating the importance of the wetlands, consider the primary functions of the wetlands (e.g., flood control, wildlife habitat, groundwater recharge, etc.), the relative importance of these functions to the total wetland resource of the area, and uniqueness that may contribute to the wetlands' importance.
- In determining the wetland impact, show the project's effects on the stability and quality of the wetland(s) by considering the short- and long-term effects on the wetlands and the importance of any loss such as: flood control capacity, shore line anchorage potential, water pollution abatement capacity, and fish and wildlife habitat service.
- Use the FACWet method to conduct the functional analysis.

Wetland functions should be determined by applying the Functional Assessment of Colorado Wetlands (FACWet) method, a CDOT- and USACE-approved wetland functional assessment method. The three USACE districts in Colorado require or recommend use of FACWet for all permits involving permanent wetland impacts of 0.5 acre or more. CDOT requires a FACWet analysis for all projects with proposed permanent wetland impacts of 0.1 acre or more.

Knowing the functions of the wetlands proposed for impacts and the degree of the impact, CDOT and FHWA will be in a better position to determine the mitigation efforts necessary to offset the potential harm to these wetlands. The options for addressing potential impacts to wetlands are avoidance, minimization, and mitigation, in decreasing order of their desirability. CDOT's policy is to mitigate unavoidable impacts to all wetlands, not just those considered jurisdictional under Section 404.

Wetland Impacts/Mitigation

- Accurately predicted acreages of disturbance
- Identified importance of and impact severity for impacted wetland(s)
- Avoidance whenever possible
- Minimal disturbance when not avoidable
- USACE approval of mitigation required, with mitigation banking preferred
- Best management practices necessary to minimize indirect impact

Numerous BMPs are available and can be found at http://www.bmpdatabase.org/

Guidance on these approaches includes the following:

- Avoidance, the preferred option, is typically built into the design of an alternative by siting the roadway or facility where it will not impact any wetlands. When this has occurred, it must be clearly stated as part of the alternative description so it is clear that any future project modifications cannot alter this facet of the design.
- Avoidance of indirect impacts can often be achieved by employing BMPs during construction and operation. BMPs include such actions as properly installing silt fencing around the perimeter of a construction site, installing perimeter berms and liners in areas used for storage of chemicals, including petroleum products, and designing roadway shoulders and drainage systems so that roadway runoff is directed to areas where it can infiltrate the soil rather than running directly into waterways. The EPA evaluated the effectiveness of various BMPs in 1999 (EPA, 1999).
- Minimization of impacts typically occurs when only partial avoidance can be accomplished. It may be that siting and design constraints necessitate impacting part of a wetland, or that BMPs are not totally effective. Whatever the reason, impacts to wetlands should always be as small as possible, given other constraints of a project.
- Compensatory mitigation measures that should be considered include wetland mitigation banking, establishment of new wetlands, restoration, enhancement, and preservation (33 CFR Parts 325 and 332, 2008). The Compensatory Mitigation for Losses of Aquatic Resources, 2008 (Final Rule) contains guidelines for choosing a mitigation strategy and specific requirements under section 404 of the Clean Water Act for developing a compensatory mitigation plan. All project wetland mitigation decisions should be made after ensuring the Final Rule guidance is followed.
- Establishment of wetlands within the project area or vicinity or, in certain situations, the purchase of credits from wetland mitigation banks are options for compensatory mitigation. The use of such measures was mandated in 16 USC Chapter 29 - Water Bank Program for Wetlands Preservation and facilitated when the ISTEA Sections 1006 and 1007, made such purchases available for federal-aid funding. The use of wetland banks by transportation projects is implemented through FHWA guidance (FHWA, 2003). The use of mitigation banks is limited to project impacts that occur in a bank's primary or secondary service area. Several wetland

Examples of Avoidance and Minimization: upland buffers, retaining walls, guardrails, shifting roadway, maintaining hydrology

Affected Environment Section of NEPA Document

- Describe the general project setting with regard to wetlands
- Focus on acreage, functions, and values of any wetlands that may be directly or indirectly impacted
- Provide sufficient detail so that project impacts to wetlands may be fully evaluated

banks currently exist in Colorado. Examples include the Middle South Platte River Mitigation Bank, the Limon Mitigation Bank (CDOT owned and utilized), the Mile High Wetland Bank, and the Finger Rock Preserve. A preference for mitigation banking exists when impacted wetland functions are low or right-of-way conditions prohibit onsite mitigation.

- Prescribed monitoring requirements to ensure that wetland mitigation commitments are installed and continue to function properly. A monitoring plan should be completed that requires thorough documentation of compensatory mitigation and establishes success criteria and the duration and frequency of monitoring.

OTHER ISSUES TO CONSIDER

Impacts to wetlands may be addressed by CDOT, FHWA, and USACE through the NEPA/404 Merger process (mandatory for EISs; discretionary for EAs) and are also subject to comment by EPA and USFWS as participating agencies. USACE will only issue an individual permit if the preferred alternative is also the LEDPA. Information on wetland impacts and their mitigation must be included in the Wetland Finding and must be approved by CDOT or FHWA as appropriate based on their current MOA. A Wetland Finding is required when there are greater than 500 square feet of permanent impacts or 1,000 square feet of temporary and permanent impacts combined.

9.6.2 NEPA Document Sections

The content needed for the wetlands sections in the Affected Environment and Environmental Consequences chapter is discussed below.

AFFECTED ENVIRONMENT

The wetlands section of the Affected Environment should include:

- An introduction that explains the importance of wetlands and the regulatory climate; a methods section that gives the details on how and when the wetlands were mapped/delineated
- The study area and results of the functional assessment; a brief summary of the vegetation, soils, hydrology, and functions of each wetland or group of wetlands identified
- A discussion of other water features (other waters of the US); and maps showing all features discussed

- The types of wetlands that are found within the general project setting (Are the wetlands ephemeral or permanent, concentrated in one particular locale or setting, fresh or alkaline?)
- The general abundance of wetlands in the project area (Are the wetlands abundant [cattail ponds] or scarce [fens]?)
- The wetlands' importance regarding function and service (Are the wetlands sufficient for flood attenuation or as a wildlife habitat?)

A few paragraphs should be sufficient to "paint a picture" of local wetlands. The wetland section should also address how the project wetlands generally relate to transportation corridors in the project vicinity. Address such questions as:

- Do the transportation corridors typically run in lowland areas and cross a disproportionately high percentage of the wetlands?
- What is the hydrogeological history of the project wetlands and will it affect the transportation corridor in the future?

Environmental Consequences

The Environmental Consequences section for wetlands should clearly address the:

- Acreage of potential direct and indirect impact to wetlands.
- Impact to functions. Support the text discussion with a map showing the location and extent of anticipated project impacts on wetlands for each of the alternatives. Summarize the text discussion focusing on the wetland functional assessment and impact severity. This information should be presented as a tabulation of data so that it can be readily assimilated and compared. Remember that wetland impacts must be described and alternatives compared without compensatory mitigation to comply with the CWA (b)(1) guidelines and so that identification of the LEDPA can be supported.
- Methods section that explains how the impacts were calculated.
- Discussion of what specific direct (filling, dredging, etc.) and indirect impacts (erosion, sedimentation, shadowing, hydrologic modification, noxious weed invasion, etc.) are expected.

For each type (indirect/direct and temporary/permanent) of wetland impact, present the proposed mitigation measures. Describe how the proposed mitigation measures were selected and how they would address the impacts identified.

Environmental Consequences Chapter of NEPA Document

- Provide the protocol used to select mitigation measures
- Discuss types of impacts, comparing and contrasting alternatives within each impact type
- If the preferred alternative impacts wetlands, thoroughly document why this could not be avoided

In accordance with FHWA Technical Advisory 6640.8A (FHWA, 1987) requirements, if the preferred alternative affects wetlands, the Final EIS needs to contain the finding required by Executive Order 11990 that there are no practicable alternatives to construction in wetlands. Where the finding is included, approval of the Final EIS will document compliance with the Executive Order 11990 requirements (23 CFR 771.125(a)(1)). The finding should be included in a separate subsection entitled 'Only Practicable Alternative Finding' and should be supported by the following information:

- A reference to Executive Order 11990
- An explanation why there are no practicable alternatives to the proposed action
- An explanation why the proposed action includes all practicable measures to minimize harm to wetlands
- A concluding statement that "Based upon the above considerations, it is determined that there is no practicable alternative to the proposed construction in wetlands and that the proposed action includes all practicable measures to minimize harm to wetlands which may result from such use."

A separate wetland finding should be included as an appendix to the NEPA document or as a technical report. Refer to the *Checklist - CDOT Wetland Findings and Wetland Finding Amendments* (CDOT, 2010b) to enable compliance with the above requirement.

Impacts and mitigation should be listed in a Summary of Impacts and Mitigation Table at the end of the resource evaluation chapter of the NEPA document. The first six columns of CDOT's Mitigation Tracking Spreadsheet should be used as this summary table (Table 9-2). CDOT's Mitigation Tracking Spreadsheet (Table 9-1) can be retrieved from http://www.coloradodot.info/programs/environmental/resources/forms/CDOT%20Mitigation%20Tracking%20Spreadsheet_June%202012.xlsx/view.

9.7 Vegetation and Noxious Weeds

Vegetation is a term that encompasses the diverse plants that grow in soil and water. These plants can be grouped on the basis of their genetic similarity (e.g., ponderosa pine, limber pine, and lodgepole pine), their structural similarity (peach-leaved willow and narrow-leaved cottonwood, or squaw bush and golden currant), or in communities (riparian forest, upland grassland, or alpine forest) because they grow together in the same ecological setting. A plant community is any assemblage of populations living in a prescribed physical habitat; it is loosely organized and has characteristics in addition to its individual and population components. Plant communities serve as animal habitats. Collectively, the plants and animals create a biotic community. GIS maps often show land cover types, which are generally comparable to plant communities at a coarse scale of definition.

Vegetation is important because it holds soil in place and prevents erosion; removes carbon dioxide from the atmosphere and releases oxygen; provides diverse materials that are used by people and other animals as food, for structures, and other products; and contributes to shade, aesthetic views, and recreation. Plant communities support diverse species and provide particular niches for specialized plants and animals.

Some plant species that readily move beyond their native habitat and invade new habitats are considered undesirable. Invasive species, or alien species, are defined "with respect to a particular ecosystem" in Executive Order 13112 *Invasive Species* (Executive Order 13112, 1999) as, "any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem." Transportation activities provide a means for potentially invasive species to move beyond existing habitats. Such species may severely disrupt ecosystem balance because they can quickly become abundant in a community and displace native species that are not adapted to the invasive species presence.

The three sections below provide guidance on the treatment of vegetation for CDOT's NEPA projects. The first section discusses the process for evaluating vegetation. The second discusses vegetation information that should be in each NEPA document. The third specifically focuses on noxious weeds.

9.7.1 Vegetation Evaluation Process

The CDOT RPEM, resource specialist, or environmental project manager is responsible for early identification of vegetation communities, their critical

uses, and important species. In fulfilling this responsibility, they may be supported by consultants who collect, evaluate, and summarize data on vegetation.

Vegetation communities should be identified throughout the project area that encompasses all alternatives. The study area should be at least large enough to contain all direct physical disturbance related to the project (e.g., the project footprint, haul roads, plus construction staging areas, etc.), as well as surrounding areas that could be indirectly impacted by the project through erosion, chemical/fuel and other pollutants, deicing operations, and roadside emissions. The surrounding area beyond the right-of-way fence should also be surveyed for the presence of noxious weeds that could readily move into the disturbed soils within the study area. If the presence of noxious weeds is noted, care must be taken to protect the project area and the surrounding habitats, particularly sensitive habitats or open water areas that are highly susceptible to the spread of invasive plants. The presence or potential uses of vegetation communities and whether they might include T&E species must also be determined.

Vegetation communities within the study area, their functions and component species must be identified as early as possible during project planning. This should be done before alternative corridors are selected if possible, and must be done before alternative alignments are finalized. Field review is required to determine whether particular plant species are present within the study area, and such data may need to be collected when the species is flowering and therefore most obvious to an observer. Planning of vegetation surveys is critical, especially with noxious weeds. Timing for field studies should be determined early in the NEPA process so that they can be conducted at the proper season, in spring, summer, or fall, without undue delay to the project.

Reasons for Evaluation of Vegetation Under NEPA

CDOT evaluates vegetation for several reasons:

- Vegetation is an important component of the natural and human community
- To comply with CDOT's environmental stewardship policy, which ensures that the statewide transportation system is constructed and maintained in an environmentally responsible, sustainable, and compliant manner
- To enable compliance with several legal mandates that pertain to particular vegetation species and their uses

Early identification of the vegetation communities present within the study area provides determination of the likelihood that sensitive plant or animal species might be present. It enables determination of the need for supplemental field studies so that these can be initiated at the proper time. It enables timely identification of biological red flags that might warrant development of additional or altered project alternatives.

Protection of vegetation that is not legally listed as T&E is determined by the importance of that vegetation to the surrounding ecosystem. Riparian vegetation and wetlands are protected under regulations specific to those communities. Plants that serve specialized functions for the animals that inhabit them (e.g., raptor nest trees, or elk calving ground vegetation) may be protected under regulations that are specific to the animal species involved.

Transportation project managers must pay special attention to vegetation because the project may include the reclamation of long stretches of roadside habitat disturbed by construction and their operation can contribute to the spread of noxious weeds. The use of native wildflowers (using at least 0.25 percent of 1 percent of the landscaping budget) during reclamation is required on federal-aid projects as noted in FHWA's *Landscape and Roadside Development* (FHWA, 1978) and *Landscaping and Scenic Enhancement* (FHWA, 23 USC Part 319).

The Colorado Department of Agriculture Noxious Weed Management Program is available at http://www.colorado.gov/cs/Satellite/Agriculture-Main/CDAG/1174084048733

Additionally, vegetation on public lands through which a transportation project passes (e.g., BLM, USFS, National Park Service (NPS), or USFWS land, or land owned or managed by a state or regional agency) may also be protected by the mandates of the managing agency. All such agencies should be contacted when the study area for a transportation project includes lands they manage.

In addition to the legal protection of vegetation, vegetation that provides important shade, or contributes to an aesthetic vista should be protected to the extent that this does not interfere with implementation of the project or result in inappropriate project costs. Further, since nearly all vegetation provides habitat for fish and wildlife, disturbance of vegetation should be kept to a minimum whenever this is reasonably possible.

Collection and Evaluation of Baseline Information

Collection of Baseline Information

To collect baseline information on vegetation, start first with the information from the Colorado Gap Analysis Project (GAP) from which 100,000 block datasets depicting vegetation can be downloaded. These data can be characterized as follows:

- GAP data is GIS spatial data
- Data is provided in GIS formats and GIS software is required to view the data
- This data is in Universal Transverse Mercator Zone 13, North American Datum 1927 projection, and provided by 30 by 60 minute blocks
- Metadata is viewable on-screen and downloadable separate from the data
- All files are zip files, which can be uncompressed using WinZip

GAP data represent the most comprehensive statewide spatial information on vegetation. However, note that while 80 percent accuracy was the goal of GAP mapping, the 52 land cover types in Colorado were initially mapped at an accuracy of 31 percent. Nonetheless, because of their comprehensive and consistent coverage, GAP data are an excellent starting place to determine the vegetation present in the vegetation study area.

CPW's Natural Diversity Information Source is also a good data source. It contains links to downloadable GIS data on riparian and wetland mapping and the Colorado Vegetation Classification Project, as well as to the GAP webpage. Additional information is provided on riparian areas and wetlands because these could not be accurately mapped with the imagery used for the overall GAP analysis.

Further sources of spatial information on vegetation include the following:

- GIS Data Depot
- US Department of Agriculture (USDA) Data Gateway
- NatureServe
- Other sites that are listed in aggregate at the USFWS Geographic Information System and Spatial Data portal

Ultimately, a single source of spatial data will need to be chosen to depict the vegetation in the vegetation study area. However, other data sources may provide additional, specific information that is more precise for a specific area or location.

More precise information on sensitive vegetation species can be found with the CNHP. The CNHP tracks rare species, some of which are legally protected and some of which are not. It provides data on the county and USGS quadrangle in which the tracked species occur; more precise data can be obtained by request with payment of a fee. The presence of a

Sources of vegetation spatial include:

- Colorado Gap Analysis Project at http://ndis1.nrel.colostate.edu/cogap/
- CPW's Natural Diversity Information Source at http://ndis.nrel.colostate.edu/
- GIS Data Depot at http://data.geocomm.com/
- USDA Data Gateway at http://datagateway.nrcs.usda.gov/
- NatureServe at http://www.natureserve.org/
- USFWS Geographic Information Systems and Spatial Data at http://www.fws.gov/data/
- Colorado Natural Heritage Program at http://www.cnhp.colostate.edu/

tracked species in the county or quadrangle where a project is planned necessitates obtaining detailed information along proposed alignments, and may be cause for realignment of one or more alternatives. Information on noxious weed species can be obtained from the Colorado Department of Agriculture. Links on the Colorado Department of Agriculture webpage provide contact information for county weed supervisors and also provide information on how to inventory noxious weeds if field data must be collected.

Vegetation communities are also of importance to fish and wildlife species. For example, if a vegetation community serves as an elk calving ground or heron rookery or provides a raptor nest site, it may need to be protected to maintain adequate breeding sites, as well as forage or feeding areas. Riparian areas are another example of an important and sensitive vegetation community. Not only is the vegetation important, but many sensitive, T&E fish species rely on healthy, intact riparian vegetation for their continued survival, not to mention the importance of the riparian forest on water quality. Therefore, good communication between CDOT's plant and fish and wildlife specialists is essential.

Evaluation of Baseline Information

To evaluate baseline information, first finalize the vegetation study area, then identify the types of impacts the project could have on vegetation and the types of measures that could be used to mitigate these impacts if they cannot be avoided. More specifically:

- Include within the vegetation study area all potential areas of direct disturbance (e.g., where the ground will be disturbed, tree/shrub branches broken or removed) and areas of indirect disturbance (e.g., where erosion might disturb the plant cover or deposition of eroded soil might cover lowland vegetation; where deicer impacts might retard plant growth, species may be altered due to hydrology, or the soil may be vulnerable to noxious weeds)
- Prepare a matrix of vegetation land cover types within the vegetation study area and types of project impacts on vegetation by alternative
- Prepare a matrix of the impacts that could occur as a result of any of the project alternatives and the measures that could be used to mitigate each

This information will inform the project-specific analysis of impacts and how they might be mitigated. Impacts of the proposed project alternatives on vegetation should be evaluated in three primary ways.

- Map the most precise spatial data that cover the vegetation study area with the expected areas of disturbance for each of the project alternatives. As needed, develop different GIS layers for areas of project disturbance that are expected to occur at different times (e.g., for temporary disturbance during construction and permanent disturbance during operation) and as a result of different types of disturbance (e.g., direct and indirect). Using the GIS software, tabulate the acreage of each land cover type that intersects with the areas of disturbance shown on each GIS layer. Use the calculated acreages to quantitatively compare the impacts of the project alternatives.
- In addition to this quantitative comparison of acreage impacts by vegetation land cover type, the relative importance of each vegetation land cover type should be determined, compared, and discussed. Include in the discussion the national, regional, and local importance of each vegetation type that would be impacted, as well as the importance at these three levels of the fish and wildlife habitat it provides.
- The level of detail provided should not be excessive relative to the magnitude of the anticipated impact. In all cases, the goal should be to provide the level of detail necessary to clarify the difference between the alternatives and the magnitude of that difference.

Development of a list of past, present, and reasonably foreseeable future projects that should be addressed for all resources in the consideration of cumulative impacts is discussed in Section 9.26. Locate these projects on a vegetation land cover map to see what vegetation land cover types they will impact. Discuss cumulative impacts to vegetation in more general terms, noting which vegetation land cover types will be most impacted, their relative importance, and the degree to which impacts from the transportation project considered in the current NEPA document will contribute to the cumulative impacts.

Other Issues to Consider

Other agencies may have information or guidance that will affect a particular CDOT project. Coordinate with the various agencies having resource oversight to obtain any site-specific data they may have, and talk to resource specialists who know the study area to determine whether they know of vegetation that should not be disturbed or have guidance that could constrain the project. The resource agencies that would have information or guidance on vegetation impacts include CPW, USFWS, and NRCS as well

as USFS, BLM, NPS, and Colorado counties and state parks, when they manage lands that are traversed by a transportation project.

In addition to information on vegetation species and communities, very specific information on T&E plant species that may occur in the study area will need to be analyzed with regard to project impacts.

9.7.2 NEPA Document Sections

The content of the vegetation sections in the Affected Environment and Environmental Consequences chapter is discussed below. The level of detail will vary with species composition, the presence of T&E species, and the value of the vegetation habitat and the potential project impact.

AFFECTED ENVIRONMENT

The description of vegetation in the Affected Environment chapter of the NEPA document should:

- Include an introduction to vegetation and the importance of protecting it in and around the project area
- Present an overview of the vegetation land cover types that are present in the project region
- Define the vegetation study area for the project
- Describe how the vegetation land cover types within the study area fit within the regional context (agriculture, forestry products, open space)
- Include a map of the vegetation land cover types within the vegetation study area and provide a cross-reference to the T&E species and wetland section of the NEPA document

If no vegetation will be impacted (e.g., the project is entirely within a highly developed urban area without any surrounding vegetation), no further detail is required in the Affected Environment chapter on vegetation. Remember, even in an urban area there may be some landscaping using sod or other irrigated landscape that could be susceptible to noxious weeds. If impacts to vegetation may, or will occur, also include the following:

- A description of each vegetation land cover type, including the locations where it occurs, its general appearance, the species that comprise it, and its importance as a plant community (fish and wildlife habitat, visual aesthetic, economic value, recreation, etc.)
- A note showing the proximity of any special use areas such as national or state forest areas, recreation areas, or parklands

Affected Environment Chapter of NEPA Document

- Map of the vegetation communities or land cover types in the vegetation study area
- Description of each vegetation community, land cover type, or surrounding area, when dealing with noxious weeds, that is expected to be impacted by the project
- Cross-reference the T&E species section so that such plant species will not be overlooked by the reader

- A description of areas of contiguous habitat
- A description of land uses, if any, within or nearby the proposed project alternatives (developed, agriculture, forest products)
- The scoping summaries from the federal, state, and local agencies. These agencies have expert knowledge of the project areas and will provide important insights to special vegetation issues.
- Identification of any noxious weeds that are within or surrounding the vegetation study area
- A statement of the likelihood of sensitive species presence and cross-reference to the T&E species discussion
- A discussion of the importance of the vegetation land cover type as habitat for fish and wildlife species cross-referenced to further discussion of this topic in the fish and wildlife section of the NEPA document

Environmental Consequences

In the impact analysis section of the NEPA document, show the map of vegetation land cover types overlain with the project areas of direct disturbance. Include the tabulation of acreages of disturbance of each land cover type by alternative. Compare and contrast the project alternatives as to their relative vegetation impacts on the basis of their acreage of disturbance, and the relative importance of each of the vegetation land cover types. Note which impacts to vegetation will be temporary, in that they occur only during construction, and which will be more permanent and last throughout the project's operation. Differentiate between direct and indirect impacts, and discuss each. Prepare the vegetation input for a tabular summary of impacts by alternative and the consideration of cumulative impacts.

Include how the actions in each alternative could affect each land cover type. Impacts could be something that enhances the vegetation habitat, such as mitigation, or the impacts could result in degradation of the vegetation cover, such as tree removal. Discuss measures to mitigate impacts to vegetation only after the impacts have been clearly documented and quantified. The preferred approach toward impacts is to first, avoid them or, if that is not possible, then to minimize them, and then to mitigate them. In the NEPA document:

- Discuss steps that were taken and/or will be taken in the final design of alternatives to avoid impacts to vegetation
- Discuss steps taken to minimize impacts

- Discuss the types of actions taken to avoid specific patches of vegetation or to minimize the overall acreage of vegetation disturbance, such as:
  - Rerouting alternative alignments
  - Narrowing the right-of-way
  - Elevating a portion of the right-of-way
  - Minimizing the size of construction staging areas or confining them to previously disturbed sites
- For impacts that cannot be avoided, discuss such mitigation measures as:
  - Seeding with a native grass/forb mix
  - Planting trees and shrubs per Senate Bill 40 commitments (1:1 trees, sod fragmentation shrubs)
  - Transplanting (moving particularly important plant populations to areas where they would not be disturbed)
  - Employing BMPs during construction by using erosion and sediment control BMPs, implementing phased seeding, and containing potential pollutants

9.7.3 Noxious Weeds

As defined by the Colorado Noxious Weed Act, the term "noxious weed" means any non-native plant or parts of a non-native plant that have been designated by rule as being noxious or have been declared a noxious weed by the state of Colorado or a local advisory board, and meets one or more of the following criteria:

- Aggressively invades or is detrimental to economic crops or native plant communities
- Is poisonous to livestock
- Is a carrier of detrimental insects, diseases, or parasites
- The direct or indirect effect of the presence of this plant is detrimental to the environmentally sound management of natural or agricultural ecosystems

Why are noxious weeds important?

- Noxious weeds constitute a threat to the economic and environmental value of land, as hundreds of acres of crop, rangeland, roadside, and natural resources, such as habitat for

wildlife and native plant communities, are being displaced by noxious weeds each year

- The spread of noxious weeds can be partially attributed to the movement of seed and plant parts on motor vehicles, and because noxious weeds are becoming an increasing maintenance problem on highway right-of-way in Colorado, and because the ground disturbance caused by construction projects are often colonized by noxious weed species preventing the establishment of native vegetation
- FHWA and CDOT policy and environmental ethic

REGULATIONS

The Colorado Noxious Weed Act (CRS 35-5.5) requires the control of designated noxious weeds. The Colorado Noxious Weed List categorizes noxious weeds as one of three categories. This list is updated annually and maintained by the Colorado Department of Agriculture in the following document: *Rules Pertaining To The Administration And Enforcement Of The Colorado Noxious Weed Act* (Colorado Department of Agriculture Plant Industry Division 8 CCR 1206-2). The list is also accessible on the website of the Department of Agriculture's Noxious Weed Management Program.

The noxious weed list categories and their management guidelines are:

- List A. All populations of List A species in Colorado are designated for eradication.
- List B. All populations of List B species in Colorado should be managed to stop their continued spread. For some of these species, a state noxious weed management plan has been created; in these cases, the management plan must be followed.
- List C. Populations of List C species are already widespread. The goal of management of List C species will not be to stop their continued spread but to provide additional education, research, and biological control resources to jurisdictions that choose to require management of List C species.

The following additional regulations are also related to noxious weed management:

- The Weed Free Forage Crop Certification Act (CRS 35-27.5)
- Rules and Regulations Pertaining to the Weed Free Forage Crop Certification Act

- State of Colorado Executive Order D 06 99 – Development and Implementation of Noxious Weed Management Programs
- State of Colorado Executive Order D 002 03 – Directing State Agencies To Coordinate Efforts for the Eradication of Tamarisk on State Lands
- Federal Executive Order 13112 – Invasive Species

AFFECTED ENVIRONMENT

The Affected Environment chapter must include areas adjacent and near the project area, not just the project footprint. The existing vegetative conditions in and adjacent to the project area should be described. The following information should also be provided:

- Plant communities in the project area
- Plant and animal species that occur in the area (including those special status species that have specific regulatory protections and cross-referencing T&E topics)
- Distribution of plant species or plant communities (maps may be useful)
- Sensitive areas that occur in the region
- Agriculture use in the area

Describe where affected environment information can be obtained and what field work may need to be conducted (and when). Describe what tools are appropriate at what time, for example, when aerial photography can be used and when field surveys may need to be conducted. Also describe any specific reports that may need to be developed and cross-reference or provide links to more detailed information (if it exists). Cross-reference other resource topics, such as water resources, vegetation, wildlife, T&E, and floodplains, as necessary. Tie regulatory requirements to noxious weed information where appropriate.

Affected Environment

The level of detail provided in the Affected Environmental discussion should be relevant and related to the level of detail needed in the environmental consequences discussion. If there are no impacts, the Affected Environment discussion should be limited.

ENVIRONMENTAL CONSEQUENCES

The project should address the identification and approximate distribution of all noxious weed species in the study area and analysis of the impact of those noxious weeds on relevant resources in and adjacent to the study area, as follows:

Identification and Mapping of Existing Noxious Weeds – The first step in the process is to identify, inventory, and map the location of noxious weeds. If

possible, it may be practical to combine the weed mapping with an existing vegetation or wetland survey. The weed survey should include:

- All species designated as List A, B, or C noxious weeds and any other species determined through consultation with county, parks, forest service, BLM, CDOT, and state weeds lists, inventories, and/or weed managers
- Geographical location and extent of infestation (size and density of patch) for each patch of noxious weeds identified
- The results of weed identification presented as both a map and a table, which includes species of weeds, extent, density, regulatory status, and any specific issues related to each weed

Potential Impacts from Invasive Species – Analysis of impacts should include area disturbed by construction and area adjacent to the project. Other questions to consider include: What are the impacts if the weeds spread within the project or adjacent to the project? Will ground disturbance result in an increase in weeds? Will the impacts affect wetland, riparian, or other sensitive habitats? Are there impacts associated with weed control methods i.e., herbicides? The potential for spreading invasive species or noxious weeds from the project into agricultural areas or sensitive ecological areas should also be addressed.

Public Land Impacts – Most of the local, state, and federal agencies have a policy addressing noxious weeds. If federal land is adjacent to the project, then the list of prioritized noxious weeds for that agency should be obtained. The impacts of the additional weeds should be addressed in the document.

T&E Species – The document must address the impacts to the identified T&E species. Will the presence of noxious weeds displace the listed plant or compete with desirable habitat vegetation? The presence of T&E species in a given area will limit the method of control for noxious weeds. Furthermore, more stringent management practices may be required in a T&E area, such as delineation via signing for controlled application and use of herbicides.

Wetlands and Open Water – The document must address the potential for contamination of herbicides adjacent to wetlands and open water. This requires special attention to recommended aquatic-use only herbicides due to potential leaching of chemicals into the groundwater table and sensitivity to fish and wildlife habitat.

Agricultural – Due to the toxicity of certain noxious weeds to livestock (including horses), bees, or adjacent croplands, address the potential impacts of the weed and use of herbicides on adjacent agricultural lands.

This section in the NEPA document should also describe the predicted environmental impacts of project alternatives on resources in the project area from the continued or further spread of noxious weeds. Impacts to be considered include direct (construction and operational) and indirect impacts. Cumulative impacts should also be considered and included in the Cumulative Impact section of the NEPA document, if necessary, and give examples of the types of impacts caused by the spread of noxious weeds. The level of detail included in the NEPA document should be commensurate with the extent and nature of the impacts.

Resource Mitigation and Preventative Control Measures

Measures to eradicate and prevent the establishment and spread of invasive and noxious weeds should be included in all projects, as appropriate. The impact of noxious weeds on other resources in the area (e.g., wetlands, T&E species, etc.) should be mitigated according to strategies specific to those resources.

The NEPA analysis should reference potential noxious weed preventative control measures that will be incorporated into the scope, design, and construction processes. As defined in the Environmental Consequences section, the method of control can have an adverse effect on the sensitive environments containing the noxious weeds. The document should address potential impacts of the chemical, biological, and/or mechanical control methods to the surrounding ecosystem. These methods are outlined below:

- Minimize Soil Disturbance – By far the most likely place for noxious weeds to take hold will be areas that have been recently cleared of vegetation
- Use of Fertilizer – Fertilizers should not be used on most projects because of their propensity to increase the growth of noxious weeds. This should be determined in consultation with a landscape architect.
- Native Plants – The use of native grasses and forbs will be used on all CDOT right-of-way for revegetative purposes. Transplanting and purchasing of native plant material (trees and shrubs) from nurseries is encouraged whenever feasible.
- Weed Free Forage Act – The environmental document must address that materials used for the project must be inspected and regulated by the Weed Free Forage Act, Title 35, Article 27.5, CRS.
- Topsoil Management – When salvaging topsoil from on-site construction locations, the potential for the spreading of noxious weeds shall be considered. Topsoil should never be salvaged if

contaminated by noxious weeds or seeds. Importing topsoil onto the project site should not be allowed unless it is certified weed free.

- Equipment Management – Equipment should remain on designated roadways and stay out of weed-infested areas until they are treated. All equipment shall be cleaned of all soil and vegetative plant parts prior to arriving on the project site.
- Stakeholder Coordination – Weed management efforts should be coordinated with local jurisdictional agencies and adjacent landowners to the extent possible.
- Cross-reference other resource topics, such as water resources, vegetation, wildlife, T&E, and floodplains, as necessary.

Integrated Noxious Weed Management Plan

The NEPA document should commit to the creation of an Integrated Noxious Weed Management Plan (INWMP) to be completed during design. Generally the NEPA document is too early in the process (given the likelihood of weed occurrences to change significantly in a few years) to write a comprehensive weed plan unless project construction is imminent. The INWMP must address the control methods (chemical, biological, preventative, etc.) that will be put in place to stop the continued spread of List B species and to eliminate the occurrences of any List A species.

This section must discuss the practical efforts CDOT can routinely undertake to mitigate or control impacts from noxious weeds. Describe typical mitigation or control measures corresponding to specific typical impacts. Cross-reference any appendices or websites with more detailed mitigation information, if necessary. Discuss what mitigation plans or reports are necessary, and under what conditions.

NOXIOUS WEEDS – OTHER ISSUES TO CONSIDER

Noxious weeds are present on most projects. The following are some additional ideas to keep in mind concerning the control of noxious weeds with pesticides:

- Pesticides and herbicides present an additional environmental hazard that must be analyzed
- Any individual who applies pesticides or herbicides must be licensed by the state as a Commercial Applicator, Qualified Supervisor or Certified Operator and must take continuing education courses to maintain their qualification

- Some pesticides/herbicides may not be used near water or other sensitive areas
- Always follow the pesticide label for instructions on proper application

Noxious weed surveys cannot be performed in the winter because accurate identification of species and patch size will be impossible when plants are not in the correct growth stage. Coordination with local agencies should help target which noxious weed species are priorities for control. Many noxious weed species are already so widespread that effective control is difficult. Moreover, large patches of common noxious weeds are not as important to control as small infestations of rare noxious weeds. Cross-reference other permit sections or appendices if necessary.

Impacts and mitigation should be listed in a Summary of Impacts and Mitigation Table at the end of the resource evaluation chapter of the NEPA document. The first six columns of CDOT's Mitigation Tracking Spreadsheet should be used as this summary table (Table 9-2). CDOT's Mitigation Tracking Spreadsheet (Table 9-1) can be retrieved from http://www.coloradodot.info/programs/environmental/resources/forms/CDOT%20Mitigation%20Tracking%20Spreadsheet_June%202012.xlsx/view.

9.8 Fish and Wildlife

The term "fish and wildlife" is typically used to identify aquatic ("fish") and terrestrial ("wildlife") animal species that are of interest. Typically in a NEPA document, species of interest are confined to selected species of vertebrates (i.e., fish, amphibians, birds, and mammals) and T&E species. The vertebrate species discussed are typically those that are of particular interest to the recreating public (e.g., fishermen, hunters, and bird watchers), are particularly abundant (e.g., mice, squirrels, blue jays, and robins), are at the top of food chains (e.g., coyotes, foxes, cougars, hawks, eagles, and owls), and/or have populations that are in some jeopardy (e.g., prairie dogs and sage grouse). An exhaustive discussion of all fish and wildlife species and/or other species would not be especially practical, of much interest, or be of much value.

Fish and wildlife are a vital component of ecosystems and contribute to their diversity, provide a source of enjoyment for recreationists, and provide a source of food for people and other animals. It is important that populations of fish and wildlife species and the habitats that support them remain healthy.

The two sections below provide guidance on the treatment of fish and wildlife for CDOT's NEPA projects. The first section discusses the process for evaluating fish and wildlife. The second discusses fish and wildlife information that should be in each NEPA document.

CDOT has a Black-tailed Prairie Dog Policy, which can be found at http://www.coloradodot.info/programs/environmental/wildlife/guidelines

9.8.1 Fish and Wildlife Evaluation Process

The CDOT RPEM, resource specialist, environmental project manager, EPB, regional biological specialists, or wildlife biologists are responsible for early identification of fish and wildlife species and their habitats. They are also responsible for determining whether sensitive species may be present in the project area. In fulfilling this responsibility, they may be supported by consultants who collect, evaluate, and summarize data on fish and wildlife.

Fish and wildlife populations should be identified throughout an area that encompasses all project alternatives.

Knowledge regarding how fish and wildlife populations use the habitat in the project vicinity and how these populations are used by humans will help define the fish and wildlife study area. Thus, the study area identified for animals is typically larger than that identified for plants, because animals are mobile.

Whether the species present might include T&E species must also be determined. These species are discussed further in Section 9.9.

Fish and wildlife species, their populations, and their habitat within the study area must be identified as early as possible during project planning. This should be done before alternative corridors are selected if possible, and must be done before alternative alignments are determined. This enables project designers to try to avoid any critical fish and wildlife impacts before they have progressed too far in developing the alternatives.

The need for field studies should also be determined early in the NEPA process so that they can be conducted at the proper season without undue delay. If field data are required to determine whether particular animal species are present within the study area, such data may need to be collected when the species are most obvious to an observer (e.g., early in the breeding season to hear the singing of song birds; before deciduous trees have leafed out to detect raptor nests).

Reasons for Evaluation of Fish and Wildlife Under NEPA

CDOT evaluates fish and wildlife resources for several reasons:

- Fish and wildlife are a vital component of ecosystems and contribute to their diversity, provide a source of enjoyment for recreationists, and provide a source of food for people and other animals.
- To comply with CDOT's environmental stewardship policy, which ensures that the statewide transportation system is constructed and maintained in an environmentally responsible, sustainable, and compliant manner.
- To enable compliance with numerous legal mandates that pertain to fish and wildlife.

There are numerous other federal laws that protect fish and wildlife (e.g., Waterfowl Depredations Prevention Act, Fish and Wildlife Conservation Act, Wild Bird Conservation Act) or their habitat (Duck Stamp Act, Wetlands Loan Act, Emergency Wetlands Resources Act, Migratory Bird Conservation Act, North American Wetlands Conservation Act), in addition to Senate Bill 40 Wildlife Certification (CRS Title 33, Article 5). The Colorado Senate Bill requires any agency of the state to obtain wildlife certification from CPW when the agency plans construction in "any stream or its bank or tributaries."

In addition, there are state laws that govern how fish, game birds, game mammals, non-game wildlife, and other species can be handled and otherwise impacted. For the most part, these laws govern the handling and

Primary Fish and Wildlife Regulations and Guidance

- Migratory Bird Treaty Act
- Fish and Wildlife Coordination Act
- Bald and Golden Eagle Protection Act
- Executive Order 13112 (Invasive Species)
- Executive Order 12962 (Recreational Fisheries)
- Senate Bill 40 Wildlife Certification

Note: There are many additional federal and state regulations and extensive guidance for protection of fish and wildlife resources.

intentional take of such species rather than unintentional take or habitat disruption. In addition, CPW has recommendations on buffer zones and seasonal restrictions for Colorado raptors that are viewed as guidance rather than official policy.

COLLECTION AND EVALUATION OF BASELINE INFORMATION

Collection of Baseline Information

Baseline information on fish and wildlife are needed to generally describe the species that are common and thereby characterize the project vicinity. Baseline information is also necessary to describe in detail the species to which impacts from the project would be of concern.

Because of the mobility of fish and wildlife, the habits and behaviors of potentially impacted species need to be described, as well as their populations and habitats. To provide sufficient information to enable a thorough assessment of project impacts, information must be known for each species present, such as:

- Migration behavior
- Known migration routes and timing
- Breeding locations, behaviors, timing, and cycle length
- Rearing periods for young
- Particular habitats uses for particular life cycles
- Factors that limit the species' population
- Areas of contiguous habitat
- Aspects of a species' habitat that are critical for its survival

The first step in the acquisition of information on fish and wildlife is to determine what species are likely to be present in the project vicinity. Such information can be obtained from a number of sources, such as:

- GAP Data – include information on numerous vertebrate animal species that are typically associated with the land cover types identified in the state
- Latilong reports, published originally by CPW in the 1980s and available in some libraries, indicate the presence/absence of mammals (Bissell and Dillon, 1982), birds (Kingery, 1987), and reptiles/amphibians (Hammerson and Langlois, 1981) in 1 degree latitude and longitude blocks across the state

Sources of fish and wildlife data include:

- Colorado Gap Analysis Project at http://ndis1.nrel.colostate.edu/cogap/
- CPW's Natural Diversity Information Source at http://ndis.nrel.colostate.edu/
- Colorado Herpetological Society at http://www.coloherps.org/
- Colorado Natural Heritage Program at http://www.cnhp.colostate.edu/
- FHWA Critter Crossing at http://www.fhwa.dot.gov/environment/wildlifecrossings/index.htm
- USFWS Invasive Species at http://www.fws.gov/invasives/
- Nature Serve at http://www.natureserve.org

- Publications such as Birds of Colorado (Bailey and Niedrach, 1965), the Colorado Breeding Bird Atlas (1998), Mammals of Colorado (Fitzgerald, Meaney, and Armstrong, 1994), and Amphibians and Reptiles in Colorado (Hammerson, 1982), as well as other publications on animal distribution
- Distributional data from the Colorado Wildlife Species Database (Schrupp and Cade, 1989)
- Distributional information from local CPW personnel, who should always be consulted
- CPW's Natural Diversity Information Source, which provides data on numerous animal species in the state
- Online data on reptiles and amphibians Colorado Herpetological Society's website
- Colorado Natural Heritage Program website, which tracks and ranks Colorado's rare and imperiled species and habitats, not all of which are T&E
- FHWA Critter Crossing website
- FHWA Invasive Species website
- USFWS Invasive Species website

A number of the above data sources contain information on the populations, behavior, and habitat use of species, as well as information on their distribution and abundance. Further information can be found online by species-specific searches on such sites as NatureServe Explorer, or additional scientific sites such as The Birds of North America online. Highly scientific data should be needed only for species that are biologically sensitive or of high public interest and that could be severely impacted by the project.

Evaluation of Baseline Information

Once data have been collected on the fish and wildlife species documented or likely to be present in the study area, map their likely distribution relative to project components. For many species, this is best done by evaluating them in assemblages that use a common habitat or land cover type. Greater specificity in the assessment of impacts can be gained by assessing how particular species use their habitat, and how the project will impact the habitat. Identification of the types of impacts that should be considered can best be understood through a series of examples.

For example, all the species that are likely to use ponderosa pine forests may be assumed to be impacted if project facilities disturb ponderosa pine habitat. Therefore:

- Small mammal species that forage and breed in ponderosa pine habitat are likely to be substantially impacted by road construction because a road will disturb the ground used for all of the mammals' activities.
- Small bird species that forage and nest in the ponderosa pine trees will be impacted by the loss of individual trees along the road right-of-way, and may also be subject to road kill, particularly if they feed by darting into the air to catch flying insects, but less so if they feed by gleaning insect larvae from the tree bark.
- Large bird species that require large unbroken expanses of forest for successful breeding may be impacted by fragmentation of their habitat, even if the percentage of their home range that is disturbed is very small.
- Species such as big game that migrate seasonally along traditional corridors may suffer considerable impacts if roads cut across this corridor. This can result in considerable road kill, particularly if the cross road is in an area with poor visibility for both the game animal and the driver of the car, and if a safe means for the game animal to cross the road is not provided and its use encouraged.
- Species that are constrained by roadside fences may avoid road kill impacts but be prevented from reaching traditional use areas. If these use areas are crucial for the species' survival, such as critical winter use areas, animal mortality could be high.
- Populations of amphibians that traditionally breed in a particular pond and disperse uphill from that pond after metamorphosis may be severely impacted if a road is placed on the uphill side of the pond.
- Aquatic species that move upstream or downstream for particular portions of their life cycle may be constrained from doing so if natural stream beds are replaced by culverts that are not conducive to their passage.
- Spawning beds used by aquatic species may be covered with silt or excessively scoured if surface flows are substantially altered by a transportation project.

The above examples are intended to encourage thoughtful evaluation of baseline data collected on fish and wildlife species. During this evaluation, consider what species are present, when they are present, what they are doing while present, and how important this activity is to the survival of healthy populations of the species. Also consider what would be happening on the ground, throughout each day during the construction and operation of the project, as well as the permanent impacts the project would have on the surrounding landscape. Mentally combine these two types of activities in time and space to envision project impacts.

Use of multiple GIS layers can enable calculation of acreages of impact from different project activities on various species groups. However, to be complete, impact evaluation must also thoroughly consider the type and importance of the impact to individual species or species groups. To determine the importance of impacts, consult regional information that may provide context for the project-specific impacts.

Use species-specific guidance to evaluate impacts when it is available. For example, CPW guidance on Recommended Buffer Zones and Seasonal Restrictions for Colorado Raptors (Craig, 2002) provides species-specific distance recommendations for avoiding surface occupancy near bald eagle, golden eagle, osprey, ferruginous hawk, red-tailed hawk, Swainson's hawk, peregrine falcon, prairie falcon, goshawk, and burrowing owl nest sites, and near bald eagle winter night roosts and hunting perches.

Once impacts to fish and wildlife species have been thoroughly identified, they should be avoided to the maximum extent possible. This can primarily be accomplished by changing the location of project components or by constructing the project during times of the year when particular impacts can be avoided (e.g., construction during fall and winter could avoid impacts to an active raptor nest that might be disrupted by excessive human construction activity but could tolerate passing vehicles during project operation). Mitigation measures that enable passage of fish and wildlife to more successfully cross the road will help to avoid road kill. Many such measures are presented on the FHWA Critter Crossing website. They should be implemented to minimize project impacts whenever feasible.

CDOT follows the American Ornithological Society's guidance that every word in the common name of a bird is capitalized (i.e., Yellow-headed Blackbird).

Mitigation measures employed to minimize impacts to other resources (e.g., air quality (Section 9.2), geologic resources and soil (Section 9.3), water quality (Section 9.4), floodplains (Section 9.5), wetlands (Section 9.6), and vegetation and noxious weeds (Section 9.7) often benefit fish and wildlife because they mitigate impacts to ecosystem components.

In addition to evaluating the impacts on fish and wildlife from the proposed project, the cumulative impact of that project and other projects must also be

assessed. Locate projects that may affect similar fish and wildlife habitats (i.e., land cover types with which species groups are associated) and major traditional use areas (e.g., calving grounds, migration corridors, brood rearing areas, leks, traditional roost or nesting sites). Discuss cumulative impacts to fish and wildlife in general terms, noting which fish and wildlife species, habitats, and activities would be most impacted, their relative importance, and the degree to which impacts from the transportation project considered in the current NEPA document would contribute to the cumulative impacts.

OTHER ISSUES TO CONSIDER

Wildlife Crossings

When roads cross routes traveled by fish and wildlife species, individuals of some species are sometimes killed or they may be prevented from crossing and perhaps from completing some aspect of their life cycle. Roads that cross wildlife corridors can also pose a safety hazard for drivers that may result in damage to a vehicle and injury or death to its occupant(s). Section 1119(n) of SAFETEA-LU mandates a study of methods to reduce collisions between wildlife and motor vehicles, as well as preparation of a report and training on the results of this study. The FHWA Critter Crossings website addresses this issue. As traffic on roadways increases in volume and density, wildlife/vehicle collisions become an increasingly important adverse impact to drivers, as well as wildlife species.

Consideration shall be given to the connectivity of wildlife habitat in the project area, especially connectivity of habitat for large ungulates that constitute an important safety hazard for the traveling public when roads bisect otherwise connected portions of their range, or lie between spring and fall ranges. Some tools for connectivity planning include:

- Land ownership maps
- Vegetation maps
- Topographic maps
- Aerial photos
- Wildlife habitat or range maps
- Roadkill data

Wildlife crossing structures or other mitigating techniques, such as the following and others, can serve to reconnect wildlife habitat divided by a road and reduce the incident of animal vehicle collisions:

- Warning signs
- Box culverts

- Large arched culverts
- Open-span bridges
- Wildlife overpasses
- Wildlife fencing

Senate Bill 40 Wildlife Certification (CRS Title 33, Article 5)

Colorado Senate Bill 40 requires any agency of the state to obtain wildlife certification from the CPW when the agency plans construction in ". . . any stream or its bank or tributaries . . ."

In addition to CDPS requirements, CDOT must also evaluate the project for potential impacts to "any stream or its banks or tributaries…" as specified in Colorado Senate Bill 40. If a project meets any of the criteria in Senate Bill 40, CDOT must obtain a Senate Bill 40 Wildlife Certification from the Colorado Division of Natural Resources (CDNR) or CPW before construction begins. Under a MOA between CDOT and CDNR, CDOT projects that do not meet any of the criteria outlined in Section III A of the MOA remain under the jurisdiction of Senate Bill 40 but are granted a Programmatic Senate Bill 40 Certification. This Programmatic Certification gives CDOT the authority to proceed with a project after a letter of notification is sent to CPW by CDOT RPEM.

For projects that require a Senate Bill 40 Wildlife Certification, the CDOT RPEM must submit an application at least 60 days prior to planned construction or maintenance activities, and CPW will complete its review of the application within 30 days and issue the Senate Bill 40 Certification or request additional information. The application is provided in the MOA.

Other Factors

Other factors that should be considered when evaluating baseline data include any regulatory or mitigation actions that may have an effect on a project. These could include things such as officially recognized block clearances for certain species, applicable mitigation banks, such as CDOT's Plum Creek Preble's Meadow Jumping Mouse Habitat Bank, specialized initiatives like the Shortgrass Prairie Initiative or CDOT/FHWA policies that may be more restrictive than a regulation. Applicable Memoranda of Understandings with other entities should be sought out and strictly adhered to as well.

Shortgrass Prairie Initiative

http://www.coloradodot.info/programs/environmental/resources/environmental-cards/wildlife/03-0013-11.pdf/view

9.8.2 NEPA Document Sections

The content of the sections on fish and wildlife in the Affected Environment and Environmental Consequences chapter is discussed below.

AFFECTED ENVIRONMENT

The Affected Environment chapter of the NEPA document should:

- Briefly characterize the important fish and wildlife species in the project vicinity and note whether any expect impacts from the project
- Justify how a species will or will not be impacted

Impacts could include, but are not limited to such things as:

- Disturbance of habitat due to fragmentation, connectivity or human encroachment
- Decrease or removal of prey base or foraging opportunities, including changes in the vegetation community
- Decrease or removal of sheltering opportunities either as part of a lifecycle (e.g., a den) or avoidance of predators
- Disruption of historic migration routes
- Increase in water contaminates that may affect species onsite or downstream
- Increase in barriers including widened highways, guardrails, cement barriers, increased speed or number of vehicles, or increased lighting and noise
- Disruption or alteration of spawning beds
- Disruption or alteration of water regimes, temperature, or chemical make-up
- Disruption or disturbance to known lambing, fawning, or rutting areas
- Removal or depletion of water from either the Upper Colorado, San Juan, or Platte River basins, which will affect species hundreds of miles downstream (Standard Platte River Depletion Language is in Appendix F)
- Increased competition from species that may not otherwise be a factor

Impact/Mitigation Section of NEPA Document

- Discuss impacts by type for species or species groups
- Compare and contrast alternatives within impact type
- Summarize impacts by alternatives for inclusion in final summary of impacts by alternative
- Also consider cumulative impacts by type for species or species groups

If no impacts are anticipated, the section on fish and wildlife should end there. If impacts to particular species or species groups are expected, the fish and wildlife section must be expanded to include:

- A description of how the species being considered were selected and the basis for any species groups has developed, since every fish and wildlife species cannot be discussed
- Detailed information on distribution, populations, habitat features, and habitat use of these species or species groups
- The timing of particular types of habitat use and behaviors
- A discussion of the importance of maintaining a healthy and sustainable population
- A map of species habitats linked to a tabulation of important species

Environmental Consequences

In the Environmental Consequences section of the NEPA document, discuss project impacts to the species or species groups. Each impact must be described, as it is exhibited in each alternative, as it affects each species or species group. For example, discuss road kill impacts and describe the effects of the impact and how it may differ among species or species groups as it pertains to each alternative. Then discuss alternatives that have the same road kill impacts together and contrast those that differ so that similarities and differences in alternatives as to their road kill impacts on fish and wildlife is clear. Include information on the importance of the impacts to the species or species groups. Impacts on fish and wildlife may be helpful to species, such as mitigation, or harmful, such as removal of high-value habitat.

Senate Bill 40 (SB 40) Certification

Mitigation for SB 40 impacts generally requires creation, restoration, and/or enhancement of impacted riparian (streamside) areas and a SWMP to address construction-related erosion/sedimentation effects. The CatEx must contain a SWMP, mitigation plan, and signed certification from CPW before the RPEM can sign Form 128. However, EAs and EISs usually provide a conceptual mitigation plan and commit to completing the SB 40 application during final design. Wetland and T&E mitigation usually applies to SB 40 and it is helpful to cross-reference the wetland and/or T&E sections of the NEPA document when this is the case.

Impacts and mitigation should be listed in a Summary of Impacts and Mitigation Table at the end of the resource evaluation chapter of the NEPA document. The first six columns of CDOT's Mitigation Tracking Spreadsheet should be used as this summary table (Table 9-2). CDOT's Mitigation Tracking Spreadsheet (Table 9-1) can be retrieved from http://www.coloradodot.info/programs/environmental/resources/forms/CDOT%20Mitigation%20Tracking%20Spreadsheet_June%202012.xlsx/view.

9.9 Threatened/Endangered (T&E) Species

T&E species are species that have been listed pursuant to the Endangered Species Act (ESA). The ESA prohibits unauthorized take of listed species and prohibits federal agencies from funding or authorizing projects that jeopardize the continued existence of listed species or adversely modify designated critical habitat.

- An endangered species is an animal or plant species in danger of extinction throughout all or a significant portion of its range.
- A threatened species is an animal or plant species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
- A proposed species is an animal or plant species proposed in the Federal Register for listing under Section 4 of the ESA.
- A candidate species is an animal or plant species defined by the USFWS as "plants and animals for which the Fish and Wildlife Service has sufficient information on their biological status and threats to propose them as endangered or threatened under the ESA, but for which development or a proposed listing regulation is precluded by other higher priority listing activities. Conservation of these species is important because they are by definition species that may warrant future protection under the ESA."
- Critical habitat, based on the physical or biological features essential to the conservation of the species, may be included with the listing of a wildlife or fish species; such as the Colorado River Basin for razorback sucker, Colorado pikeminnow, humpback chub, and bonytail chub.

Additional terms are used to describe species that have low populations, but may or may not be formally listed. T&E species and other species with low populations can serve as indicator species that are particularly sensitive to adverse impacts to the environment and thereby are indicators of environmental problems. Their gene pool also contributes to biological diversity, uniqueness, and potential. These additional species include:

- Species of Concern – An informal term referring to a species that might be in need of conservation actions ranging from periodic monitoring of populations and threats to the species and its habitat to the necessity for listing as threatened or endangered. Such species receive no legal protection and use of the term does not

necessarily imply that a species will eventually be proposed for listing.

- Species at Risk – Any species with status under the ESA and a state's ESA. Other species at risk are those on a state's Fish and Wildlife Department's sensitive species list, and a state's Department of Agriculture lists.
- Imperiled Species – Any species that is listed as threatened or endangered by the ESA, considered a candidate for listing, or its population is in steep decline

The two sections below provide guidance on the treatment of T&E species for CDOT's NEPA projects. The first section discusses the process for evaluating T&E species. The second section discusses information on T&E species that should be in each NEPA document.

9.9.1 T&E Species Evaluation Process

Because T&E species are plants or animals that have low populations, they have requirements placed on their evaluation that are in addition to the requirements for their evaluation as plants or animals, have limited habitat availability or other barriers. As for plants and animals in general, the CDOT RPEM, resource specialist, or environmental project manager are responsible for early identification of T&E species and their habitats and may be supported by consultants. It should be noted that some projects will have far-reaching effects that may impact listed species well outside the construction zone. For example, water depletions can adversely affect species such as greenback trout or humpback chub hundreds of miles from the highway project's location.

Similarly, the study area for T&E species should be defined on the basis of direct and indirect impacts that any individuals of these species might incur from a project. Even more so for these species, the study area should be large enough to enable consideration of all possible direct or indirect project impacts.

Species that are T&E are more rigidly protected than other plant and animal species, their potential presence in the vicinity of a project must be known early. Impacts to T&E species and their designated critical habitat must be minimized to ensure compliance with the ESA. Early knowledge that T&E species and any critical habitat may be present enables project designers to avoid and minimize impacts to any species before they have progressed too far in developing the alternatives. It also enables any field studies needed to determine the presence/absence of T&E species to be conducted at the correct time.

Reasons for Evaluation of T&E Species Under NEPA

CDOT evaluates T&E species for several reasons:

- Unauthorized take of listed species is subject to both civil and criminal penalties.
- T&E species and their designated critical habitat are ecologically important.
- To comply with CDOT's environmental stewardship policy, which ensures that the statewide transportation system is constructed and maintained in an environmentally responsible, sustainable, and compliant manner.
- To comply with several legal mandates that pertain to T&E species.
- T&E plant and animal species are subject to all of the regulations identified in Section 9.7 for vegetation and in Section 9.8 for fish and wildlife. They are also subject to protection under the ESA and subsequent amendments (Endangered Species Act, 16 USC § 35).
- Section 7 of the ESA requires that "each federal agency . . . in consultation with and with the assistance of the Secretary [of the Interior] insure that any action authorized, funded or carried out is not likely to jeopardize the continued existence of endangered species or threatened species or result in the destruction or adverse modification of habitat of such species . . . which is determined to be critical . . . unless such agency has been granted an exemption for such action."
- Section 9 lists those actions that are prohibited under the ESA. Unauthorized take of a species listed in accordance with the ESA is prohibited. However, there are processes whereby take is allowed when it is incidental to an otherwise legal activity.
- Whereby an action without a federal nexus but with a potential to result in the take of a listed species could be allowed under an incidental take permit.

Regulations governing interagency cooperation for T&E species can be found in the Joint Counterpart ESA Section 7 Consultation Regulations (Joint Counterpart Endangered Species Act, 50 CFR 402). FHWA Technical Advisory T6640.8A guidance (FHWA, 1987) includes T&E species among the potentially significant impacts most commonly encountered by highway projects. The state of Colorado also protects T&E species under Non-game and Endangered Species Conservation, Colorado Revised Statutes (CRS), Title 33, Article 2 (Non-game and Endangered Species Conservation, CRS 33 § 2).

Collection and Evaluation of Baseline Information Under NEPA

For T&E species, two parallel processes require collection and evaluation of baseline information—compliance with NEPA and with ESA. For CDOT and FHWA, compliance with ESA means initiating consultation with the USFWS when it has been determined that a propsed project may affect one or more federally listed species. If the project is likely to adversely affect one one more federally listed species, formal consultation will be required. FHWA or another federal agency must then prepare a Biological Assessment (BA). A BA is a document prepared for the Section 7 process to determine whether or not a proposed major construction activity under the authority of a federal action agency is likely to adversely affect listed species, proposed species, or designated critical habitat. The BA must be submitted to USFWS in order to obtain their Biological Opinion (BO) as to whether the project jeopardizes a listed species or its habitat. A BO is a document stating the opinion of USFWS as to whether or not a federal action is likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. Further information on the USFWS consultation process can be found in the *Endangered Species Consultation Handbook Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act* (USFWS and National Marine Fisheries Services, 1998).

Collection of Baseline Information

The first step in addressing T&E species is to determine whether such species are impacted by the project. Use online data to obtain information on the following, at a minimum:

- Federally listed T&E species in Colorado (USFWS)
- State listed T&E species (CPW)
- County-specific species lists from the Natural Diversity Information Source (CPW)

Additional information and GIS data on listed species can be found on the following web sites:

- USFWS website
- CPW (additional data may be obtained through area biologists)
- Colorado Natural Heritage Program (additional data may be requested via a prescribed process)

T&E Online Resources

- USFWS Colorado Listed Species at http://ecos.fws.gov/tess_public/StateListing.do?status=listed&state=CO
- CPW Species of Concern at http://cpw.state.co.us/learn/Pages/SOC-ThreatenedEndangeredList.aspx
- CPW's Natural Diversity Information Source at http://ndis.nrel.colostate.edu
- CPW's website at http://wildlife.state.co.us/
- CNHP's website at http://www.cnhp.colostate.edu/

The latter two organizations also have databases that contain records of specific sightings of the species that they track. Some of these data are available in GIS format and can be plotted together with project features.

In addition, it is possible that some of the T&E species being impacted have critical habitat that has been formally designated by USFWS and is legally protected. Be sure to learn whether the T&E species in the project area of impact have designated critical habitat and obtain a description and map of any such habitat.

Section 9.7 and Section 9.8 of this Manual may contain additional sources that include information on T&E vegetation and fish and wildlife species, respectively.

Evaluation of Baseline Information

The process used to evaluate baseline information for T&E plant and animal species does not differ from the process used for other plant and animal species populations. However, the rigor with which these processes are applied to T&E species should be greater because of their status. Therefore, it is also important to include:

- Documented records of species occurrence within the influence of the project
- A determination of whether or not there is potential occupied habitat and, if so, to assume the species may be present
- Evaluation of potential project impacts on T&E species, their habitat and any designated critical habitat

Other Issues to Consider

The information used for compliance with NEPA and ESA must be consistent, but may not be identical. For example, in the NEPA document, CDOT and FHWA may decide to highlight all sensitive species in a separate chapter that is titled "Sensitive Species" rather than "T&E Species," while documentation prepared to comply with ESA should address only federally listed species. Less detail may be provided for individual species in the NEPA document so long as the BA is referenced, which means that information on federally listed species in the ESA document can be summarized for the NEPA document.

A BA cannot be completed until one alternative has been selected. This constraint, together with the 90 and 180 day constraints on BA preparation means that the formal initiation of the BA should be timed carefully. However, preparation of the species accounts in the BA can begin early in the project because informal lists of the species likely to require addressing

in the BA can be obtained from the online sources listed above. Such detailed species-specific information may benefit the development of project alternatives. Also, because the BA prepared on T&E species must ultimately be approved by USFWS, it is important to coordinate closely with this agency when collecting and evaluating information for the NEPA document.

9.9.2 NEPA Document Sections

The content of the sections on T&E species in the Affected Environment and Environmental Consequences chapter is discussed below.

AFFECTED ENVIRONMENT

Determine whether the Affected Environment section on T&E species should include only these species, or also discuss other species of concern, and title the section appropriately (i.e., sensitive species, species of concern etc.). If other species of concern are not discussed with T&E species, they should be highlighted in the sections on vegetation and fish and wildlife.

Information on T&E species in the Affected Environment chapter should be more detailed and species specific than what is provided in the sections on other vegetation (Section 9.7) and wildlife (Section 9.8). Discuss each T&E species separately. Provide specific information on the habitat or critical habitat each of these species occupies, what features of the habitat it uses, and why this is important to the species' population. The better this information is the more precisely potential impacts to the species can be identified.

ENVIRONMENTAL CONSEQUENCES

One of three findings must be made for listed species or critical habitat:

- No effect
- May affect but not likely to adversely affect
- May affect, likely to adversely affect

No consultation is required for "no effect" findings. For a finding of "may affect but not likely to adversely affect," CDOT will informally consult with the USFWS. If USFWS concurs with the finding in writing, the Section 7 process is complete. An "adverse effect" finding requires preparation of a BA and for FHWA or other federal agency to enter into formal consultation. At the end of formal consultation, the USFWS will issue a BO.

Discuss the impacts to each T&E species separately. Because these species and their designated critical habitat are so stringently protected, determination of precise potential impacts to them will best meet NEPA and

ESA requirements and will also benefit the project. After describing each type of impact to a species, note the importance of this impact to the species' population.

As for other resources, discuss alternatives that have the same impacts on a T&E species together and contrast those that differ so that similarities and differences in alternative impacts on a T&E species are clear. Prepare the T&E species input for a tabular summary of impacts by alternative.

For T&E species and designated critical habitat, avoidance of impacts is preferable. If the BA and NEPA document conclude that the project "may adversely affect" the species, USFWS may issue an incidental take statement in the BO. In addition, "reasonable and prudent measures" and "terms and conditions" must be adhered to during project implementation to minimize the incidental take.

If the BA and NEPA document conclude that the project "may adversely affect" the species and the USFWS BO contains a finding of jeopardy and/or adverse modification, the *Endangered Species Consultation Handbook Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act* (USFWS and National Marine Fisheries Services, 1998) outlines the necessary procedure to follow.

The lead federal agency may:

- Adopt one of the reasonable and prudent alternatives for eliminating the jeopardy or adverse modification of critical habitat in the opinion
- Decide not to grant the permit, fund the project, or undertake the action
- Request an exemption from the Endangered Species Committee (Appendix G in the *Endangered Species Consultation Handbook Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act* [USFWS and National Marine Fisheries Services, 1998])
- Reinitiate the consultation by proposing modification of the action or offering reasonable and prudent alternatives not yet considered
- Choose to take other action if it believes, after a review of the BO and the best available scientific information, that such action satisfies Section 7(a)(2)

The lead federal agency must notify the USFWS of its final decision on any proposed action that receives a jeopardy or adverse modification BO (50 CFR § 402.15(b)).

In either of the above situations, the process of ESA compliance becomes complex and the project may be severely delayed. The best course is to avoid potential impacts to T&E species whenever possible.

Impacts and mitigation should be listed in a Summary of Impacts and Mitigation Table at the end of the resource evaluation chapter of the NEPA document. The first six columns of CDOT's Mitigation Tracking Spreadsheet should be used as this summary table (Table 9-2). CDOT's Mitigation Tracking Spreadsheet (Table 9-1) can be retrieved from http://www.coloradodot.info/programs/environmental/resources/forms/CDOT%20Mitigation%20Tracking%20Spreadsheet_June%202012.xlsx/view.

9.10 Historic Properties

Historic properties are defined as any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP).

The steps in this section outline procedures for the identification and evaluation of historic properties as required by federal and state law. Qualified cultural resource professionals, as defined in the Secretary of the Interior's Professional Qualification Standards, in consultation with Native Americans, subject matter experts, and review authorities, are charged with identifying and dealing with historic properties that could have significance and could be affected by transportation projects.

The evaluation of historic properties should be initiated by the project engineer in consultation with the RPEM and appropriate cultural resource specialist.

The steps set forth in Section 106 of the National Historic Preservation Act (NHPA) describe the process that federal agencies must follow when planning undertakings that have the potential to affect historic properties.

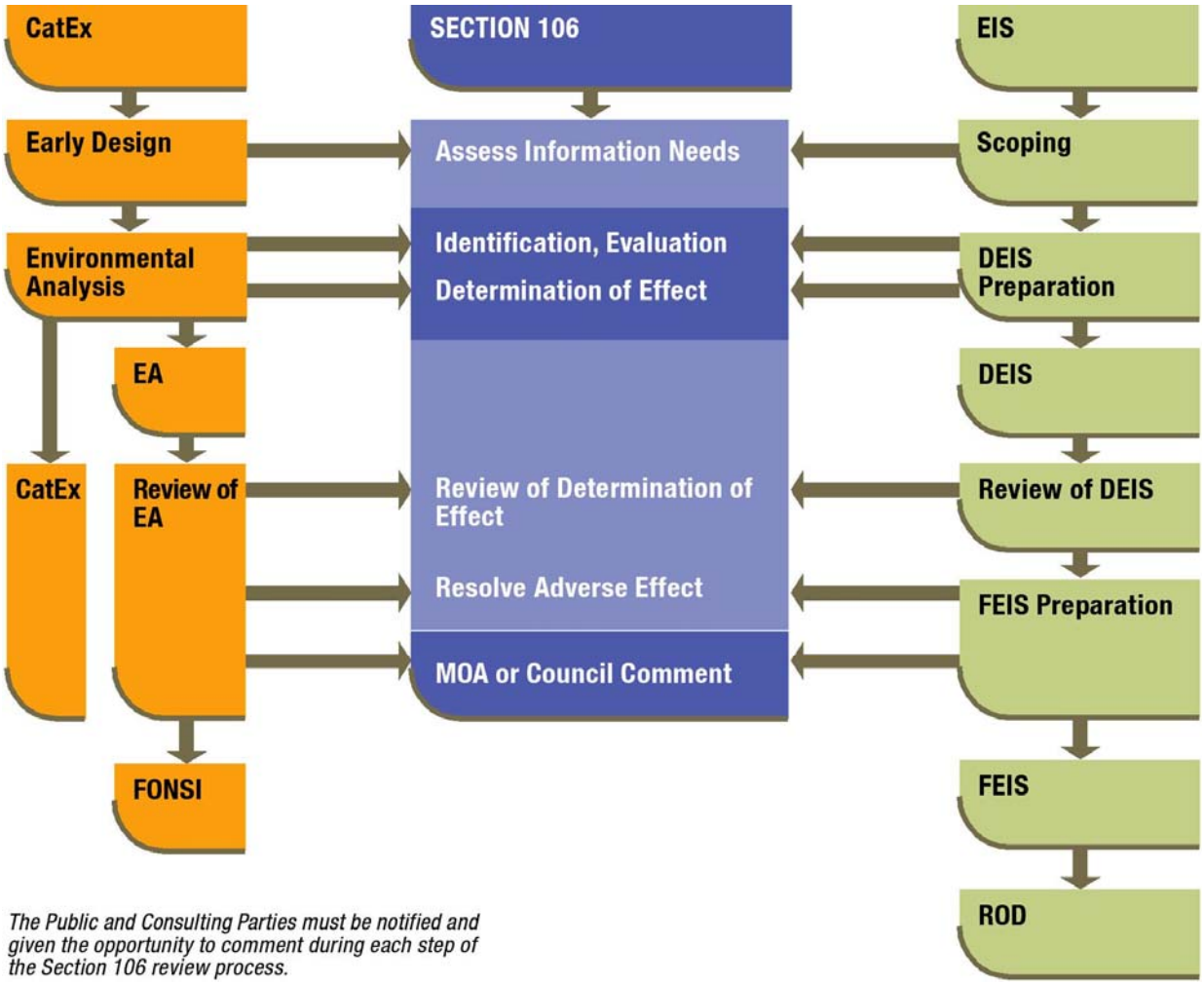
CDOT identifies potential historic properties, recommends determinations of eligibility and effect, and consults with the State Historic Preservation Officer (SHPO) on behalf of FHWA. FHWA has authorized CDOT to make these evaluations; however FHWA is legally responsible for the findings and determinations made during the Section 106 process (Figure 9-2) and also determines whether the work done by CDOT fulfills the intent of the legislation. FHWA is also responsible for ensuring the Section 106 process is undertaken early in the planning process in order to fulfill public coordination and SHPO review requirements. Otherwise, the agency may be unable to document that it has fulfilled its responsibilities under Section 106, causing issues for CDOT later in the process. The issues that can arise from improper Section 106 documentation include legal challenges that can delay or stop a project.

Identification and evaluation of historic properties must be conducted during the initial planning phases of the project. This includes when alternatives for the proposed action are first being designed and developed. By taking alternatives into account at the planning stage, there is less chance of delays in the NEPA process due to undiscovered historic properties.

Refer to the Colorado Cultural Resource Survey Manual, Volumes I and II (http://www.historycolorado.org/sites/default/files/files/OAHP/crforms_edumat/pdfs/1527.pdf) on how to conduct a cultural survey and complete the necessary forms. The entire site form should be completed; however, to facilitate a quick review, specific detail and attention should be given to the item numbers listed for each form.

- Architectural Inventory Form—This is a stand-alone form (13, 22, 29, 35, 42, and 43)
- Management Data Form—Is to be completed in combination with other forms, as appropriate, including the Historic and/or Prehistoric Archaeological Component Form for every archaeological resource (10, 32, 36, 37, and 38)
- Linear Component Form—Is to be completed for railroads, irrigation ditches, roads, trails, etc., in combination with the Management Data Form (6, 9, 14, 15, 17, and 18)
- Cultural Resource Re-Evaluation Form (7, 8, 9, 10, 12, and 13)

Figure 9-2 Coordination Between NEPA and Section 106



9.10.1 Reasons for Evaluation of Historic Properties Under NEPA

CDOT is required by state and federal law to identify and evaluate the significance of historic properties prior to commencing work related to transportation construction and maintenance activities that could potentially impact historic and/or archaeological resources. There are several state and federal regulations that direct the evaluation and protection of historic properties.

As previously discussed, FHWA has authorized CDOT to make these evaluations. According to 36 CFR 800, Protection of Historic Properties, the regulations implementing Section 106, any undertaking that may result in alterations to features of a property's location, setting, alterations to features, or use may constitute an impact depending on a property's significant characteristics, transfer, or lease. For transportation projects, an undertaking is typically defined as any construction, maintenance, or enhancement project with the potential to affect historic properties. Adverse effects can occur when historic properties listed on or eligible for listing on the NRHP are subjected to any of the following:

- Physical destruction or alteration of all or part of the property
- Isolation of the property or alteration of the property's setting when that character contributes to the property's qualification for the NRHP
- Introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting
- Neglect of a property, resulting in its deterioration or destruction
- Transfer, lease, or sale of the property

Local jurisdictions may also have their own ordinances and regulations that must be followed. The CDOT Project Engineer, in consultation with the RPEM, must coordinate with the counties, cities, and other jurisdictions where the undertaking will or may affect historic properties.

Time Frames for the Section 106 Process

The following are average time frames for completion of the Section 106 process, from notification to completion, if all necessary information is provided in a timely manner and there are no issues.

- Adverse Effect – six months or more
- No Adverse Effect – four months
- No Historic Properties Affected – two months

Note: These time frames do not include Section 4(f) evaluations, which are detailed in **Section 9.19**.

9.10.2 Collection and Evaluation of Baseline Information Under NEPA and Section 106

Section 106 of the NHPA outlines procedures to identify and determine the effects of a project on historic properties. The Section 106 and NEPA processes must be coordinated (Figure 9-2) so that the acquired information can provide the historic properties baseline information required for NEPA analysis.

The Section 106 regulations and guidance materials describe a four-step process that agencies must follow to assess the eligibility of historic properties and potential impacts to them. Surveys conducted for CDOT undertakings often carry out multiple steps with one transmittal letter to the SHPO (determinations of eligibility and effect as well as preliminary recommendations for mitigation of adverse effects) for a project. Note: This generally requires one letter each for archaeology and history, although they may be combined as the situation dictates. The regulations recognize that agencies can conduct consultation on several steps simultaneously, as long as the process includes adequate time to consider the views of consulting parties, interested parties, and the public.

Any time a project will or may have direct or indirect impacts to historic properties, whether within public right-of-way or on private land, a historic properties clearance should be discussed with the EPB or Regional Senior Staff Historian and EPB Senior Staff Archaeologist. The four step process is described in the following sections.

Step 1: Initial Consultation with Participants in Section 106

The RPEM will notify the EPB or Regional Senior Staff Historian and/or EPB Senior Staff Archaeologist if he or she is aware of any consulting or interested parties. Any federally recognized Indian Tribe with a potential interest in the Area of Potential Effects (APE) is identified and contacted during this initial phase. It should be noted that all consultation with federally recognized Native American Tribes must be conducted following a strict government to government protocol, per the NHPA. It should also be noted that the Tribes determine whether or not they have an interest in a property and it is not required that the Tribe have a modern physical presence within the state. Native American consultation is discussed in more detail in the subsection "Native American Consultation". The appropriate EPB or Regional staff specialist will contact the members of certified local governments, local historical societies, museums, historic preservation commissions, or other knowledgeable groups/individuals who might be able to provide views or comments on an undertaking or have specific knowledge concerning historic properties. Notification of the public and/or historic preservation organizations and individuals will occur commensurate with the type of undertaking, its anticipated effects on historic properties, and the level of federal involvement.

Step 2: Identification of Historic Properties

Step 2 determines whether any resources that may be affected by an undertaking have the potential to be eligible for or listed on the National or State Registers of Historic Places. It is not necessary for a resource to be

Eligibility Criteria

- Association with significant events or people
- Technological, engineering, or architectural significance
- Ability to yield information about prehistoric or historic site
- Retains physical integrity or is able to demonstrate or communicate the qualities of its significance
- For properties less than 50 years old, review Criterion G to determine if the property is an exception.

listed on the NRHP to be afforded protection under the law, as eligible properties are also protected. NRHP-eligible resources must meet certain criteria, including association with significant events or people; technological, engineering, or architectural significance; or the ability to yield information about a prehistoric or historic site. In addition to meeting the significance criteria, a resource must retain physical integrity or be able to demonstrate or communicate the qualities of its significance. Except under exceptional situations, cemeteries, birthplaces, churches, structures that have been moved from their original location, reconstructed structures, memorial or commemorative structures, and structures less than 50 years old, are not considered eligible to the NRHP. Isolated artifacts and features also are generally not NRHP-eligible.

If a property is determined not eligible for the NRHP, the Section 106 process is completed. However, even though a property may not have the significance or integrity to be nationally eligible, it can still be eligible for, or listed on, the State Register of Historic Places (8CCR 1504-5). If so, it must be considered under the Colorado Register of Historic Places Act (CRS 24-80.1). For more information about how CDOT evaluates projects under these state laws, please see Section 9.10.3 below. In addition, some local governments in Colorado have historic preservation ordinances and/or lists of local landmark districts and properties. Some properties may be listed as locally significant, and impacts to these resources must be coordinated with the local government.

In addition to historic properties that are protected under Section 106 because of their age and physical attributes, properties that have traditional cultural significance because of the role they play in a community's historically rooted beliefs, customs, and practices must be addressed by Section 106. In this context, "traditional" refers to beliefs, customs, and practices of a living community of people that have been passed down through the generations, usually orally or through practice. Such properties are also eligible for inclusion on the NRHP. Examples of such properties on the NRHP, provided in National Register Bulletin 38, *Guidelines for Evaluating and Documenting Traditional Cultural Resources* (Parker and King, 1998), include the following:

- A location associated with the traditional beliefs of a Native American group about its origins, its cultural history, or the nature of the world
- A rural community whose organization, buildings and structures, or patterns of land use reflect the cultural traditions valued by its long-term residents

Suggested Reference Materials

- National Register Bulletin: How to Apply the National Register Criteria for Evaluation (#15)
- National Register Bulletin: Defining Boundaries for National Register Properties (#21)
- Colorado Cultural Resource Survey Manual Vol. 1 & 2

These references and other useful guidance materials can be found at the Colorado Historical Society Office, Archaeology and Historic Preservation

- An urban neighborhood that is the traditional home of a particular cultural group, and that reflects its beliefs and practices
- A location where Native American religious practitioners have historically gone, and are known or thought to go today, to perform ceremonial activities in accordance with traditional cultural rules of practice
- A location where a community has traditionally carried out economic, artistic, or other cultural practices important in maintaining its historic identity

Determine Undertaking's Area of Potential Effects (APE)

The EPB or Regional Senior Staff Historian and EPB Senior Staff Archaeologist are responsible for determining and documenting the APE for each project. In all cases, an APE must be developed in consultation with CDOT cultural resource staff and the SHPO and, in most cases, prior to the intensive-level field survey. The APE is not determined on the basis of land ownership or legal parcel boundaries and does not end at the highway right-of-way boundary. The APE includes:

- All alternatives being considered for the undertaking
- All locations threatened with ground disturbance
- All locations from which the undertaking may be visible or audible
- All locations where the undertaking may result in changes in traffic patterns, land use, public access, and so on
- All areas where there may be indirect as well as direct effects

An APE is determined according to specific project circumstances, and it is not necessary to intensively survey all historic properties within every APE, at the discretion of the agency. However, all potential historic properties within the APE must be taken into account when assessing project effects. An APE boundary may change during the course of a project as alternatives are modified, new alternatives are considered, or new effects to historic properties are identified.

Definition of an Undertaking's APE

The geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may vary for different types of effects caused by the undertaking [800.16(d)].

SHPO Concurrence with Determinations of Eligibility

Once potential historic properties are identified within the APE, the EPB or Regional Senior Staff Historian, EPB Senior Staff Archaeologist, and consultant (where applicable) evaluate each property for historical or archaeological significance and recommend whether or not the property is eligible for the National or State Registers. If it is determined that no historic properties exist within the APE, or that historic properties exist but will not be impacted by the work, and the SHPO concurs with this determination, the

resulting decision is that no historic properties are affected, and the Section 106 process is completed. If NRHP-eligible properties exist and there is potential for impact to these properties, the project team continues to Step 3.

Step 3: Assessment of Effects

During Step 3, the EPB or Regional Senior Staff Historian, EPB Senior Staff Archaeologist or cultural resource consultant applies the criteria of adverse effect to any eligible or listed historic properties within the APE. This process involves consultation with the SHPO and federally recognized Native American Tribes. Interested parties identified during Steps 1 and 2 are notified of the effects. Effects include direct, physical impacts to historic properties, as well as indirect or secondary impacts that may include noise, visual, atmospheric, or vibration elements that may diminish a property's integrity or alter the qualities that make it eligible for the NRHP.

No Adverse Effect

The finding of no adverse effect can be applied when an undertaking's effects do not meet the criteria of adverse effect but are still considered to have an effect on a property. This finding can also be applied when specific conditions are met to avoid adverse effects. If SHPO concurs with the finding of no adverse effect, CDOT may proceed with the undertaking and the Section 106 process is completed. The Advisory Council on Historic Preservation (ACHP) will not review findings of no adverse effect, except under unusual circumstances. If the SHPO fails to respond within 30 days of their receipt of the finding, CDOT may assume SHPO concurrence with the finding and proceed with the project.

Adverse Effect

An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify it for inclusion on the NRHP in a manner that would diminish the integrity of the property's location, design, settling, materials, workmanship, feeling, or association (36 CFR Part 800.5(a)(1)). Adverse effects are further defined below.

If the determination results in a finding of adverse effect, CDOT must proceed to Step 4 and consult further with the SHPO and federally recognized tribes that request further involvement, while providing information to other interested parties, to resolve or mitigate adverse effects to historic properties.

According to the regulations, the SHPO has 30 days from receipt of the documentation to provide comments to CDOT. If they do not submit their comments within the 30-day period, CDOT is authorized by the regulations

to assume SHPO concurrence. If the SHPO does not participate within the specified time frame for one phase of a project (i.e., eligibility determination), that does not preclude their participation in further phases of a project (i.e., determinations of effect, consultation, and final review of NEPA documentation).

Step 4: Resolution of Adverse Effects

The purpose of Step 4 is to develop strategies that avoid, minimize, or mitigate adverse impacts to historic properties but also meet the basic objectives of all interested stakeholders. Measures to mitigate negative impacts to historic properties can include adjusting the proposed alignment to avoid impacting the resource, moving the resource to a new location (which generally does not apply to archaeological localities and negates NHPA eligibility), and, as a last resort, photographic and written recordation of the resource prior to demolition. Ideally, alternatives that avoid historic properties will already have been considered prior to this step. FHWA notifies the ACHP of an adverse effect determination and provides specific documentation for their review of the project. The ACHP is given 15 days from receipt of the documentation to determine whether or not they will participate in consultation. If a response is not received within that time frame, the agency continues the consultation without the involvement of the ACHP. In addition, FHWA must invite the ACHP to participate in the consultation on adverse effects when:

- FHWA wants the ACHP to participate (i.e., for very controversial or high-profile projects)
- The undertaking will have an adverse effect on a National Historic Landmark
- The project will result in the preparation of a Programmatic Agreement

To resolve adverse effects to historic properties on a project-by-project basis, interested parties develop a Memorandum of Agreement (MOA) outlining agency responsibilities to avoid, minimize, or mitigate adverse effects. In virtually all cases, CDOT staff develops and facilitates project-specific MOAs. Significant archaeological sites, which previously were exempt from this process, are now subject to development of a MOA prior to data recovery excavations. If the ACHP decides to join the consultation, a MOA is executed with its participation. If not, the agreement is developed and executed by FHWA and SHPO, with CDOT as an invited signatory. In addition, the agencies may invite other organizations (e.g., Native American Tribes, local historic preservation commissions, etc.) to participate as invited signatories in the development of a MOA if those entities will assume a

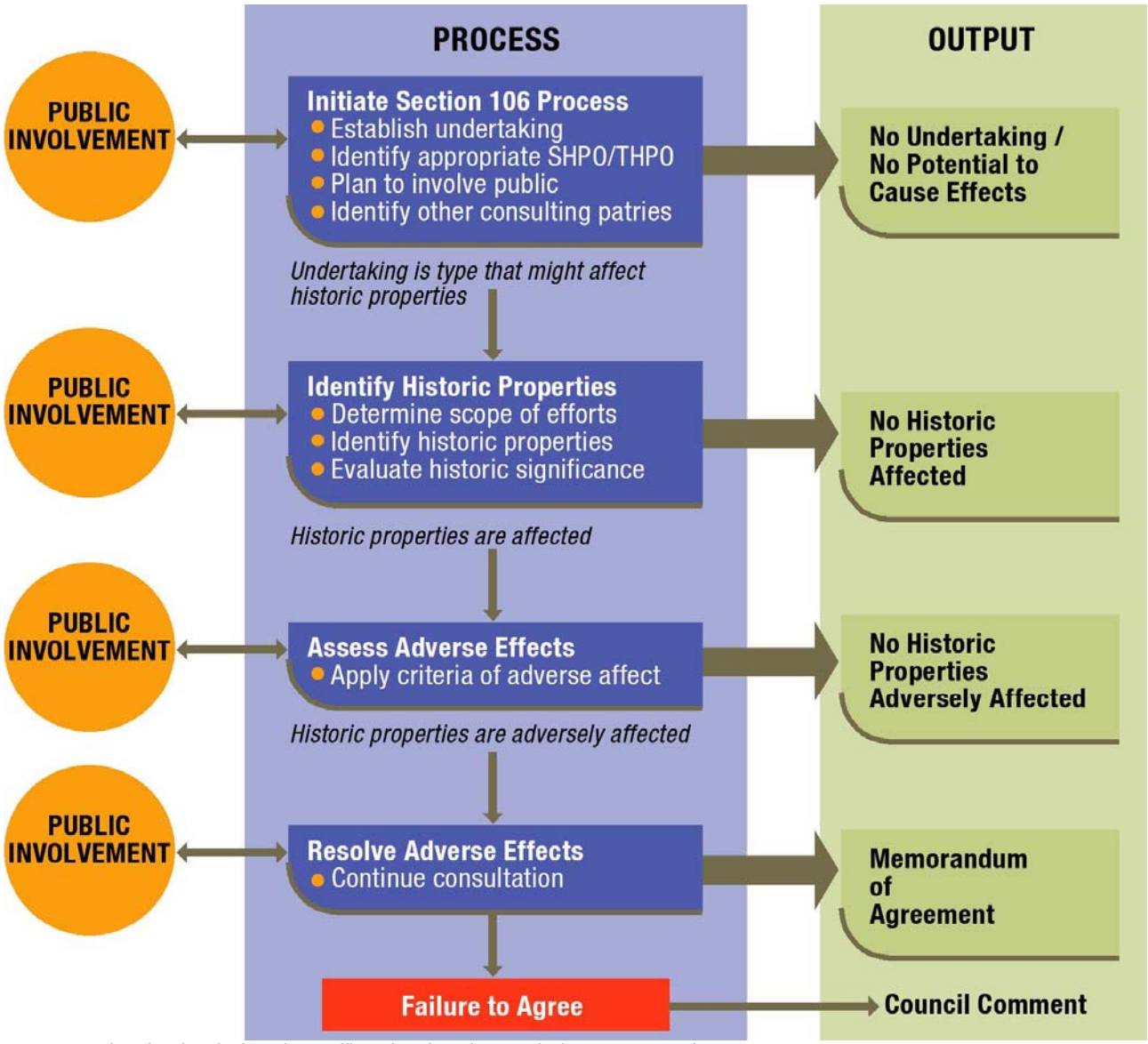
specific role or responsibility as outlined in the MOA. Other interested parties lacking explicit action items may be invited to sign the document as concurring parties.

The execution and implementation of the stipulations in a MOA provide evidence of FHWA's compliance with Section 106. The MOA is submitted to the ACHP for filing, and CDOT, on behalf of FHWA, ensures the mitigation stipulations are carried out in accordance with the MOA. Unless project circumstances change and other potentially historic properties will be affected by an undertaking, or CDOT/FHWA is unable to fulfill the stipulations of the MOA, the Section 106 process is considered complete.

Section 106/NEPA Merger Timeline

Merging the Section 106 and NEPA processes (Figure 9-3) provides an opportunity to streamline the approach to historic properties compliance, especially for projects that will or may have complex historic or archaeological resource issues. Determination of the utility of a merger process will be made by CDOT and FHWA early in project planning, and coordinated closely with the SHPO and ACHP. FHWA and CDOT will first determine if a partial or full merger process will be implemented. Streamlining with a partial merger occurs primarily at the Determination of Effects stage, as the Draft EIS will serve as the conduit for transmittal of effects information to the SHPO, rather than the use of traditional correspondence. Conversely, a full merger entails incorporating all phases of the Section 106 process (determinations of eligibility and effects, and resolution of adverse effects) in the EA or Draft EIS. This process effectively replaces all or most standard correspondence between the transportation agencies and SHPO until release of the draft NEPA document, at which point the SHPO (and ACHP, as appropriate) will comment on the Section 106 issues at once. If the NEPA document is a Draft EIS, FHWA and CDOT may document the measures to avoid, minimize or mitigate adverse effects in the ROD; unless there is a dispute related to historic properties compliance, a MOA is unnecessary, although the agencies may elect to execute a MOA at their discretion. For an EA and FONSI, a MOA is required in addition to documenting measures to address adverse effects in the FONSI.

Figure 9-3 Section 106 / NEPA Merger Process



Source: Colorado Historical Society, Office of Archaeology and History Preservation. Tribal Historic Preservation Officer (THPO)

For the merger of Section 106 and the NEPA process, early consultation with the SHPO is essential and should include:

- Establishment of the APE
- Identification of historic properties
- Development of alternatives
- Assessment of effects of the undertaking
- Dispersal of Section 106 information during public involvement activities
- A review process for the Draft EIS and Final EIS
- If necessary, development of appropriate mitigation measures, drafting of a MOA, and incorporation of mitigation measures into the ROD

According to 36 CFR 800.8, the NEPA process and documentation can be used for Section 106 purposes if the agency official has notified in advance the SHPO/THPO and the ACHP that it intends to do so, and the documentation must meet the standards set forth in 36 CFR 800.8 (c) (1) through 36 CFR 800.8 (c) (5).

9.10.3 Other Issues to Consider

Requesting Archaeology and Historic Surveys from CDOT Staff

For most CatEx and other types of smaller-scale undertakings, the EPB or Regional Senior Staff Historian and/or EPB Senior Staff Archaeologist (or their staff) will visit the site and conduct an on-the-ground survey, as appropriate, and prepare the necessary reports and paperwork, time and schedules allowing. Otherwise, projects are forwarded to the statewide consultant under contract to EPB. Project implementation involves completing a survey (Figure 9-4), preparing reports and letters, and forwarding documentation to the SHPO, ACHP, FHWA, or other agencies, as necessary. Meetings with the SHPO will be scheduled as needed by the EPB or Regional Senior Staff Historian and, on rare occasions, by the EPB Senior Staff Archaeologist. Copies of all correspondence will be forwarded to the RPEMs for their files.

Required Information for Clearance of Archaeological Resources

- Project number and name
- Appropriate accounting numbers
- Brief description of the project

Required Information for Clearance of Historic Resources

- Project number and title, and all appropriate accounting information
- Map showing project location
- Design plans (if available)
- Copies of the 128/463 forms, memos, or other documents describing the project
- Brief description of resources to be impacted, (i.e., CDOT) structure numbers and locations, or description of ditch, farm house, neighborhood, etc.
- Project Schedule, with estimates of FIR, FOR, and advertisement dates
- Written memo or telephone conference with the EPB or Regional Senior Staff Historian describing concerns about potentially historic resources or other project-related issues

- Physical dimensions of the study corridor, including beginning and ending mileposts and corridor width
- A copy of a 7.5 minute USGS topographic quadrangle or county map clearly showing the extent of the proposed undertaking, and engineering design plans, if available
- In order for a clearance to be provided in a timely manner, a specific due date must be furnished
- If temporary or permanent easements beyond the existing right-of-way are required to accommodate detours, line-of-sight improvements, shoulder widening, or material source areas (among others), this should be noted and right-of-entry forms obtained and forwarded to the EPB Senior Staff Archaeologist
- CDOT Forms 128 and 463 can also be provided, but it is important to note that these forms do not by themselves constitute an adequate clearance request
- Field and archival investigations should generally be scheduled for completion by the FIR

Process for Requesting and Completing Clearance of Historic Resources

RPEMs are encouraged to contact the EPB or Regional Senior Staff Historian as early as possible to discuss undertakings that have the potential to impact historic properties. It is important to identify potential historic resources early in the planning process to allow enough time for coordination with regulatory agencies and consulting parties. Section 106 also requires coordination with local historic preservation commissions, if they have jurisdiction within the project area, in addition to public notification. RPEMs will notify the EPB or Regional Senior Staff Historian if a project has the potential to affect historic resources—generally projects that require right-of-way where buildings, irrigation ditches, railroad lines, or similar features are located.

Process for Requesting and Completing Clearance of Archaeological Resources

Archaeological resources are the material remains of past human life or activities which are of archaeological interest. Prehistoric archaeological resources include remains from human activities prior to written records. In Colorado, prehistoric resources date to the time before sustained European contact with Native American populations. Historic archaeological resources are locations with remains from the historic period that can be examined

using archaeological techniques. Both prehistoric and historic archaeological resources often have artifacts and other indications of *in situ* subsurface remains.

Historic resources are those that are 50 years or older; however, resources less than 50 years old are surveyed if they have exceptional significance or contribute significant information to the historical record, such as intact Nike Missile sites. Typical historic resources include buildings, residential neighborhoods, commercial districts, agricultural complexes, bridges, irrigation canals and ditches, reservoirs, and railroad lines. Less obvious historic resources include structure foundations, trails, sidewalks, and landscapes, including vegetation and dumps. At the earliest possible date in the planning process for a proposed undertaking, the RPEM will forward to the EPB Senior Staff Archaeologist a written request for an archaeological clearance. Undertakings include, but are not limited to, highway construction projects, off-system roadway projects, maintenance activities, transportation enhancements, and property transfers or sales. Archaeological investigations initiated by private contractors for activities associated with CDOT projects—such as undesignated material sources and equipment staging areas—are the responsibility of the contractor. It is imperative that project managers and contractors are made aware of their responsibilities in this regard, and that all appropriate permits and clearances are obtained prior to initiating ground disturbance for any activity peripheral to actual construction.

Requirements for Consultants Conducting Historic and Archaeological Surveys

All consultants are expected to perform a field survey of APEs in accordance with the Secretary of Interior's *Standards for Archaeology and Historic Preservation, and the Colorado Cultural Resource Survey Manual, Volume I (The Steps) and Volume II (The Forms)* (USDOI NPS, 1983). Prior to initiating work on an undertaking, consultants must coordinate directly with the appropriate CDOT cultural resource staff to discuss project approach. Consultants are required to conduct an OAHP file search prior to field investigations and review all pertinent maps and written information pertaining to previous inventories and documented sites, if applicable. It may be necessary to search other archival sources as well (e.g., federal agency files). In most cases, all sites surveyed will be recorded in their entirety, even if they extend beyond the limits of the project area.

For historic resources (generally not including historic archaeological sites), consultants may find it advantageous to discuss survey results and preliminary determinations of eligibility with Office of Archaeology and Historic Preservation (OAHP) staff in order to confirm that all pertinent

information has been collected for the survey. The EPB or Regional Senior Staff Historian does not necessarily need to attend these informal meetings unless required by unusual situations. However, the EPB or Regional Senior Staff Historian must be informed in advance when consultants plan to speak with OAHP staff. In most cases, the consultant is responsible for assessing effects to historic and archaeological resources if or when design plans have been created for specific transportation projects. The assessment of effects should be undertaken in close consultation with the EPB or Regional Senior Staff Historian and/or EPB Senior Staff Archaeologist.

Consultants must submit all documents generated by the survey directly to the EPB or Regional Senior Staff Historian or EPB Senior Staff Archaeologist, as appropriate, who are responsible for direct coordination with the SHPO. Where a federal land managing agency has assumed the duties of Section 106 "lead agency" for a project, the EPB or Regional Senior Staff Historian or EPB Senior Staff Archaeologist will forward all documentation to that agency, which will review the findings and subsequently send it to the SHPO. Under no circumstances will a consultant send final documents or correspondence regarding specific projects directly to the SHPO.

Consultants conducting field surveys must submit the following documentation to the EPB or Regional Senior Staff Historian and EPB Senior Staff Archaeologist (Figure 9-4):

1. Historic and/or Archaeological Resource Survey Report, formatted according to the OAHP survey guidelines, documenting inventory of prehistoric or historic resources encountered in the project area, including recommendations of NRHP eligibility for each resource. Consultants will provide three copies of the survey report (preferably unbound and corner-stapled, depending on size), and two copies of OAHP inventory forms (more on occasion, if needed). All reports, site forms and other documentation must be printed double-sided; single-sided copies are unacceptable unless previous justification and notification to this effect has been made to CDOT.

2. 7.5 minute USGS topographic quadrangles (or photocopied portions thereof) with the APE clearly marked, and separate quadrangle maps (generally as a report appendix) showing the location of all cultural resources present in the survey area. An explanation of the APE boundaries and why these boundaries were chosen must be provided, taking into account direct and (for historic resources) indirect impacts.

Figure 9-4 Cultural Resource Survey Forms – Which Forms to Use When

RESOURCE TYPES / CULTURAL RESOURCE FORMS	Architectural Inventory Form (1403)	Management Date Form (1400)	Historic Archeological Component Form (1402)	Prehistoric Archeological Component Form (1401)	Rock Art Component Form (1407)	Linear Component Form (1418)	Paleontological Component Form (1409)	Vandalism Report Form (1406)	Cultural Resource Revisitation Form (1405)	Isolated Find Record (1408)	Post World War II Subdivision Form (1403b)	Colorado Cultural Resources Survey-Historic Cultural Landscapes (1404)
Historic Architecture (for uses during architectural surveys only)	●											
Historic Architecture (for uses during archaeological surveys only)		●										
Non-Architectural Historic Archaeological Site		●	●									
Prehistoric Archaeological Site		●		●								
Rock Art Component		●		●	●							
Linear Feature		●				●						
Paleontological Site		●					●					
Vandalized Site		●						●				
Revisited Site									●			
Isolated Find										●		

3. 4 X 6 inch traditional 35 millimeter black and white prints, or black and white digital prints of historic resources over 50 years of age, and/or color photographs of archaeological resources must accompany the site forms. Consultants should review the OAHP "Photographic Standards for Intensive Level Historical and Architectural Surveys" for more specific information about acceptable photographic documentation.

4. For historic surveys, a Draft Determination of Eligibility and Effects letter to SHPO must be submitted to the EPB or Regional Senior Staff Historian on compact disc (CD) or via electronic mail. Samples of these letters are available from the EPB or Regional Senior Staff Historian.

Native American Consultation

As stipulated in the NHPA and the revised ACHP regulations, federal agencies must afford the Native American community a reasonable opportunity to comment on and participate in federal undertakings in the context of the Section 106 process. Federally recognized Tribes are, by law, considered sovereign nations and as such FHWA is obligated to initiate government-to-government cultural resource consultations on transportation projects when federal funding or a federal action is involved. FHWA has delegated most day-to-day consultation activities in this regard to CDOT. The EPB Senior Staff Archaeologist is the individual charged with coordinating Native American consultation for all EA- and EIS-level projects. Tribal consultation is initiated early in the project development process and entails an on-going administrative relationship between the federal agency, CDOT, and consulting Tribes. Consultants may on occasion be used to facilitate consultation activities on a project-specific basis, but generally the EPB Senior Archaeologist will complete all associated tasks in this regard.

Consultation under the Colorado Register of Historic Places Act (CRS 24-80.1 and 8 CCR 1504-5)

The Register of Historic Places Act (CRS 24-80.1) states that the planning and activities of state agencies must take into account the preservation of historically significant cultural resources of the state. It also outlines how state agencies should evaluate actions that have the potential to affect properties eligible for or listed in the State Register of Historic Places (SRHP). The Rules and Procedures implementing the Act (8 CCR 1504-5) includes guidance regarding the evaluation of properties for State Register eligibility, how to assess effects, and consultation with the State Historical Society.

CDOT conducts consultation under the Register of Historic Places Act when projects are state funded (i.e., lack federal funding or another nexus) and when there is the potential to affect CDOT-owned properties that may be eligible for or listed in the State Register of Historic Places. A four-step process has been developed that is similar to, but less rigorous than, the process followed for Section 106 consultation.

Step 1: Initial Consultation and Participants

The Register of Historic Places Act requires state agencies to notify the State Historical Society of proposed actions that have the potential to effect properties that are listed in the SRHP. CDOT includes this notification, along with eligibility and effect determinations, in a letter to the SHPO. As with Section 106 consultation, CDOT has identified the SHPO as the point of contact for the SRHP consultation process.

The state act does not specifically require consultation with local interested parties or Certified Local Governments. However, following the protocol outlined in the CDOT Environmental Stewardship Guide, EPB staff identifies and includes interested parties in the consultation process to ensure that they are aware of the project and have an opportunity to provide information about resources that may be affected by the proposed action.

Although the state law does not reference the development of an APE, the Act does require state agencies to identify properties within "the area of proposed action" (24-80.1-104). For state-funded projects, CDOT does not request SHPO agreement regarding the "area of proposed action" but does provide a map or graphic depicting this area to clarify the project and resource locations.

Step 2: Identification of Properties

Step 2 involves determining if resources affected by a state-funded action have the potential to be eligible or listed in the SRHP. The EPB or Regional Senior Staff Historian, or EPB Senior Staff Archaeologist, will evaluate the property to determine it meets one or more of the Criteria for Nomination as outlined in the National Register of Historic Places Act:

a) The association of such property with events that have made a significant contribution to history;
b) The connection of such property with persons significant in history;
c) The apparent distinctive characteristics of a type, period, method of construction, or artisan;
d) The geographic importance of the property;
e) The possibility of important discoveries related to prehistory or history.

Criteria for Nomination a, b, c, and e are similar to the NRHP Criteria for Evaluation (NRHP Criteria). Criterion for Nomination D (geographic importance of the property) is not addressed by the NRHP criteria. The state Criteria also do not include NRHP Criterion Considerations A through G, which cover exceptional situations including cemeteries, birthplaces, churches, reconstructed structures, memorial or commemorative structures, and structures less than 50 years old. CDOT determines if a property meets the Criteria for Nomination and consults with the SHPO to determine if the properties are significant.

Step 3: Evaluation of Effects

The Register of Historic Places Act includes guidance on how to assess effects and consult with the State Historical Society regarding those effects. The Act defines an "effect" as "any change in the quality of the historical, archaeological, or architectural character that qualifies the property for entry in the state register." Unlike Section 106, the degree of effect (adverse effect, no adverse effect, no historic properties affected) is not defined in the state laws, but CDOT uses these categories to describe effects when consulting for state-funded actions.

The Act outlines the process by which state agencies consult regarding eligibility and effects. State agencies are required to notify the State Historical Society of the proposed action, identify properties within the area of the proposed action, request a determination of effect on properties, and afford the State Historical Society 30 days to review the proposed action. If there is disagreement over a finding, the state agency has 30 days to negotiate an agreement with the Historical Society. If no agreement is reached during this time, the governor makes the final determination.

CDOT has modified the consultation process so that CDOT, not the State Historical Society or SHPO, determines the significance of the property and whether there is an adverse effect. CDOT submits these determinations and requests concurrence from SHPO. If there is agreement regarding the eligibility of the resource and there is a finding of no adverse effect, the consultation process is complete.

Step 4: Resolution of Adverse Effects

When an adverse effect to a property is identified for a state action, CDOT includes mitigation recommendations in a letter to SHPO, agrees to complete mitigation before the property is affected, and provides SHPO an opportunity to review the final mitigation. Because there is no federal involvement for state funded actions, it is not necessary to notify the ACHP of adverse effects and there are no requirements to execute a formal MOA. Once mitigation has been completed and reviewed by SHPO, the

consultation process under the State Register of Historic Places Act is complete.

9.10.4 NEPA Document Sections

The content of the sections on historic properties in the Affected Environment and Environmental Consequences chapter is discussed below. For projects having complex historic properties issues, these sections shall contain subsections on "Historic Resources," "Archaeological Resources," and "Native American Consultation."

AFFECTED ENVIRONMENT

Brief but thorough data specific to the historic properties within the APE must be presented. The Affected Environment chapter must contain all relevant information related to the status and disposition of historic properties in the study area, and omit data that has no bearing on the transportation decision ultimately made as a result of the FONSI or ROD. Depending on the document and the resources present in an APE, historic and archaeological resources can be discussed either jointly or independently.

Other guidelines to be considered include using data tables whenever feasible, especially if many properties are present. Lengthy narrative site descriptions should generally be avoided. An adequate document will also be specific when discussing effects and proposed mitigation of adverse effects for NRHP eligible or listed sites. Discussion shall focus on properties that require protection under the law (i.e., are eligible) and exclude information regarding non-NRHP eligible resources.

ENVIRONMENTAL CONSEQUENCES

This chapter of the NEPA document summarizes the efforts taken during the Section 106 evaluation process and any findings. Discuss alternatives that have the same historic property impacts together and contrast those that differ, so that similarities and differences in impacts are clear. Effects to historic properties as a result of alternatives must be quantified as specifically as possible. All interagency correspondence documenting the evaluation should be attached as an appendix to the NEPA document.

As shown in Figure 9-5, one of the steps of the Section 106 evaluation process is the resolution of adverse effects. Discuss strategies to avoid, minimize, or mitigate adverse effects to historic properties in this section.

Basic Information to include in a NEPA document includes:

- Brief overview of the "whys and whats" of Section 106
- Brief description of SHPO and consulting party consultation regarding methodology(s) and development of the APE, file searches, and field inventory(s)
- The number and types of historic properties, and under which NRHP criteria they are eligible

  NRHP-eligible archaeological sites are sensitive resources that are exempt from the provisions of the Freedom of Information Act (FOIA), and as such should never be reflected on maps or otherwise have specific locational data included in a NEPA document. Historic resources, however, can and should be illustrated on mapping, including the APE boundary.

Impacts and mitigation should be listed in a Summary of Impacts and Mitigation Table at the end of the resource evaluation chapter of the NEPA document. The first six columns of CDOT's Mitigation Tracking Spreadsheet should be used as this summary table (Table 9-2). CDOT's Mitigation Tracking Spreadsheet (Table 9-1) can be retrieved from http://www.coloradodot.info/programs/environmental/resources/forms/CDOT%20Mitigation%20Tracking%20Spreadsheet_June%202012.xlsx/view.

9.11 Paleontological Resources

Paleontological resources constitute a fragile and nonrenewable scientific record of the history of life and related natural processes on earth. These resources include vertebrate, invertebrate, and plant fossils. In Colorado, plant and animal remains found in deposits post-dating the end of the Pleistocene Epoch (approximately 10,000 radiocarbon years ago), at which time modern fauna and flora were established and human occupation is well-documented, are not considered paleontological in nature. For the purposes of this Manual, paleontological resources include fossils, associated radiometrically- and/or paleomagnetically-datable rocks, sediments, or organic matter, and the physical characteristics of the fossils' associated sedimentary matrix.

The two sections below provide guidance on the treatment of paleontological resources for CDOT's NEPA projects. The first section provides guidance for evaluating paleontological resources. The second section outlines paleontological information that will be in each NEPA document.

9.11.1 Paleontological Evaluation Process

The evaluation of paleontological resources shall be initiated by the RPEM (or their designee) in association with the CDOT Staff Paleontologist.

Generally paralleling the archaeological program, paleontological clearances are required to proceed to construction, commence maintenance activities, or initiate materials excavation. This applies to all projects that propose any effect off the existing road prism, all CDOT-provided materials sources, and those materials sources adjacent to interstates where direct contractor access to the roadway is an issue. Previous disturbance, including cutting and even paving of an area to be impacted, does not automatically relieve the responsibility to consider potential affects to paleontological resources, particularly on projects where excavation to previously undisturbed bedrock is anticipated. Typically (although not exclusively), the scientific importance of paleontological resources is not as intimately tied to their precise original location (as in the case of archaeological resources), so that even surface finds of fossils in previously disturbed areas can be of scientific importance.

The paleontological evaluation will be conducted when alternatives for the proposed action are first being designed.

Paleontology Regulations and Guidance

Historical, Prehistorical, and Archaeological Resources Act (Colorado Revised Statue 24-80-401 ff, aka State Antiquities Act)

- The Act protects all fossils on state owned lands and lands controlled by any subdivision of state government.

Federal Land Policy and Management Act (FLPMA) of 1976 (USC Title 43, Section 1732)

- This section authorizes the Secretary of the Interior to issue regulations providing for the use, occupancy, and development of public lands through leases, permits, and easements.

Paleontological Resources Preservation Act (PRPA) of 2009 (16 USC 470aa-aaa11)

- This Act requires the Secretaries of the Interior and Agriculture to manage and protect paleontological resources on federal lands using scientific principles and expertise.

Reasons for Evaluation of Paleontological Resources Under NEPA

Requirements to locate and assess the scientific importance of fossils on state- and federal-owned lands are not stated explicitly in the law. However, state law is implicit in its requirement to avoid any damage to, or destruction or removal of, the resource without a permit.

The CDOT Staff Paleontologist, or any paleontological consultant working for CDOT, must be named on a current State of Colorado permit to search for and collect fossils on state-owned lands. Permits are obtained from the OAHP in Denver. FHWA considers protection of fossils on FHWA-funded projects a NEPA issue, but the extent of work required to protect the resource is based on the degree of protection afforded by each state's laws.

For highway projects that cross BLM-administered lands, BLM utilizes the Federal Land Policy and Management Act (FLPMA) of 1976 and the Paleontological Resources Preservation Act (PRPA) of 2009 to regulate the collection of fossils. The CDOT Staff Paleontologist, or any paleontological consultant working for CDOT, must be named on a current State of Colorado BLM fossil collecting permit to collect fossils on BLM-administered lands in Colorado. Permits can be obtained from the Colorado State Office of the BLM in Lakewood.

For highway projects that cross USFS-administered lands, fossil collection is regulated under the Paleontological Resources Preservation Act (PRPA) of 2009. The CDOT Staff Paleontologist, or any paleontological consultant working for CDOT, must hold a current USFS Special-Use Permit to collect scientifically significant fossils on USFS-administered lands in Colorado.

Paleontological Reports Authored by Consultants

Consultant reports are typically expected to provide a more detailed account of the factors described under Step 1 than is typical of in-house reports because the CDOT Staff Paleontologist keeps more detailed data on file where it is readily accessible for CDOT's use.

Consultant reports will include two copies of any newly recorded fossil localities and previously recorded fossil localities for which a field survey has provided additional locality data for insertion in the CDOT Staff Paleontologist's files. In order to conserve document space, all written materials submitted to CDOT must be double-sided.

Consultant reports should be submitted in electronic format.

Collection and Evaluation of Baseline Information Under NEPA

The paleontological clearance process consists of four steps: (1) initiation of paleontological clearance, (2) initial research, (3) on-the-ground reconnaissance, and (4) report of results.

Step 1: Initiation of a Paleontological Clearance

To initiate a paleontological clearance, a request and accompanying data shall be sent by the RPEM to the CDOT Staff Paleontologist. A request for paleontological clearance will provide the following information, at a minimum:

- Project name and number
- For a linear highway project, its beginning and ending mileposts

- For a linear highway project, the width of the corridor requiring clearance, measured each direction from centerline (if the corridor to be cleared is the existing right-of-way only, stating that fact is sufficient)
- For a materials source, its location in relation to the nearest highway milepost
- For a materials source, its legal location, either descriptive or plotted on a 1:24,000 scale topographic map
- For a materials source, the dimensions of the area for which clearance is being requested
- Copies of any pertinent, signed rights-of-entry forms
- A proposed clearance due date

When available, plan, profile, and cross-section sheets are a valuable data source that aid in the paleontologist's assessment of the nature and scope of proposed affects to known and potential paleontological resources. If not provided with a paleontological clearance request, they may be requested by the reviewing paleontologist.

Step 2: Initial Research

Upon receipt of a paleontological clearance request, the paleontologist conducts a search for pertinent published and unpublished research data. This includes researching the availability of geologic map data relevant to the proposed linear highway project corridor or materials source. This initial research may reveal that a proposed linear highway project corridor or materials source does not require on-the-ground reconnaissance for paleontological resources. This is usually because there is no potential fossiliferous geologic unit cropping out at or near the existing ground surface within the proposed project limits. The paleontological assessment must include use of the best (usually, the largest-scale available) geologic maps in identification of geologic units encountered or expected to be encountered during paleontological survey. When CDOT requests a consultant to conduct a paleontological study, CDOT's Staff Paleontologist is available for consultation on the availability of geologic maps.

In addition to searching published and unpublished literature, a previously recorded fossil locality search at the Paleontological Section of the University of Colorado Museum, Boulder, and/or the Denver Museum of Nature and Science is conducted. Federal agencies may also require that their fossil locality databases be consulted when a survey is conducted on CDOT rights-of-way that intersect federally owned lands. When CDOT

requests a consultant to conduct a paleontological study, CDOT's Staff Paleontologist is available to facilitate these searches, if necessary. The CDOT Staff Paleontologist will also be consulted to determine other fossil localities known to him or her but not recorded in either of the above-cited museum databases (e.g., USGS fossil localities cited in USGS Bulletins, Professional Papers, and various geologic map series).

Step 3: On-the-Ground Reconnaissance

A site visit and visual survey on state-owned lands must search out not only vertebrate fossils, but macroinvertebrate (non-microscopic animals without backbones) and macropaleobotanical (plant remains other than pollen) fossils as well. Federal agencies may only require consideration of possible effects to vertebrate fossils where CDOT right-of-way intersects federally owned lands. Intermittent shallow subsurface sampling of bedrock exposures where plant and/or invertebrate fossils may be buried will be necessary. This should include cracking of limestone concretions common in some marine shale and sandstone lithologies and probing for leaf fossils in locations where literature search and on-the-outcrop experience indicate that they may be present. Vertebrate fossil searches may be conducted by surface examination alone.

Step 4: Report of Results

The CDOT Staff Paleontologist provides reports to the appropriate RPEM. Report text, at a minimum, includes:

- The linear highway project location, with milepost limits and legal location of the endpoints of the linear survey to the quarter-quarter-quarter-quarter section, or the materials source location, located legally and in relation to the nearest highway milepost
- Date(s) of on-the-ground reconnaissance (when applicable)
- The bedrock units known to crop out within the proposed linear highway project or materials source limits and the source(s) of that geologic data
- The results of on-the-ground reconnaissance, including identification of any newly recorded and/or relocated previously recorded fossil localities
- An assessment of all identified fossil localities' scientific significance

- A recommendation either for further paleontological investigation prior to NEPA clearance, or clearance to proceed to project construction, or commence proposed maintenance work, or initiate materials excavation. If appropriate, the clearance to proceed to project construction, or commence proposed maintenance work, or initiate material excavation will include stipulations for mitigation of impacts to paleontological resources during project construction or completion of proposed maintenance work or materials excavation.

New fossil localities identified during field reconnaissance and previously recorded localities for which field survey has provided additional data, are recorded on fossil locality data sheets. These data sheets are provided by the institution designated as the repository for specimens collected under the OAHP permit issued to CDOT or the paleontological consultant. Federal agencies may require separate recordation of fossil localities identified on federally administered lands.

Other Issues to Consider

Although OAHP is responsible for enforcing the State Antiquities Act and, by inference, reviewing reports of surveys addressing CDOT's efforts to satisfy the act, OAHP has delegated report review responsibilities to the CDOT Staff Paleontologist. OAHP only requires that the CDOT Staff Paleontologist provide annual lists of clearance reports and fossil localities identified and specimens collected.

9.11.2 NEPA Document Sections

The content of the sections on paleontological resources in the Affected Environment and Environmental Consequences chapter is discussed below.

Affected Environment

Information from the paleontological assessment report is used to provide a brief summary in the NEPA document of the paleontological resources located within the APE, along with a brief description of those resources likely to be impacted. An EA or EIS typically includes only one to three paragraphs concerning paleontological resources in the Affected Environment chapter. Lengthy narrative fossil locality and geologic unit lithology descriptions should be avoided. If a special issue of concern is raised in the paleontological assessment report, additional information may be necessary and appropriate. In most instances, only a very brief summary of the geological and paleontological data presented in the paleontological assessment report need be included in the Affected Environment chapter. If applicable, the basis for determination of identified fossil localities' scientific significance will be provided. Also, the basis for concluding that there will

likely be no effects to scientifically important paleontological resources should be provided. Paleontological sites are sensitive resources that are exempt from the provisions of the FOIA, and must never be reflected on maps or otherwise have specific locational data included in a NEPA document.

A NEPA document will discuss any special concerns that will require further study during the final design phase of planned construction projects within the project study corridor. Final design may be important in determining the nature and scope of any mitigation efforts required during construction. Specific subsurface soil, bedrock, and groundwater conditions that may be relevant to the nature and scope of mitigation efforts are determined at that time for use in preparing construction plans.

Environmental Consequences

The Environmental Consequences section of the NEPA document summarizes the efforts taken during the paleontological clearance process. Discuss alternatives that have the same paleontological impacts together and contrast those that differ, so that similarities and differences in alternative paleontological impacts are clear. All interagency correspondence documenting the evaluation should be attached as an appendix to the NEPA document.

Effects to scientifically significant fossil localities are mitigated by avoidance and/or further collection and documentation of their associated resources. Paleontological mitigation may consist of controlled salvage excavation prior to linear highway project construction or materials source excavation, but more typically mitigation is completed through on-site monitoring of highway construction or materials excavation into bedrock deposits known to produce scientifically important fossils.

Mitigation through on-site monitoring includes the collection of any scientifically important fossils and associated scientific data uncovered during major construction or materials excavation. On-site monitoring typically is the mitigation strategy adopted when (1) potentially fossiliferous bedrock is not exposed at the ground surface prior to major construction or materials excavation, but will likely be uncovered during these efforts, and (2) fossil density at previously identified scientifically significant fossil localities is such that controlled excavation prior to construction will not produce enough important fossils to represent a statistically valid sample in a timely and cost-effective manner. CDOT may request a paleontological consultant to conduct mitigation efforts, but such efforts will be under the direct supervision of, and/or in close cooperation with, the CDOT Staff Paleontologist.

The NEPA document will discuss concerns to be studied in depth during the final design phase of future construction projects. Final design may be an important phase in determining the nature and scope of any mitigation efforts required during construction. Specific subsurface soil, bedrock, and groundwater conditions that may be relevant to the nature and scope of mitigation efforts are determined at that time, for use in preparing construction plans.

Impacts and mitigation should be listed in a Summary of Impacts and Mitigation Table at the end of the resource evaluation chapter of the NEPA document. The first six columns of CDOT's Mitigation Tracking Spreadsheet should be used as this summary table (Table 9-2). CDOT's Mitigation Tracking Spreadsheet (Table 9-1) can be retrieved from http://www.coloradodot.info/programs/environmental/resources/forms/CDOT%20Mitigation%20Tracking%20Spreadsheet_June%202012.xlsx/view.

9.12 Land Use

The way land is developed and used for various activities (e.g., residential, commercial, industrial, parks and open space) affects quality of life and the environment. Land use topics include: designations created by a state, county or city through land use plans (General Plans, Comprehensive Plans, etc.), zoning, future land use and growth management areas, conservation easements, urban infrastructure service boundaries, annexation plans, and past, existing, and future development trends. The planning, design, and construction of roads and highways, as well as other transportation modes, is often based on land use development patterns and trends and affects existing land uses and plans and proposals for future development. Safe and efficient travel, whether by walking, public transportation, taking a car, an airplane, or a bike, is also influenced by the types and patterns of land uses.

The two sections below provide guidance on the treatment of land use for CDOT's NEPA projects. The first section discusses the process for evaluating land use. The second section discusses land use information that should be in each NEPA document. In addition, the introduction to this section of this Manual provides guidance on the treatment of resource-specific information that is the same for all resources.

9.12.1 Land Use Evaluation Process

The CDOT project team is responsible for reviewing land use in the area of potential impact and consulting with local agencies.

The current land use and future planned and proposed land uses should be assessed and evaluated for their consistency with the approved local government comprehensive development.

The land use evaluation should be completed when alternatives for the proposed action are first being designed and developed, prior to the formal initiation of the NEPA process.

Reasons for Evaluation of Land Use Under NEPA

CDOT evaluates land use for several reasons:

- Its importance in a community
- To comply with CDOT's environmental stewardship policy, which ensures that the statewide transportation system is constructed and maintained in an environmentally responsible, sustainable, and compliant manner

There are no land use specific regulations that FHWA and CDOT must comply with; however, the land use discussion should assess the consistency of the alternatives with the comprehensive development plans adopted for the area and (if applicable) other plans used in the development of the transportation plan required by 23 USC 134.

Collection and Evaluation of Baseline Information Under NEPA

Information on existing and planned and proposed land use is typically available from regional and local governments and metropolitan planning organizations, if applicable. County and city governments typically have land use plans that document existing and planned future land use within their legal geographic limits. Depending on the locale, these data may be available from the county or city planning department's website, in hard copy publications, or, preferably, from their GIS group. For largely rural areas, planning departments may have less data and generalized statewide data may need to be used. Use these sources to obtain information on the type of land use (i.e., such uses as urban, suburban, parks, agricultural, pastureland, riparian corridors, or unused grassland, shrubland, or forest). For urban and suburban land, obtain data that differentiate light industry, heavy industry, commercial, retail, and residential uses, if available. Also useful is information on residential density and Transit Oriented Development (TOD) whether the dwellings provide single family or multi-family housing. Map this information together with project facilities and provide further information on the mapped categories in tables. Coordinate the information obtained with land use information used in addressing noise impacts (Section 9.22). The data used in these two sections may differ in its level of detail, but should not be inconsistent.

Regional government entities also compile and analyze current and future land use information. In many instances future land use assumptions at the regional level differ from those at the local level. Both figures can be used, but regional figures are often required for NEPA traffic, noise and air quality analysis purposes. If differences are substantive, the differences should be identified.

To assess the impacts of the project on land uses, envision what will happen during construction and operation of each project facility and how that activity will affect the ongoing uses of the adjacent land and future plans for changes in land use. Often, the need for a transportation project will have been identified by the county or city government, which would therefore have been involved since the very early planning of the project. Implementation of some projects may induce growth beyond what has been anticipated by the local planning departments.

Induced growth is an indirect impact that occurs when a project causes changes in the intensity and integrity, location or pattern of land use. For transportation projects this results from changes in accessibility that influence where development occurs. Induced growth impacts may be analyzed by modeling or by a round-table approach involving agency staff members, business people, and citizens particularly well-informed regarding existing and future land use, restrictions to growth, the location of developable land, infrastructure, population and economic growth trends, and transportation systems and planned improvements, including the proposed project.

If the transportation project will potentially affect adjacent land uses, work with the county and city government and the local citizens to develop acceptable mitigation measures. Measures such as elevated or depressed roadways, berms, or walls to constrain sight of and noise from the project come with a cost that must be balanced against their benefit to the nearby community.

OTHER ISSUES TO CONSIDER

Because induced growth has the potential to affect many aspects of a community in addition to its land use (e.g., the economy, existing transportation network, future growth plans, community diversity and composition), extensive public involvement (Chapter 7) may be required to characterize, evaluate, and to help develop mitigation for potential impact. This has implications on the project's early planning, budget, schedule, and community buy-in.

9.12.2 NEPA Document Sections

The content of the sections on land use in the Affected Environment and Environmental Consequences chapter is discussed below.

AFFECTED ENVIRONMENT

Typically two areas are discussed in detail under the land use section - existing and future land use and consistency with local government land use planning. The level of detail provided in the document depends on the complexity of the project area and its surroundings. The section should discuss how the project will or will not meet the SWLRTP and the local comprehensive plan, as well as any possible differences in the objectives of federal, regional, state, and local land use plans and controls for the area concerned.

Affected Environment Chapter of NEPA Document

- Existing and future land use and zoning
- Current development trends in the project vicinity and community at large
- Consistency with state and local land use planning and policies
- Understanding of growth management policies practiced in the city/county, community growth patterns, and conservation and preservation areas and easements

Existing and Future Land Use

This section should provide a description of the existing and planned future land use in the project area. It should also provide a discussion about any access requirements (acceleration/deceleration lanes, signalization, etc.) imposed on the new development and any required traffic impact fees of current development trends in the project vicinity and the community at large. In discussing development trends, this section should provide:

- The development name
- The development's status (i.e., existing, under construction, or proposed)
- The development's size (i.e., area, type of use, density)

If the document is an EIS, this type of information is usually found in the affected environment chapter. The level of detail should be appropriate to enable evaluation of the impact potential of the proposed action.

Consistency with Land Use Planning

In addition, the land use section must describe the state and local government plans and policies regarding land use controls and community growth management in the project area. This discussion should entail a brief overview of existing land use and growth management planning for the county and/or city.

The ultimate goal of this portion of the land use section is to ensure that the reader gains a clear understanding of the prevailing land use and growth management policies practiced in the county and/or city, substantiated by the state, community growth patterns and values, economic incentives, and conservation/preservation areas.

In discussing the policies of the county and/or city and state regarding land use controls, this section should also show how the existing community has grown and expanded, consistent with these plans and policies or otherwise. The section should reference appropriate sections of the approved local government comprehensive plan, community services element, and other areas that would substantiate the information presented. Where conflict exists among these policies and/or land usages within the community, these areas should be identified.

ENVIRONMENTAL CONSEQUENCES

The land use section of the Environmental Consequences section should assess and evaluate the consistency of each alternative for the proposed action with the approved local government comprehensive development plan and, if applicable, other plans used in the development of the transportation plan required by Section 134. In discussing the consistency of the proposed action with local planning, evaluate how the development of various project alternatives will directly contribute to changes in land use in the project area.

The secondary social, economic, and environmental impacts of any substantial, foreseeable, induced development should also be presented for each alternative to determine its importance in a community. Where possible, the distinction between planned and unplanned growth should be identified.

Development of a list of past, present, and foreseeable future land use development projects that should be addressed for only impacted resources in the consideration of cumulative effects is discussed in Section 9.26. Locate these projects on a land use map. Discuss cumulative impacts to land use in more general terms, noting which land use components will be most impacted, their relative importance, and the degree to which impacts from the transportation project considered in the current NEPA document will contribute to the cumulative impacts.

Minimizing potential impacts of transportation alternatives to existing and future land use and local government's comprehensive development plans is the most satisfactory form of mitigation planning for land use. Other options, such as amending land use plans, or compensating for land use changes by supporting replacement land uses in other locations, are likely to be costly in terms of time and money and also require extensive negotiation between CDOT and the community leaders and decision-makers.

Impacts and mitigation should be listed in a Summary of Impacts and Mitigation Table at the end of the resource evaluation chapter of the NEPA document. The first six columns of CDOT's Mitigation Tracking Spreadsheet should be used as this summary table (Table 9-2). CDOT's Mitigation Tracking Spreadsheet (Table 9-1) can be retrieved from http://www.coloradodot.info/programs/environmental/resources/forms/CDOT%20Mitigation%20Tracking%20Spreadsheet_June%202012.xlsx/view.

Key Points for Land Use Impacts

- Consistency of alternatives with approved local government comprehensive development plans
- Direct impacts from alternatives to local zoning and how land use will change in project area
- Secondary social, economic, and environmental impacts of substantial, foreseeable, induced development
- Distinguish planned and unplanned growth

9.13 Social Resources

Social resources include a variety of factors that may affect quality of life for a population. Transportation projects must consider the following potential social impact concerns:

- Changes in neighborhoods or community cohesion
- Community resources (schools, churches, parks, shopping, emergency services, etc.)
- Community vision and values
- Community transportation resources (alternative modes, etc.)
- Community mixed-use developments, Transit Oriented Development

Public scoping input should help guide the topics and level of detail presented under Social Resources.

Since social resources tend to be more qualitative, dynamic, and intangible, public involvement and coordination with local communities may be required to gather adequate information to address this resource area. Other issues affecting the social health of a community include land use changes, economics, Environmental Justice, and relocation and acquisitions.

The sections below provide guidance on the analysis of social resources for CDOT's NEPA projects. The first section discusses the process for evaluating the community composition. The second section discusses community information that should be in each NEPA document.

9.13.1 Social Resource Evaluation Process

The CDOT project manager and social analyst (either in-house social analysts or consultants) are responsible for early identification of the community composition and community issues. It is recommended that data collection and analysis be conducted under the supervision of persons with an educational background in sociology, regional planning, economics, or similar training.

Information on community composition and community issues should be collected and refined throughout the project. The study area should at least include communities within and immediately surrounding the proposed project. Community boundaries can often be delineated by physical barriers, land-use patterns, political divisions (such as school districts), selected demographic characteristics, historical backgrounds, resident perceptions, and subdivisions and neighborhoods recognized by name and tradition. Additionally, the project may have consequences for communities beyond the immediate geographic area. In such instances, the study area needs to be expanded to include these other communities.

Community composition and community issues must be identified as early as possible during project planning. Early identification of social resource issues is important to community buy-in and project success. Proactive involvement of community leaders and local political entities, as well as other segments of society important to a project, is an integral part of the analysis. This outreach leads to decision-making that is more likely to be responsive to community concerns and goals, resulting in greater community acceptance of proposed transportation improvements, enhancing agency credibility, and ensuring non-discrimination.

Reasons for Evaluation of Social Resources Under NEPA

CDOT evaluates social resources for several reasons:

- To involve communities that will be affected by transportation projects (whether positively or negatively) and should be an important part of the process
- To comply with CDOT's environmental stewardship policy, which ensures that the statewide transportation system is constructed and maintained in an environmentally responsible, sustainable, and compliant manner
- To comply with several legal mandates that pertain to communities and federally funded projects

CDOT must comply with federal social regulations when implementing transportation projects in Colorado.

These policies require that consideration be given to qualitative factors and unquantifiable amenities and values, along with social and technical considerations in decision-making. However, social effects are not intended by themselves to require preparation of a NEPA document, but should be addressed when a NEPA document is prepared and social and natural or physical environmental effects are interrelated. Then the document will discuss all of these effects on the human environment without discrimination on the basis of race, color, national origin, age, sex, or disability.

Collection and Evaluation of Baseline Information Under NEPA

Gathering baseline information can be expensive and time consuming. To avoid wasted effort, carefully define the intended use of the data, identify what data are needed, and determine whether they are readily available before beginning to gather information. In many cases, in-house staff has expertise; and in larger communities, various planning agencies and councils of government have information that can easily be obtained. Another source may be other projects' files or earlier attempts at the current project, which may then be updated. If information is not available from

Community Resource Regulations and Guidance

- National Environmental Policy Act of 1969
- Federal Aid Highway Act of 1970
- Section 1508.14 of CEQ regulations
- Sections 109(h) and 128, Title 23 of the United States Code on Highways
- Title VI of the Civil Rights Act of 1964
- Americans with Disabilities Act of 1990
- FHWA Technical Advisory T6640.8a
- Section 5309 New Starts, 49 USC 5309(e)
- Major Transit Capital Investment Projects Final Rule, 49 CFR Part 611, April 6, 2001

traditional sources, resourcefulness is needed to seek out alternative sources.

Before using data, be aware of when they were collected, their sources, and their reliability. Use the most up-to-date data available, understand the basic assumptions used in each compilation, and recognize the purposes for which data were originally collected.

Baseline data on community composition are available from several sources including:

- US Census Bureau – Provides easy access to community resource data and maps. US Census Bureau's Decennial Census Summary File 1 and Summary File 3 – Quick Tables are a good starting point for data on demographic, social, and housing characteristics for the study area. The analysts can easily obtain Colorado state level data including economic development and gentrification down to Census Block-group level data to develop population trends, demographics, and social makeup. US Census Bureau Maps and Cartographic Resources provide maps for determining community boundaries, physical characteristics, instances of joint land use, and locating activity centers within the study area.
- Local Governments (e.g., city and county planning, labor, and social service departments) – Provide more recent demographic, social, economic, and housing characteristics. Local governments can also provide land use and zoning plans, building-permit records, social programs, and business and marketing information that can be used to determine infrastructure, house and business locations, approved or built development, and community issues.
- Metropolitan Planning Organizations – Provide land-use and zoning plans, building-permit records, and real estate market surveys to determine infrastructure, house and business locations, approved or built development, and housing characteristics.
- Local Publications (from state, local, and university libraries) – Provide general insight, historical background, and business and marketing information. Assure all community groups are reached including those of limited English proficiencies or unique cultural backgrounds.
- Community Groups (such as local historical societies, Colorado Historic Preservation Office, and religious institutions) – Provide historical background, location of historic structures, landmarks, and districts, special populations and their needs, and community issues.

Do not rely solely on one data source. A second data source should be used to validate the first.

US Census Bureau's Decennial Census Summary File 1 and Summary File 3

http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml

US Census Bureau Maps and Cartographic Resources

http://www.census.gov/geo/www/maps/

- Social Service Agencies – Provide information on special populations and their needs, businesses, and community issues.
- Public Scoping Meetings (with community leaders, local political entities, special interest groups, businesses, and residents) – Provide information on community values and issues.
- Windshield Surveys – Provide information on locations and numbers of structures, and social activity patterns.

Evaluation of Baseline Information

Use the collected baseline information to delineate and characterize the social resource study area and understand its interface with the proposed project. Work with engineers and transportation planners to consider new project options based on preliminary indications of likely community issues and special areas to avoid. The evaluation of baseline information incorporates the following components:

- Finalize the social study area, as it will vary from multiple counties to specific Census Tracts and Block data depending on the magnitude of potential social impacts and the existing community base.
- Include demographic characteristics such as: ethnic composition of the existing population, age distribution, median income of the study area, low mobility status (elderly and/or disabled), and existing number of households and average household size.
- Identify the defined communities (e.g., communities recognized by name and/or practice) and perceived neighborhoods (e.g., a little section of open space, the corner grocery, a laundromat, a beauty salon, or a neighborhood bar, etc.) within the study area.
- Discuss the growth policies of the local jurisdictions, such as adopted growth targets, growth management policies, or other policies relating to the location or rate of population growth.
- Briefly describe the types of transit facilities, highways, streets, and bicycle and pedestrian facilities associated with the proposal, if the proposed project will likely have an effect on such facilities.
- When it may be an issue, describe the type, size, and location of public services and facilities within the affected social environment (e.g., parks, schools, hospitals, day care centers, libraries, counseling facilities, alcohol and drug rehabilitation, bike paths, emergency services, etc.).

If known, any substantial population changes that have occurred in recent decades in ethnic, elderly, poor, or other demographic groups within the affected community area should be discussed.

Impacts on social resources that may occur as the result of proposed transportation improvements include impacts on community cohesion, community facilities and services, mobility, and safety. The following subsections provide specific guidance for addressing the impacts of each alternative on these four social impact areas.

Community Cohesion

The community cohesion analysis should address such impacts of project alternatives on cohesiveness, as the following:

- Bisecting (dividing) neighborhoods
- Social isolation (isolating a portion of an ethnic group or neighborhood)
- Facilitating new development (infill)
- Urban renewal
- Decreased neighborhood size (relocation)
- Joint land use
- Changes in property values
- Changes in neighborhood or community access
- Changes in quality of life
- Changes in neighborhood identification
- Separation of residences from community facilities

Community social groups that will benefit from or be adversely affected by the proposed project alternatives should also be identified. It is important that all segments of the population be treated with equal consideration, including:

- Elderly persons
- Disabled persons
- Non-drivers and transit-dependent individuals
- Minority groups (See Section 9.15)
- Low-income individuals and households (See Section 9.15)

Public Services and Facilities

Analysis of project alternative impacts on public services and facilities should include actions such as the following:

- Identify the existence of public service providers, their responsibilities and facilities: police, fire, ambulance, hospital, and schools, as appropriate, given site condition and potential project issues
- Show on a map the proximity of each facility to the project
- Define service areas, user groups, and affected populations
- Discuss each service/facility's principle involvement with the community
- Determine the value of the service/facility to the community
- Determine the project's impact on these services/facilities

Mobility

The analysis of mobility should describe and discuss changes in travel patterns and accessibility (e.g., vehicular, commuter, bicycle, or pedestrian). It is important to note the effects of such changes on community mobility and neighborhood interaction, especially for groups that may experience more severe mobility impacts due to physical limitations, including the elderly, disabled persons, and children.

If any of the proposed alternatives will close or move cross streets, address the impacts of closing or moving each street. If pedestrian/bicycle routes are closed or otherwise modified, identify and discuss potential impacts on community mobility/neighborhood interaction. The views of the community and the city and/or county government on such changes must be clearly documented.

Safety

The evaluation of safety should discuss the impacts of each project alternative on traffic and neighborhood safety. Neighborhood safety issues to be addressed include:

- Police services
- Emergency services
- Bicycle/pedestrian safety
- Increase in crime

Other Issues to Consider

Other agencies may have information or guidance that will affect a particular CDOT project. Coordinate with the various agencies having resource oversight to obtain any site-specific data they may have, talk to resource specialists who know the study area and determine whether they know of social issues that could constrain the project. The resource agencies that are particularly likely to have information or guidance on the social makeup of the communities include local planning agencies (e.g., county, city, and community planning offices), social services agencies, and community groups, as well as the USFS, and BLM when they manage lands that are traversed by a transportation project.

The project file should include correspondence and telephone contact information with community service groups, as well as minutes of meetings where appropriate. The files should thoroughly document the process whereby the social service needs of the community have been taken into consideration during project development.

9.13.2 NEPA Document Sections

The content of the sections on social resources in the Affected Environment and Environmental Consequences chapter is discussed below.

Affected Environment

If the proposed project or activity impacts a population, the NEPA document should discuss the existing and projected population and the relevant demographic characteristics of the affected area and the associated city, county, or region. The level of detail should be commensurate with the importance of the social impacts. The description of the community composition in the Affected Environment chapter of the NEPA document should include social aspects that may be impacted as the result of the proposed project:

- Community cohesion
- Public services and facilities
- Mobility
- Safety

The baseline information on the social environment of the study area should be used to help develop a community profile. The community profile is a summary of the history, present conditions, and anticipated future of an area. It provides an overview or series of snapshots of the area and provides a basis for identifying potential impacts of a proposed transportation action.

Affected Environment Chapter of NEPA Document

- A visual map or maps that depict physical characteristics, such as neighborhood boundaries, land uses, public facilities, and commercial centers
- Narrative text that describes community characteristics, such as population demographics, social, social history and values of the communities, the importance of various facilities, and plans for the future
- Tables or graphics that summarize important data or conclusions, such as population demographics or employment trends

The community profile enables conclusions regarding community cohesion, public services and facilities, mobility, and safety of various groups within the social study area as a whole.

It may also be necessary to expand or supplement the information, depending on the level of detail developed for the study area, by communicating with community groups, stakeholders, and local sociologists. Attributes typically included in the community profile are summarized in the side bar. For additional information, consult FHWA's *Community Impact Assessment: A Quick Reference for Transportation* (FHWA, 1996).

Environmental Consequences

Impacts on social resources that may occur as the result of proposed transportation improvements include impacts on community cohesion, community facilities and services, mobility, and safety, aesthetics, displacement, traffic, employment and construction. Discuss alternatives that have the same social impacts together and contrast those that differ so that similarities and differences in alternative social impacts are clear. The following subsections provide specific guidance for each of these four social impact areas. The impacts of each alternative on each of the four social impact areas—community cohesion, public services and facilities, mobility, and safety—should be addressed at a level of detail appropriate to their severity and the complexity of the project. For additional information, consult FHWA's *Community Impact Assessment: A Quick Reference for Transportation* (FHWA, 1996).

Where the evaluation determines that potential social impacts are adverse to community cohesion, public services and facilities, mobility, and/or safety, the document should provide discussion of possible mitigation. Include the information shown in the sidebar in the NEPA document, as appropriate. This section should provide assurance that the social service needs of the community have been taken into consideration during project development.

Impacts and mitigation should be listed in a Summary of Impacts and Mitigation Table at the end of the resource evaluation chapter of the NEPA document. The first six columns of CDOT's Mitigation Tracking Spreadsheet should be used as this summary table (Table 9-2). CDOT's Mitigation Tracking Spreadsheet (Table 9-1) can be retrieved from http://www.coloradodot.info/programs/environmental/resources/forms/CDOT%20Mitigation%20Tracking%20Spreadsheet_June%202012.xlsx/view.

Mitigation Planning Information to Include in NEPA Document

- Basis for the mitigation decisions and flow chart of the decision process
- Identify mitigation strategies to avoid or minimize potential impacts to communities' well being and incorporate them into project designs as necessary
- Outreach efforts to minority and low income populations
- Appropriateness, reasonability, and timing of the mitigation strategies relative to project planning and implementation
- Coordination required to obtain agreement on mitigation measures

9.14 Economic Resources

Economic resources include a variety of factors that may affect an area's economy. Transportation projects must consider the following potential economic impact concerns:

- Employment and tax base affected by project (retail sales, opportunity for development, tax revenues, relocation of employment centers, etc.)
- Businesses affected by project or construction (detours, bypasses, circulation)
- Housing
- Infrastructure and public services
- Changes in property values

Public scoping input should help guide the topics and level of detail presented under Economic Resources.

Economic resources tend to be quantitative and tangible; however, public involvement and coordination with local communities may be required to gather adequate information to address this resource area. The economic health of a community is affected by changes in other resources such as land use, social resources, Environmental Justice, and relocations and acquisitions.

The two sections below provide guidance on the treatment of economics for CDOT's NEPA projects. The first section discusses the process for evaluating economics. The second section discusses economic information that should be in each NEPA document.

Economic Resource Regulations and Guidance

- NEPA
- Federal Aid Highway Act of 1970
- Section 1508.14 of CEQ regulations
- Intermodal Surface Transportation Efficiency Act of 1991
- Sections 109(h) and 128, Title 23 of the United States Code on Highways
- FHWA Technical Advisory T6640.8a
- Section 5309 New Starts, 49 USC 5309(e)
- Major Transit Capital Investment Projects Final Rule, 49 CFR Part 611, April 6, 2001

9.14.1 Economic Evaluation Process

The CDOT project manager and economic analyst (either in-house economic analysts or consultants) are responsible for early identification of the local economies and their specific profiles. It is recommended that data collection and analysis be conducted under the supervision of persons with an educational background in economics, regional planning, or similar training.

Economic profiles of the communities should be identified throughout the project. The economic study area should at least include communities within and immediately surrounding the proposed project. Community boundaries can often be delineated by physical barriers, land-use patterns, political divisions (such as school districts), selected demographic characteristics, historical backgrounds, resident perceptions, and subdivisions and neighborhoods recognized by name and tradition. Additionally, the project may have economic consequences for communities beyond the immediate

geographic area. In such instances, the study area needs to be expanded to include these other communities.

Economic profiles of the communities within the economic study area and issues must be identified as early as possible during the project planning. Early identification of economic issues is important to community buy-in and project success. Proactive involvement of community leaders and local political entities, as well as business segments, is an integral part of the analysis. This outreach leads to decision-making that is more likely to be responsive to community concerns and goals, resulting in greater community acceptance of proposed transportation improvements, enhancing agency credibility, and ensuring non-discrimination.

Reasons for Evaluation of Economics Under NEPA

CDOT evaluates economics for several reasons:

- The economy of an area is a vital component of a community
- To comply with CDOT's environmental stewardship policy, which ensures that the statewide transportation system is constructed and maintained in an environmentally responsible, sustainable, and compliant manner
- To comply with several legal mandates that pertain to local economics and federally funded projects

CDOT must comply with federal economic regulations when implementing transportation projects in Colorado.

These policies require that consideration be given to qualitative factors and unquantifiable and/or quantifiable economic amenities and values in decision-making. However, economic effects are not intended by themselves to require preparation of a NEPA document, but should be addressed when a NEPA document is prepared and economic and natural or physical environmental effects are interrelated. Then the document will discuss all of these effects on the human environment.

Collection and Evaluation of Baseline Information Under NEPA

Collection of Baseline Information

Before beginning to collect baseline information on economic resources, carefully define the intended use of the data, identify what data are needed, and determine whether they are readily available to avoid wasting time and money. Obtain needed information from in-house staff with expertise and, in larger communities, from various planning agencies and councils of

Baseline Information for NEPA Document

Background of the fiscal and economic conditions in the study area such as:

- Tax revenue
- Employment
- Labor force characteristics
- Employment programs and policies

government. Also review other projects' files or earlier attempts at the current project, which may then be updated.

Before using the data, be aware of when they were collected, how current they are, their sources, and their reliability. Also be sure to understand the basic assumptions used in each compilation, and recognize the purposes for which data were originally collected.

Baseline data for economic resources are available from several sources including:

- US Census Bureau – Provides data on population and economic and housing characteristics for the study area. In US Census Bureau Decennial Census Summary File 1 and File 3 Quick Tables, Colorado State level data down to Census Block-group level data are available for use in developing economic trends and indicators. Additionally, US Census Bureau Maps and Cartographic Resources provide maps for determining community boundaries, physical characteristics, and locating economic activity centers within the study area.
- Bureau of Economics Regional Publication – Provides Colorado level data down to micropolitan statistical area data on personal income and industry employment
- Bureau of Labor Unemployment Publications – Provides Colorado level data down to micropolitan statistical area data on unemployment
- Local Governments (revenue, labor, and planning departments, economist's office, chambers of commerce, etc.) – Provide economic and housing characteristics that can be used to determine employment and salary by industry, employment trends, unemployment rates, tax revenues, and property values
- Local Businesses – Provide information on business issues, tax revenues, and property values
- Local Publications (from state, local, and university libraries) – Provide business and marketing information
- Public Scoping Meetings (with community leaders, local political entities, special interest groups, businesses, and residents) – Provide information on business needs and issues

US Census Bureau's Decennial Census Summary File 1 and Summary File 3

http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml

US Census Bureau Maps and Cartographic Resources

http://www.census.gov/geo/maps-data/index.html

Bureau of Economics Regional Publications

http://bea.gov/regional/index.htm

Bureau of Labor Unemployment Publications

http://data.bls.gov/cgi-bin/dsrv?la

Evaluation of Baseline Information

Collected baseline information is used to help evaluate the project and delineate the economic study area. Work with engineers and transportation planners to consider new options based on preliminary indications of likely economic issues and special areas to avoid. The evaluation of baseline information incorporates the following components:

- Finalizes the economic study area, as it will vary from multiple counties to specific Census Tracts and Block data depending on the magnitude of potential economic impacts and the existing economic base
- Identifies the types of economic impacts the project could have on the communities as highlighted in the sidebar
- Briefly characterizes the current fiscal and economic conditions in the study area including such information as tax revenue(s) (e.g., retail sales and use tax, business tax, property tax, etc.) and major contributors, employment by sector, labor force characteristics (e.g., labor earnings by sector, and personal income), employment centers in the study area, jobs versus housing balance, and relevant comprehensive plans
- Discuss impacts to economics in somewhat general terms, noting which economic components will be most impacted, their relative importance, and the degree to which impacts from the transportation project considered in the current NEPA document will contribute to the impacts.

OTHER ISSUES TO CONSIDER

Other agencies may have information or guidance that will affect a particular CDOT project. Coordinate with the various agencies having resource oversight to obtain any site-specific data they may have, talk to resource specialists who know the study area, and determine whether they know of economic issues that could constrain the project. The resource agencies that is particularly likely to have information or guidance on economics include city and county planning offices and chambers of commerce, as well as the USFS, BLM, and NPS when they manage lands that are traversed by a transportation project.

9.14.2 NEPA Document Sections

The content of the sections on economic resources in the Affected Environment and Environmental Consequences chapter is discussed below.

AFFECTED ENVIRONMENT

The description of economics in the Affected Environment chapter of the NEPA document should include those aspects of fiscal and economic conditions that are likely to be impacted by the project. Economic aspects that may be impacted as the result of proposed transportation improvements include changes in growth rates, business activity, property values, and tax revenues. These impacted economic aspects are generally related to one of two factors: changes in the accessibility of an area and/or changes in the local environment.

Transportation improvements tend to affect businesses, residences, and taxing authorities in different ways; therefore, the impacts to various land uses and local government should be evaluated and addressed separately in the documentation. The types of impacts that should be evaluated for businesses, residential areas, and local taxing authorities are summarized below.

Businesses

- Changes in regional traffic (bypass impacts)
- Changes in business environment (noise, air quality, aesthetics, amenities, traffic volumes and traffic speed)
- Access changes (delivery, employee, customer)
- Changes in customer and/or employee base (relocations)
- Compatibility with economic development plans
- Changes in parking availability

Residential Areas

- Changes in residential environment (noise, air quality, aesthetics, amenities, traffic volumes and traffic speed)
- Changes in employment opportunities and retail shopping/services related to changes in businesses

Local Taxing Authorities

- Conversion of taxable property to public use
- Affected taxing authorities
- Revenue losses and the affect on taxing authorities

Environmental Consequences

The Environmental Consequences section of the NEPA document should identify and discuss the impacts from each alternative on the economic health of the community as a whole. Discuss alternatives that have the same economic impacts together and contrast those that differ so that similarities and differences in alternative economic impacts are clear. The section should:

- Identify affected businesses, residential areas, and/or local taxing authorities
- Show on a map the proximity of the project to each affected business or residential area
- Show on a map the jurisdictional boundaries of affected local taxing authorities
- Define the employee and customer base for affected businesses
- Discuss the value of the businesses and/or residential area to the community
- Determine the project's impact on these businesses and/or residential areas

Economic impacts are best described quantitatively, but, in certain cases, qualitative data may be the only information available to adequately characterize the area. When applicable, potential total economic impacts (direct and indirect) of alternatives associated with the project can be estimated using economic models, such as the commonly used IMPLAN Input/Output model, which can be purchased. Input/Output models generate estimates of how a given amount of a particular economic activity translates into jobs and income in the study area.

In the NEPA document, only identify those mitigation measures that are in response to project impacts and are appropriate as CDOT commitments. Summarize these measures just below the impacts they are intended to mitigate in the tabulation of economic impacts by alternative. Note whether residual economic impacts will remain after the suggested mitigation measures are applied. Discuss economic impacts as a result of induced growth as further discussed in Section 9.26.

Where the evaluation determines that potential economic impacts are substantial, the document should provide discussion of possible mitigation. It is important to consider the effects on small businesses or businesses with unique customer and/or employee bases, since these businesses are more

An Input/Output model is a regional economic impact model that provides mathematical accounting of the flow of dollars and commodities through a region's economy.

Mitigation Planning Information to Include in NEPA Document

- Basis for the mitigation decisions and flow chart of the decision process
- Mitigation strategies to avoid or minimize potential impacts to communities' economic well being to be incorporated into project designs as necessary
- Appropriateness, reasonability, and timing of the mitigation strategies relative to project planning and implementation
- Coordination required to obtain agreement on mitigation measures
- Reasonableness and reliability of the mitigation measures

sensitive to change. Include the information shown in the sidebar in the NEPA document, as appropriate.

Mitigation measures needed to resolve economic impacts can be costly. It is important to work with the project development team and the local community to choose practical solutions that result in a reasonable expenditure of public funds and help the project fit harmoniously into the community. For example, phase the project to minimize impedance to business access during peak periods. Another option could be to redesign a road segment as an underpass to avoid cutting off access to a business activity center.

For additional information, consult FHWA's *Community Impact Assessment: A Quick Reference for Transportation* (FHWA, 1996).

Impacts and mitigation should be listed in a Summary of Impacts and Mitigation Table at the end of the resource evaluation chapter of the NEPA document. The first six columns of CDOT's Mitigation Tracking Spreadsheet should be used as this summary table (Table 9-2). CDOT's Mitigation Tracking Spreadsheet (Table 9-1) can be retrieved from http://www.coloradodot.info/programs/environmental/resources/forms/CDOT%20Mitigation%20Tracking%20Spreadsheet_June%202012.xlsx/view.

9.15 Environmental Justice, Title VI, and Limited English Proficiency (LEP)

This section discusses Limited English Proficiency (LEP), Environmental Justice, and Title VI of the Civil Rights Act of 1964.

9.15.1 Limited English Proficiency (LEP)

LEP persons are individuals who do not speak English as their primary language and who have a limited ability to read, write, speak, or understand English. In certain circumstances, failure to ensure that LEP persons can effectively participate in or benefit from federally assisted programs and activities may violate the Title VI prohibition against national origin discrimination. Therefore, when developing a public involvement strategy at the beginning of the NEPA process, the community study area must be evaluated to identify LEP populations and determine whether language assistance measures are needed to ensure meaningful access to the process. Efforts to ensure meaningful access to LEP individuals should be documented in the public involvement section of the NEPA document.

IDENTIFY LEP POPULATIONS

LEP data is available from the US Census Bureau American Community Survey 5-year Estimates (Household Language by Linguistic Isolation data) and can be obtained down to the Census tract level as well as to the county level. CDOT recommends evaluating Census data based upon populations 18 and older that speak English not at all, not well, and well. For comparison, LEP data should also be collected for Colorado and the county/counties within the community study area.

Additionally, school district data may be used to supplement Census data to identify LEP populations. Some individuals may not be captured in the Census data; therefore students with English as a second language may be an indication of an LEP population. Public involvement, discussed in Chapter 7, is also an important source of information for identifying LEP populations that could be affected by a project.

LEP analysis is a way to identify if language assistance is needed during a project. The information should be included in the public involvement section of a NEPA document. The information should also be included in the Environmental Justice-specific outreach section if one is included in the Environmental Justice section.

During the next NEPA Manual update, LEP will be discussed in **Chapter 7** *Public Involvement* rather than in this section to alleviate confusion

Example Table: Percent of Households with LEP (Spanish as the Primary Language) within the Community Study Area

Area	Total Households	Households with Limited English Proficiency [Spanish as the Primary Language] (%)
State		
County		
Census Tract(s) [Include rows for all in the community study area]		

Determine Language Assistance Measures

When the presence of LEP populations is identified, the project team should discuss the need to incorporate language assistance measures in accordance with USDOT LEP guidance. All vital documents should be translated into the language spoken by the affected LEP population. In addition to translation of vital documents, other language assistance measures may include interpretation services, bilingual community liaisons, and other means for providing access to LEP services. CDOT must also be able to provide reasonable individualized assistance in any language upon request. Contact the CDOT Civil Rights and Business Resource Center if assistance with individual requests is needed.

9.15.2 Evaluating Environmental Justice and Title VI under NEPA

CDOT evaluates Environmental Justice for several reasons:

- To ensure a non-discriminatory process
- To comply with CDOT's environmental stewardship policy, which ensures that the statewide transportation system is constructed and maintained in an environmentally responsible, sustainable, and compliant manner
- To comply with several legal mandates that pertain to protected populations

Environmental Justice and Title VI Regulations and Guidance

- Title VI of the Civil Rights Act of 1964, as amended
- Title VI Regulations, 49 CFR 21 and 23 CFR 200
- Executive Order 12898 on Environmental Justice
- Executive Order 13166 on Environmental Justice
- NEPA of 1969
- 23 USC 140 (Non-discrimination)
- 23 USC 324 (Non-discrimination on basis of sex)
- Americans with Disabilities Act (ADA) of 1990
- Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, amended 1987
- Environmental Impact and Related Procedures, 23 CFR 771
- USDOT Order 5610.2(a) on Environmental Justice
- USDOT Guidance on Environmental Justice and NEPA (December 16, 2011)
- FHWA Executive Order 6640.23(a) on Environmental Justice
- 23 USC 109(h), Federal-Aid Highway Act of 1970

PRINCIPLES OF ENVIRONMENTAL JUSTICE

Under Executive Order 12898 (1994), *Federal Actions to Address Environmental Justice in Minority Populations*, CDOT is required to identify and address disproportionately high and adverse human health or environmental effects, including the interrelated social and economic effects of their programs, policies, and activities on minority populations and low-income populations in the United States.

A thorough demographic analysis is critical to meaningful public involvement and identification of impacts due to a project. Hence, it is important to identify low-income and minority populations early so that these populations can become involved and have a meaningful opportunity to participate during every phase of a NEPA project.

Under Executive Order 12898, minority, as it applies to Environmental Justice, is defined as a person who is:

- Black: a person having origins in any of the black racial groups of Africa
- Hispanic or Latino: a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture of origin, regardless of race
- Asian American: a person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent
- American Indian and Alaskan Native: a person having origins in any of the original people of North America, South America (including Central America), and who maintains cultural identification through tribal affiliation or community recognition
- Native Hawaiian or Pacific Islander: people having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands

Under Executive Order 12898, minority populations are defined as any readily identifiable group of minority persons who live in geographic proximity, and, if circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who will be affected by a proposed DOT program, policy, or activity. For purposes of these guidelines, tribal governments are also included in this definition of minority populations.

Under Executive Order 12898, low-income populations are defined as any readily identifiable group of low-income persons (household income is at or below the Department of Health and Human Services poverty guidelines)

The Environmental Justice Executive Order 12898 requires federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects on minority and low-income populations in all its operations. This is an amplification of the non-discrimination mandate of Title VI of the Civil Rights Act of 1964. The resultant USDOT and FHWA Orders require CDOT to ensure that Environmental Justice is appropriately addressed within the framework of existing laws such as NEPA in all its operations.

who live in geographic proximity, and, if circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who will be affected by a proposed DOT program, policy, or activity.

The three fundamental principles at the core of Environmental Justice, as expressed by Executive Order 12898 are:

- To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on tribal governments, minority, and low-income populations
- To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process
- To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations

The requirements expressed in Executive Order 12898 are intended to ensure that procedures are in place to protect low-income and minority groups that have been traditionally underserved.

Title VI Nondiscrimination Law

Title VI of the Civil Rights Act of 1964, which states "No person in the US shall, on the ground of race, color, or national origin be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance."

Title VI bars not only intentional discrimination, but also neutral practices that result in disparate impacts on individuals of a particular race, color, or national origin. To such end, CDOT must ensure that any activity that will result in disparate impacts on individuals protected by Title VI only be carried out if:

- The activity has a substantial legitimate justification;
- There are no comparably effective alternative practices that would result in less disparate impacts; and
- The justification for the action is not a pretext for discrimination.

CDOT staff and consultants should be aware of the mandate to not discriminate and seek to ensure equal access to and treatment of all individuals during NEPA processes. No specific documentation is required to demonstrate Title VI compliance. However, the record as a whole should demonstrate that this standard has been met.

CDOT's Civil Rights and Business Resource Center website

http://www.coloradodot.info/business/civilrights

If complaints regarding discrimination, whether oral, written or otherwise, are received during the NEPA process, they should be submitted to the CDOT Civil Rights and Business Resource Center Title VI staff.

How do Title VI and Environmental Justice Work Together?

The purpose of conducting an Environmental Justice analysis as part of NEPA is not to satisfy Title VI requirements because Title VI imposes statutory and regulatory requirements that are broader in scope than Environmental Justice. Similarly, a Title VI analysis will not necessarily satisfy Environmental Justice requirements. Key differences include:

- Title VI prohibits recipients of federal financial assistance from discriminating on the basis of race, color, or national origin in their programs or activities.
- Title VI allows persons to file administrative complaints with the federal departments and agencies that provide financial assistance alleging discrimination based on race, color, or national origin by recipients of federal funds.
- Under Title VI, CDOT has a responsibility to ensure that its funds are not being used to subsidize discrimination based on race, color, or national origin. This prohibition against discrimination under Title VI has been a statutory mandate since 1964.
- CDOT's Civil Rights and Business Resource Center is responsible for the CDOT's administration of Title VI, including investigation of such complaints.
- Executive Order 12898 generally calls on each federal agency to achieve "environmental justice ... by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations...."
- Executive Order 12898 applies to federal agency actions and directs agencies, to the extent permitted by law, to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects on minority populations and low-income populations.
- The Executive Order establishes the Administration's policy on environmental justice; it is not enforceable in court and does not create any rights or remedies.

Executive Order 13166, "Improving Access to Services for Persons with Limited English Proficiency" requires federal agencies to examine the services they provide, identify any need for services to those with LEP, and develop and implement a system to provide those services so LEP persons can have meaningful access to them. Executive Order 13166 applies to all federally conducted programs and activities. USDOT funding recipients are required to follow its guidance document entitled "Policy Guidance Concerning Recipients' Responsibilities to Limited English Proficient (LEP) Persons."

COLLECTION AND EVALUATION OF BASELINE INFORMATION UNDER NEPA

A web user guide has been prepared with directions for collecting and evaluating baseline information. These directions are provided in Attachment B of this chapter.

The data collection and analysis process consists of:

- Defining the area of potential impact (i.e., community study area)
- Identifying Environmental Justice (minority and low-income) populations within the community study area
- Evaluating impacts/benefits to determine if there are any adverse and disproportionate impacts on the Environmental Justice population and identify benefits
- Identifying mitigation (if needed) and any need for specialized outreach

Define Area of Community Study Area

Prior to conducting the Environmental Justice analysis, a community study area should be developed that includes the geographic area likely to be affected by the project. The community study area typically includes all communities within and adjacent to the project that may reasonably be affected. Community boundaries can often be delineated by Census tracts, block groups, physical barriers, land-use patterns, political divisions (such as school districts), selected demographic characteristics, historical backgrounds, resident perceptions, and subdivisions and neighborhoods recognized by name and tradition. Additionally, the project may have social consequences for communities beyond the immediate geographic area. In such instances, the community study area needs to be expanded to include these other communities.

Many transportation projects have far-reaching impacts. It is, therefore, probable that the area of impact may be a considerably larger area than the literal project footprint. The determination of the community study area should be presented, reviewed, and agreed upon by the project team and documented in the public involvement process.

Identify Minority Populations

An Environmental Justice evaluation must include a discussion about the minority populations present in the community study area. The project team should gather and analyze as much information as reasonably possible about the community study area's population. The amount of analysis necessary for identifying minority populations will depend on the complexity

A Census tract is defined as "A small, relatively permanent statistical subdivision of a county or statistically equivalent entity, delineated for data presentation purposes by a local group of Census data users or the geographic staff of a regional Census center in accordance with Census Bureau guidelines. Designed to be relatively homogeneous units with respect to population characteristics, economic status, and living conditions at the time they are established, Census tracts generally contain between 1,000 and 8,000 people, with an optimum size of 4,000 people.

A block group is the next level above Census blocks. A block group is a combination of Census blocks that is a subdivision of a Census tract or block numbering area. (US Census Bureau)

of the project area and the number of residents and businesses possibly affected, among other factors.

It is important for the project team to gather and analyze as much demographic information, as reasonably possible, about the community study area's population. A variety of data sources record and maintain statistics relative to minority populations. At the start of a project, the project team will need to determine, based on project-specific factors, the level of data (i.e., Census tract, Census block group, block levels) that is the most appropriate to define the demographic characteristics within the community study area. CDOT generally uses the Census block group level data, when available. If data is not available at the block group level, the Census tract level of data is used. It is important to be sensitive to your public. If information is collected down to the block level regarding individuals or individual households, it should not be included in the environmental document. The information should be documented and included in the project file.

The selected data sources need to be detailed enough to determine if minority populations are in the community study area and what the impacts to those populations might be as a result of the project. The first data source used to define and identify minority populations as part of an Environmental Justice analysis is the US Census data, which is available from the US Census 2010 American Fact Finder website. The US Census website provides details on the race, ethnicity, and other population characteristics.

If there is more than one minority group within the community study area, the minority percentage should be based on the aggregate of all minority persons. For example, if the percentage of African American persons in an identified Census block is 20 percent and the percentage of Asian persons is 20 percent, then the total of 40 percent should be used for the minority percentage.

Census data should not be used as conclusive evidence that there are no affected minority or low income populations. Additional sources of information should be used to supplement Census data and further refine identification of the presence of minority and low income populations.

If minority populations are identified, they should be characterized by their size, general location, etc. (see example table below).

Example Table: Minority Populations in Community Study Area

Area	Total Population	Minority Populations (%)				
		Black/African American	Native American	Asian/ Pacific Islander	Hispanic or Latino	Total Minority (%)
State						
County						
Census Block Groups in Community Study Area						
Block Group						
Block Group						

Hispanic is classified as an ethnicity rather than a race in the US Census to avoid double counting because a person who self-identifies as Hispanic may be of any race. Therefore, for purposes of Environmental Justice analysis, the total population within the geographic area being analyzed minus the total White, non-Hispanic/Latino population would generate the total minority population.

Identify Low-Income Populations

An Environmental Justice evaluation must include a discussion about the low-income populations present in the community study area. The project team should gather and analyze as much information as reasonably possible about the community study area's population. The amount of analysis necessary for identifying low-income populations will depend on the complexity of the project area and the number of residents and businesses possibly affected, among other factors.

Median household income is the amount which divides the income distribution into two equal groups, half having income above that amount, and half having income below that amount.

It is important for the project team to gather and analyze as much demographic information, as reasonably possible, about the community study area's population. A variety of data sources record and maintain statistics relative to low-income populations. At the start of a project, the project team will need to determine, based on project-specific factors, the level of data (i.e., Census tract, Census block group, block levels) that is the most appropriate to define the demographic characteristics within the community study area. CDOT generally uses the Census block group level data, when available. If data is not available at the block group level, the Census tract level of data is used. It is important to be sensitive to your public. If information is collected down to the block level regarding

individuals or individual households, it should not be included in the environmental document. Also, information regarding low-income communities, including the poverty level dollar amount should not be included in the environmental document. This information should be documented and included in the project file.

Low-income populations may be spread throughout the community study area, but there may be a concentrated area that has a significantly higher percentage of a low-income population than the county or metro area average. The first step is to identify any of these potential areas.

To determine whether there are low-income populations in a community study area, two things must be established: 1) the low-income threshold dollar amount, number, and percentages for a particular county; and 2) the number and percentage of low-income populations in the community study area that will be compared to the county percentage.

The low-income threshold means a household income at or below the Department of Health and Human Services (HHS) poverty guidelines.

To identify and define low-income populations, a combination of US Census data and US Department of Housing and Urban Development (HUD) data (http://huduser.org/portal/pdrdatas_landing.html) are used.

County Census data and county-specific HUD Average Median Income at 30 percent (AMI30) data are used to determine the areas for low-income populations. US Census data indicate total households and the number of households per income range by county and by smaller levels of geography (i.e., by Census tract or other appropriate level such as block group). The average household size is also designated by county. However, these data do not indicate the number of persons in each household.

The HUD AMI30 data are county-specific and indicate the low-income dollar amount for each household size. AMI30 is recommended as the method to use to determine the county low-income percentage. This method is also used to determine if a low-income population is greater than the county or metro area income percentage. This is preferred to Census poverty household state averages because it is sensitive to county differences in income.

Median Household Income

Obtain the 30 percent median household income data set from the HUD website at http://www.huduser.org/portal/datasets/il/il12/index.html.

- Select Income Limits from the Topic Areas
- Select the FY 2012 (or most current year) Income Limits Documentation
- Select the county within the community study area

If there are multiple counties in your community study area, follow these steps for each county.

- Find the 30 percent median income for the appropriate county or counties in the community study area and then find the 30 percent of median low-income thresholds for the whole number above and below the average household size (e.g., if the average household size is 2.27, use the data from the FY Income Limit Category for the 2 person and 3 person household).
- Subtract the lower low-income threshold dollar number from the higher low-income threshold dollar number and multiply by the decimal portion of the average household size (e.g., if 2.27, multiply by .27). Add this number to the lower whole dollar number (30 percent of median low-income) identified in the last step. This will give you the low-income threshold amount for the actual average household size for the county.

Calculate the low-income threshold number and percentage of low-income households for each Census tract in your community study area. Use the county-level household size (# of low-income households (county level)/total # of households in Census tract/block group). A detailed calculation example is provided below.

Low-Income Methodology Example

The following is an example low-income calculation. (Sample taken from "Environmental Justice in Transportation Planning Phase II, CDOT Research Branch, December 2003.)

Data Assumptions:

The average household size is 3.25 people per household for this county, as provided in the 2010 Census data.

Tract 1, County X

Low-income thresholds for County X

Persons per household	1	2	3	4	5	?	?	?
Low-income	$24,450	$27,950	$31,450	$34,950	$37,750	$40,550	$43,350	$46,150

Household Income	Total Households
Total	1,190
Less than $10,000	50
$10,000 to $14,999	60
$15,000 to $19,999	70
$20,000 to $24,999	80
$25,000 to $29,999	90
$30,000 to $34,999	100
$35,000 to $39,999	100
$40,000 to $44,999	200
$45,000 to $49,999	100
$50,000 to $59,999	100
$60,000 to $74,999	100
$75,000 to $99,999	100
$100,000 to $124,999	100
$125,000 to $149,999	100
$150,000 to $199,999	100
$200,000 or more	100

Given the data presented above, the number of households that are considered to be low income in Tract 1 is calculated as follows.

Low-Income Thresholds

The value of the threshold low-income based on an average 3.25 person household is calculated as follows:

- The average household is between 4 persons and 3 persons, so: $34,950 (4-person household income) minus $31,450 (3-person household income) = $3,500
- $3,500 multiplied by 0.25 (decimal portion of county average household size) = $875
- Low-income threshold for Tract 1: $31,450 (3-person household income) + $875 = $32,325

Referring back to the total household income, the total number of households with incomes at or below $32,325 would be 450, or a total of the number of households within the first six income categories (refer to example table above) below the threshold range "$0 to $34,999" (50+60+70+80+90+100=450).

Census Tract/Block Group Comparison

Use the method described above to calculate the Census tract or block group number and percentage of low-income households. Use the previously calculated county-level household size. Derive the total number of households in the Census tract/block group with income at or below the low-income threshold using the Census tract or block group ranges. Add all the households at or below the threshold income calculated above. It may be necessary to count some households that may have a higher income than the threshold income because they fall in an income range that includes the threshold income level.

Compare this to the county percentage that is used as a reference point to identify low-income populations within the Census tract/block groups within the community study area. If the percentage of low-income households is higher than what has been calculated as the county percentage, the Census tract/block group should be included in the Environmental Justice analysis. If there is any doubt about whether a particular area constitutes a low-income area, it is recommended that additional data be used to refine the analysis. The county and block group (or metro area) averages are initial points of reference, but should be supplemented by additional, more specific local data sources as appropriate.

Area	Low-Income Households (%)
County	
Census Tracts in the Community Study Area	
Census Tract	
Census Tract	

If a low-income area within the community study area exceeds the county average, then the entire Census tract/block group containing the low-income area should be studied.

Supplement Data with Other Sources

Additional sources of information should be used as available to supplement Census and HUD data and further refine the identification of minority, low-income, or LEP populations within the community study area. The use of additional data or efforts to further identify minority, low-income, or LEP populations in the community study area must be documented in the environmental document or associated technical memorandum/report. As previously discussed, it is important to be sensitive to your public. If information is collected down to the block level regarding individuals or individual households, it should not be included in the environmental document. The information should be documented and included in the project file. Public involvement, discussed in Chapter 7 of this Manual, is a particularly important source of information relevant to this process, as potentially small or dispersed groups may be identified through the public involvement process.

Additional sources of data that may provide data or other anecdotal information may include religious groups, schools, homeowner and community associations, civil rights organizations, minority business associations, economic and workforce development agencies, and local businesses. Other reliable local data sources include county assessors, social service agencies, local health organizations, local public agencies, and community action agencies.

9.15.3 NEPA Document Sections

The content of the sections on Environmental Justice in the Affected Environment and Environmental Consequences chapter is discussed below.

To adequately address Environmental Justice impacts to minority and low-income populations within the community study area, the NEPA document must include the following:

- Describe the environmental effects on all communities, including human health, economic, and social effects (negative and positive) on all people within the study area, with special consideration for minority and low-income populations based on the evaluation of impacts
- Identify any disproportionately high and adverse environmental effects that exist
- When impacts on minority or low-income populations are projected to be disproportionately high or adverse after considering offsetting benefits, the NEPA document should discuss the mitigation measures that are feasible for the project

Consistent with FHWA's guidance on how to address Environmental Justice in NEPA documents (December 2011), it is especially important to thoroughly document the following information as part of the NEPA process:

- The ethnic and economic character of the affected community has been determined as early as possible in the process to appropriately identify potential Environmental Justice issues.
- Meaningful opportunities for public participation were provided throughout the project development process, including activities to increase low-income and minority participation such as consultation with affected communities to identify potential effects and possible mitigation measures, and improved accessibility to public meetings, project documents, and project decision-makers on Environmental Justice populations.
- The degree to which the affected groups of minority and/or low income populations have been involved in the decision-making process related to the alternative selection, impact analysis, and mitigation.
- The views of the affected population(s) about the project and any proposed mitigation, and the steps being taken to resolve any controversy that exists.

- The types of outreach and involvement processes undertaken are responsive to the unique characteristics of the community, including the comments and opinions of the minority and/or low-income populations.
- Other reasonable alternatives that do not have Environmental Justice impacts were evaluated and eliminated because they did not meet the purpose and need for the project, or had impacts that were more severe, affected far greater numbers of people, did greater harm to the environment, or involved costs of extraordinary magnitude, etc.
- The project's impacts are unavoidable.
- Identifiable minimization and/or mitigation measures will be made to reduce the harm to minority and/or low-income populations.

AFFECTED ENVIRONMENT

Consistent with the FHWA guidance on how to address Environmental Justice in NEPA documents (December 2011), Environmental Justice information is typically included in the social conditions section. This section includes information on the general population in the community study area. Social characteristics that should be described include:

- Description of minority populations
- Race and ethnicity in Census tract or block groups – compared to the State of Colorado and county(ies) in which project is taking place
- Description of low-income populations in Census tract or block groups – compared to county(ies) in which project is taking place
- Description of businesses
- Description of community facilities and public services (trails, parks, recreation centers, churches)
- Public and agency involvement relevant to Environmental Justice

If no minority or low-income populations are present in the community study area, an Environmental Justice analysis is not required. If your documentation concludes that no low-income or minority populations are present in a community study area, the documentation needs to support how that conclusion was reached.

ENVIRONMENTAL CONSEQUENCES

If Environmental Justice populations exist in the community study area, the next step in the Environmental Justice evaluation is to consider how each alternative might positively or negatively impact the low-income or minority populations. Include consideration of:

- Possible relocation of minority and/or low-income populations
- Displacement of businesses that provide jobs for minority and/or low-income populations
- The displacement of a place of worship or community center that is a gathering place, or other actions that could disrupt or destroy the social fabric of a community or sense of place
- Impacts that may result from issues unique to a community's distinct cultural practices or use of affected resources (e.g., subsistence fish, vegetation or wildlife consumption or use of well water in rural communities)

Determine Whether Each Alternative Has Adverse Impacts

The Environmental Justice evaluation must consider how each alternative might adversely impact the low-income or minority populations compared to populations that are not minority or low-income in the community study area and how mitigation might off-set these impacts. At a minimum, use the evaluative criteria set out below. Adverse impacts include, but are not limited to, significant individual or cumulative human health or environmental effects. Examples of adverse impacts include:

- Destruction of human made or natural resources, destruction or diminution of aesthetic values
- Destruction or disruption of community cohesion or a community's economic vitality
- Destruction or disruption of the availability of public and private facilities
- Adverse employment affects
- Displacement of persons, businesses, or nonprofit organizations
- Increased traffic congestion
- Isolation, exclusion, or separation of Environmental Justice individuals from a broader community

Impacts may result from issues unique to a community's distinct cultural practices or use of affected resources. When identifying the impacts, project staff should consider public comments and reactions about alternatives from

low-income, minority, or other affected populations. If one or more tribal governments are involved, the tribal consultation process under Section 106 of the National Historic Preservation Act may be necessary, along with consultation with CDOT NEPA staff or the CDOT Senior Staff Archeologist.

Mitigation

If adverse impacts to an Environmental Justice population have been identified for any alternatives, efforts must be made to avoid, minimize, and mitigate such adverse effects. Mitigation may include:

- Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
- Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
- Compensating for the impact by replacing or providing substitute resources or environments.

Further, FHWA Order 6640.23A states that impacts to minority and low-income populations can be addressed by "proposing offsetting benefits and opportunities to enhance communities, neighborhoods, and individuals affected by FHWA programs, policies, and activities." Project staff should consider the option of applying early mitigation where applicable and solicit community input about how to best mitigate impacts.

Project staff must clearly document how each project alternative avoids, minimizes, and mitigates for adverse impacts, if necessary.

Determine Whether Impacts Have a Disproportionately High or Adverse Effect on the Environmental Justice Population

After impacts and mitigation efforts have been identified, a determination must be made as to whether each alternative will create disproportionately high or adverse impacts to minority and low income populations. A disproportionately high or adverse effect is an adverse effect or impact that would be:

- Predominantly borne by minority and/or low-income populations; or
- Will be suffered by minority and/or low-income populations and is appreciably more severe or greater in magnitude than the adverse effect suffered by the non-minority population and/or non-low-income population.

In considering whether a disproportionately high and adverse impact is predominantly borne by minority and/or low-income populations, project staff should consider and weigh at least the following factors:

- Whether health effects are significant or above generally accepted norms. Adverse health effects may include bodily impairment, infirmity, illness, or death.
- Whether there is or will be an impact on the natural or physical environment with significant and adverse impacts. Such effects may include ecological, cultural, human health, economic, or social impacts.
- Whether the risk or rate of exposure to health hazards or environmental effects are significant and appreciably exceeds or is likely to exceed the risk or rate to the general population or other appropriate comparison group.
- Whether health or environmental effects occur in an Environmental Justice population affected by cumulative or multiple adverse exposures from environmental and health hazards.
- If there are still disproportionately high and adverse impacts on the Environmental Justice population after taking benefits and mitigation into account, FHWA will not approve the project unless:

  There is a substantial need for the project, based on the overall public interest; and Alternatives that would have less adverse effects on protected population have either adverse social, economic, environmental, or human health impacts that are more severe or would involved increased costs of an extraordinary magnitude.

For more information on identifying disproportionately high and adverse effects and proceeding when there are disproportionately high and adverse effects, refer to FHWA's guidance on how to address Environmental Justice in NEPA documents (December 2011).

Impacts and mitigation should be listed in a Summary of Impacts and Mitigation Table at the end of the resource evaluation chapter of the NEPA document. The first six columns of CDOT's Mitigation Tracking Spreadsheet should be used as this summary table (Table 9-2). CDOT's Mitigation Tracking Spreadsheet (Table 9-1) can be retrieved from http://www.coloradodot.info/programs/environmental/resources/forms/CDOT%20Mitigation%20Tracking%20Spreadsheet_June%202012.xlsx/view.

9.16 Transportation Resources

The Colorado Transportation Commission has policies that guide CDOT by providing transportation operating principles, and the transportation vision, mission, goals and objectives. The policies establish CDOT's position on promoting an integrated multimodal transportation system. Therefore, CDOT's NEPA projects should consider and evaluate all travel modes available to the study area.

Transportation resources include the entire transportation network within the study area, including roadway, freight, transit, rail, aviation, bicycle, and pedestrian facilities. Evaluation of these transportation resources provides a framework within which the new transportation project can be considered and evaluated.

In a transportation-focused NEPA document, Transportation Resources are sometimes included in a separate Transportation Resources Chapter and improvements are evaluated in the Alternatives chapter. Elements of the transportation system, however, may also be addressed in other chapters of the NEPA document, such as:

- **Freight** – Socioeconomics and Land Use sections
- **Bicycle/Pedestrian** – Section 4(f) and Parks/Recreation sections
- **Transit** – Environmental Justice, Socioeconomics, and Land Use sections

9.16.1 Transportation Resources Evaluation Process

When CDOT is evaluating a transportation project that is expected to be federally funded, FHWA requires integration of the NEPA process with the transportation decision-making process. Since the transportation system is typically the focal point of CDOT's NEPA projects, the purpose and need is tied heavily to the transportation problems. Therefore, the transportation system is considered and evaluated in two different ways:

- Impacts of the project on the transportation system (e.g., the project results in elimination of a bus shelter).
- Transportation alternatives' ability to address the project's purpose and need.

Reasons for Evaluation of Transportation Resources Under NEPA

CDOT evaluates transportation resources for several reasons:

- To understand and thoroughly evaluate the impacts and benefits to the transportation system that could result from a proposed action.
- To further CDOT's mission "to provide the best multimodal transportation system for Colorado that most effectively and safely moves people, goods, and information."
- To comply with CDOT's environmental stewardship policy, which ensures that the statewide transportation system is constructed and maintained in an environmentally responsible, sustainable, and compliant manner.

- To comply with several legal mandates that pertain to 23 USC 135 and to evaluate compliance with air quality laws and regulations.
- To comply with FHWA's Vital Few Objective #1: to use integrated approaches to multimodal planning, the environmental process, and project development at a system level and/or context-sensitive solutions at the project level.

Those projects involving Federal Transit Administration (FTA) can reference the guidance provided in **Chapter 10** *FTA NEPA Compliance*.

Collection and Evaluation of Baseline Information Under NEPA

There are many resources available for the collection and evaluation of the baseline transportation system. Information on the existing and future local and regional transportation system should be obtained and evaluated in close coordination with the local community(ies), regional agency (e.g., Metropolitan Planning Organization [MPO]), CDOT, and FHWA. If transit is present or planned in the study area, the local transit agency and Federal Transit Administration (FTA) involvement may also be appropriate. Likewise, if aviation alternatives are being considered, the Federal Aviation Administration (FAA) and CDOT's Division of Aeronautics should be involved.

The existing conditions and future baseline conditions should provide a thorough description and analysis of the state of the multimodal transportation system within the study area today and in the future. The future baseline condition should represent the transportation system without any proposed action in the study area. Outside of the immediate study area, the baseline should include only those transportation improvement projects that have committed funding during the planning horizon.

9.16.2 NEPA Document Sections

In NEPA, the existing and the long-range planning horizon No Action conditions are essential in determining the need for a project.

Affected Environment

The transportation system includes roadway, freight, transit, rail, aviation, bicycle, and pedestrian facilities and how the modes connect and interrelate to form the transportation network. Evaluation of the existing and future transportation system conditions provides a framework for alternatives development and screening.

The purpose of this effort is to gather enough information to provide a complete picture of the existing and future transportation system within the study area. The data collection effort should rely on professional judgment and general knowledge of the study area to determine the information sources that are needed to provide an overview of the existing and future transportation system. The level of detail of the information gathered should correspond with the importance of the specific element to the transportation system.

Roadway

Physical Characteristics

Information about the physical roadway network should be collected and documented, including:

- Cross-sections (e.g., right-of-way width, through lanes, auxiliary lanes, median, shoulder, etc.)
- Functional classification (e.g., expressway, major arterial, etc.) and access category (e.g., Regional Highway [R-A], Non-Rural Highway [NR-A], etc.)
- Access points, spacing, and traffic control (e.g., signalization, stop control)
- Interchange configurations, ramp lengths
- Lane restrictions (e.g., high occupancy vehicle [HOV] or tolled lanes)
- Freight designations (e.g., truck routes, hazardous material routes)
- Parallel transportation facilities that affect travel patterns in the study area
- Inventory of planned roadway network improvements from local agency and regional fiscally-constrained and vision plans

Traffic Composition and Patterns

Existing traffic volumes and patterns for motorized and non-motorized traffic should be documented using thorough field traffic data collection and from existing CDOT, regional, county, and municipal data sources, including:

- Daily traffic volumes and peak hour intersection turning movement counts
- Posted and observed speeds, travel times
- Travel patterns (e.g., trip length, local vs. regional trips, origins/destinations, trip purposes)
- Level of Service (LOS) – using the currently accepted *Highway Capacity Manual* (Transportation Research Board) methodology to provide a qualitative assessment of the traffic flow for intersections, highway or freeway segments, ramp merge/diverge/weave sections, etc.
- Hours of congestion
- Vehicle miles of travel (VMT) and vehicle hours of travel (VHT)
- Safety records and significant crash patterns

TDM/TSM

Transportation Demand Management (TDM) and Transportation System Management (TSM) infrastructure or programs that exist within the study area should be documented. Examples could include:

- Intelligent Transportation Systems (ITS) that provide signal coordination, traveler information, dynamic message signs, etc. to maximize the efficiency of the system
- TDM measures aimed at encouraging changes in driving behavior (e.g., educational information, transit or carpool incentives, congestion pricing, parking management, etc.)

Freight

Freight can be defined as the movement of goods to, from, and through the study area. In Colorado, freight is most commonly transported on the roadway network (trucks) and by rail. Data collection for freight could include:

- Vehicle classification, truck counts and truck count forecasts
- Freight flow data including commodity flow databases
- Truck travel patterns
- Location of freight distribution centers, manufacturing locations, intermodal facilities

Transit and Rail

The transit system includes any mass transportation service in the study area, including shuttle, bus, light rail, commuter rail, passenger rail, etc. and demand-responsive services, along with the facilities that support those services (transit stations, stops, park and ride facilities, etc.). Information about transit routes, amenities, and infrastructure within the study area, or potentially impacted by the project, should be collected and documented, including:

- Public and private transit service providers
- Type of transit service by provider (e.g., fixed-route bus, demand responsive bus, light rail transit)
- Routing or service area
- Frequency of service (e.g., 15 minute peak/30 minute off peak)
- Span of service - days of week and hours of day service operates
- Ridership annually (by stop if available)

Transit Resources

CDOT's Division of Transit and Rail (DTR) has guidance available on the CDOT website at http://www.coloradodot.info/programs/transitandrail.com

CDOT Transit Projects

CDOT could have projects that are transit focused or projects that are focused on another mode but have the potential to impact transit services. This guidance focuses on projects that have the potential to impact transit services.

Transit and rail projects will need to comply with FTA and/or Federal Railroad Administration (FRA) requirements.

- Clientele served (e.g., commuters, seniors, disabled)
- Connecting routes
- Origins and destinations served by impacted bus stops and along the transit route as a whole (e.g., business park, neighborhood, medical facility, grocery store)
- Number and location of passenger amenities (e.g., shelters, benches, trash receptacles, signing)
- Infrastructure improvements present (e.g. transit signals, parking spaces, queue jumps, bus pullouts)
- Planned (fiscally constrained and vision) transit improvements in the study area (local, regional or statewide)

Aviation

If aviation alternatives are being considered, an inventory of the existing airport facilities should be documented, including:

- Location of airports
- Category of airport: commercial service, primary, cargo service, reliever
- Type of service (commercial vs. general aviation)
- Annual enplanements and operational capacity
- Ground transportation facilities and services

Bicycle and Pedestrian

Bicycle accommodation can take a number of forms including on-street facilities (shared lanes, wide curb lanes, paved shoulder, bike lanes, etc.) and off-street shared use paths. Pedestrians are most commonly accommodated on sidewalks or shared use paths. The existing and planned bicycle and pedestrian facilities and amenities in the vicinity of the project should be documented, including:

- Existing bicycle facilities (e.g., designated bike routes, bike lanes, shared use paths, etc.)
- Existing pedestrian facilities (e.g., sidewalks, shared use paths, intersection crossing treatments, etc.)
- Bicycle and pedestrian LOS – using *Highway Capacity Manual* (Transportation Research Board) methodology to provide a qualitative assessment of segment and intersection LOS in the study area

Scope of Traffic Analysis

Key aspects of the traffic scoping include:

- **Horizon Years**: Traffic analysis is generally required for the existing and the long-range planning horizon year.
- **Time Periods:** Analysis should be geared to recurrent peak traffic conditions.
- **Study Area**: The study area for the transportation analysis is often larger than the area defined for most environmental resources.
- **Model Calibration**: Travel demand and traffic operations models should be validated against actual conditions and calibrated to ensure that they are reasonably representing the area and local travel conditions.

- Bicycle and pedestrian crossing treatments (e.g., crosswalks, pedestrian push button activation, bicycle in-street actuation, etc.)
- Amenities (e.g., bike racks, bike lockers, bicycle accommodation on transit vehicles)
- Bicycle and pedestrian connections to other transportation facilities (e.g., transit stations or stops)
- Local and regional bicycle and pedestrian improvements (fiscally constrained and vision plan)

ENVIRONMENTAL CONSEQUENCES

The Environmental Consequences section of EAs and EISs should compare the effects of each alternative carried forward for detailed analysis for all affected travel modes in the study area. The following sections provide an overview of the range of tools and analytical techniques that can be used to evaluate how well each alternative meets the project's stated purpose and need and to assess the project's impacts on transportation resources in the study area.

Roadway

Travel Demand and Traffic Operations Modeling

One or more of the following four categories of travel demand and traffic operations models may be needed to appropriately forecast the travel demands and assess the operational conditions associated with the various transportation alternatives in the future.

Regional Travel Demand Models

This type of transportation model is designed to forecast travel demand at a regional level. Travel demand forecasting models are typically developed and maintained by an MPO and are used to understand the regional demands on and needs of a transportation system.

- Common software packages: TransCAD, VISUM, Cube
- Basic inputs: land use forecasts and the transportation network (roadway and transit)
- Basic outputs: forecasted daily traffic volumes and transit ridership for individual corridors in a region, regional travel patterns including origins/destinations
- Typical applications: regional, community, and corridor level analysis
- Level of effort required: a relatively low level of effort is required to adapt these tools for project-level application

The travel demand model used by a project should be adopted by the relevant MPO and verified/approved by FHWA.

Analytical/Deterministic Tools

Analytical/deterministic tools implement the procedures of the *Highway Capacity Manual* to conduct operational analyses (Transportation Research Board). The *Highway Capacity Manual* procedures use deterministic mathematical equations to calculate facility LOS. These tools quickly predict capacity, density, speed, delay, and queuing and are validated with field data and small-scale calibration. Analytical/deterministic tools are good for analyzing the performance of isolated facilities but do not evaluate the interaction between multiple intersections.

- Common software packages: Highway Capacity Software, Synchro
- Basic inputs: traffic volumes (peak hour), roadway geometry, and signalization characteristics
- Basic outputs: signalized and unsignalized intersection levels of service, travel delay, freeway mainline and ramp peak hour operations, etc.
- Typical applications: intersection operational analysis
- Level of effort required: a low level of effort is required to use these tools

Microscopic Simulation Models

Microscopic simulation models are designed to provide detailed simulation of individual vehicles in a network. They evaluate the interaction between each single car, bus, or person in the simulation based on the laneage and geometry and are capable of providing very detailed information about the performance. Due to the fine detail and large amount of information required to develop microscopic simulation models, these models often focus on small areas and are developed for specific corridor and intersection studies. Microscopic models rely on user-defined travel patterns and demands, and do not adjust for capacity constraints. Microscopic simulation models can be particularly useful when evaluating over-saturated traffic conditions.

- Common software packages: CORSIM, VISSIM, and SimTraffic (which is packaged with the Synchro analytical/deterministic tool)
- Basic inputs: the most extensive and detailed of the four modeling tools; all of the conditions in the study area (lanes, signal timing, volumes, geometry, etc.) are required in order to evaluate operational performance
- Basic outputs: intersection operations (LOS) and network performance including interaction (queuing) between intersections

- Typical applications: individual corridors or sub-area system of intersections
- Level of effort required: requires a high level of effort and calibration

Mesoscopic Operational Models

Mesoscopic models are relatively new to transportation planning and bridge the divide between travel demand models and microscopic models. Mesoscopic operational models include dynamic network assignment processes that adjust driver route choices based on real-time conditions and are designed to include more detailed aspects of the roadway system (e.g., the location of auxiliary turn lanes, the existence of tolled or managed lanes or facilities, etc.) without the intense resource requirements of a full microscopic simulation model. This model type is particularly useful when analyzing the route decision-making differences resulting from congested conditions or managed lanes, assessing the impacts of ITS technologies, supporting the decision-making for work zone planning and traffic management, the evaluation of congestion pricing schemes, and the planning for special events and emergency situations.

- Common software packages: DynusT, Aimsun, TransModeler
- Basic inputs: the basic requirements for a travel demand model with the potential for increased network information, such as auxiliary lanes, signal timing and coordination, ITS technologies, tolled lanes and HOV lanes
- Basic outputs: Travel forecasts in small time increments that account for and demonstrate the impacts of congestion (e.g., rerouting, queuing) over time
- Typical applications: regional or corridor level analysis
- Level of effort required: This model type is not as readily available as travel demand models. The regional nature of a mesoscopic model requires a considerable effort for development, calibration, and validation. Depending on the existence of an established model and the project requirements and goals, this process requires a moderate to high level of effort.

Safety

CDOT requires explicit consideration of safety in a transportation planning process. The analysis should employ the concepts of Level of Service of Safety (LOSS) and pattern recognition to test the frequency and severity of crashes throughout the study area. The LOSS formulation categorizes four

Safety Analysis Resources

Highway Safety Manual – American Association of State Highway Transportation Officials (AASHTO)

CDOT's Safety Performance Functions (SPF)

levels of "potential for accident reduction," I through IV. Level I indicates a better than expected safety performance and thus a low potential for crash reduction. Level IV indicates a crash history significantly greater than expected for a given roadway type, thus possessing a high potential for crash reduction.

Freight

Projects that may require the integration of freight considerations include, but are not limited to, intersection improvements, reconstruction and rehabilitation of roadways, bridge replacements and/or rehabilitation, repaving, building roadway on a new alignment, expanding roadway corridors, interchange improvements, additions of interchanges, roadway widening, access to intermodal facilities, accommodating rail expansion with roadway improvements, and safety improvements. There are generally two types of freight considerations for CDOT transportation projects:

- Freight-focused: a transportation project intended to resolve a freight issue or that has a significant freight element. The project's purpose and need would likely be heavily focused on freight movement, and freight would likely be a major consideration in the alternatives evaluation process.
- Freight-related: a transportation project that could impact freight operations. The role of freight in the project would likely be one of several transportation considerations.

Alternatives development and evaluation should consider freight infrastructure, operations and policy. Truck volume forecasting should be verified for accuracy, as many regional models calibrate mainly on overall traffic volumes. For both freight-focused and freight-related projects, screening of alternatives may consider:

- The degree to which the alternative solves an existing freight problem
- The degree to which the alternative satisfies all transportation needs, not just freight (a balancing of benefits)
- Direct impacts on freight movement such as access changes, facility design that could reduce truck safety, tolls that could divert trucks onto the adjacent street network, inhibiting intersection design (e.g., roundabouts), poor signal timing, increased congestion that could reduce truck travel times and/or reliability

Freight Stakeholders

Freight stakeholders can be hard to engage and reluctant to disclose operational information that they deem to be proprietary and could benefit their competitors.

Statewide and regional resources are important to identify freight users of the study area.

Key input from freight stakeholders:

- Current freight uses of the facility
- Freight forecasts
- Alternatives development and refinement
- Impacts of alternatives on freight operations

- Indirect impacts on freight movement such as induced changes in the pattern of land use, the location of freight facilities, and effects to the supply chain
- The impacts of freight movement on environmental resources and features (e.g., air quality, water quality, noise, visual, social/environmental justice, etc.) and the potential for an alternative to minimize the impacts should also be considered

Transit and Rail

The travel demand modeling tools described above may provide some insight into how ridership and travel times are likely to change as a result of a project. However, a calibrated travel demand model with transit is often not available. Therefore, this section provides guidance on qualitative and quantitative off-model analysis that can be useful:

- Degree to which the alternative impacts the transit service in relation to the services importance regionally
- Change in ridership
- Potential to incite mode shift to transit
- Influence on transit's ability to service existing clientele and key activity centers
- Compatibility with planned transit improvements
- Impacts on origins and destinations served
- Impact to transit agency or service provider
- Impact on connecting services or ability to make connections
- Change in travel time and/or reliability
- Impact on passenger amenities
- Change in transit infrastructure
- Change in access to facilities and circulation

Aviation

Although it is rare for a CDOT NEPA project to impact aviation facilities, some large studies with aviation facilities in proximity to the study areas may exist. Facilities may include runways, airports, airport towers etc. Aviation impacts should be coordinated with the FAA, the CDOT Division of Aeronautics and the local airport managers.

Transit Stakeholders

- Public transit agencies
- Private for profit transit providers
- Private not for profit agencies
- Municipalities
- Regional planning entities (e.g., MPOs)
- CDOT DTR
- Federal Transit Administration (FTA)
- Federal Railroad Administration (FRA)
- Colorado Association of Transit Agencies (CASTA)
- Human services agencies
- Transit and rail interest groups

Bicycle and Pedestrian

Both the U.S. Department of Transportation's (USDOT) policy statement on bicycle and pedestrian accommodation (signed March 11, 2010) and the Colorado Transportation Commission's Bike and Pedestrian Policy Directive 1602.0 (dated October 22, 2009) and subsequent State Statute 43-1-120 support the development of fully integrated active transportation networks. CDOT's Policy Directive states that "the needs of bicyclists and pedestrians shall be included in the planning, design, and operation of transportation facilities, as a matter of routine." As such, bicycle and pedestrian accommodation needs to be incorporated into all CDOT transportation projects. Some CDOT NEPA projects may be specifically focused on bicycle and/or pedestrian travel.

To identify the potential impacts and benefits to bicycle and pedestrian use under each alternative, the following tools may be useful:

- Maps showing the alignment of the project alternatives overlaid with existing and planned bicycle and pedestrian facilities
- Comparison of the bicycle and pedestrian features of the project alternatives with respect to existing and planned bicycle and pedestrian facilities outlined in community transportation plans and information provided by local interest groups
- Evaluation of whether the proposed action features will have negative or positive impacts on the existing and planned bicycle and pedestrian facilities
- Completion of bicycle and pedestrian LOS evaluation for each alternative, using the methodologies presented in the *Highway Capacity Manual*
- Comparison of the bicycle and pedestrian features of the alternatives to highlight the similarities and differences among the alternatives

The Environmental Consequences discussion in EAs and EISs should, at a minimum, compare the effects in the following three categories of each alternative carried forward for detailed analysis:

- Community Needs: Demonstrate that CDOT has fully considered bicycle and pedestrian transportation and has actively coordinated with local government bicycle and pedestrian agencies and public interest groups to understand and meet, where feasible, community needs. The information contained in this discussion should provide

Unless currently under construction, all CDOT and local agency projects (including those in a re-evaluation process) are subject to the Transportation Commission's Bike and Pedestrian Policy Directive 1602.0 and State Statute 43-1-120.

Bicycle/Pedestrian Stakeholders

Groups supporting the development of bicycle and pedestrian facilities on the project typically have information regarding existing and future needs for bicycle and pedestrian accommodation. Stakeholders could include:

- Bicycle advocacy groups
- Biking clubs
- Walking organizations
- Senior advocacy groups
- Schools

a firm understanding of how the local needs and movements of bicyclists and pedestrians will be met by the proposed facilities.

- Public Law: The Environmental Consequences discussion must cite the federal legislation in Title 23 of the U.S. Code Section 109(m), documenting CDOT's full consideration of bicycle and pedestrian accommodation and the provision of reasonable accommodation for the bicycling and walking public.
- Community Context: Describe any project components that will benefit the local bicycle and pedestrian network by being constructed as part of the project or by providing adequate right-of-way for later construction.

Cumulative Impacts

Develop a list of past, present, and reasonably foreseeable future projects that may impact similar transportation components. Cumulative impacts to transportation should be discussed in more general terms, noting which transportation components and travel modes will be most impacted, their relative importance, and the degree to which impacts from the transportation project considered in the current NEPA document will contribute to the cumulative impacts.

Conclusion of Effects

The conclusion of the Environmental Consequences related to the transportation resources should restate the biggest transportation concerns associated with each alternative and identify the alternative with the least expected negative effect on and the greatest benefit to the transportation network.

MITIGATION

The mitigation section should describe project design elements that avoid or minimize impacts to the existing transportation network and detail the proposed mitigation measures and describe how they will mitigate the impact for which they were developed.

Roadway

Traffic Operations

Mitigation measures should be considered when the analysis of alternatives results in a negative impact to existing or future traffic operations and safety. These measures could include:

- Implementation of traffic control devices (e.g., traffic signals, stop signs, ramp metering)

- Intersection improvements (e.g., roundabout construction, auxiliary lanes)
- Signal timing improvements (e.g., reallocation of green time, addition of protected-only left turn phase to address safety issue)

TDM/TSM

Mitigation of impacts to the transportation system can often be performed through TDM and TSM, such as the following:

- TDM strategies to change or reduce the demand for automobile use, particularly during peak periods of the day, by encouraging a change in travel behavior. Example measures could include:
  - Requiring parking fees
  - Subsidizing transit costs for employees or residents
  - Enhancing facilities and amenities for alternative travel modes (transit, bicycle, pedestrian) to encourage mode shift from single-occupancy vehicles
  - Implementing TDM programs, often through major employers, to encourage telecommuting and flexible work schedules
- TSM strategies focus on maximizing the efficiency of transportation system operations by improving traffic flow and reducing traveler delay. Such programs can also reduce emissions by changing vehicle speeds, reducing vehicle idling, and rerouting to avoid congested areas. Example measures could include:
  - Signal coordination
  - Traveler information (e.g., online tools or applications)
  - Dynamic messaging signs

Freight Resources

FHWA's Integrating Freight into NEPA Analysis guidance

http://ops.fhwa.dot.gov/publications/fhwahop10033/nepa.pdf (September 2010)

CDOT's DTR

http://www.coloradodot.info/programs/transitandrail.com

Freight

Appropriate mitigation of impacts on freight facilities and operations should be commensurate with the presence of freight activity and the project's impacts thereon. Working with freight stakeholders during the identification of mitigation options is critical to the success of freight-focused or freight-related project. Mitigation measures could address:

- Impacts to truck operations during construction (e.g., advance notice of construction schedules to prominent trucking companies, ensuring work zone safety measures account for corridor truck travel)
- Geometric design and pavement materials to adequately handle forecasted truck travel

- Alterations in the transportation network to minimize interactions between trucks/trains and autos/pedestrians/bicyclists
- Efficient truck routing that avoids residential communities
- Provision of loading and unloading areas for truck deliveries to stores, restaurants, and offices
- Provision of sound or visual barriers to reduce freight transportation noise and visual impacts on the adjacent area

Transit and Rail

Mitigation measures should be considered when the analysis of alternatives results in a negative impact to existing or planned transit and/or rail services. Mitigation measures should be coordinated with transit stakeholders but could include:

- Relocation of transit stop(s)
- Enhancement of transit stop(s) (e.g., sidewalks, ramps, connections to adjacent land uses, lighting)
- Replacement, relocation or enhancement of passenger amenities such as shelters and benches
- Rerouting of service to retain reliability and travel time
- Signing and way finding
- Transit priority features (e.g., queue jumps, signal priority)
- Pedestrian crossing treatments (e.g., crosswalks, grade separated crossings)
- New or expanded intercept parking lots
- Local agency modifications to zoning and/or setbacks to encourage transit-supportive land uses

Aviation

Mitigation measures should be considered if the alternatives analysis results in negative impacts to aviation facilities in the study area. These mitigation measures could include enhanced or new access to affected airports, traveler information, or enhanced transit service to access the affected airports.

Aviation Resources

CDOT's Division of Aeronautics at http://www.coloradodot.info/programs/aeronautics

Bicycle and Pedestrian

If the analysis of alternatives shows a negative impact on existing or planned accommodation of bicyclists or pedestrians, mitigation measures should be identified. Such mitigation measures could include:

- Expansion of or improvements to existing bicycle or pedestrian facilities to maintain a desired bicycle or pedestrian LOS
- Provision of connections to other system options such as local or regional trail system, on-street lanes or routes, etc.
- Rerouting of bicyclists/pedestrians to equivalent type facility if proposed action would sever existing bicycle or pedestrian facilities
- Intersection or mid-block crossing treatments to enhance pedestrian safety
- Grade separations to eliminate conflicts between bicyclists/pedestrians and autos/trains
- Provision of amenities (e.g., bike racks or bike lockers) at transit stations to enhance inter-modal connections
- Signing and wayfinding

Impacts and mitigation should be listed in a Summary of Impacts and Mitigation Table at the end of the resource evaluation chapter of the NEPA document. The first six columns of CDOT's Mitigation Tracking Spreadsheet should be used as this summary table (Table 9-2). CDOT's Mitigation Tracking Spreadsheet (Table 9-1) can be retrieved from http://www.coloradodot.info/programs/environmental/resources/forms/CDOT%20Mitigation%20Tracking%20Spreadsheet_June%202012.xlsx/view.

Bicycle/Pedestrian Resources

CDOT's Bicycle and Pedestrian Program at www.coloradodot.info/programs/bikeped

9.17 Residential/Business/Right-of-Way Relocation

The relocation and displacement analysis of the NEPA document should identify and discuss any residential, business, non-profit association, or farm operation relocations associated with the proposed project to:

- Ensure that community issues are identified and project effects are addressed and incorporated into the decision-making process
- Try to avoid, minimize, or mitigate, where feasible, adverse community effects
- Ensure the incorporation of environmental protection and community impact considerations from the earliest stages of project or plan development
- Provide for the participation and consultation of communities affected by the proposed project throughout the life of the project development process

The CDOT's right-of-way staff should be involved in all projects where right-of-way acquisition will be required or is a potential concern. It is the responsibility of environmental planners performing relocation and displacement analysis to coordinate closely with the CDOT right-of-way staff in order to avoid duplication of effort as well as better integration of information. Acquisitions and relocation issues also affect the land use and social and economic health of a community and should be addressed accordingly.

The two sections below provide guidance on the treatment of acquisition and relocation for CDOT's NEPA projects. The first section discusses the process for evaluating acquisition and relocation. The second section discusses acquisition and relocation information that should be in each NEPA document.

Relocation/Acquisition Regulations and Guidance

- FHWA Technical Advisory T6640.8a
- Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 100-17)
- FHWA's Environmental Impact and Related Procedures (23 CFR 771)

9.17.1 Relocation and Acquisition Evaluation Process

The CDOT project manager and relocation and displacement analyst (either in-house or consultants) are responsible for obtaining data on the number of relocations and availability of replacement property.

Information will be evaluated on how the relocations and acquisitions, caused by the proposed project, would facilitate or inhibit access to jobs, educational facilities, religious institutions, health and welfare services, recreational facilities, social and cultural facilities, pedestrian facilities,

shopping facilities, and public transit services within the project area. The study area is obligated to include communities within, and immediately surrounding, the proposed project. Community boundaries can often be delineated by physical barriers, land-use patterns, political divisions (such as school districts), selected demographic characteristics, historical backgrounds, resident perceptions, subdivisions and neighborhoods recognized by name and tradition.

Possible right-of-way acquisitions must be identified and evaluated as early as possible during project planning. This should be done before alternative corridors are selected if possible and must be completed before proceeding with any right-of-way acquisitions.

Reasons for Evaluation of Relocation and Acquisition Under NEPA

CDOT evaluates relocation and acquisition for several reasons:

- Relocation and acquisition of any residence, business, non-profit associations, or farm operations is an involved undertaking that needs to be carefully considered before any individual or group is impacted
- To comply with CDOT's environmental stewardship policy, which ensures that the statewide transportation system is constructed and maintained in an environmentally responsible, sustainable, and compliant manner
- To comply with several legal mandates that pertain to right-of-way acquisitions

CDOT must comply with federal relocation regulations when implementing transportation projects in Colorado. These policies provide for uniform and equitable treatment of persons displaced from their homes, businesses, farms, or other properties, by federal and federally funded programs or projects, and establishes uniform and equitable land acquisition policies.

It is not appropriate to collect and present demographic details of individuals associated with displacement. In situations where the number of displacements is low, general demographic discussions may be appropriate. In situations where there are numerous displacements, demographic information from the Census or other sources may be sufficient to characterize the overall nature of the displaced individuals.

Collection and Evaluation of Baseline Information Under NEPA

To comply with the FHWA Technical Advisory 6640.8A (FHWA, 1987) information on right-of-way requirements are to be included in the description of project alternatives. The CDOT *Right-of-Way Manual* (CDOT, 2011) addresses the preparation of right-of-way plans. These plans are a prerequisite to federal participation in the cost of acquiring real property and are required under state law. Preliminary development of these plans is initiated as soon as the route of the proposed project has been selected and approved by the Transportation Commission.

Collection of Baseline Information

The contents of final right-of-way plans are prescribed in the CDOT *Right-of-Way Manual* and include information that could enable evaluation of relocation/acquisition impacts. However, NEPA analysis occurs between the processes of describing right-of-way requirements for project alternatives and preparing right-of-way plans for the selected route of the proposed highway. Relevant data sources are discussed in Section 9.13 (Social Resources) and Section 9.14 (Economic Resources) and coordinated with the CDOT right-of-way staff.

Evaluation of Baseline Information

To enable identification of relocation and acquisition impacts, the baseline information must be limited to the right-of-way boundaries for each of the project alternatives. As appropriate to project complexity, this information can then be used to develop the following types of information with regard to project impacts:

- Estimation of types of households to be displaced, including:
  - Percentage of minority (racial, national origin, and ethnic) households
  - Income range (in dollars) of the affected neighborhoods or community
  - Age of the structures that are being displaced, taking into consideration the types, effective and chronological age
  - Percentage of elderly households to be displaced
  - Percentage of households containing five or more family members
  - Disabled residential occupants for whom special assistance services may be necessary
  - Comparison of available (decent, safe, and sanitary) housing in the area with the housing needs of displacees as to price range, size, and occupancy status
  - Special relocation advisory services necessary for identified unusual conditions or unique problems
  - Actions proposed to remedy insufficient relocation housing, including a commitment to housing of last resort, if necessary
- Number, type, and size of businesses to be displaced, including special business characteristics, number of employees, and

general economic impact of business dislocation(s) on community economy, plus:

- Sites available in the area for business relocation
- Likelihood of such relocation
- Impacts on remaining businesses
- Sign relocations
- Summary of potential contamination concerns
- Identification of any publicly owned lands

A discussion of the results of early consultation with local government(s) and any early consultation with businesses subject to displacement, including any discussions of potential sources of funding, financing, planning for incentive packaging (e.g., tax abatement, flexible zoning, and building requirements), and advisory assistance that has been or will be furnished along with other appropriate information. Specific financial and incentive programs or opportunities (beyond those provided by the Uniform Relocation Act) to residential and business relocates to minimize impacts may be identified, if available through other agencies or organizations.

A description of the actions proposed to remedy insufficient relocation housing including, if necessary, Last Resort Housing. If Last Resort Housing is anticipated, the plan should address how this housing could be provided, that is, whether newly constructed housing must be made available or if there is sufficient replacement housing on the resource market to handle Last Resort Housing situations.

The results of discussions with local officials, social agencies, and such groups as the elderly, disabled, nondriver, transit-dependent, and minorities regarding the relocation impacts.

A statement that relocation and acquisition would be in accord with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, making resources for relocation available without discrimination.

Relocation and right-of-way acquisition impacts are mitigated by avoidance to the extent feasible, such as by changing an alignment so that there are no displacements. When this is not possible, just compensation in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Uniform Relocation Assistance and Real Property Acquisition Policies Act, 42 USC § 61) may be provided.

Other Issues to Consider

Other agencies may have information or guidance that will affect a particular CDOT project. Coordinate with the CDOT right-of-way staff to obtain any site-specific data they may have. Also, talk to project engineers who are familiar with the alternative locations to determine whether they know of acquisition and relocation issues that could constrain the project. right-of-way acquisition and relocation can be a very sensitive issue, so do not share any information outside the project team that has not already been made public, unless it is previously cleared by the CDOT project manager.

9.17.2 NEPA Document Sections

The content of the sections on relocations and acquisitions in the Affected Environment and Environmental Consequences chapter is discussed below.

Affected Environment

Relocation and acquisitions aspects that may be impacted by the project should be described in the Affected Environment chapter (as summarized in the sidebar). Additional information is provided in the CDOT *Right-of-Way Manual* (CDOT, 2011).

Environmental Consequences

It is essential that the relocation and acquisition section in the Environmental Consequences section of the NEPA document identify and discuss any residential, business, non-profit association, or farm operation relocations associated with the proposed project to:

- Ensure that community issues are identified and project effects are addressed and incorporated into the decision-making process
- Attempt to avoid, minimize, or mitigate, where feasible, adverse community effects
- Ensure the incorporation of environmental protection and community impact considerations from the earliest stages of project or plan development
- Anticipate any relocation problems early in the process and identify and develop proposed solutions
- Provide for the participation and consultation of communities affected by the proposed project throughout the life of project development

Affected Environment Chapter of NEPA Document

- Describe the number of houses and/or buildings subject to displacement
- Incorporate CDOT's right-of-way estimates of the number of people in the study area who are subject to relocation
- Determine if the potential relocatees represent a disproportionate population
- Include projections of housing stock
- Briefly discuss housing policies and programs

- Discuss such topics as the number of relocations, categorized by residences, businesses, non-profit associations, farm operations, and acreage of right-of-way acquisitions involved
- Provide information on all alternatives
- Discuss how the relocations caused by the proposed project would facilitate or inhibit access to jobs, educational facilities, religious institutions, health and welfare services, recreational facilities, social and cultural facilities, pedestrian facilities, shopping facilities, and public transit services

When a project will require the relocation or acquisition of residences or businesses, standard CDOT statements such as the following should be included in the NEPA document discussion of relocation or acquisition impacts these statements are also included in Appendix F.

Model Relocation Statement

In certain situations, it may also be necessary to acquire improvements that are located within a proposed acquisition parcel. In those instances where the improvements are occupied, it becomes necessary to "relocate" those individuals from the subject property (residential or business) to a replacement site. The Uniform Act provides for numerous benefits to these individuals to assist them both financially and with advisory services related to relocating their residence or business operation. Although the benefits available under the [Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, (Uniform Act)] are far too numerous and complex to discuss in detail in this document, they are available to both owner occupants and tenants of either residential or business properties. In some situations, only personal property must be moved from the real property and this is also covered under the relocation program. As soon as feasible, any person scheduled to be displaced shall be furnished with a general written description of the displacing agency's relocation program that provides, at a minimum, detailed information related to eligibility requirements, advisory services and assistance, payments, and the appeal process. It shall also provide notification that the displace person(s) will not be required to move without at least 90 days advance written notice. For residential relocatees, this notice cannot be provided until a written offer to acquire the subject property has been presented, and at least one comparable replacement dwelling has been made available. Relocation benefits will be provided to all eligible persons regardless of race, color, religion, sex, or national origin. Benefits under the [Uniform] Act, to which each eligible owner or tenant may be entitled, will be determined on an individual basis and explained to them in detail by an assigned right-of-way Specialist (CDOT, 2011).

Mitigation Planning Information to Include in NEPA Document

- The availability of residential and commercial real estate for sale to accommodate potential relocation needs
- Consider and reference the Relocation Assistance Program including types of benefits available
- An evaluation of city zoning considerations with respect to potential relocation and franchise territories for potentially relocated/acquisitioned commercial entities

Model Acquisition Statement

For any person(s) whose real property interests may be impacted by this project, the acquisition of those property interests will comply fully with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended (Uniform Act). The Uniform Act is a federally mandated program that applies to all acquisitions of real property or displacements of persons resulting from federal or federally assisted programs or projects. It was created to provide for and ensure the fair and equitable treatment of all such persons. To further ensure that the provisions contained within this act are applied "uniformly," CDOT requires Uniform Act compliance on any project for which it has oversight responsibility regardless of the funding source. Additionally, the Fifth Amendment of the US Constitution provides that private property may not be taken for a public use without payment of "just compensation." All impacted owners will be provided notification of the acquiring agency's intent to acquire an interest in their property including a written offer letter of just compensation specifically describing those property interests. A right-of-way specialist will be assigned to each property owner to assist them with this process (CDOT, 2011).

When relocation and acquisition impacts are identified, the document will discuss possible mitigation and include the information shown in the sidebar in the NEPA document, as appropriate.

Impacts and mitigation should be listed in a Summary of Impacts and Mitigation Table at the end of the resource evaluation chapter of the NEPA document. The first six columns of CDOT's Mitigation Tracking Spreadsheet should be used as this summary table (Table 9-2). CDOT's Mitigation Tracking Spreadsheet (Table 9-1) can be retrieved from http://www.coloradodot.info/programs/environmental/resources/forms/CDOT%20Mitigation%20Tracking%20Spreadsheet_June%202012.xlsx/view.

9.18 Utilities and Railroads

A utility is a private or publicly owned line, facility, or system for producing, transmitting, or distributing communications, cable television, power, electricity, light, heat, gas, oil, crude products, water, steam, waste, stormwater not connected with highway drainage, or any other similar type of commodity that directly or indirectly serves the public (23 CFR Part 645.105(m) Utility Relocations, Adjustments, and Reimbursement, Definitions).

The two sections below provide guidance on the treatment of utilities and railroads for CDOT's NEPA projects. The first section discusses the process for evaluating utilities and railroads. The second section discusses utilities and railroads information that should be addressed in each NEPA document.

Utility and Railroad Clearance Documentation

Utilities

- CDOT's *Project Development Manual* (CDOT, 2001b) Section 5.03 Utility Involvement for clearance process

Railroad

- Early coordination with the railroad company and with the Railroad Program Manager is critical as ***it may take up to a year to obtain clearance***

9.18.1 Utilities and Railroads Evaluation Process

The CDOT project manager will coordinate with the Region Utility Engineer and the Region Railroad Coordinator, whenever there is involvement with utilities and/or a rail system on a project.

The study area will need to be surveyed for the existing and proposed utilities and railroads through utility company map review and field review. If they are present, project construction will need to be coordinated with the existing and proposed infrastructure. It may also be necessary to relocate utilities for a number of reasons, such as:

- A utility may conflict with proposed construction
- Road construction may provide a convenient opportunity to place new utility or upgrade existing ones (betterment)
- Existing unsafe or hazardous conditions may easily and economically be mitigated during construction
- Certain non-aesthetic visual impacts may be replaced with a more acceptable solution (i.e., undergrounding an overhead line)

Early coordination with utility and rail line owners ensures development of reasonable alternatives relative to existing utilities and railroads. Additionally, the associated improvements and timely consideration of the costs associated with the potential relocation of these resources can be fully integrated into the NEPA document. Early coordination identifies potential conflicts with existing or future utilities and rail line owners and users within the study area. Associated improvements that can be impacted include proposed/revised roadway section, drainage facilities (storm sewer facilities,

retention/detention ponds, etc.), landscaping, and any other proposed improvement with potential for subsurface disturbance.

Reasons for Evaluation of Utilities and Railroads Under NEPA

CDOT evaluates utilities and railroads for several reasons:

- Utilities and railroads are under the ownership of a private or public entity, which requires coordination and possibly mediation
- To comply with CDOT's environmental stewardship policy, which ensures that the statewide transportation system is constructed and maintained in an environmentally responsible, sustainable, and compliant manner
- To comply with several legal mandates

The legal mandates include CRS 38-5-101, Eminent Domain Act; CRS 45-1-225, Transportation Act; and other state laws and constitutional provisions. These mandates give utilities the right to construct their lines within highway right-of-way, provided they meet CDOT's established criteria (CDOT, 2008c).

Collection and Evaluation of Baseline Information Under NEPA

CDOT has established procedures in the *Project Development Manual* (CDOT, 2001b), Section 5.03, for coordinating with utility companies when utilities may be impacted by a project.

It is the responsibility of the Region Utility Engineer to furnish all relevant information concerning the location, dimension, and characteristics of major utilities found within a proposed project corridor (all viable alternates under consideration). The Region utility section is responsible for maintaining contact with local utility agencies and coordinating with those utility agencies during the plans, specifications, and estimates phase. It is the responsibility of the project manager to evaluate and consider potential utility conflicts and recommended mitigations made by the Region utility staff when addressing roadway impacts on utilities.

CDOT also has established procedures in the *Project Development Manual*, Section 5.04 (CDOT, 2001b) for coordinating with railroad companies when a railroad facility may be impacted by a project.

The development of a list of past, present, and foreseeable future projects that should be addressed for all resources in the consideration of cumulative impacts is discussed in Section 9.26. A utilities and railroad map should be consulted to identify what utility and railroad components will be impacted by projects. For input to this section, evaluate cumulative impacts to utilities and

Utility and Railroad Regulations and Guidance

- Transportation Act, CRS 43-1-225
- Eminent Domain Act, CRS 38-5-101
- CDOT Utility Manual
- CDOT Project Development Manual
- State Highway Utility Accommodation Code; CFR-Title 23 Section 645, 646 and 635-309b
- Local Agency Manual (LACA); CFR 38-5-101
- UNCC Article 1.5
- ASCE Standard 38-02 (C-1-38-02)

railroads in relatively general terms, noting which utility and railroad components will be most impacted, their relative importance, and the degree to which impacts from the transportation project considered in the current NEPA document will contribute to the cumulative impacts.

9.18.2 NEPA Document Sections

The content of the sections on utilities and railroads in the Affected Environment and Environmental Consequences chapter is discussed below.

Affected Environment

The introduction of the Affected Environment chapter of the NEPA document shall identify existing and proposed utilities and rail systems within the project area and discuss their relationship to the proposed project.

The Affected Environment chapter of the NEPA document will include the information developed to understand the utility and railroad information compiled as part of the inventory process. This information will be presented in the NEPA document with sufficient detail to be clear and understandable. General information listed in the sidebar, as well as any unique information necessary to evaluate potential impacts, will be included.

Environmental Consequences

Summarize impacts by alternative, such that similarities and differences between alternatives relative to utility and railroad impacts can be discerned.

Overall, it is in the best interest of CDOT to avoid impacts to utility and railroad facilities. This is due to the cost for relocations (as applicable) and the time and effort needed for coordination with the entities. As noted above, early involvement of the Region Utility Engineer, Resident Engineer, and Railroad Program Management in the alternatives development process is key to identifying locations of utilities and railways, possible effects to these locations, and possible avoidance alternatives. It also contributes to the development of effective agreement documents if avoidance is not possible.

Impacts and mitigation should be listed in a Summary of Impacts and Mitigation Table at the end of the resource evaluation chapter of the NEPA document. The first six columns of CDOT's Mitigation Tracking Spreadsheet should be used as this summary table (Table 9-2). CDOT's Mitigation Tracking Spreadsheet (Table 9-1) can be retrieved from http://www.coloradodot.info/programs/environmental/resources/forms/CDOT%20Mitigation%20Tracking%20Spreadsheet_June%202012.xlsx/view.

General Information to Include in NEPA Document

Utilities

- Owner
- Location
- Dimension
- Characteristics
- Type of facility/utility
- Material(if known)
- Easements/agreements/ permits (property interests)

Railroad

- Owner
- Location
- Type of crossing (at grade, etc.)
- Used or abandoned

9.19 Section 4(f) Evaluation

Section 4(f) has been part of federal law since 1966 when it was enacted as Section 4(f) of the USDOT Act. It is codified in 23 USC Section 138 and 49 USC Section 303. Section 4(f) requires consideration of:

- Parks and recreational areas of national, state, or local significance that are both publicly owned and open to the public
- Publicly owned wildlife and waterfowl refuges of national, state, or local significance that are open to the public to the extent that public access does not interfere with the primary purpose of the refuge
- Historic sites of national, state, or local significance in public or private ownership regardless of whether they are open to the public

The law says that FHWA (and other DOT agencies) cannot approve the use of land from publically owned parks, recreation areas, wildlife refuges, or historic sites unless there is no feasible and prudent alternative to the use and the action includes all possible planning to minimize harm to the property. The substantive provisions of Section 4(f) apply only to agencies within the USDOT.

Section 4(f) resources that may be affected by transportation uses can be divided into two principal categories:

- Publicly owned parks, recreation areas, and wildlife refuges
- Historic resources

Publicly owned land that has been formally designated and determined to be significant for park, recreation area, or wildlife and waterfowl refuge purposes is also considered a Section 4(f) resource, even if it may not be functioning as such during project development. If a governmental body has a proprietary interest in the land (such as fee ownership or an easement), it is considered publicly owned.

9.19.1 Legislative Background

In 2005, Section 6009(a) of the SAFETEA-LU, made the first substantive revision to Section 4(f) since it was enacted in 1966. This amendment simplified the process and approval of projects that have only *de minimis* impacts on lands subject to protection under Section 4(f). *De minimis* impacts are of such a minor extent as to not require a full Section 4(f) evaluation. Under the new provisions, once the USDOT determines that a transportation use of Section 4(f) property results in a *de minimis* impact, analysis of avoidance alternatives are not required and the Section 4(f) evaluation process is complete.

In 2008, FHWA reorganized the regulations implementing Section 4(f), clarifying specific elements of the Section 4(f) approval process and simplifying the regulatory requirements. Section 4(f) regulations also moved from 23 CFR 771.135 to 23 CFR 774. FHWA has a Policy Paper which supplements the regulations, which aids FHWA in administering Section 4(f) in a consistent manner.

The two sections below provide guidance on the evaluation of Section 4(f) resources for CDOT's NEPA projects. The first section discusses the process for evaluating Section 4(f) resources. The second section discusses information about Section 4(f) properties that should be included in each NEPA document.

In July, 2012 FHWA released a new policy paper on Section 4(f). The policy paper can be retrieved at http://www.environment.fhwa.dot.gov/4f/4fpolicy.asp#intro

9.19.2 Section 4(f) Evaluation Process

A Section 4(f) evaluation is required when a project uses a Section 4(f) resource. A use is defined as one of the following:

- Land from a Section 4(f) property is incorporated into the transportation system
- Occupancy of the land is adverse in terms of the statute's preservationist purposes
- Proximity impacts of the transportation project are so great that the purposes for which the Section 4(f) property exists are substantially impaired (normally referred to by courts as a constructive use)

The Section 4(f) evaluation should be initiated when alternatives for the proposed action are first being designed and developed. If the Section 4(f) evaluation is part of the NEPA document, it should be completed in conjunction with the NEPA process to the extent possible.

Additional information on FHWA's five nationwide programmatic applications for Section 4(f) properties is available at http://www.environment.fhwa.dot.gov/projdev/4fnspeval.asp

Reasons for Evaluation of Section 4(f) Properties under NEPA

CDOT conducts Section 4(f) evaluations for its projects for a variety of reasons, including the following:

- Section 4(f) evaluation is required by law for USDOT agencies
- To comply with CDOT's environmental stewardship policy, which ensures that the statewide transportation system is constructed and maintained in an environmentally responsible, sustainable, and compliant manner
- To comply with federal and state transportation regulations when implementing transportation projects in Colorado

DETERMINING WHAT TYPE OF SECTION 4(F) EVALUATION TO COMPLETE

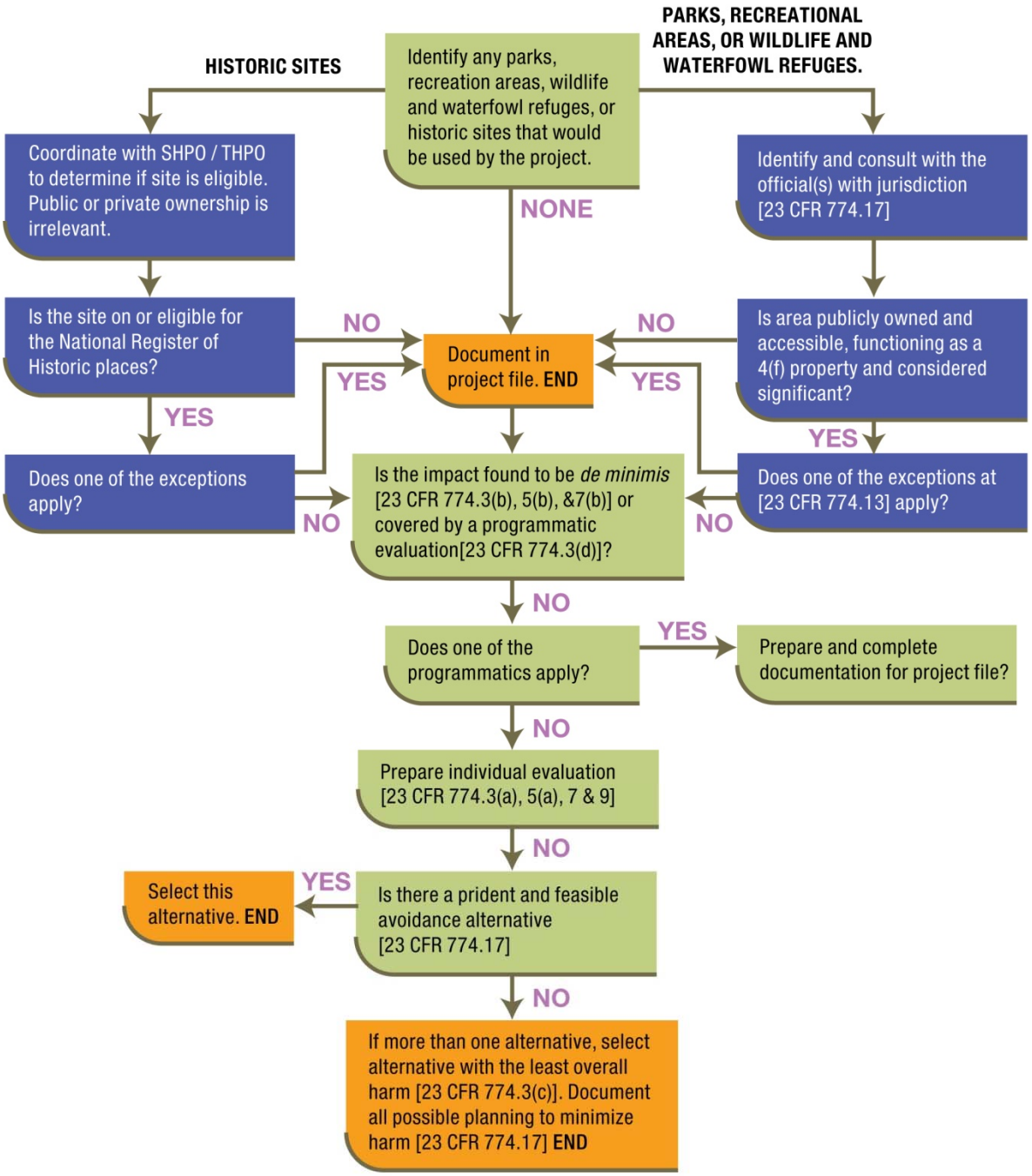
Collection of Baseline Information

The first step in the Section 4(f) evaluation process is to identify existing and planned Section 4(f) properties, which include the following:

- Historic sites on or eligible for the NRHP.
- Archaeological sites on or eligible for the NRHP and that warrant preservation in place as determined by FHWA and the SHPO.
- Officially designated publicly owned parks, recreation areas (including recreational trails), and wildlife or waterfowl refuges. Factors such as public access restrictions may affect whether properties qualify for Section 4(f) protection. A property that requires fees for public access does not disqualify the property as a Section 4(f) resource.
- Portions of multi-use properties; including public schools, Forest Service property, some wild and scenic rivers, and open space properties; where the agency having jurisdiction over the land determines that the area of the property affected by the project has a primary purpose or function and are considered significant for purposes of use as a park, recreation area, or refuge.
- Planned publicly owned parks, recreation areas (including recreational trails), wildlife or waterfowl refuges where agencies having ownership have taken significant steps towards implementation.

Once a Section 4(f) property is identified within the project area, it must be determined if there will be a "use" of land from that property within the meaning of Section 4(f). As a result, all Section 4(f) applicability determinations are made on a case-by-case basis. An evaluation diagram for Section 4(f) projects is shown in Figure 9-5.

Figure 9-5 Section 4(f) Evaluation Process



Evaluation of Baseline Information

Compliance with Section 4(f) can be established through: 1) application of an exception to Section 4(f) identified in 23 CFR 774.13 2) a *de minimis* impact determination, 3) a Nationwide Section 4(f) Programmatic Evaluation that is approved at the FHWA Division Office level, or 4) a full Section 4(f) Evaluation that requires FHWA legal and external agency review prior to approval. An analysis for each property must be made and the appropriate process for the use of that property followed. However, where a project has multiple uses, the consideration of which process minimizes overall paperwork and process should be considered.

If a proposed alternative involves more than one Section 4(f) resource, each resource should be reviewed individually to determine if the *de minimis* exemption or a programmatic evaluation is applicable. If there remain uses for which an exception to Section 4(f), the *de minimis* impact determination or a programmatic evaluation is not appropriate, a full Section 4(f) evaluation must be done for the project as a whole with measures to minimize harm included for all Section 4(f) protected properties.

The advantage of using exceptions, *de minimis*, and programmatic evaluations is that there is no requirement to circulate the draft Section 4(f) evaluation to the DOI, the USDA, or Housing and Urban Development (HUD). There is also the advantage of not needing a Legal Sufficiency review on programmatic, which is necessary for full Section 4(f) evaluations. This reduces the amount of time necessary to complete the Section 4(f) evaluation. The complete Section 4(f) documentation should be included in the NEPA document, usually as an appendix, and retained in the project file as a matter of public record.

Several agencies and organizations have a role in preparing and approving programmatic Section 4(f) evaluations: the SHPO as the official with jurisdiction for historic and archaeological properties and local historic preservation agencies, agencies having ownership and management of non-historic Section 4(f) properties, EPB and Regional environmental staff, FHWA Operations Engineers, and FHWA environmental staff. The EPB Manager, RPEM, and FHWA Division Administrator approve the final programmatic Section 4(f) evaluations.

Exceptions to Section 4(f)

23 CFR 774.13 establishes a series of exceptions to Section 4(f). These exceptions allow for the use of Section 4(f) properties without the requirement for a formal evaluation process. Each exception has specific requirements that must be met and demonstrated to the FHWA-CO Division to determine applicability.

Exceptions apply to a specific property, not to the project as a whole, and therefore must be evaluated separately for each Section 4(f) property used by a project.

Determining *de minimis* Impacts to Section 4(f) Resources

Certain uses of Section 4(f) properties are minor (*de minimis*) in nature. The requirements for *de minimis* are included in 23 CFR 774.5(b), 774.7(b), and 774.17. If, after consideration of any impact avoidance, minimization, and mitigation or enhancement measures, FHWA determines that CDOT transportation projects result in *de minimis* impacts to a Section 4(f) property, an analysis of avoidance alternatives is not necessary and the Section 4(f) process is complete.

Because *de minimis* applies to individual uses, each property must be evaluated separately to determine if *de minimis* is appropriate for the specific use identified. An alternative with all *de minimis* impacts does not require further evaluation

Historic Properties
According to 23 CFR 774.5(b)(1)(i) and (ii), a Section 4(f) *de minimis* finding can only be made when: 1) the Section 106 process results in a finding of "no adverse effect" or "no historic properties affected" in accordance with 36 CFR part 800; 2) there is written concurrence from the SHPO and/or THPO (and ACHP if they are part of the consultation process) on the Section 106 effect determination; 3) the SHPO and/or THPO, and ACHP if participating, are notified of FHWA's intent to make a *de minimis* finding based on the Section 106 determination; and 4) the views of the Section 106 consulting parties have been considered.

Publicly Owned Parks, Recreation Areas, and Wildlife or Waterfowl Refuges
According to 23 CFR 774.5(2)(i) and (ii), impacts that are *de minimis* for publicly owned parks, recreation areas, and wildlife or waterfowl refuges are defined as those that do not adversely affect the activities, features, and attributes of the Section 4(f) resource. The public must be afforded the opportunity to review and comment on the effects of the project on the identified Section 4(f) resource(s). After the public comment period, the official(s) with jurisdiction over the property must provide written concurrence that the project will not adversely affect the activities, features, and attributes that qualify the property for protection under Section 4(f). When identifying *de minimis* impacts on publicly owned parks, recreation areas, and wildlife or waterfowl refuges, it is important to distinguish the activities, features, and attributes of a Section 4(f) resource that are important to protect from those that can be impacted without adverse effects. For example, when identifying uses to a public park, portions of the resource, such as playground

equipment, should be distinguished from facilities such as parking. Further guidance for *de minimis* impacts findings for non-historic Section 4(f) resources is located in Attachment C.

De minimis Impact Finding

Only the FHWA Division Administrator can make the final *de minimis* impact finding. The *de minimis* impact finding is based on the degree or level of impact including any avoidance, minimization, and mitigation or enhancement measures that are included in the project to address the Section 4(f) use. *De minimis* impact findings must include conditions requiring the implementation of any measures that were relied upon to reduce the impact to a *de minimis* level.

A *de minimis* finding cannot be made for a constructive use of a Section 4(f) property. A constructive use, by definition, involves impacts such that the protected activities, features, and attributes would be substantially impaired.

A *de minimis* finding can sometimes be made for a temporary uses of a Section 4(f) property, when the project does not meet FHWA's temporary occupancy exception criteria.

Public Involvement

Historic Section 4(f) properties do not require a separate public review process, but non-historic properties do require public involvement. Additional information can be found in the FHWA's Section 4(f) Policy Paper (FHWA, 2012b) and 23 CFR 774.

For parks, recreation areas, or wildlife or waterfowl refuges, in most cases a separate public review process, including the public notice or comment requirement, is not necessary because the information supporting the *de minimis* impact finding will be included in the NEPA document. The public involvement criteria related to the specific NEPA document will be sufficient to satisfy the same criteria for the *de minimis* impact finding if the information about the impacts and use of the properties is included in the public review and comment activities. There are instances (e.g., certain CatExs and Reevaluations) that do not routinely require public review and comment, however for those where a *de minimis* finding will be made, a separate public notice and opportunity to review and comment will be necessary.

Programmatic Evaluations

FHWA developed five nationwide programmatic evaluations for Section 4(f) properties. Each of the five types of programmatic evaluations has specific applicability criteria. A detailed description of their specific criteria can be found by following the links for a particular Section 4(f) evaluation.

- Final Nationwide Section 4(f) Evaluation and Approval for Federally Aided Highway Projects With Minor Involvements With Public Parks, Recreation Lands, and Wildlife and Waterfowl Refuges. http://www.environment.fhwa.dot.gov/projdev/4fmparks.asp
- Final Nationwide Section 4(f) Evaluation and Approval for Federally Aided Highway Projects With Minor Involvements With Historic Sites http://www.environment.fhwa.dot.gov/projdev/4fmhist.asp
- Programmatic Section 4(f) Evaluation and Approval for FHWA Projects That Necessitate the Use of Historic Bridges http://www.environment.fhwa.dot.gov/projdev/4fbridge.asp
- Section 4(f) Statement and Determination for Independent Bikeway or Walkway Construction Projects http://www.environment.fhwa.dot.gov/projdev/4fbikeways.asp
- Section 4(f) Evaluation and Approval for Transportation Projects That Have a Net Benefit to a Section 4(f) Property http://www.environment.fhwa.dot.gov/projdev/4fnetbenefits.asp

The programmatic evaluations require coordination and documentation similar to the regular Section 4(f) procedures, including proof that there is no prudent and feasible alternative to the use of Section 4(f) lands and that all measures to minimize harm have been taken. In addition, a programmatic evaluation must demonstrate that the project meets the criteria of the appropriate nationwide programmatic evaluation.

Individual Section 4(f) Evaluation

Individual Section 4(f) evaluations must include sufficient analysis and supporting documentation to demonstrate that there is no feasible and prudent avoidance alternative and shall summarize the results of all possible planning to minimize harm (23 CFR 774.7(a)). Individual Section 4(f) evaluations are processed in two distinct stages: draft and final. Draft evaluations must be circulated to the US Department of Interior (DOI) and shared with the official(s) with jurisdiction. The analysis and identification of the alternative that has the overall least harm must be documented in the final Section 4(f) evaluation. If the analysis concludes that there is no feasible and prudent avoidance alternative, then FHWA may approve, from among the remaining alternatives that use Section 4(f) property, only the alternative that causes the least overall harm in light of the statute's preservation purpose. Detailed guidance on least harm is provided in the FHWA *Section 4(f) Policy Paper* (FHWA, 2012b).

Although public review is not required by Section 4(f), the public may review and comment on a draft evaluation during the NEPA process. When a

project is processed as a CatEx, the Section 4(f) evaluation must be circulated independently to the US DOI. In all cases, final Section 4(f) evaluations are subject to FHWA legal sufficiency review prior to approval.

9.19.3 Section 4(f) Documentation in NEPA Documents

The majority of information related to the Section 4(f) evaluations related to *de minimis*, programmatic, or individual Section 4(f) evaluations will be included in a separate Section 4(f) chapter. The Section 4(f) alternatives analysis is generally incorporated into an EIS or EA. A description of the process and the findings of the Section 4(f) evaluation are included in the body of the NEPA document while the Programmatic and *de minimis* may be included in the appendix.

Information that should be included in each of the chapters is discussed below.

Section 4(f) chapters should include "All Possible Planning to Minimize Harm" and not Measures to Avoid and Minimize Harm

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Separate identification and review of Section 4(f) resources is not necessary in the Affected Environment or Environmental Consequences chapter of the NEPA document. Affected Environment and Environmental Consequences information for the following resources will be used as part of the Section 4(f) evaluation and may include a Section 4(f) evaluation related to the property/resource for each of the following:

- Historic Properties (Section 9.10.4)
- Social Resources (Section 9.13.2) for parks and other public recreational properties
- Bicycle and Pedestrian Facilities (Section 9.16)
- Fish and Wildlife (Section 9.8.2) for Wildlife or Waterfowl Refuges
- Other sections as appropriate (Land Use Section 9.12.2)

SECTION 4(F) COMPLIANCE AND APPROVALS

Depending on the type of Section 4(f) evaluation, there are different requirements for what should be included as part of the evaluation as discussed below:

<u>Exceptions Evaluations</u>

Those properties determined to be exceptions to the requirement for Section 4(f) approval must be evaluated by having a documented agreement with the official(s) with jurisdiction over the Section 4(f) resource. This documentation can be included in the appendix or attached to the NEPA document.

De Minimis Evaluations

The *de minimis* impact determination must include sufficient supporting documentation to demonstrate that the impacts, after avoidance, minimization, mitigation, or enhancement measures are taken into account, are *de minimis* as defined in 23 CFR 774.17. The *de minimis* information can be presented in a chapter in the NEPA document or in an appendix.

Programmatic Evaluations

Information related to an approval to use Section 4(f) property by applying a programmatic Section 4(f) evaluation should be included in the project NEPA document (EA or EIS), or in the project file for a CatEx. Sufficient supporting documentation to demonstrate that the programmatic evaluation being relied upon applies to the use of the specific Section 4(f) property including documentation that the coordination required by the applicable programmatic evaluation was completed and that all specific conditions of the applicable programmatic evaluation were met.

Some of the information identified in the following sections would typically be included in a NEPA document, even in the absence of the Section 4(f) process. However, it is summarized here to fully document Section 4(f) compliance and approval protocols.

Individual Section 4(f) Evaluation

Individual Section 4(f) evaluations must include sufficient analysis and supporting documentation to demonstrate that there is no feasible and prudent avoidance alternative and shall summarize the results of all possible planning to minimize harm. For projects requiring a least overall harm analysis, that analysis must be included within the Individual Section 4(f) evaluation in an appendix or separate document. Additionally, the least overall harm analysis must address the seven factors as set forth in 23 CFR 774.3(c)(1) and further explained in FHWA *Section 4(f) Policy Paper* (FHWA, 2012b).

Guidance for how to handle Section 4(f) evaluations in tiered NEPA documents is in CFR 23 774.7(2)

Draft Section 4(f) Evaluation

The following format and content are suggested for a draft Section 4(f) Evaluation as outlined in the *FHWA Technical Advisory T 6640.8A* (October 30, 1987).

- Description of the proposed project including an explanation for the project purpose and need.
- Description of each Section 4(f) resource which would be used by any alternative under consideration.

- Discussions of the impacts on the Section 4(f) resource for each alternative. Impacts that can be quantified should be quantified.
- Identification and evaluation of location and design alternatives that would avoid the Section 4(f) property. Detailed descriptions of alternatives in an EIS or EA do not need to be repeated if they are presented in other chapters.
- Discussion of all possible measures available to minimize the impacts of the proposed action on the Section 4(f) property(ies) including detailed discussion of mitigation measures in the EIS or EA. A preliminary least harm analysis of the Section 4(f) analysis should be included as well.
- Discussion of the results of preliminary coordination with the public official having jurisdiction over the Section 4(f) property and with regional (or local) offices of DOI.

At the draft Section 4(f) evaluation stage, it should be noted that although it will contain a discussion about prudent and feasible avoidance alternatives and a preliminary least harm analysis, conclusions about these subjects are made only after the evaluation has been circulated and coordinated with the appropriate agencies and any identified issues have been adequately evaluated.

Final Section 4(f) Evaluation Format and Content

When the preferred alternative uses Section 4(f) land, the final Section 4(f) evaluation must contain the following information:

- All of the information required for a draft Section 4(f) evaluation.
- A discussion of the basis for concluding that there are no feasible and prudent alternatives to the use of the Section 4(f) land. The supporting information must demonstrate consistency with the requirements for a prudent and feasible evaluation as required in 23 CFR 774.17.
- A discussion of remaining prudent and feasible alternatives and a determination of which alternative has the overall least harm as defined in 23 CFR 774.3(c)(1).
- A discussion of the basis for concluding that the proposed action includes all possible planning to minimize harm to the Section 4(f) property.
- A summary of the appropriate formal coordination with the headquarters offices of DOI (and/or appropriate agency under that

department) and, as appropriate, the involved offices of USDA and HUD.

- Copies of all formal coordination comments and a summary of other relevant Section 4(f) comments received and an analysis and response to any comments received. When new alternatives or modifications to existing alternatives are identified and will not be given further consideration, the basis for dismissing these alternatives (using the prudent and feasible criteria) should be provided and supported by factual information.
- Where Section 6(f) land is involved, the NPS's position on the land conversion should be documented.
- Concluding statement as follows: "Based upon the above considerations, there is no feasible and prudent alternative to the use of land from the (identify the Section 4(f) property) and the proposed action includes all possible planning to minimize harm to the (Section 4(f) property) resulting from such use." If the analysis of avoidance alternatives concludes that there is no feasible and prudent avoidance alternative, then the FHWA may only approve the alternative that causes the least overall harm to the Section 4(f) property (23 CFR 774).

Documenting the Section 4(f) Process

The following information should be presented in the NEPA document in the Section 4(f) section of the resource evaluation or as a separate chapter or used as supporting documentation for a CatEx, as appropriate:

- Comments received after the circulation of the draft Section 4(f) Evaluation
- Responses to comments
- Documentation that all possible planning has been done to minimize harm to Section 4(f) resources
- Summary of coordination with the SHPO, other officials with jurisdiction and, as appropriate, the USDA and HUD including any activities since the draft NEPA document was published
- Documentation that the preferred alternative is the one with the overall least harm

Impacts and mitigation should be listed in a Summary of Impacts and Mitigation Table at the end of the resource evaluation chapter of the NEPA document. The first six columns of CDOT's Mitigation Tracking Spreadsheet should be used as this summary table (Table 9-2). CDOT's Mitigation

Tracking Spreadsheet (Table 9-1) can be retrieved from http://www.coloradodot.info/programs/environmental/resources/forms/CDOT%20Mitigation%20Tracking%20Spreadsheet_June%202012.xlsx/view.

If FHWA headquarters has determined there is "constructive use," include documentation to that effect, as well as the following documentation:

- Authority having jurisdiction over the Section 4(f) property agrees with conversion and acceptability of any replacement property
- CDOT project manager has approved the conversion of the Section 4(f) property and any replacement
- Identification of any commitment to acquire Section 4(f) replacement property

9.19.4 Section 4(f) Evaluation Processing, Review, and Approval

Full Section 4(f) evaluations that are included in NEPA documents are typically incorporated and reviewed internally within the preliminary versions of that NEPA document. Once the Section 4(f) evaluation has undergone FHWA review and has been revised to include any comments, the FHWA operations engineer will submit the NEPA document and associated Section 4(f) evaluation to FHWA legal counsel (if required) for a review period of 30 days. The FHWA legal review is conducted prior to external agency and public review.

Approval for the NEPA document and associated draft full Section 4(f) evaluation to be circulated for external review is indicated by FHWA approval of the accompanying NEPA document. External review is required by DOI. Review may also be required by USDA and HUD. These outside agencies are given a 45-day review period.

Full Section 4(f) Approval can take up to a year or more to process. It is important to start the process early.

Once the external agency review is complete, an FHWA legal sufficiency review is required prior to approval of the final full Section 4(f) evaluation. For full Section 4(f) evaluations processed as part of an EIS, approval of the evaluation will typically occur upon approval of the Final EIS. A summary of the basis for the Section 4(f) approval must also be included in the ROD. In EAs, the draft Section 4(f) evaluation is included in the FHWA-approved EA. The FHWA-approved FONSI includes the final Section 4(f) evaluation. The final full Section 4(f) evaluation must be provided to DOI and to USDA and HUD if required.

There are circumstances when a Section 4(f) evaluation is not included in a NEPA document and a separate Section 4(f) evaluation is required. As

outlined in the Section 4(f) regulations (23 CFR 774.7(f), 774.9(c) and 774.11(b)), this may occur when:

- A project is classified as a CatEx.
- A proposed modification of the alignment or design would require the use of Section 4(f) property after the CatEx, FONSI, or ROD has been processed.
- The FHWA determines, after processing the CatEx, FONSI, or ROD that Section 4(f) applies to a property.
- A proposed modification of the alignment, design, or measures to minimize harm (after the original Section 4(f) approval) would result in a substantial increase in the amount of Section 4(f) land, or a substantial reduction in mitigation measures.
- Another agency is the lead agency for the NEPA process, unless another USDOT element is preparing the Section 4(f) Evaluation.
- There is no feasible and prudent alternative to the use of land from the (identify the Section 4(f) property) and the proposed action includes all possible planning to minimize harm to the (Section 4(f) property) resulting from such use.

If it is determined that a Section 4(f) evaluation is required after the CatEx, FONSI, or ROD has been processed, preparation and circulation of the Section 4(f) evaluation will not necessarily require the preparation of a new or supplemental NEPA document. In addition, the separate evaluation does not prevent the granting of new approvals, require the withdrawal of previous approvals, or require the suspension of project activities for any activity not affected by the Section 4(f) evaluation.

For full Section 4(f) evaluations which are circulated separately from NEPA documents, EPB or Regional staff, FHWA Operations Engineers, and FHWA environmental staff review the preliminary draft evaluations. Upon completion of the FHWA division review, the draft Section 4(f) evaluation is submitted to FHWA legal counsel for a 30-day review. The signed draft Section 4(f) evaluation is then forwarded to the DOI and any entities with jurisdiction over a Section 4(f) resource. The USDA and/or HUD may also need to review the evaluation (45-day review period). Following receipt of the agency comments, the concluding statement is incorporated and the Section 4(f) evaluation is submitted to FHWA for internal and official legal sufficiency review. The final document is signed by the EPB Manager and the FHWA Division Administrator and submitted to the DOI.

Constructive Use Approval

In the case of constructive use of a Section 4(f) resource, the pre-draft Section 4(f) evaluation must be reviewed and approved by FHWA headquarters office. This coordination ideally occurs early in the project development process. During the legal review, the FHWA operations engineer will also send a copy to FHWA headquarters. If the determination of constructive use is approved, the draft Section 4(f) document is processed normally.

Final Section 4(f) Approval

The FHWA must make a formal determination that there is no prudent and feasible alternative to the use of Section 4(f) resources and all possible planning has been done to avoid the use of a Section 4(f) property or to minimize harm to any Section 4(f) property affected by the project. This approval can be contained in a FONSI, a ROD, or as a separate document.

The FHWA is ultimately responsible for making all decision related to Section 4(f) compliance. These include whether Section 4(f) applies to a property, whether a use will occur, whether a *de minimis* impact determination may be made, assessment of each alternative's impacts to Section 4(f) properties, and determining whether the law allows the selection of a particular alternative after consulting with the appropriate officials with jurisdiction. CDOT staff also plays a critical role in assessing alternatives and their impacts to Section 4(f) properties and should be included throughout the entire Section 4(f) process.

9.20 Section 6(f) Evaluation

Section 6(f) properties are those purchased or improved with grants from the Land and Water Conservation Fund (LWCF) Act. Importantly, Section 6(f) applies to all transportation projects involving possible conversions of the property whether or not federal funding is being utilized for the project. The Section 6(f) evaluation and process should be conducted separately from the Section 4(f) evaluation and process.

The Section 6(f) evaluation should be started when alternatives for the proposed action are first being designed and developed, or during the scoping phase of a proposed action.

9.20.1 Reasons for Evaluation of Section 6(f) Under NEPA

CDOT evaluates Section 6(f) for several reasons:

- To preserve the intended use of public funds for land and water conservation and the protection of outdoor recreational activity
- To comply with CDOT's environmental stewardship policy, which ensures that the statewide transportation system is constructed and maintained in an environmentally responsible, sustainable, and compliant manner
- To comply with several legal mandates that pertain to the Land and Water Conservation Fund Act of 1965, Section 6(f)(3)

State and local governments often obtain grants through the LWCF to develop or make improvements to parks and outdoor recreation areas. Section 6(f) of the LWCF prohibits the conversion of property acquired or developed with these grants to a non-recreational purpose without the approval of the DOI's National Park Service (NPS).

9.20.2 Collection and Evaluation of Baseline Information Under NEPA

Once a study area, or the approximate area of impact, is established, and there are any parks or outdoor recreational facilities in or adjacent to the area, a Section 6(f) file search should be conducted. CDOT, Colorado Parks and Wildlife (CPW), and the NPS all have a database of LWCF grants by county. If a LWCF grant was issued for a property that could be affected by the proposed action, then a Section 6(f) boundary map needs to be requested from CPW by CDOT. This boundary map shows the area of the property that the grant applies to and is protected by Section 6(f). This could be the entire property or just a portion of it.

If it is determined that the proposed action could potentially impact a Section 6(f) property, and that impact cannot be avoided, the official with jurisdiction of the Section 6(f) property should be consulted. CDOT must now determine the approximate size of the Section 6(f) property that will be converted either as right-of-way or as a permanent easement. CDOT, in cooperation with the official with jurisdiction, must identify replacement land that is of reasonably equivalent size, usefulness and location, and of at least equal fair market value. The process is as follows:

- Upon identification of such land(s), CDOT must compose a letter of concurrence to the local official with jurisdiction, which demonstrates that the Section 6(f) replacement land is acceptable to the local government entity. The letter must also include any special conditions, mutually agreed to by both parties, as deemed necessary, to bring about equivalent size, location, and usefulness, and of at least equal fair market value in the replacement land as required under Section 6(f). The value of both the land to be converted and the replacement land should be assessed by the same professional assessor.
- Coordination with the CPW and NPS should occur during this process.
- Once the concurrence letter is signed by the local official with jurisdiction, CDOT will compose a letter to the Section 6(f) State Liaison Officer (SLO) at CPW that contains a project description; a description of the Section 6(f) property(ies); avoidance considerations; impacts to the Section 6(f) property(ies), including the location and size of the conversion; planned mitigation, including the size, location, usefulness, and value of replacement land; and the attached letter of concurrence from the official with jurisdiction. The CPW may comment on the letter to resolve any issues. Upon acceptance of the letter by the CPW, the SLO will forward to NPS for their review and conditional clearance. If NPS does grant conditional clearance, this concludes the process for NEPA clearance.
- The local official with jurisdiction letter and the correspondence with CPW and NPS should be included in the appendix of the NEPA document.

The conversion of the Section 6(f) land to transportation right-of-way or permanent easement, and the acquisition of the replacement land occur during the normal right-of-way acquisition phase of a project. The CPW and NPS will not permit the conversion of Section 6(f) land to occur until the replacement property has been fully acquired and is available to serve public

outdoor recreational uses Be aware that because the functional replacement must occur before the conversion of the Section 6(f) property, it is imperative to contact the Right-of-way Office and inform them of the requirements of Section 6(f) land for the project. The Right-of-way Office should participate in the selection of replacement land, as failure to include this land in the right-of-way process will cause delays in subsequent project construction.

After construction is complete, but before the project is closed out, NPS will need to be contacted showing the exact amount of land converted and the exact size, location and value of the replacement land. They will then grant their final clearance for the Section 6(f) process.

9.20.3 NEPA Document Sections

The content of the sections on the Section 6(f) evaluation in the Affected Environment and Environmental Consequences chapter is discussed below.

Affected Environment

The Affected Environment chapter of the NEPA document should include the definition of Section 6(f) of the LWCF Act of 1965, general requirements for determining a Section 6(f) resource, and a brief discussion of each Section 6(f) resource(s) in the project area including value, size, location, and use.

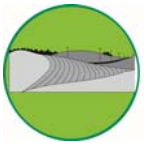
Environmental Consequences

In the Environmental Consequences section, identify Section 6(f) properties that would be impacted by any of the project alternatives, as well as any lands proposed to replace them. Show the Section 6(f) properties on a map and describe them, focusing particularly on any losses or gains in specific attributes associated with the purposes for which the properties were acquired.

Additionally, this section should include information such as any local official with jurisdiction or CPW/NPS coordination/communication and any approvals obtained from the agency(ies). A mitigation plan should be included indicating where replacement land will occur and during what project phase it should occur (preliminary design, final design, right-of-way process, construction).

Impacts and mitigation should be listed in a Summary of Impacts and Mitigation Table at the end of the resource evaluation chapter of the NEPA document. The first six columns of CDOT's Mitigation Tracking Spreadsheet should be used as this summary table (Table 9-2). CDOT's Mitigation Tracking Spreadsheet (Table 9-1) can be retrieved from http://www.coloradodot.info/programs/environmental/resources/forms/CDOT%20Mitigation%20Tracking%20Spreadsheet_June%202012.xlsx/view.

9.21 Farmlands



Farmlands are a valuable economic and cultural resource that is protected by the Farmland Protection Policy Act, 7 CFR Part 658. The two sections below provide guidance on the treatment of farmlands for CDOT's NEPA projects. The first section discusses the process for evaluating farmlands. The second section discusses farmlands information that should be in each NEPA document.

9.21.1 Farmland Evaluation Process

The project team is responsible for reviewing the applicability of the Farmland Protection Policy Act and obtaining the Farmland Protection clearance from the USDA – Natural Resources Conservation Service, if necessary.

The "Impacted Farmlands of Colorado" county maps may have copies of the maps, but the most current data is available online or from the county NRCS office. If the maps indicate that the impacted area is farmland but visual inspection of the area indicates it is clearly not being utilized as farmland, the Farmland Protection Policy Act does not apply.

The farmlands evaluation should be completed when alternatives for the proposed action are first being designed and developed, prior to the formal initiation of NEPA. Figure 9-6 is a representation of the steps involved in the completion of a Farmland Protection Policy Act Analysis.

Farmland Regulations and Guidance

- 7 CFR Part 658 – Farmland Protection Act
- 23 CFR Part 771 – Environmental Impact and Related Procedures

REASONS FOR EVALUATION OF FARMLANDS UNDER NEPA

CDOT evaluates farmlands for several reasons:

- To enable identification and protection of important farmlands
- To comply with CDOT's environmental stewardship policy, which ensures that the statewide transportation system is constructed and maintained in an environmentally responsible, sustainable, and compliant manner
- To comply with several legal mandates required under the Farmland Protection Policy Act

The Federal Farmland Protection Policy Act, 7 CFR Part 658, requires federal agencies to consider the adverse effects their programs may have on the preservation of farmland, review alternatives that could lessen adverse effects, and ensure that their programs are compatible with private, local, and state programs and policies to protect farmland.

COLLECTION AND EVALUATION OF BASELINE INFORMATION UNDER NEPA

The Farmland Protection Policy Act defines farmlands as follows:

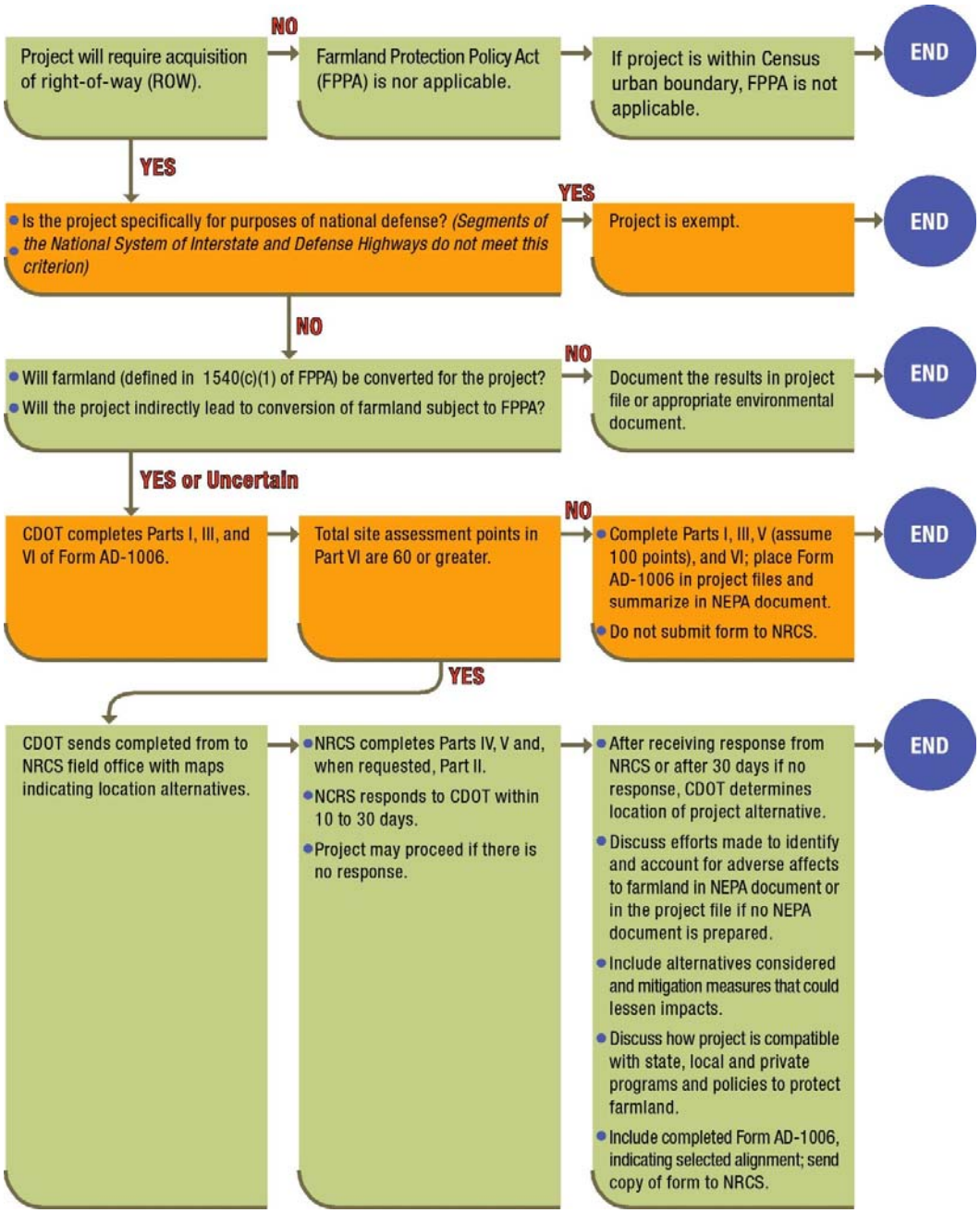
- Prime farmland is land that has the best combination of physical and chemical characteristics for production of food, feed, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor, and without intolerable soil erosion. Prime farmland includes land that possesses the above characteristics but is being used currently to produce livestock and timber.
- Unique farmland is land other than prime farmland that is used for production of specific high-value food and fiber crops. It has the special combination of soil quality, location, growing season, and moisture supply needed to produce sustained high quality or high yields of specific crops.
- Other than prime or unique farmland that is of statewide importance for the production of food, feed, and other crops, as determined by the appropriate state government agency or agencies.
- Other than prime or unique farmland that is of local importance for the production of food, feed, and other crops, as determined by the appropriate local government agency or agencies.

Clearance and coordination with the NRCS and other appropriate state and local agricultural agencies is required for all projects that require acquisition of right-of-way. Once the alternative right-of-way requirements are conceptually defined and the study area is identified as farmland the RPEM should complete the farmland conversion impact rating, NRCS form AD-1006 and submit it to NRCS for review. Figure 9-6 is a flow diagram for completing the Farmland Protection Policy Act analysis. Note: for corridor projects, Form NRCS-CPA-106 should be used.

Farmlands Clearance Documentation

- Identify whether conversion of farmland may occur
- If so, follow process outlined in Form AD-1006
- For corridor projects, use Form NRCS-CPA-106
- Incorporate alternatives to avoid farmland, potential impacts to farmland, and appropriate mitigation in the NEPA document

Figure 9-6 Completing the Farmland Protection Act Analysis



Other Issues to Consider

As part of the process for Form AD-1006, a farmland conversion impact rating score for the proposed project is established that is based on the severity of impacts on the farmland. If the site assessment criteria score (Part VI completed after return of form from NRCS) is less than 60 points for each alternative, then Form AD-1006 need not be sent to back to the NRCS. If the score is 160 points or greater and/or an area qualifies as prime farmland, Form AD-1006 must be submitted to the NRCS.

9.21.2 NEPA Document Sections

An EA or EIS typically should include only one to three paragraphs concerning farmland resources in the Affected Environment, Environmental Consequences and Mitigation section(s).

Affected Environment

The farmlands section of the Affected Environment chapter should describe:

- The general abundance of farmland in the project vicinity
- The land's primary use and economic and cultural importance

Environmental Consequences

A copy of the completed Farmland Conversion Impact Rating must be included in the document, as well as correspondence to and from the NRCS. Discuss alternatives that have the same farmlands impacts together and contrast those that differ so that similarities and differences in alternative farmlands impacts are clear. The extent to which alternatives avoid farmland impacts should be discussed in the NEPA document. Measures to minimize and mitigate impacts to farmland should be included in the document if avoidance is not possible. Mitigation measures to consider include:

- Replacement of any lost or damaged irrigation pipes or ditches
- Assurance that all remaining farmland can be irrigated
- Payment for any crops damaged during construction or restriction on a farmer's access to fields

Impacts and mitigation should be listed in a Summary of Impacts and Mitigation Table at the end of the resource evaluation chapter of the NEPA document. The first six columns of CDOT's Mitigation Tracking Spreadsheet should be used as this summary table (Table 9-2). CDOT's Mitigation Tracking Spreadsheet (Table 9-1) can be retrieved from http://www.coloradodot.info/programs/environmental/resources/forms/CDOT%20Mitigation%20Tracking%20Spreadsheet_June%202012.xlsx/view

9.22 Noise

Noise is generally defined as unwanted or excessive sound and is an undesirable by-product of our modern way of life. It can be annoying, can interfere with sleep, work, or recreation, and in extremes may cause physical or psychological damage. While noise emanates from many different sources, transportation noise is perhaps the most pervasive and difficult source to avoid in society today. Highway traffic noise is a major contributor to overall transportation noise. A broad-based effort is needed to control transportation noise. This effort must achieve the goals of personal privacy and environmental quality while continuing the flow of needed transportation services for a quality society.

Many transportation projects, during both construction and operation, cause noise levels to either decrease or increase. Physical and operational changes associated with a highway project can lead to changes in the noise levels in the environment. If a highway project is on a new alignment, highway and construction noise levels may be considerably higher than existing noise levels. At the other end of the spectrum is a transportation project along an existing alignment in a highly developed urban area where existing noise levels are already high. Both the neighboring land uses and the resulting traffic noise levels are important in determining traffic noise impacts. The specific thresholds and processes for this are detailed in *CDOT's Noise Analysis and Abatement Guidelines* (CDOT, 2015).

The two sections below provide guidance on the treatment of noise for CDOT's NEPA projects. The first section discusses the process for evaluating noise. The second section discusses noise information that should be in each NEPA document.

Noise Regulations and Guidance

- Federal-Aid Highway Act of 1970
- Noise Control Act of 1972
- FHWA Highway Traffic Noise: Analysis and Abatement Guidance
- CDOT Noise Analysis and Abatement Guidelines
- 23 CFR 772, FHWA Noise Regulations

9.22.1 Noise Evaluation Process

The CDOT project manager in coordination with the RPEM and the EPB or Regional Noise Specialist is responsible for ensuring that appropriate noise impact analyses and mitigation evaluations are performed. Typically, a consultant is hired to perform the noise analyses, prepare the noise technical report, and evaluate mitigation measures as part of these studies.

Noise analyses must be performed on Type I projects if: noise sensitive receptors are present within the project study zone. A 500-foot study zone represents the minimal noise study zone, so that if there is reasonable expectation that noise impacts would extend beyond that boundary, the study zone must be expanded. Note that if any portion of a project qualifies as Type I, the entire project is considered to be Type I.

Type I projects are proposed federal or federal-aid highway projects for the construction of a highway on a new location or the physical alteration of an existing highway that significantly changes the horizontal or vertical alignment or increases the number of through traffic lanes (CDOT, 2015). Type II projects provide noise abatement on an existing highway (retrofit noise barriers)–CDOT does not currently fund a Type II program. Type III projects are any projects that are not Type I or Type II and these do not require a noise analysis.

The process of evaluating noise associated with a transportation project involves identification of land uses adjacent to the transportation project, determination of existing noise levels, and then prediction as to how the project will affect this setting. *CDOT's Noise Analysis and Abatement Guidelines* (CDOT, 2015) contain specific information on conducting noise studies. If it is determined that noise barriers or other mitigation measures will be recommended, this can substantially affect project costs. Therefore, noise evaluations should be performed as soon as proposed alignments for project alternatives have been identified and traffic projections are available. This will allow timely revisions in project design to be made if information from these studies indicates that alternate alignments should be considered.

In general, changes in noise levels less than 3 A-weighted decibels (dBA) are barely detectable to the human ear. A 5-dBA change would be readily perceptible to most people, while a change of 10 dBA would be perceived as either halving or doubling the relative loudness. For example, a sound at 70 dBA would seem twice as loud as a sound level of 60 dBA.

Reasons for Evaluation of Noise Under NEPA

CDOT evaluates noise impacts for several reasons:

- Noise can adversely affect people and their use/enjoyment of properties near transportation facilities
- To comply with 23 CFR 772 and related legal mandates
- To comply with CDOT's environmental stewardship policy, which ensures that the statewide transportation system is constructed and maintained in an environmentally responsible, sustainable, and compliant manner

Regulations and guidance on noise evaluations are provided in the sidebars. Both FHWA and CDOT have well-developed guidance and protocols for evaluating noise impacts on people.

The two key working documents used by these agencies are FHWA's *Highway Traffic Noise: Analysis and Abatement Guidance* (FHWA, 2011)

Noise Guidance

FHWA Highway Traffic Noise Regulations and Guidance at http://www.fhwa.dot.gov/environment/noise/regulations_and_guidance/

CDOT Environmental Noise Guideline and Policies at http://www.coloradodot.info/programs/environmental/noise/guidelines-policies

and CDOT's *Noise Analysis and Abatement Guidelines* (CDOT, 2015). The latter document provides the primary foundation for the protocols discussed below.

Collection and Evaluation of Baseline Information Under NEPA

The discussion of the collection and evaluation of baseline information in this manual represents a summary of information provided in CDOT's *Noise Analysis and Abatement Guidelines* (CDOT, 2015). Please refer to those guidelines for further detail before implementing a noise analysis under NEPA.

The baseline information needed to perform a noise analysis for a Type I project is dictated by the requirements of the prescribed process. There are five general steps that should be completed to analyze noise for each project alternative (CDOT, 2015):

- Identification of nearby land uses
- Measurement and modeling of existing traffic noise
- Modeling of future traffic noise levels
- Determination of future traffic noise impacts
- Identification and evaluation of noise abatement measures for reducing or eliminating the traffic noise impacts (including construction noise), if necessary

These units represent both the sound exposure level (a combination of the duration of a sound event and its intensity in dBA units—a mathematical combination of each frequency's sound energy corrected for the human hearing range) and the number of sound events over a one-hour period.

Step 1: Identification of Nearby Land Uses

Land uses near a highway project should be reviewed and assigned to one of seven categories on the basis of the uses described in Table 9-3. Most land uses of noise concern along highway corridors will fall under Categories B, C, or E. Note that the use of Category A should be extremely rare and only considered for special facilities. Projects located where only Category F (non-noise sensitive) or G (undeveloped) uses are present or permitted may not require a full noise analysis.

Exterior areas having frequent human use are the primary locations where mitigation of traffic noise impacts is considered. CDOT established Noise Abatement Criteria (NAC) that are one dBA below the FHWA NAC to comply with requirements of 23 CFR 772. The CDOT NAC are provided in terms of the Hourly Equivalent Sound Level (Leq(h)) (Table 9-5).

To complete Step 1, information on land uses must be obtained for the project study zone (described above) and referenced to the appropriate NAC (Table 9-5). The NAC Categories are then used to characterize the affected environment and to establish the noise level(s) at which noise impacts occur

and noise abatement must be considered under the subsequent steps. The NACs are not to be used as a noise design goal. Traffic noise impacts can also occur at levels below the NAC if noise levels increase by 10 dBA or more.

Step 2: Measurement and Modeling of Existing Traffic Noise

Existing noise levels should be determined by a combination of field monitoring of sound levels and use of FHWA's Traffic Noise Model (TNM) Version 2.5 or "latest approved version" noise prediction model.

Table 9-5 CDOT Land Use Categories and Noise Abatement Criteria

Category	Leq(h)[a]	Evaluation Location	Description of Activity Category Use
A	56	Exterior	Tracts of land in which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is to continue to serve its intended purpose.
B[b]	66	Exterior	Residential
C[b]	66	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or non-profit institutional structures, radio studios, recording studios, schools, Section 4(f) sites, trails, trail crossings, and television studios
D	51	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or non-profit institutional structures, radio studios, recording studios, schools and television studios
E[b]	71	Exterior	Hotels, motels, offices, restaurants, bars and other developed lands, properties or activities not included in Categories A-D or F.
F	NA	NA	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, ship yards, utilities (water resources, water treatment, electrical), and warehousing
G	NA	NA	Undeveloped lands that are not permitted for development

Source: *CDOT Noise Analysis and Abatement Guidelines* (CDOT, 2015).

[a] Hourly sound level in A-Weighted decibels (dBA), reflecting a 1-dBA approach value below 23 CFR 772 values

[b] Includes undeveloped lands permitted for this activity category

NA = not applicable

The primary purpose of monitoring noise in the field is to validate the noise prediction model by comparing measurements of existing noise with levels predicted by TNM for those traffic conditions. It is desirable to monitor noise when traffic noise levels are greatest, but this is not necessary as long as

traffic data are collected for the period of measurement. The period of the greatest noise levels may be during peak traffic volumes or when the truck mix or vehicle speeds are greater. Typically, the noisiest hour will be when both the traffic volume and speed are the highest.

To complete Step 2, the "worst hour" existing noise levels are typically determined through TNM modeling. The hour with the highest traffic volumes traveling at the highest speeds in the project study zone is modeled to calculate noise levels at the noise-sensitive areas. These results are used to establish "worst hour" existing noise levels for the project study zone points and to identify any areas with existing traffic noise impacts.

Step 3: Modeling of Future Traffic Noise Levels

During Step 3, noise levels in the project study zone in the future design year (e.g., in 20 years) are predicted, again using TNM models. Future traffic noise levels for all project alternatives under consideration, including the No Action Alternative, should be modeled. Specific model inputs should be discussed with the CDOT EPB or noise specialist and the methodology used to predict traffic noise levels should be thoroughly documented in a technical report provided to CDOT for review (CDOT, 2015). Modeling should focus on all noise sensitive land uses in the project study zone, but especially those receptors in the "front row." Generally, the noise analysis will focus on noise levels at ground level, but upper-floor receptors must be included as warranted (CDOT, 2015). In addition, FHWA requires noise analysis for undeveloped lands where development is "planned, designed, and programmed" (Table 9-5). In other words, if building permits have been issued for a development, the noise analysis must be performed for that property as if the development already existed.

To complete Step 3, the "worst hour" future noise levels for each alternative are determined through TNM modeling. The hours with the highest traffic volumes traveling at the highest speeds in the project study zone are modeled to calculate noise levels at the noise-sensitive areas. These results are used to identify noise impacts in Step 4.

Step 4: Determination of Future Traffic Noise Impacts

In Step 4, the modeled noise levels predicted for each location for each future alternative are compared to the NAC (Table 9-5). In addition, the future noise levels for each location for each alternative should be compared to the corresponding existing noise levels to determine whether future noise levels will increase by 10 dBA or more. Based on these comparisons, a traffic noise impact occurs when predicted traffic noise levels equal or exceed the relevant NAC, *or* when future traffic noise levels will increase by 10 dBA or more. Thus, for a Category B (residential) receptor, the noise

level that would trigger identification of an impact from the NAC would be 66 dBA. Or, for example, if the existing noise level for a Category B receptor was 46 dBA and the predicted future noise level was 59 dBA, this would result in identification of an impact even though the 66 dBA NAC had not been reached. Any location that is found to meet either of these thresholds is found to be impacted and must be evaluated for abatement in Step 5.

Step 5: Identification and Evaluation of Abatement Measures

In Step 5, noise abatement measures are considered as appropriate for the impacts identified in Step 4. A number of measures can be taken to reduce noise levels (CDOT, 2015). FHWA guidance directs that noise abatement measures should be designed to provide a "substantial" noise reduction, rather than to achieve a specific noise level such as the NAC. The minimum noise reduction for a receptor to "benefit" from an abatement action is 5 dBA. However, CDOT's noise reduction design goal is 7 dBA, which must be achieved at one or more receptors.

Noise barriers in the form of walls often will be the best available traffic noise abatement option and are the actions examined in detail most frequently for projects. A robust evaluation of the prospective walls must be undertaken to examine the potential abatement outcomes. This may mean, in part, examining walls of different heights as well as different physical placements, possibly both on and off the CDOT right-of-way, to identify the best noise abatement option(s). The individual circumstances of each project need to be considered when formulating the range of abatement actions to be analyzed. The potential drawbacks associated with each abatement option (e.g., added right-of-way takes, long-term maintenance issues, etc.) must be catalogued, too, for the information necessary to complete the CDOT and FHWA evaluation criteria.

CDOT's and FHWA's guidelines identify two main elements in the consideration of noise abatement measures: feasibility and reasonableness. FHWA guidelines direct that noise abatement measures must be both feasible and reasonable to be recommended for inclusion in the project. CDOT's process is to evaluate feasibility first, then reasonableness, which is described in detail in the technical guidance (CDOT, 2015). If, in the evaluation of an abatement measure, a specific criterion is found to be infeasible or unreasonable, the evaluation for that abatement measure can stop at that point and the abatement measure dismissed.

Feasibility - Feasibility deals primarily with these engineering considerations:

- Can a 5-dBA noise reduction be achieved?
- Are there any fatal flaw issues—safety, design, etc.?
- Is the potential barrier less than 20 feet tall?

A fatal flaw is a problem with the design of an abatement measure that presents hazards to vehicular traffic or creates major maintenance problems. Examples of a fatal flaw include restricted sight distance, icing of driving lanes due to barrier shadows, conflicts with snow removal operations, glare or reflection of sunlight off the noise barrier, drainage problems, and so on. CDOT has defined barriers more than 20 feet tall as infeasible.

Reasonableness – Reasonableness addresses a combination of economic, environmental and social factors affected by the potential noise abatement measure. This analysis ensures the recommendations are a prudent use of public funds. Reasonableness considers the following:

- Is the 7-dBA noise reduction design goal met at one or more receptors?
- Is the Cost Benefit Index $6,800/receptor/decibel or lower?
- Are more than 50 percent of the potentially benefited receptors in favor of the abatement measure?

The potential noise abatement measure(s) must be found to be both feasible and reasonable by satisfying the six criteria above for the measure(s) to be recommended for inclusion in a CDOT project. Please note that for the NEPA document, this is a mitigation recommendation—the final decision on noise abatement measures is made during final design for the project.

Further detail on the construction and effectiveness of noise walls, on situations where noise barriers are needed on both sides of a highway (parallel barriers), and on the entire noise analysis procedure can be found at *CDOT's Environmental Noise Guidelines* website and websites addressing the TNM model (FHWA TNM website). The EPB or Regional Noise Specialist should be consulted prior to completion or submission of a final noise analysis.

TNM Model

FHWA TNM website at http://www.fhwa.dot.gov/environment/noise/traffic_noise_model/

9.22.2 NEPA Document Sections

CDOT Type I projects require the evaluation of noise impacts as part of the environmental clearance process. All CDOT projects that include a noise analysis require a stand-alone noise analysis report (CDOT, 2015). The technical report is summarized in the main NEPA document, except for a CatEx project where a formal NEPA document is not prepared (CDOT, 2015). Noise topics in the Affected Environment and Environmental Consequences section of NEPA documents are discussed below. Note that noise studies for Tier 1 NEPA documents are very general in nature and

cannot be used to make detailed impact determinations and mitigation commitments.

Technical Report

The noise technical report must describe the methods and findings from the project noise impacts analysis and the findings from any abatement action evaluations. Different levels of noise reports are acceptable—an EIS would require a more thorough noise report than a CatEx—but technical documentation is required for the project if a formal noise analysis is performed.

The noise technical report must include discussion of each of the five steps of the noise analysis described above. It must also include a completed version of CDOT Form 1209 for each noise abatement action that was evaluated for the project.

A project is considered "cleared" when a final analysis has been submitted and reviewed by the EPB and/or Regional Noise Specialist. All comments submitted during these reviews must be resolved before the analysis can be finalized.

Affected Environment

Documentation for the Affected Environment chapter of EAs and EISs is discussed in this section. At a minimum, the Affected Environment chapter should contain a discussion of the following two elements:

Land Use Categories and Noise Receptors – Discuss the various land uses adjacent to the project, cross-reference the discussion of land use elsewhere in the NEPA document, and discuss the land use categories as they are relevant to noise. Characterize the receivers of noise within each type of land use.

Measured and Modeled Existing Noise Levels – Present a discussion of the measured and modeled existing noise levels, and briefly discuss how and for which locations these were calculated plus any relevant points regarding how they differ. Note any locations where existing noise levels equal or exceed the relevant NAC as impacted. Detailed results are tabulated in the technical report.

Environmental Consequences

Documentation for the Environmental Consequences section of EAs and EISs is discussed in this section. The information presented in the NEPA document on noise impacts is typically a summary of the detailed information in the noise technical report.

Affected Environment Chapter of NEPA Document

- Land use attributes relevant to noise, including receptors
- Measured and modeled existing noise levels
- Comparison and discussion of measured and modeled existing noise levels

Environmental Consequences Chapter of NEPA Document

- Summarize impact analysis from the noise technical report
- Document location-specific noise impacts and their basis
- Provide sufficient detail to support any mitigation measures recommended

The modeling results for the alternatives must be described. The locations calculated to have noise impacts in the future design year, based on either NAC exceedences or substantial increases in noise (as discussed above), should be identified. This should be provided for each alternative being considered by the project and the alternatives should be compared to each other. Noise considerations other than traffic, such as construction, should be described.

MITIGATION EVALUATION

If noise impacts are identified for the project under Environmental Consequences, noise abatement measures must be evaluated for the impacted properties for the alternatives other than No Action. Several noise abatement measures are available for consideration, but noise walls are the most common in developed areas. These noise walls are costly. Therefore, it is important to thoroughly justify and describe abatement measures for the specific locations are recommended for the project.

Discussion of Noise Abatement Evaluations – For each of the identified noise impact areas, an evaluation of noise abatement is needed. The types of abatement actions considered should be described and the findings from the feasibility and reasonableness assessments for each should be presented. The dimensions of the proposed abatement structures should be summarized. This should be provided for each action alternative being considered by the project. It is important to note that the desires of the benefitting receptors must be determined for an abatement measure to be found reasonable. It should be clearly indicated which potential mitigation actions were found to be feasible and reasonable and are being recommended for inclusion in the project. All investigated abatement measures must be described in the noise mitigation evaluation, including areas where noise abatement was not found to be feasible or reasonable. Note whether residual noise impacts will remain after the suggested mitigation measures are applied, and quantify the residual impacts if possible.

Statement of Likelihood – The NEPA document must identify the recommendations for construction of noise abatement measures, if any. This analysis is completed to the extent that design information is available at the time the NEPA decision document is completed. A Statement of Likelihood must be included in the NEPA document because feasibility and reasonableness determinations may change due to changes in final project design after approval of the environmental document. The Statement of Likelihood includes the preliminary location and physical description of noise abatement measures determined to be feasible and reasonable in the preliminary analysis. Note that the final noise abatement decision will be

An important and challenging criterion is the preference of benefitting receptors. More than half of these receptors must support the abatement action for it to be reasonable. A preliminary survey of these receptors may be needed during the NEPA process – it may be blended into the public involvement process – to reach a NEPA recommendation on whether or not abatement should be implemented for noise impacts. A final survey is needed during final design for the formal determination on whether abatement will be implemented.

made during the completion of the project's final design and the public involvement processes.

Impacts and mitigation should be listed in a Summary of Impacts and Mitigation Table at the end of the resource evaluation chapter of the NEPA document. The first six columns of CDOT's Mitigation Tracking Spreadsheet should be used as this summary table (Table 9-2). CDOT's Mitigation Tracking Spreadsheet (Table 9-1) can be retrieved from http://www.coloradodot.info/programs/environmental/resources/forms/CDOT%20Mitigation%20Tracking%20Spreadsheet_June%202012.xlsx/view.

9.23 Visual Resources/Aesthetics

Visual resources include those elements that define the visual character of an area. These can be important natural features, vistas, or view sheds, but can also include urban or community visual characteristics, including architecture, skylines, or other characteristics that create a visual definition for an area. The long-term goal is to consider transportation design in a broader, sustainable and contextual perspective.

Visual resources and aesthetics are important because of their uniqueness and the strong emotion they inspire in human viewers. Such special places often provide a sense of community to the inhabitants of an area and may attract tourism and drive its economy.

The two sections below provide guidance on the treatment of visual resources and aesthetics for CDOT's NEPA projects. The first section discusses the process for evaluating visual resources and aesthetics. The second section discusses visual resource and aesthetics information that should be in each NEPA document.

9.23.1 Visual Resource/Aesthetic Evaluation Process

The CDOT project manager, together with the EPB Visual Resource Specialist and Landscape Architect, is responsible for the evaluation of visual resources and aesthetics. Typically the development of a visual resource and aesthetics baseline and evaluation of potential project impacts is done by a consultant. The public should also contribute to identification of visual resources and aesthetics because they are important in defining "a sense of place" for the local community.

All visual resources and aesthetics that are visible from key observation points within the project area should be evaluated.

The presence of visual resources and aesthetics may influence the routing of the proposed project or its alternatives because such resources may need to be avoided by a roadway that passes too closely, or it may be advantageous to enhance the view of a particularly important visual resource from the project or its turnouts. Therefore, information on visual resources and aesthetics should be collected as early as possible during project development. Identification of local visual resources, design elements and aesthetics principles should be a goal of the first public scoping meetings.

Visual Resource/Aesthetics Regulations and Guidance

- Guidance for Preparing Environmental and Section 4(f) Documents
- Streamlined EIS Review and Approval Process
- Colorado Regional Transportation Planning Guidebook
- CDOT Landscape Architecture Manual

Reasons for Evaluation of Visual Resources and Aesthetics Under NEPA

CDOT evaluates visual resources and aesthetics for several reasons:

- They are important components of the nation's environmental heritage and in the definition of local communities' sense of place
- To create design guidelines in the design process that address architectural and view shed objectives developed during the process
- To conduct a contextual analysis of the study area setting
- To comply with CDOT's environmental stewardship policy, which ensures that the statewide transportation system is constructed and maintained in an environmentally responsible, sustainable, and compliant manner
- To comply with legal mandates or guidance that refer to visual resources and aesthetics in the context of NEPA implementation

FHWA document on Flexibility in Highway Design

www.fhwa.dot.gov/environment/flex/index.htm

Context Sensitive Solutions Organization

http://www.contextsensitivesolutions.org/

Most of the mandate for considering visual resources and aesthetics under NEPA is found in guidance regarding the conduct of NEPA. For example, the FHWA Technical Advisory 6640.8A (FHWA, 1987) includes visual impacts among those that should be evaluated in a NEPA document. The FHWA's *Streamlined Environmental Impact Statement (EIS) Review and Approval Process* (FHWA, 1996b) includes visual resources among the resource topics that should be addressed in the affected environment chapter and notes that the discussion of visual resources should indicate whether a project is in a visually sensitive urban or rural setting. In addition, areas of potential environmental concern recognized in the *2035 Regional and Statewide Transportation Plan* Guidebook (CDOT, 2006c) include visual resources. CDOT's vision regarding context-sensitive solutions is provided in *Chief Engineer's Policy Memo 26 Context Sensitive Solutions (CSS) Vision for CDOT* (CDOT, 2005b). Aesthetic guideline considerations are included in CDOT's Landscape and Aesthetic Manual (CDOT, current edition)

In addition to guidance relating specifically to visual resources and aesthetics, is guidance on CSS, since being sensitive to a project's context includes being sensitive to its visual setting.

COLLECTION AND EVALUATION OF BASELINE INFORMATION UNDER NEPA

Collection of Baseline Information

Information on locally important visual resources and aesthetics should be gathered from the local community at public scoping meetings. The study area of the proposed project is composed of its view shed. A view shed is the area that can be seen from various viewpoints within the project area. In addition, survey the views and vistas in the study area to determine whether there are visual resources and aesthetics that the project should avoid. When a project involves modification of an existing roadway, a quick survey of visual resources and aesthetics is all that's required. When a project is along a new alignment, it may be necessary to survey it from a helicopter to see its new vantage points. The goal is to collect baseline information on the scenic quality of an area and its sensitivity to modification, as well as to identify particular visual treasures and gateways. Creating visual models that use topography to determine view sheds from specified vantage points can also be used. Negative visual impacts should also be assessed during the project evaluation such as utilities lines, views created by location of alignment and other visual issues.

In addition to impacts of the project on the physical character of locally important visual resources and aesthetics, the project itself may intrude on views of its setting from elsewhere, such as viewpoints along frequently used hiking trails or scenic byways. Baseline information should include descriptions of local trails, scenic byways, or other routes that are locally enjoyed because of their views, if their view sheds include the alignment of any of the project alternatives.

Evaluation of Baseline Information

The importance of visual resources and aesthetics is defined by their visibility and the number of people who view them as well as by their innate character. The extent of impact to them is typically based on their visual importance in the community, as well as the compatibility of project facilities with their character.

The most current FHWA guidance for evaluating visual resources is somewhat general (FHWA, 1987). There are two FHWA documents that address the evaluation of visual resources and aesthetics (*Appendix I: FHWA Memorandum on Aesthetics and Visual Quality Guidance Information*, August 18, 1986; *Appendix 5.23-B: FHWA Environmental Impact Statement, Visual Impact Discussion*) but the more recent protocols developed by agencies such as the BLM and USFS are generally used when detailed analysis is required.

These more detailed protocols evaluate the scenic quality and sensitivity of a study area. Sensitivity is based on such factors as the type of users, amount of use, public interest, adjacent land uses, special areas, natural landscape characteristics and other factors. A prescribed or ad hoc rating scale may be used to delineate and evaluate scenic quality and sensitivity. The study area is often subdivided into mapping distance zones (e.g., foreground, middle ground, background, and seldom-seen zones) on the basis of their visibility. Finally the study area is typically assigned to visual resource management classes that have established objectives for retention of the existing character of the landscape, the level of change permissible in the landscape, and the extent to which a proposed project is required to blend into the landscape. In the BLM Manual, management classes and their objectives are the following:

- Class I Objective – To preserve the existing character of the landscape. The level of change to the characteristic landscape should be very low and must not attract attention.
- Class II Objective – To retain the existing character of the landscape. The level of change to the characteristic landscape should be low

Implementation of such an approach can be accomplished by using topographic maps and familiarity with an area, or by use of software packages such as Environmental Systems Research Institute's Spatial Analyst, which electronically defines view sheds from selected particular viewpoints.

For most transportation projects, visual resource analysis can be generalized from the process outlined above. The level of detail provided in the analysis should be commensurate with the complexity of the proposed project and the importance of the visual resources present.

Contextual Analysis

A contextual analysis document consists of study area photographs and maps often supplemented with corridor drawings created by a Landscape Architect. This visual tool should identify key elements such as parks, major drainages, business areas, unique land features, vegetation or elements identified during the community review. The Contextual Analysis will help achieve class I and II objectives and fulfill the objective to best fit the alternatives to the physical setting.

View Shed Analysis

The purpose of a view shed analysis is to identify existing character of the terrain involved in the study area. Basically the analysis is focused on line

mass, texture and color. Visual analysis is very important in a mountain setting with mountainous terrain and forest cover.

When working in US Forest Service Lands a FHWA's Visual Prioritization Process (VPP) is required and should be conducted by a Licensed Landscape Architect. The VPP is similar to a view shed analysis and is intended to focus on mitigation in response to visual impacts and visual goals.

OTHER ISSUES TO CONSIDER

More information on how to approach the evaluation of visual resources and aesthetics is available from the handbooks on visual resource analysis prepared by other agencies such as the BLM (e.g., *Manual H-8410-1 – Visual Resource Inventory*). A review of such guidance can help to identify the types of issues that should be considered in an analysis of visual resources and aesthetics for CDOT.

9.23.2 NEPA Document Sections

Visual resources and aesthetics in the Affected Environment and Environmental Consequences section of NEPA documents are discussed below.

AFFECTED ENVIRONMENT

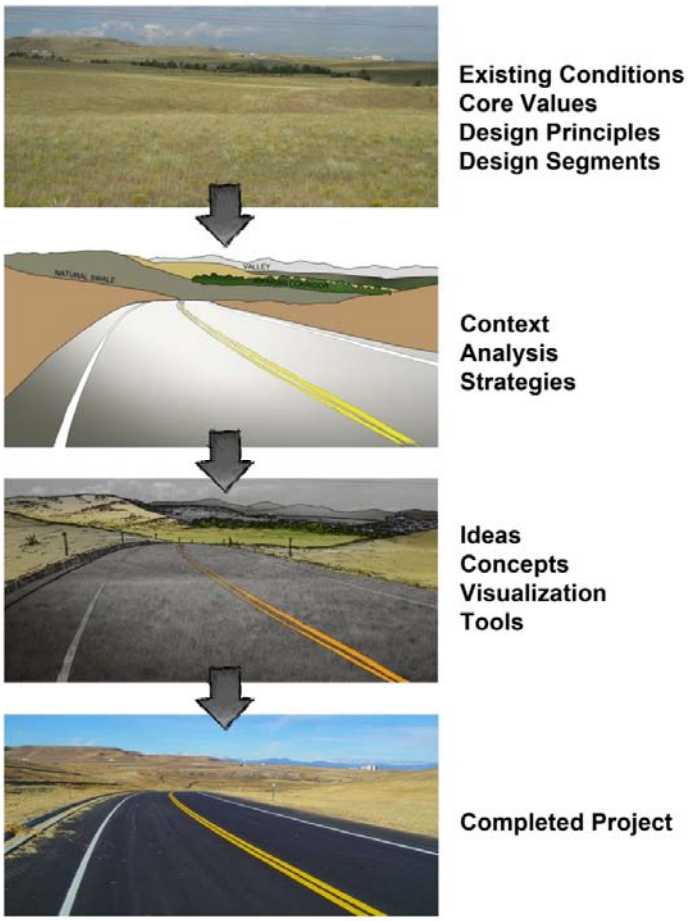
Documentation for the Affected Environment chapter of EAs and EISs is discussed in this section. At a minimum, the Affected Environment chapter should contain a discussion of the following three elements:

- Existing Visual Resources and Aesthetics – Describe the general visual character of the study area and identify important visual resources and aesthetics that are present
- Common Viewpoints – Note any other travel routes (hiking trails, biking trails, scenic byways, favored local routes) in the study area that have important views of the location
- Graphics – Include topographic maps and photographs of the important visual resources and aesthetics identified (Figure 9-7)

Affected Environment Chapter of NEPA Document

- Description of visual character
- Identification of important visual resources and aesthetics
- Documentation of other travel routes from which the project can be seen

Figure 9-7 Visual Resource Evaluation



ENVIRONMENTAL CONSEQUENCES

Documentation needs for the Environmental Consequences section of EAs and EISs are discussed in this section. At a minimum, the Environmental Consequences section should compare the effects of each alternative carried forward for detailed analysis in the following four categories:

Visual Analysis – Identify desirable view sheds and seeks to preserve them while maintaining compliance with other resources. Consider both natural and cultural impacts during preservation. Conversely, visual analysis must identify negative views within the project and adjacent to the project. Consider screening negative view points and address alternatives to improve undesirable areas within in the design templates. For example, above ground utilities intersecting a view shed of the mountains should be

addressed as a negative visual impact. The process for doing this is as follows:

- On the map of visual resources, identify key viewpoints along each of these routes from which the project can be seen and also identify key viewpoints from which local visual resources can be observed from the project
- If appropriate to the project complexity, illustrate the view shed visible from each viewpoint
- Perform this analysis for key viewpoints of/from each of the project alternatives
- If the project is complex, individual alternatives may need to be illustrated on separate maps
- Use the map showing topography, visual resources/aesthetics, viewpoints, and view sheds as the basis for a text discussion of impacts

As noted in FHWA Technical Advisory 6640.8A (FHWA, 1987), "when the project alternatives have potential visual impacts, the draft NEPA document should identify impacts to the existing visual resource, the relationship of the impacts to potential viewers of and from the project, as well as measures to avoid, minimize, or reduce the adverse impacts."

FHWA Technical Advisory T6640.8A suggests that when there is potential for visual quality impacts, the draft NEPA document should explain the consideration given to design quality, art, and architecture in project planning. Such considerations represent early recognition and avoidance of potential project impacts through project design.

Additionally, when a proposed project will include features associated with design quality, art, or architecture, be certain that circulation of the draft NEPA document includes officially designated state and local arts councils and, as appropriate, other organizations with similar interests.

Sustainability – Aesthetic mitigation must blend into the existing environment by using adaptive restoration methods and matching native plant communities of the natural landscape. Utilizing natural character types will fit the facility to the landscape and better respond to the local influences.

Continuity – Evaluating existing landscape enables fitting the landscape to adjacent landscape characteristics. Uniform visual guidelines should be developed that apply to the entire study area based on consensus and compliance with land manager agencies (USFS, BLM, and NPS), local

agencies, and the local community. Studies should commit to developing master guidelines addressing aesthetics and architectural standards.

Conclusion of Effects – The conclusion should restate the biggest visual resource/aesthetics concerns associated with each alternative and identify the alternative with the least expected effect on visual resource and aesthetics.

Depending on project complexity and the effort entailed in developing mitigation measures, it may be appropriate to suggest mitigation measures for each of the project alternatives, or only for the preferred alternative once it has been identified on the basis of overall impacts (including unmitigated visual resource and aesthetics impacts). In either case, the final NEPA document should identify any proposed mitigation for the preferred alternative.

Aesthetic Design Criteria

Mitigation of impacts to visual resources and aesthetics can include such measures as:

- Minimization of cut-and-fill so a roadway's scar on the landscape is as small as possible
- Modification of facility alignment to fit the template into the physical setting
- Modification of facility shape, texture, and color to help it blend in with the surrounding landscape
- Construction on the backside of hillsides included in important view sheds
- Routing of alternatives away from visual resources and aesthetics that might be damaged
- Inclusion of turnouts, parking areas, and signage that promote public enjoyment of visual resources and aesthetics from the project
- Planting to soften/minimize cuts, fills, bridge abutments, and so on, mitigate vegetation taken, and block negative views

Impacts and mitigation should be listed in a Summary of Impacts and Mitigation Table at the end of the resource evaluation chapter of the NEPA document. The first six columns of CDOT's Mitigation Tracking Spreadsheet should be used as this summary table (Table 9-2). CDOT's Mitigation Tracking Spreadsheet (Table 9-1) can be retrieved from http://www.coloradodot.info/programs/environmental/resources/forms/CDOT%20Mitigation%20Tracking%20Spreadsheet_June%202012.xlsx/view.

9.24 Energy

Energy resources typically include liquid or gaseous fuels, petroleum products, or electricity. The term "energy" is used in many other contexts and might be universally defined as "the potential for causing change." It is a conserved quantity, which means the total energy of the universe remains constant, but may be converted from one form into another. The efforts to conserve such energy sources are in part efforts to conserve currently available energy resources that can do useful work such as propel vehicles. Such efforts are also intended to minimize the consumption of energy resources, which contributes to air and water pollution.

Wise use of energy resources is important because those that are readily available are in dwindling supply and subject to political constraints.

The two sections below provide guidance on the treatment of energy for CDOT's NEPA projects. The first section discusses the process for evaluating energy use and conservation. The second section discusses information about energy that should be in each NEPA document.

9.24.1 Energy Evaluation Process

The aspects of the current transportation system that contribute to inefficient use of energy should be discussed as should the ways in which project components will contribute toward more efficient use of energy. The discussion should focus on the project system as a unit (rather than on specific locations), including construction and operation time frames, and project aspects and components that contribute to energy economy.

Energy use should be considered throughout the design, development, construction, and use of a transportation project. Efficiencies can be incorporated in each of these phases.

Reasons for Evaluation of Energy Under NEPA

CDOT evaluates energy for several reasons:

- Available and readily useable energy is a resource that is important to the nation's economy and sustainability
- To comply with CDOT's environmental stewardship policy, which ensures that the statewide transportation system is constructed and maintained in an environmentally responsible, sustainable, and compliant manner
- To comply with several legal mandates that pertain to energy production, use, and conservation

Energy Regulations and Guidance

- National Energy Policy Act of 2005 provides incentives for traditional energy production and for newer, more efficient energy technologies and conservation.
- Executive Order 13211 requires preparation of a Statement of Energy Effects from federal agencies responsible for "significant energy actions"
- FHWA policy on Environmental Best Practices mentions energy efficiency in numerous contexts
- SAFETEA-LU Section 1121 identifies fuel efficient vehicles among the exceptions that may be allowed in HOV lanes

The regulations and guidance listed in the previous sidebar are variously relevant to transportation. As a result of these, as well as broad-based national policy, energy conservation is an important factor in the design and analysis of highway projects and in the conduct of day-to-day life at CDOT. Beyond the legal requirements for energy conservation are environmental benefits under the NEPA umbrella.

COLLECTION AND EVALUATION OF BASELINE INFORMATION UNDER NEPA

Collection of Baseline Information

Because the topic of energy is complex, care must be taken to focus the collection of baseline information specifically on the types of energy that will be affected by the project. The level of detail obtained for the baseline should not be greater than that which can be predicted for project construction and operation energy uses.

For existing roadways, obtain information on the traffic mix, speed, and volume at key times of day. Use this information to characterize the annual energy consumption of current vehicular traffic. Data could also be collected on other annual expenditures of energy, such as in maintenance of the existing roadway and on lighting and signage. The specific information collected should be guided by the changes in energy use that will be brought about by the project. The larger the scale and complexity of the proposed project, the greater the level of detail should be in collecting baseline data on energy consumption. Except for large scale projects, a detailed energy analysis including computations of British thermal unit requirements, and so on, is not needed.

Evaluation of Baseline Information

Evaluate all aspects of the proposed project to identify how it will be different from the existing situation in ways that affect energy consumption or conservation. Consider questions such as the following for each of the alternatives:

- Will the new roadway be longer and require vehicles to travel further, as well as require more lighting and more maintenance?
- Will the design, speed limit posting, and LOS of the new roadway cause vehicles to travel at speeds of maximum efficiency, or at speeds higher or lower than that?
- How much energy will be expended during construction of the project and what energy conservation measures will be employed during construction?

- Will HOV lanes be installed to encourage efficient use of the roadway and, if so, what energy savings are likely to result?
- Will incentives be provided to encourage and promote the use of fuel-efficient vehicles on the new roadway?
- Will the new roadway and the materials used for it require less maintenance?

To evaluate the energy impacts of the project, develop tables that compare the existing and proposed future energy use for the entire road network affected by each of the project's alternatives.

Other Issues to Consider

Beyond regulations and guidance directed specifically at energy policy, energy conservation is woven throughout the fabric of CDOT activities. CDOT's *Lighting Design Guide* (CDOT, 2006) which provides current recommended practice for roadway lighting and criteria for typical Colorado applications, focuses on energy efficiency repeatedly as a primary benefit of various lighting fixtures. Energy dissipation is also a factor in roadside barrier material selection and drainage system design. In this and other documents, energy efficiency is an environmental and safety concern, as well as an economic consideration.

9.24.2 NEPA Document Sections

The content of the sections on energy in the Affected Environment and Environmental Consequences chapter is discussed below.

Affected Environment

In the energy section of the Affected Environment chapter of the NEPA document, present the data collected on current energy use. Include only information on the types of energy use that the proposed project will alter, at a level of detail that can be matched with reasonable projections for the project alternatives.

Affected Environment Chapter of NEPA Document

- Constrain to types of energy use that the proposed project would alter
- Quantify the existing energy use to the same level of detail that can be projected for the project

Environmental Consequences

Discuss in general terms the construction and operational energy requirements and conservation potential of various alternatives under consideration. The discussion should be reasonable, supportable, and, when appropriate, do the following:

- Recognize that the energy requirements of various construction alternatives are similar and are generally greater than the energy requirements of the No Action Alternative.

- Point out that the post-construction, operational energy requirements of the facility should be less with one or more of the build alternatives. In such a situation, one could conclude that the savings in operational energy requirements would more than offset construction energy requirements and thus, in the long term, result in a net savings in energy usage.
- For large-scale projects with potentially substantial energy impacts, the Draft EIS should discuss the major direct and/or indirect energy impacts and conservation potential of each alternative.
- Direct energy impacts refer to the energy consumed by vehicles using the facility.
- Indirect impacts include construction energy and such items as the effects of any changes in automobile usage.
- The alternative's relationship and consistency with a state and/or regional energy plan, if one exists, should also be indicated.

The NEPA document should identify any energy conservation measures that would be implemented for each of the alternatives. Once the preferred alternative is identified, the energy conservation measures to be implemented for that alternative should be highlighted. Measures to conserve energy could include:

- Use of HOV incentives
- Measures to improve traffic flow
- Reduction of the energy used in lighting
- Reduction of the roadway maintenance extent or frequency
- Limiting the idling of construction equipment
- Encouraging employee carpooling or vanpools for construction workers
- Encouraging the use of the closest material sources
- Locating construction staging areas close to work sites
- Using cleaner and more fuel-efficient construction vehicles
- Using alternative fuels and asphalt binders
- Implementing traffic management schemes that minimize motorist delays and vehicle idling
- Carrying out maintenance activities during periods of reduced traffic volumes
- Promoting carpooling/vanpooling
- Encouraging transit

Impacts and mitigation should be listed in a Summary of Impacts and Mitigation Table at the end of the resource evaluation chapter of the NEPA document. The first six columns of CDOT's Mitigation Tracking Spreadsheet should be used as this summary table (Table 9-2). CDOT's Mitigation Tracking Spreadsheet (Table 9-1) can be retrieved from http://www.coloradodot.info/programs/environmental/resources/forms/CDOT%20Mitigation%20Tracking%20Spreadsheet_June%202012.xlsx/view.

9.25 Hazardous Materials

The term hazardous materials is an all-inclusive term for materials that are regulated as a solid waste, hazardous waste, and other materials contaminated with hazardous substances, radioactive materials, petroleum products, toxic substances, and pollutants. The regulations that apply to the acquisition, investigation, and cleanup of sites containing hazardous materials that may be present in a project area include but are not limited to:

- Resource Conservation Recovery Act (RCRA) (40 CFR Parts 260–299) is the primary law governing the management and disposal of solid and hazardous waste. Subtitle C regulates hazardous waste and Subtitle I regulates underground storage tanks containing hazardous materials and petroleum products.
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 USC Part 103, Sec. 9601 et seq.) established prohibitions and requirements concerning closed and abandoned hazardous waste sites; provided for liability of persons responsible for releases of hazardous substances at these sites; and established a trust fund to provide for cleanup when no responsible party could be identified.
- US Environmental Protection Agency (EPA) Standards and Practices for All Appropriate Inquiry (AAI)/ASTM (40 CFR Part 312) establishes federal standards and practices for conducting all appropriate inquiries related to the previous ownership and uses of a property to qualify for landowner liability protections under CERCLA.
- Underground Storage Tank (UST) Remediation Colorado Department of Labor and Employment-Division of Oil and Public Safety (OPS) (7CCR 1101-14).
- Colorado Hazardous Waste Regulations (6 CCR 1007-3, Part 260).
- Radiation Control, Colorado Department of Health and Environment, Hazardous Materials and Waste Management Division (6 CCR 1007-1).

The sections below provide guidance on the assessment and management of hazardous materials and the process for collecting information on and evaluating the presence of hazardous materials for CDOT's NEPA projects.

9.25.1 Hazardous Material Evaluation Process

The RPEM or designee should be responsible for completing hazardous material studies and for assessment of the potential for encountering hazardous materials on a CDOT project. Consultants or others conducting hazardous materials investigations/studies on behalf of CDOT should coordinate with CDOT Environmental staff in advance to determine the scope of work (level of effort, type of document) required. CDOT has contracted with a database firm to generate environmental database reports for hazardous materials clearances. CDOT staff and consultants should use these reports rather than ordering environmental reports at an additional cost to the project, unless otherwise directed by CDOT.

CDOT has contracted with a database firm to generate environmental database reports for hazardous materials clearances. Database searches should be done in-house whenever possible because the database is already paid for and is regularly updated.

The goal of a hazardous material study is to provide information needed for planning efforts related to hazardous materials and contaminated sites. A hazardous material study should be conducted to assess past and present uses which indicate that hazardous materials might be present.

The discovery of hazardous materials within the proposed project area may have an adverse impact on budgets and the timely completion of the project; therefore, an assessment of potential areas of contamination should be conducted early in the project development process. This assessment will:

- Supply information for property evaluation during the right-of-way acquisition process, in order to limit or avoid CDOT liability
- Assess project alternatives for feasibility based on impacts from hazardous materials
- Allow estimation of the cost of any required remediation
- Prevent delay claims during construction
- Identify worker health and safety concerns
- Develop specific materials management or institutional controls required during construction

When hazardous materials are discovered early in the project development process, the affected areas can either be avoided entirely or addressed in a timely manner.

REASONS FOR EVALUATION OF HAZARDOUS MATERIALS UNDER NEPA

CDOT conducts site assessments during the planning or project development process to evaluate hazardous materials at proposed project areas for several reasons:

- To assess project alternatives during the alternatives screening and evaluation process for feasibility based on impacts related to hazardous materials
- To identify potential soil and groundwater contamination issues so they do not affect a project in terms of mitigation, cost, schedule, and project environmental and personnel health and safety issues
- To comply with state and federal regulations and laws
- To facilitate the development of project plans and specifications
- To develop specific materials management or institutional controls required during construction and include in project costing and schedule

EPA has delegated enforcement of the federal hazardous waste regulations to CDPHE. USTs, aboveground storage tanks (AST), and leaking USTs (LUST) are regulated by OPS.

9.25.2 Collection and Evaluation of Baseline Information

CDOT has developed a guidance table to streamline and provide consistency on information gathered for NEPA documents. There are three types of hazardous material documents that CDOT utilizes for hazardous material analysis to support NEPA: Initial Site Assessments (ISA), Phase I Environmental Site Assessment (Phase I), and Modified Environmental Site Assessment (MESA). These three documents are described in Table 9-6.

Table 9-6 CDOT Hazardous Material Document Guidance Table

Hazardous Material Document	When Prepared	Purpose	Typical Limitations	Guidance/Resources	Modifications	Notes
Initial Site Assessment (ISA)	In support of a Categorical Exclusion OR Right-of-Way Acquisition. For properties that are to be acquired by, dedicated to, or disposed by CDOT and have minimal hazardous materials concerns.	Provide an approach that is less comprehensive than a MESA for clearance of the Hazardous Materials section of Form 128, or acquisition and dedication of right-of-way.	Site access is preferred, but may not be available.	CDOT. October 2003. Right of Way Manual. ASTM. E 1528-05 Standard Practice for Environmental Site Assessments: Transaction Screen Process. CDOT ISA Checklist Form #881 CDOT Asbestos-Contaminated Soil Management Standard Operating Procedure (August, 2011)	None	Consider the potential for asbestos-containing materials and heavy metal-based paint – notably for the demolition of structures. Findings and conclusions should be specific and give an opinion for additional assessment or investigation. Information should include what monitoring during construction may be appropriate (and where), and what remediation or monitoring actions may be needed.

Hazardous Material Document	When Prepared	Purpose	Typical Limitations	Guidance/Resources	Modifications	Notes
Phase I Environmental Site Assessment (Phase I)	For properties that are to be acquired by or dedicated to CDOT and have known or are suspected of storing hazardous materials.	Provide a site-specific assessment of known or suspected soil and groundwater contamination, asbestos containing materials, and heavy metal-based paint for liability protection.	Right-of-entry required. Site access necessary.	ASTM. E 1527-05 Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process. CDOT Asbestos-Contaminated Soil Management Standard Operating Procedure (August, 2011)	Extend the ASTM Minimum Search Radius by 0.25 – 1 mile, at the discretion of the CDOT environmental professional and/or where project footprint is uncertain. Include a brief description of CDOT's most current plans regarding acquisition, excavation areas, temporary and permanent dewatering, and other issues that may affect liability in acquisition. Include a map that summarizes the important features of the project and locations of sites with recognized environmental conditions and those of concern that may affect the project.	A general discussion of asbestos-containing materials, heavy metal-based paint, and suspected drug lab waste should be included, notably for the demolition of structures. The site reconnaissance and historical document review should identify sites with potential concerns that could affect project design, right-of-way acquisition, construction, and decisions about the preferred alternative. Findings and conclusions should be specific and give an opinion for additional assessment or investigation. Information should include what monitoring during construction may be appropriate (and where), and what remediation or monitoring actions may be needed.

Hazardous Material Document	When Prepared	Purpose	Typical Limitations	Guidance/Resources	Modifications	Notes
Modified Environmental Site Assessment (MESA)	In support of a technical report for an Environmental Assessment (EA) or Environmental Impact Statement (EIS). At the discretion of the regional Environmental Staff.	Corridor or project-wide assessment of soil and groundwater contamination, asbestos containing materials, and heavy metal-based paint.	Site access is preferred, but may not be provided and property owners may not be available for interviews.	ASTM. E 1527-05 Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process. CDOT Asbestos-Contaminated Soil Management Standard Operating Procedure (August, 2011)	Perform a limited site reconnaissance ("windshield survey"), if site access is not available. Extend the ASTM project minimum search radius 0.25 to 1 mile, at the discretion of the CDOT environmental professional and/or where the project footprint is uncertain. Include a general project description including the project footprint and any right-of-way to be acquired. Include a brief description of the environmental setting, such as topography, geology, and groundwater hydrology including estimated depth to groundwater and shallow groundwater flow direction. Include a map that summarizes the important features of the project and locations of sites with recognized environmental conditions and those of concern that may affect the project. Indicate if sites are up or down gradient of the corridor.	

Note – CDOT Environmental reserves the right to designate whether an ISA or a Phase I is prepared.

OTHER ISSUES TO CONSIDER

During site reconnaissance and documentation activities hazardous material investigations for CDOT projects must identify properties adjacent or within project areas for the following items:

- USTs
- Liquid waste
- Above ground storage tanks
- Electrical/transformer equipment
- Cisterns, sumps, drains
- Surface staining
- Suspected methamphetamine lab waste
- Chemical storage facilities
- Structures constructed prior to 1980 – suspect asbestos containing materials
- Painted/preserved materials – lead based paint
- Oil/gas wells/natural gas pipeline
- Exposed/buried landfills
- Miscellaneous storage, dumping, stockpiles, surface trash, debris
- Railroad tracks/railyards
- Vehicle maintenance activities
- Evidence of remediation activities

9.25.3 NEPA Document Sections

The content of the sections on hazardous materials in the Affected Environment and Environmental Consequences chapter is discussed below. Generally, the information in the EA or EIS should be sufficient to compare the scope of potential hazardous waste involvement among the project alternatives and support the determination of a preferred alternative.

In the case of a CatEx, where a full NEPA document is not required, CDOT expects that the appropriate hazardous material information to confirm the presence/absence of hazardous materials be evaluated prior to the final approval of the CatEx.

Affected Environment

The hazardous materials section of the Affected Environment chapter in the NEPA document should be based on the results of the preliminary hazardous materials work and include the following information, at a minimum:

- Text description of work performed during the ISA/MESA
- Summary of reports and databases compiled during the ISA/MESA
- Description of properties that may affect the project due to recognized environmental conditions or other hazardous materials concerns
- Map showing properties of concern
- Table listing properties of concern, including their addresses and the potential issues
- General discussion of asbestos-containing materials and heavy metal–based paint, particularly with respect to structures that must be demolished
- Location and description of any suspected or known methamphetamine laboratories

Environmental Consequences and Mitigation

The discussion of hazardous materials in the Environmental Consequences section should do the following:

- Identify the types and locations of any hazardous materials that may affect the project, using the conclusions of the ISA, site-specific Phase I Environmental Site Assessment, or MESA
- Provide a map that shows the proposed project alignments and the nature and location of known or suspected hazardous materials
- Discuss where, specifically, the hazardous materials are located with respect to project activities that will take place on site
- Note where further investigation of some sites is necessary before the property is acquired
- Discuss the potential for dispersal of hazardous materials through project-related activities
- Note whether any hazardous materials will be used during project construction or operation and, if so, how these will be handled to avoid impacts

Environmental Consequences Chapter of NEPA Document

- Conclusions and recommendations regarding future actions that are needed to mitigate potential public health or worker safety concerns and limit potential agency liability
- Discussion of whether or not any properties affect the decision of proposed action or preferred alternative
- Discussion of hazardous material use associated with project construction or operation

If the ISA, site-specific Phase I Environmental Site Assessment, or MESA identifies one or more sites within the project area that are known or suspected to contain hazardous materials there are several methods to mitigate the impact of the hazardous material on the project. The three primary mitigation methods are: 1) altering the alignment to avoid the contamination, 2) modifying the project construction procedures, or 3) remediating the site to remove the contamination. All of these actions associated with potential hazardous materials sites should be considered during the alternatives screening process.

If hazardous materials are identified in a project area that cannot be avoided (e.g., the project must go through this property), CDOT must coordinate with State Regulators and/or EPA to determine the required mitigation as shown in Figure 9-8.

Figure 9-8 Mitigation Process for CDOT Projects

Impacts and mitigation should be listed in a Summary of Impacts and Mitigation Table at the end of the resource evaluation chapter of the NEPA document. The first six columns of CDOT's Mitigation Tracking Spreadsheet should be used as this summary table (Table 9-2). CDOT's Mitigation Tracking Spreadsheet (Table 9-1) can be retrieved from http://www.coloradodot.info/programs/environmental/resources/forms/CDOT%20Mitigation%20Tracking%20Spreadsheet_June%202012.xlsx/view.

9.26 Cumulative Impacts

Cumulative impacts are defined in Section 1508.7 of (Council on Environmental Quality (CEQ), 40 CFR § 1500 – 1508):

> The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Past, present, and reasonably foreseeable future actions are considered in the analysis to identify:

- Whether the environment has been previously degraded and to what extent
- Whether ongoing activities are causing impacts
- What the trends are for activities and impacts in the area
- Whether the environment will be degraded in the foreseeable future and to what extent

The cumulative impact analysis must take into consideration all of the aspects of the environment affected by the proposed action, as well as the impacts of that action in relation to other past, present, and reasonably foreseeable actions in the vicinity and/or region. Reasonably foreseeable actions are those future activities that have been committed to or that are known proposals, which could take place within the defined planning horizon.

In selecting the cumulative impacts to analyze and discuss, consider scoping direction, and:

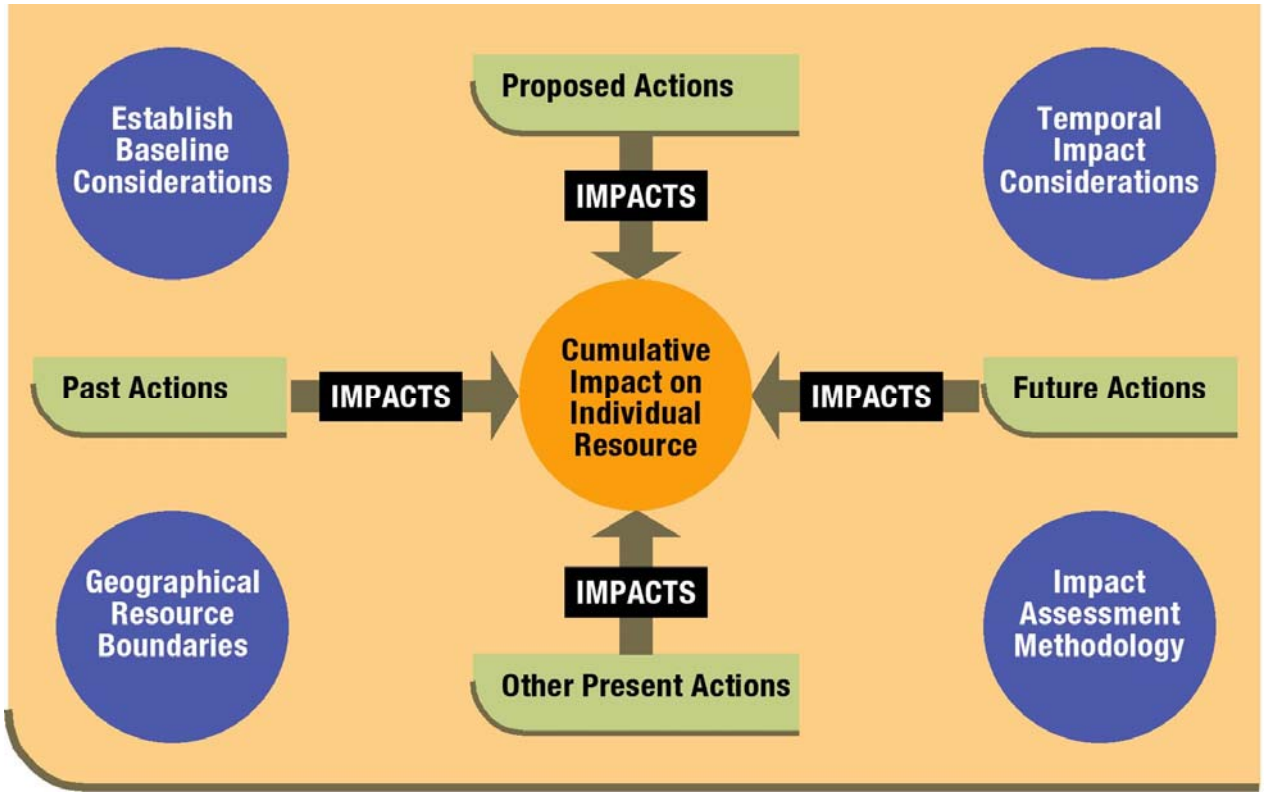
- Whether a resource(s) is important and especially vulnerable to incremental impacts
- If the proposed action is one of several actions within the same resource study area with common impacts
- Whether other proposed activities in the area will have similar impacts
- If these impacts have been historically significant for the resource
- If other environmental or planning analysis in the area has identified a cumulative impact concern

Cumulative Impacts Regulations and Guidance

- CEQ'sNEPA website at http://energy.gov/nepa/council-environmental-quality-ceq
- FHWA Technical Advisory T6640.8a at http://www.environment.fhwa.dot.gov/projdev/impTA6640.asp
- FHWA Secondary and Cumulative Impact Assessment in the Highway Project Development Process at http://www.environment.fhwa.dot.gov/guidebook/content/Secondary_Cumulative_Impact_Assessmt.asp
- Guidance on the Consideration Of Past Actions In Cumulative Effects Analysis at http://energy.gov/nepa/downloads/guidance-consideration-past-actions-cumulative-effects-analysis

Individual resource studies and consultation with federal, state, and local agencies should provide the basis for identifying cumulative impact issues. Previous environmental documents prepared for local and regional plans can provide guidance regarding adopted mitigation that may be applicable to reducing the cumulative impact of a specific proposed highway or off-highway project. Figure 9-9 depicts the process for determining cumulative impacts.

Figure 9-9 Determining Cumulative Impacts



The potential cumulative impacts are described for each resource within a defined cumulative impact analysis area. Generally, these areas are larger for resources that are mobile (e.g., wildlife) compared to resources that are stationary (e.g., historic and archaeological resources). In the cumulative impacts discussion, only substantial impacts to those resources that may be affected need be discussed.

The following components are required for a cumulative analysis:

- Spatial and Temporal Boundaries – In establishing appropriate spatial and temporal boundaries for cumulative impact analysis, the EPA points out that there are no set or required formulas for determining appropriate scope. Decisions must be made on a case-by-case basis depending on the magnitude of the project impacts and the environmental setting. For a given project, decisions are also made on a resource-by-resource basis. Generally, the boundaries for cumulative analysis are broader than the scope of analysis used in assessing direct or indirect impacts. Geographic boundaries should be defined for each resource of concern, and the periods of time considered should include the period in which the proposed action's impacts will persist. The geographic boundaries and periods of time being considered are likely to vary among different resources. The rationales used to establish the spatial and temporal boundaries of the cumulative analysis should be identified in the NEPA document. Some thought must be given to whether the CDOT project is the cause or the effect of cumulative impacts. A larger development may be drawing all the growth, and the CDOT project could just be a response to that growth.
- Past, Present, and Reasonably Foreseeable Future Actions – In identifying past, present, and reasonably foreseeable future actions to be considered, only those actions that incrementally contribute to the cumulative impacts on resources need be addressed. Consideration should be given to current level of degradation, ongoing activities in the area that are causing impacts, and trends for activities and impacts in the area. To be considered "reasonably foreseeable" an action need not be a specific proposal; however, the courts have excluded actions that can be considered purely "speculative." Near-term projects identified in local, state, and federal agency planning documents are usually considered reasonably foreseeable. In general, the description of past, present and reasonably foreseeable projects for a cumulative impact analysis should be inclusive, but does not need to identify every project in the defined spatial and temporal boundaries of the analysis.

The CEQ and EPA have highlighted the importance of cumulative impact analysis and recognized the complexity of delineating the cause-and-effect relationships between the multiple actions and the resources, ecosystems, and human communities of concern. Both CEQ and EPA have issued detailed guidance to assist in formulating cumulative analysis. The latter

EPA's Consideration of Cumulative Impacts in EPA Review of NEPA Documents (1999)

http://www.epa.gov/compliance/resources/policies/nepa/cumulative.pdf

document was prepared to assist EPA staff in evaluating and commenting on EISs; however, it contains substantial information of use to NEPA practitioners.

Cumulative impacts result when the impacts of an action are added to or interact with impacts of other actions that result in a compounded impact from all actions in the same geographic area over time. It is the combination of these impacts, and any resulting environmental degradation on its sustainability, is the focus of the cumulative impact analysis.

While ecological and land use cumulative impacts are of particular importance, other resource areas are considered, including social resources, economic resources, recreation, quality of life or community values, global climate change, and cultural resources. The level of analysis and scope in the cumulative analysis should be commensurate with the potential impacts, resources affected, scale, and other relevant factors associated with the project. These assessments involve determinations that are often complex and, to some degree, subjective.

The two sections below provide guidance on the treatment of cumulative impacts for CDOT's NEPA studies. The first section discusses the process for evaluating cumulative impacts. The second section discusses information on cumulative impacts that should be in each NEPA document.

9.26.1 Cumulative Impact Process

The CDOT project manager, together with the specialists responsible for each environmental resource that is expected to be impacted by the project, is responsible for evaluating cumulative impacts. Typically, the resource specialists who perform resource-specific impact analyses will collaborate, together and with their CDOT counterparts in EPB or the CDOT Regions, in providing information for the cumulative impact analysis.

The collective impacts of the proposed project and all other past, present, and future projects in the cumulative impacts study area regardless of their ownership, sponsorship, or funding source, should be evaluated for each resource. The study area for cumulative impacts is the physical area that bounds the environmental, sociological, economic, or cultural resources of interest for the purpose of cumulative analysis. The practical bounds of this statement are discussed below in this section of this Manual.

Detailed consideration of cumulative impacts should occur after project-specific impacts have been identified for each resource. However, even at the start of project development it should be possible to identify resources in the project vicinity that have been historically impacted by talking with local planning and agency personnel and asking the public at scoping meetings.

Variation in the areas for which resource data are available may also influence the size of the cumulative impacts study area. For example, socioeconomic data may be available for Census blocks, economic data may be available for counties, and wildlife data may be available for game management units—none of which have the same boundaries.

Whenever possible, further impacts on the resources identified should be avoided and/or minimized through project design.

Reasons for Evaluation of Cumulative Impacts Under NEPA

CDOT evaluates cumulative impacts for several reasons:

- Cumulative impact analysis considers total project impacts in combination with the impacts from other past, present, and reasonably foreseeable future actions to provide a measure of overall impacts to environmental resources
- It provides the decision-maker information on the health of an environmental resource due to past, present and reasonably foreseeable future actions
- It is a required analysis in NEPA documents
- To comply with CDOT's environmental stewardship policy, which ensures that the statewide transportation system is constructed and maintained in an environmentally responsible, sustainable, and compliant manner
- To comply with several legal mandates that pertain to cumulative impacts as discussed below

The original wording of NEPA in 1969 does not contain the word "cumulative," but does direct that agencies "recognize the worldwide and long-range character of environmental problems." CEQ's Regulations for Implementing NEPA introduce the consideration of cumulative impacts CEQ, 40 CFR § 1500 – 1508. The concept of cumulative impacts has continued to be developed and refined through subsequent guidance from CEQ and federal agencies.

Evaluation of Cumulative Impacts Under NEPA

Collection of Baseline Information

The main components in the cumulative impact analysis process include:

- Determining temporal and spatial boundaries for the analysis
- Generating a list of planned projects or foreseeable activities for consideration
- Gathering data to supplement the list generated
- Achieving agreements on which resources to count, the baseline data and its sources

The approach for each of these components is further described below:

- Develop temporal (timeframe) and spatial (cumulative impacts study area) boundaries for the cumulative analysis based on all resources of concern and all of the actions that may contribute. Generally, the temporal and spatial boundaries would be based on the period of time that the impacts would persist and the natural boundaries of resources of concern (as opposed to jurisdictional boundaries), for example:
  - The most common temporal scope is from the naturally occurring baseline (as depicted in the affected environment) through the life of the project.
  - The size and shape of the cumulative impacts study area boundaries vary by resource and are larger for resources that are mobile or migrate (e.g., elk populations) compared with stationary resources. Occasionally, spatial boundaries may be contained within the project area or just a portion of the project area.
- Generate a list of past, present, and reasonably foreseeable future actions through informal contacts and a formal meetings with cooperators, local agencies, and other stakeholders.
- Gather data to supplement the list of projects and activities accumulated through telephone calls, website searches, and document reviews. Enough information should be gathered to generally describe the project and impacts that occurred or may potentially occur from the project or activity.

To successfully assess cumulative impacts, the analysis must consider other projects with a broad range of activities and patterns of environmental degradation that are occurring in the vicinity of the project. The following factors are considered in identifying actions that may relate to the project:

- Proximity (either spatially or temporally)
- Probability of an action affecting the same environmental system
- The likelihood a project leads to a range of impacts or other associated activity
- Whether the impacts are similar to the project proposed
- The likelihood a project will occur, and if the project is imminent

Constraints of time, money, and reliable data make detailed consideration of the past unrealistic, although some recognition of the undeveloped natural

state of an area should be provided so that the abundance of predevelopment ecosystems will not be forgotten. In 2005, CEQ issued *Guidance on the Consideration of Past Actions in Cumulative Effects Analysis* (CEQ, 2005), which states in part:

> CEQ interprets NEPA and CEQ's NEPA regulations on cumulative effects as requiring analysis and a concise description of the identifiable present effects of past actions to the extent that they are relevant and useful in analyzing whether the reasonably foreseeable effects of the agency proposal for action and its alternatives may have a continuing, additive and significant relationship to those effects. In determining what information is necessary for a cumulative effects analysis, agencies should use scoping to focus on the extent to which information is "relevant to reasonably foreseeable significant adverse impacts," is "essential to a reasoned choice among alternatives," and can be obtained without exorbitant cost.

Evaluation of Baseline Information

To evaluate the cumulative impact information collected, the following should be done:

- Characterize each resource within the project cumulative impacts study area by obtaining data on past trends in the state of the resource and its current state. This information should be documented in the Affected Environment chapter of the NEPA document.
- Locate the projects identified on a map to enable easy comparison for each resource. It may be possible to combine several resources, such as vegetation and fish and wildlife, on a single map.
- Evaluate only the effects of resources that are expected to receive impacts under one or more of the project alternatives.
- Assess the magnitude and importance of cumulative impacts by comparing the environment in its naturally occurring state with the expected impacts of the project alternatives and other actions in the same geographic area. Base magnitude on the extent of difference between the naturally occurring environment and the anticipated condition. Base importance on whether the long-term sustainability of a resource or social system would be affected.
- Describe any cumulative impacts in somewhat general terms. Note any cumulative benefits, as well as detriments, in the analysis.

- Note the relative importance of this impact to the overall resource as it currently exists and in relation to historic trends.
- Describe the degree to which impacts from the proposed transportation project will contribute to the cumulative impacts for this resource.

OTHER ISSUES TO CONSIDER

When considering the appropriateness of evaluating a project as a CatEx, it should be remembered that a CatEx should only be used for projects that do "not individually or cumulatively have a significant effect on the human environment (Sec. 1508.4) and . . . [that] are therefore exempt from requirements to prepare an environmental impact statement." (CEQ, 40 CFR § 1500 – 1508).

9.26.2 NEPA Document Sections

The description of cumulative impacts in the NEPA document should provide a brief summary of cumulative impacts

This section would include the temporal and spatial boundaries used, the baseline condition used (typically documented in the affected environment section), and any additional factors considered, such as:

- Federal, nonfederal, and private actions
- Potential for synergistic impacts or synergistic interaction among or between impacts
- Potential for impacts to cross political and administrative boundaries
- Other spatial and temporal characteristics of each affected resource
- Comparative scale of cumulative impacts across alternatives
- Discuss the past, present, and reasonably foreseeable future actions considered in the analysis and how the list of actions was developed (note any public meetings, agency meetings, etc.)
- Discuss cumulative impacts identified through the analysis by resource
- Conclude the discussion with project-specific text that states: When combined with other past, present, and reasonably foreseeable future actions, the preferred alternative (or build alternatives) are (or are not) expected to negatively (or beneficially) impact the resource.

If some of the impacts would occur only during construction and be temporary while others would be more permanent and last throughout the project's

operation, mention this. Also note which cumulative impacts are direct and which are indirect. Tables may provide a useful way to present cumulative impacts if a project is complex.

Global climate change must also be addressed in the cumulative impact analysis section of the NEPA document.

The CEQ issued draft guidelines in 1997 on how global climate change should be addressed in NEPA documents. The CEQ guidance calls on federal agencies to consider how major federal actions could affect sources and sinks of greenhouse gases and how climate change could potentially influence such actions. The CEQ bases its guidance on the NEPA regulations which mandate that all "reasonably foreseeable" environmental impacts of the proposed action be considered.

FHWA has standard language for global climate change that should be incorporated in the cumulative impacts section of CDOT NEPA documents. This language is provided as Appendix F of this Manual.

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ATTACHMENT A: WATER QUALITY TEMPLATE AND WATER QUALITY MODEL PROGRAM DECISION TREE

Attachment A

Water Quality Template

This document should serve as an outline to your water quality technical report. The main bullet points should all be included. Some sub-bullets include prompts for information which may or may not apply to your project. Text in blue should be inserted verbatim. Various options are provided to fit your project. Please be sure to check with a water quality specialist for assistance.

1. Introduction
    a. Where is the project located?
    b. What is the purpose and need for the project?
    c. What are the alternatives? What is the Preferred Alternative?
    d. The following analysis was conducted in compliance with the Clean Water Act and the Colorado Department of Public Health and Environment's Total Maximum Daily Loads database was consulted. Additionally, all Municipal Separate Storm Sewer System and New Development and Redevelopment guidelines were followed. OR The following analysis was conducted in compliance with the Clean Water Act and the Colorado Department of Public Health and Environment's Total Maximum Daily Loads database was consulted. This project is outside any designated Municipal Separate Storm Sewer System areas.
2. What is the receiving water body of interest?
    a. What is its name and is it a river, creek, lake, etc?
    b. Is it a sensitive water body and if so, what is its 303(d) list of impaired waters status or the 305(b) list status?[1]
3. Issues
    a. What are the potential construction phase issues? Sedimentation? Pollutant runoff?
    b. What are the post-construction phase (long-term operations) issues? Sedimentation? Pollutant runoff? Increased impervious surface?
4. Method
    a. Based on CDOT's Water Quality Model Program Decision Tree and Evaluation Handbook and the pollutant criteria, the (insert name) model was chosen to determine potential impact to the (insert name of water body/bodies). OR Based on CDOT's Water Quality Model Program Decision Tree and Evaluation Handbook it was determined that no modeling was necessary for this project.
    b. How did you collect your data? Checked 303(d) list of impaired waters database? Sampling and analysis procedures?
    c. When did you collect this data?
5. Context Summary
    a. What is the water body's listed beneficial use(s)?[2]
    b. Are there constituents/impairments present? If so, what types and at what levels or Total Maximum Daily Loads?
6. Impact Summary
    a. Insert one of the following as appropriate to address permanent impacts.

        - No water bodies are present in the project area and no runoff from the project will reach a water body. (Note: this is unlikely)
        - Water quality in (water body) will not be impacted.
        - Water quality in (water body) will not be impacted due to project modifications.
        - Water quality in (water body) will benefit from this project.
        - Water quality in (water body) will be negatively affected but will not be mitigated.
        - Water quality in (water body) will be negatively affected but will be mitigated.
    b. Insert one of the following as appropriate to address temporary construction impacts.
        - Temporary impacts during construction include working within (water body) to install structures. (Add details as necessary.)
        - Temporary impacts during construction include working adjacent to and runoff potentially reaching (water body).
        - Temporary impacts during construction include working within and adjacent to (water body).
    c. Add text to explain how water quality in the water body will be affected.
7. Mitigation Strategies
    a. The following are preliminary strategies for mitigation of impacts and are subject to change. Final mitigation measures will be defined in the NEPA Decision Document.
    b. What efforts have been/will be made to avoid the impact?
    c. What efforts have been/will be made to minimize the impact (i.e. design modifications)?
    d. What efforts will be made to mitigate the impact during construction?
    e. What efforts will be made to mitigate the impact after construction (long-term operations)?
8. What agencies did you consult with for this project?
9. What departments within CDOT did you consult with for this project (i.e. Region water quality staff, EPB water quality staff, maintenance, etc.)
10. Permits
    a. What permits will be needed for this project (401, Stormwater Construction Permit, dewatering, etc.)?
    b. When will those permits be obtained?
    c. Who will obtain the permits?

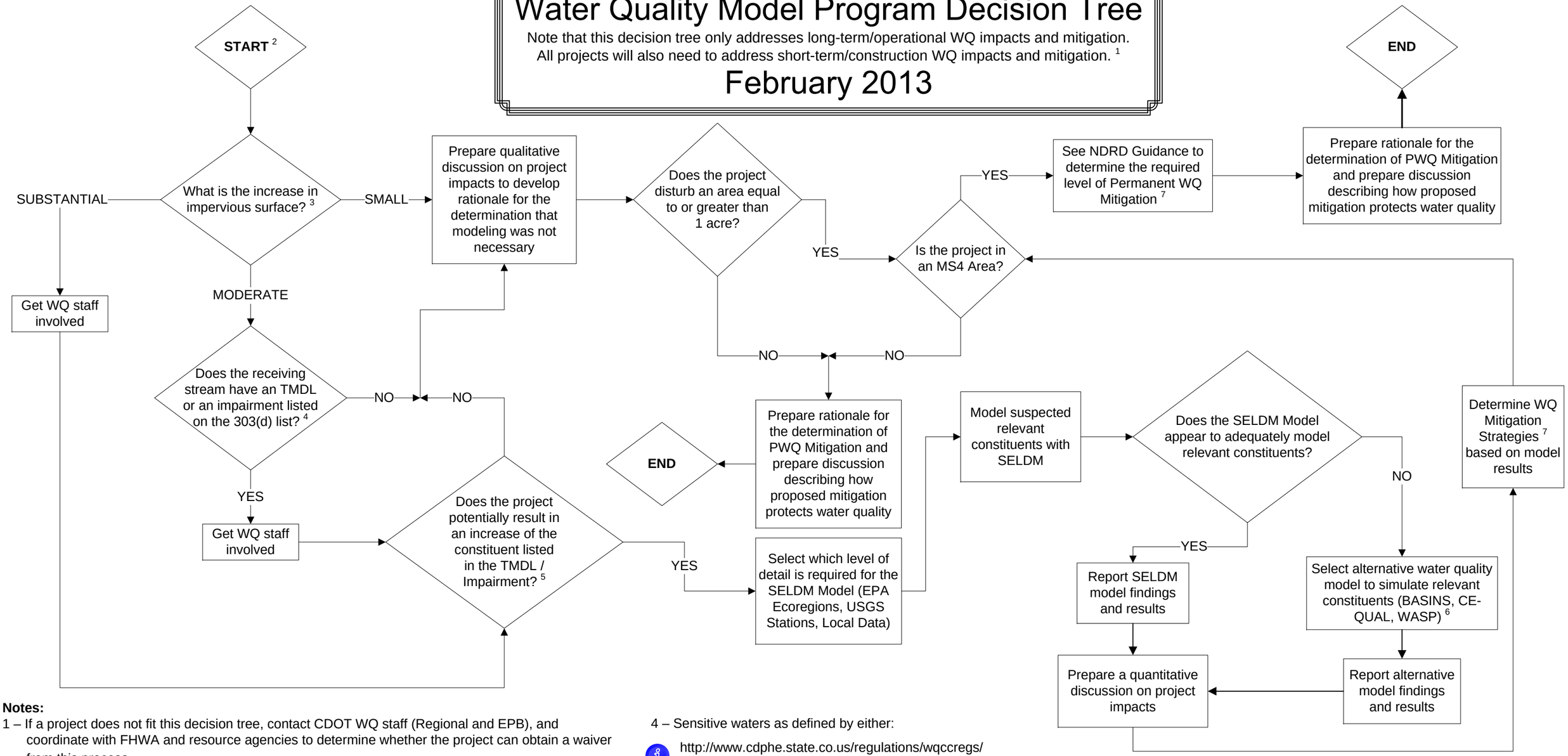
1 –For Colorado's Section 303(d) List of Impaired Waters and Monitoring and Evaluation List go to http://www.cdphe.state.co.us/regulations/wqccregs/index.html. Follow the Regulation 93 link for the most current list.

2 – For CDPHE Current Effective Standards go to http://www.cdphe.state.co.us/op/wqcc/Standards/RegsCurrent/RegsCurrent.html.

Water Quality Model Program Decision Tree

Note that this decision tree only addresses long-term/operational WQ impacts and mitigation.
All projects will also need to address short-term/construction WQ impacts and mitigation. [1]

February 2013



Notes:

1 – If a project does not fit this decision tree, contact CDOT WQ staff (Regional and EPB), and coordinate with FHWA and resource agencies to determine whether the project can obtain a waiver from this process.

2 – If a project is a bridge project, FHWA strongly recommends that all drainage from bridges be conveyed to the ends of the bridge and is mitigated before being discharged.

3 – An "increase in impervious surface" is split into three categories*:
- a) Small** – less than a 1 acre increase in impervious area.
- b) Moderate – an increase of impervious area between 1 and 10 acres.
- c) Substantial – greater than 10 acres of increase in impervious area.

*Based on preliminary data and best professional judgment, the numbers defined above for the three categories will be changed as more data is gathered and analyzed.
**Activities that are listed as excluded from NDRD permanent water quality BMP requirements per CDOT's MS4 permit, as of 12/31/2011 shall automatically be placed in the Small category.

4 – Sensitive waters as defined by either:

http://www.cdphe.state.co.us/regulations/wqccregs/100293wqlimitedsegtmdlsnew.pdf
or
http://www.cdphe.state.co.us/wq/assessment/TMDL/TMDLs.html

5 – If sufficient WQ commitments are included within the NEPA document, so that the project will not exacerbate WQ impairment, then the answer to this decision point is "No," and subsequent decisions follow the "No" path.

6 – Refer to the Technical Report

7 – WQ Mitigation includes: BMPs, PWQ, or any other approved type of mitigation

Definitions:

BASINS –	Better Assessment Science Integrating Point & Non-Point Sources
BMP –	Best Management Practice
EPA –	Environmental Protection Agency
MS4 –	Municipal Separate Storm Sewer System
PWQ –	Permanent Water Quality Structure
SELDM –	Stochastic Empirical Loading and Dilution Model
TMDL –	Total Maximum Daily Limit
USGS –	United States Geological Survey
WASP –	Water Quality Analysis Simulation Program
WQ –	Water Quality

ATTACHMENT B: ENVIRONMENTAL JUSTICE CENSUS 2010 DIRECTIONS

COLLECTION OF BASELINE DATA

Demographic information regarding a specific geographic area, such as race, income, and household size, can be obtained from the US Census American Fact Finder website: http://factfinder2.census.gov.

INSTRUCTIONS FOR COLLECTION & EVALUATION OF BASELINE INFORMATION

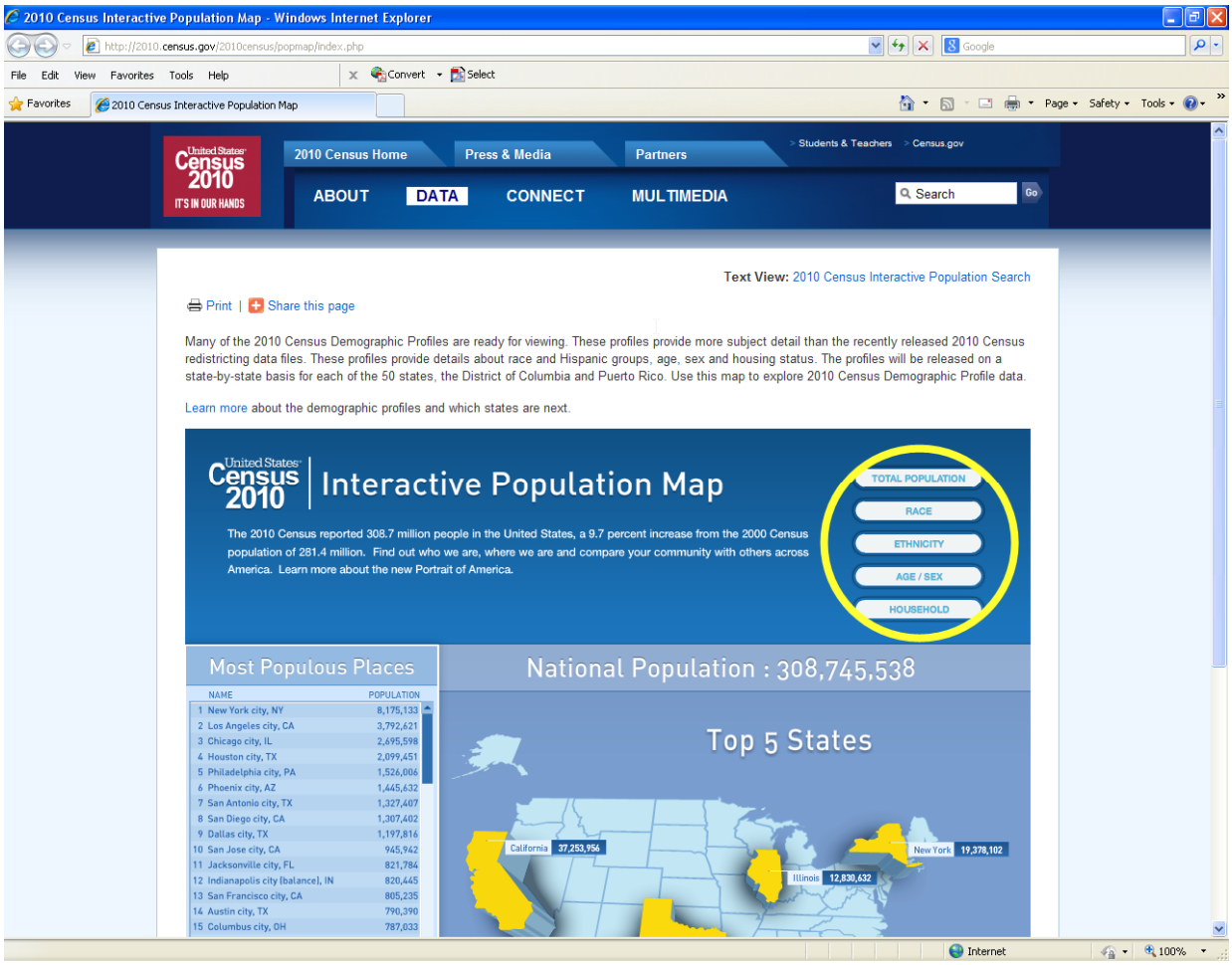
CDOT HEADQUARTERS AT 4201 E. ARKANSAS AVE., DENVER, CO 80222 WILL BE USED AS THE GEOGRAPHIC AREA LIKELY TO BE AFFECTED BY THE PROJECT AS AN EXAMPLE FOR THE PURPOSE OF THIS GUIDE.

DEFINE COMMUNITY STUDY AREA

CENSUS tracts and block groups within a particular geographic area can be identified using the US Census Interactive Population Map website.

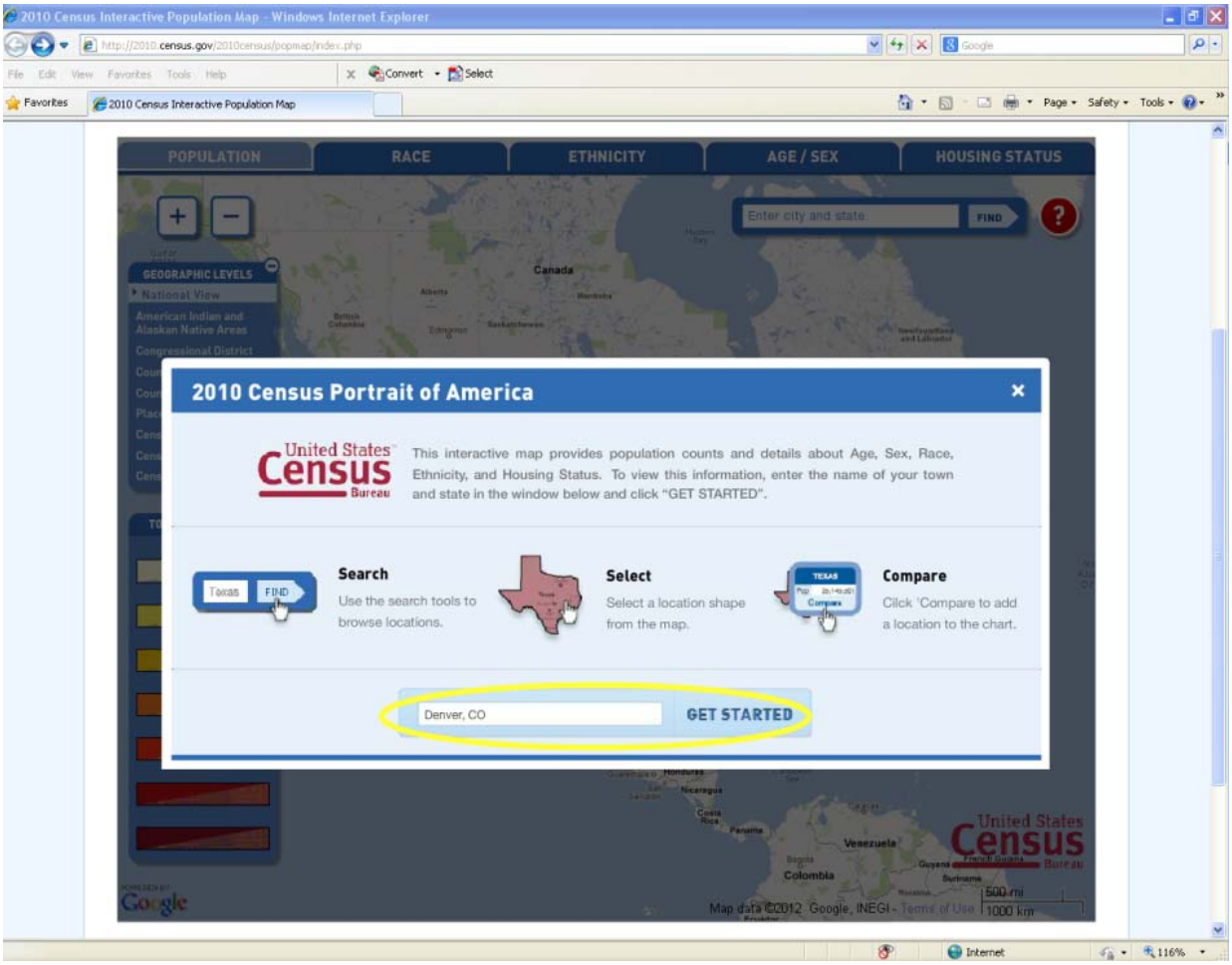
STEP 1- Go to the US Census Bureau Interactive Population Map website http://www.census.gov/2010census/popmap/

STEP 2- To define the census tracts and block groups within a particular geographic area, choose the Total Population, Race, Ethnicity, Age/Sex, or Household button to get started.



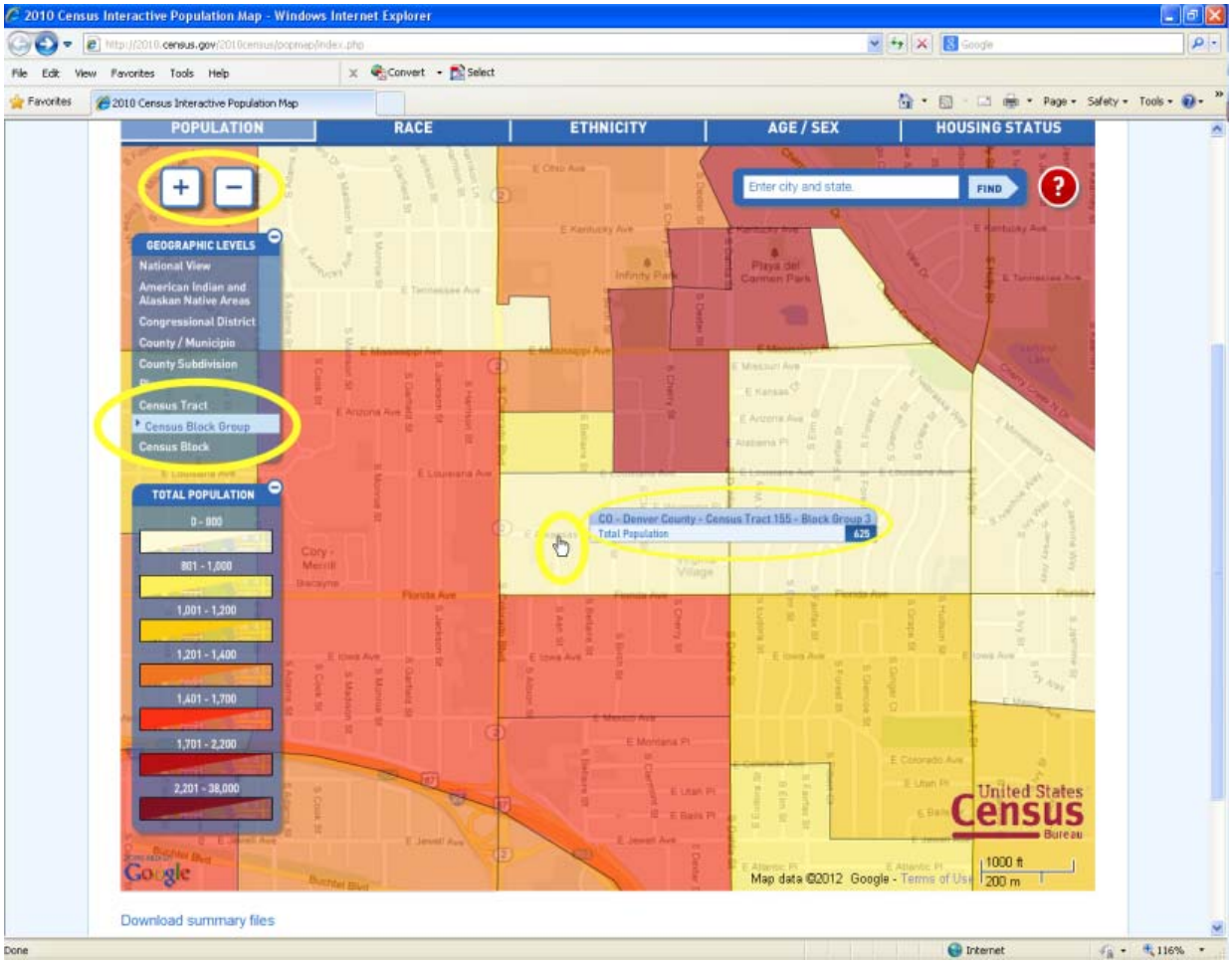
STEP 3- In the pop-up box, type the *City* and *State* where the project is located and click the **Get Started** button.

(EX: DENVER, CO)



STEP 4- Click Census Block Group on the left-hand side of the screen under the Geographic Levels menu, which will display both the census tract and census block group. (However, any of the categories can be clicked to see that information within a particular geographic area.)

- Zoom in to your project area by clicking the + button on the left-hand side of the screen and navigate to your project area by single-clicking the left mouse button and dragging the map in the direction you want to move it. Scroll the mouse over your project area to identify the census tracts/census block groups.*(EX. CENSUS TRACT 155, BLOCK GROUP 3)*



DEFINE GEOGRAPHY (COMMUNITY STUDY AREA) FOR DATA ANALYSIS

STEP 1- Go to the US Census American Fact Finder website: http://factfinder2.census.gov. Select **Get Data** - Decennial Census.

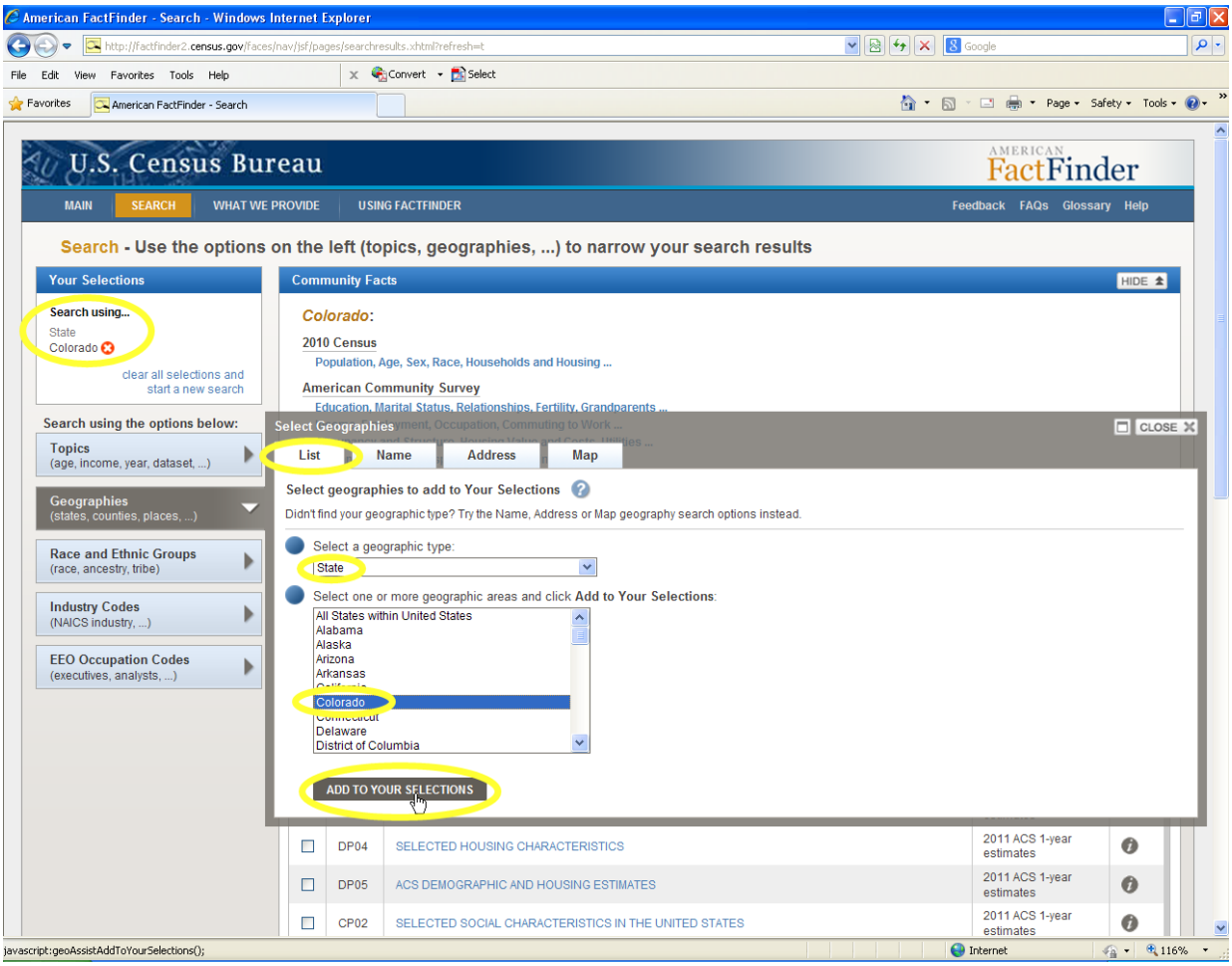
STEP 2- Click the **Geographies** option on the left-hand side of the screen.

- Once **Geographies** is selected, you will see the following tab options: **List**, **Name**, **Address**, **Map**.

STEP 3- Select the **List** tab.

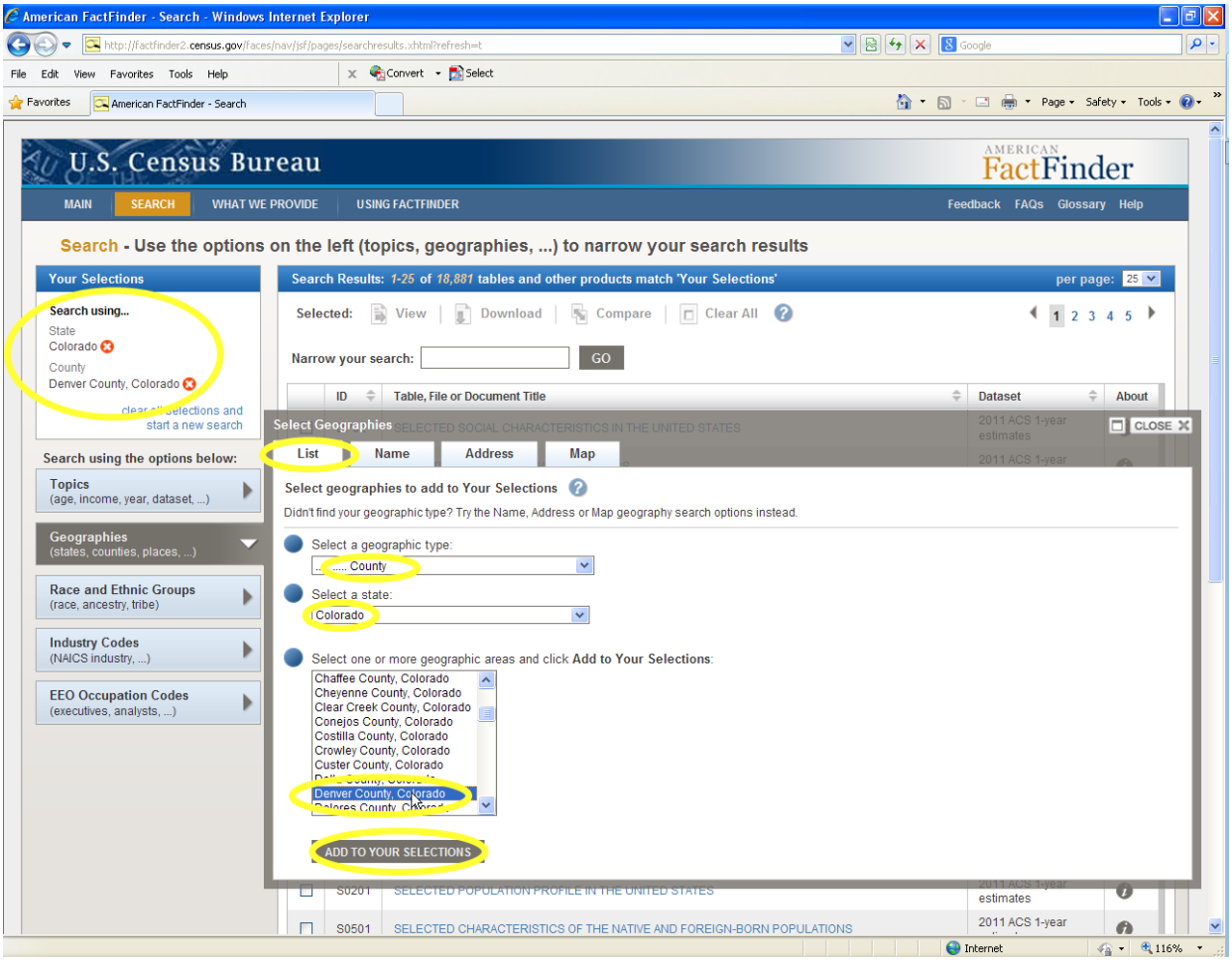
STEP 4- Select **State** from the **Select a geographic type** drop down menu.

- Select **Colorado** from the **Select a geographic area** drop down menu.
- Click the **Add To Your Selections** button. You will see the selection you made appear in the **Your Selections** box on the upper left-hand side of the screen.



STEP 5- Select **County** from the **Select a geographic type** drop down menu.

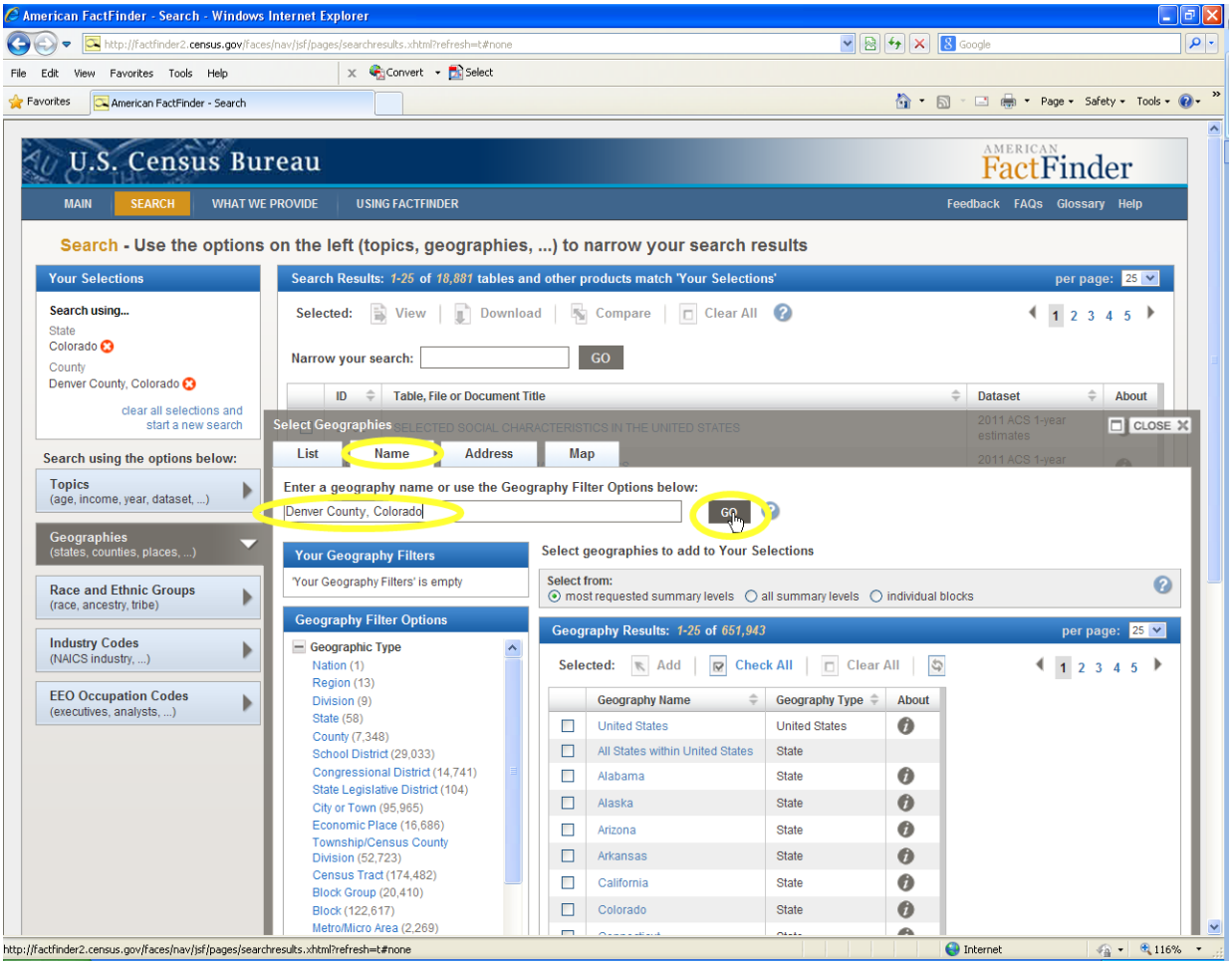
- Select **Colorado** from the **Select a state** drop down menu.
- Select the appropriate county under the **Select one or more geographic areas** drop down menu. You may select multiple counties by holding down the CTRL key and clicking the counties. *(EX. DENVER COUNTY, COLORADO)*
- Click the **Add to Your Selections** button. You will see the selections you made appear in the **Your Selections** box on the upper left-hand side of the screen.



STEP 6- Select the Name tab.

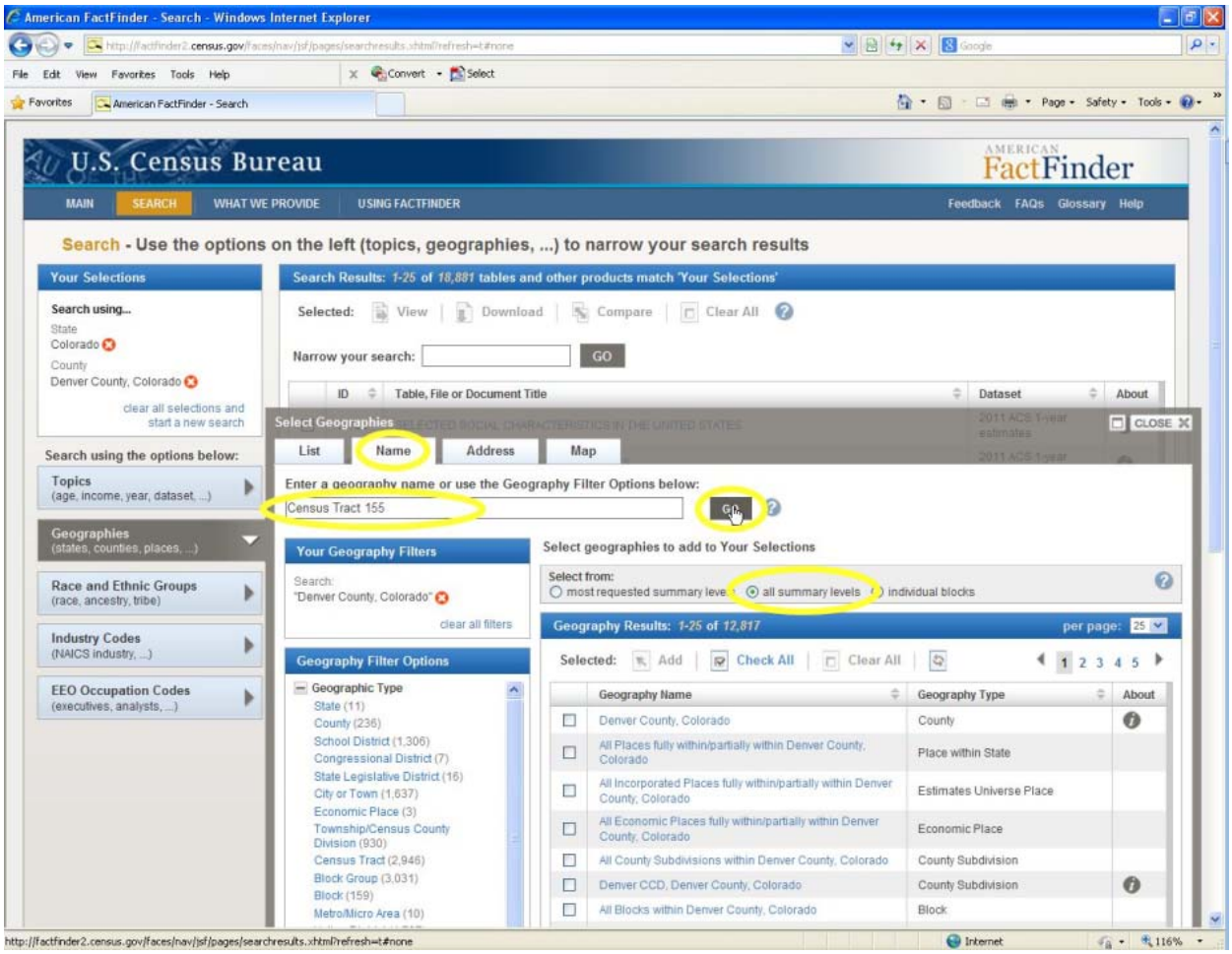
STEP 7- Type the appropriate *County* Name in the Enter a geography name box for a particular geographic area. *(EX. "DENVER COUNTY, COLORADO")*

- Click Go



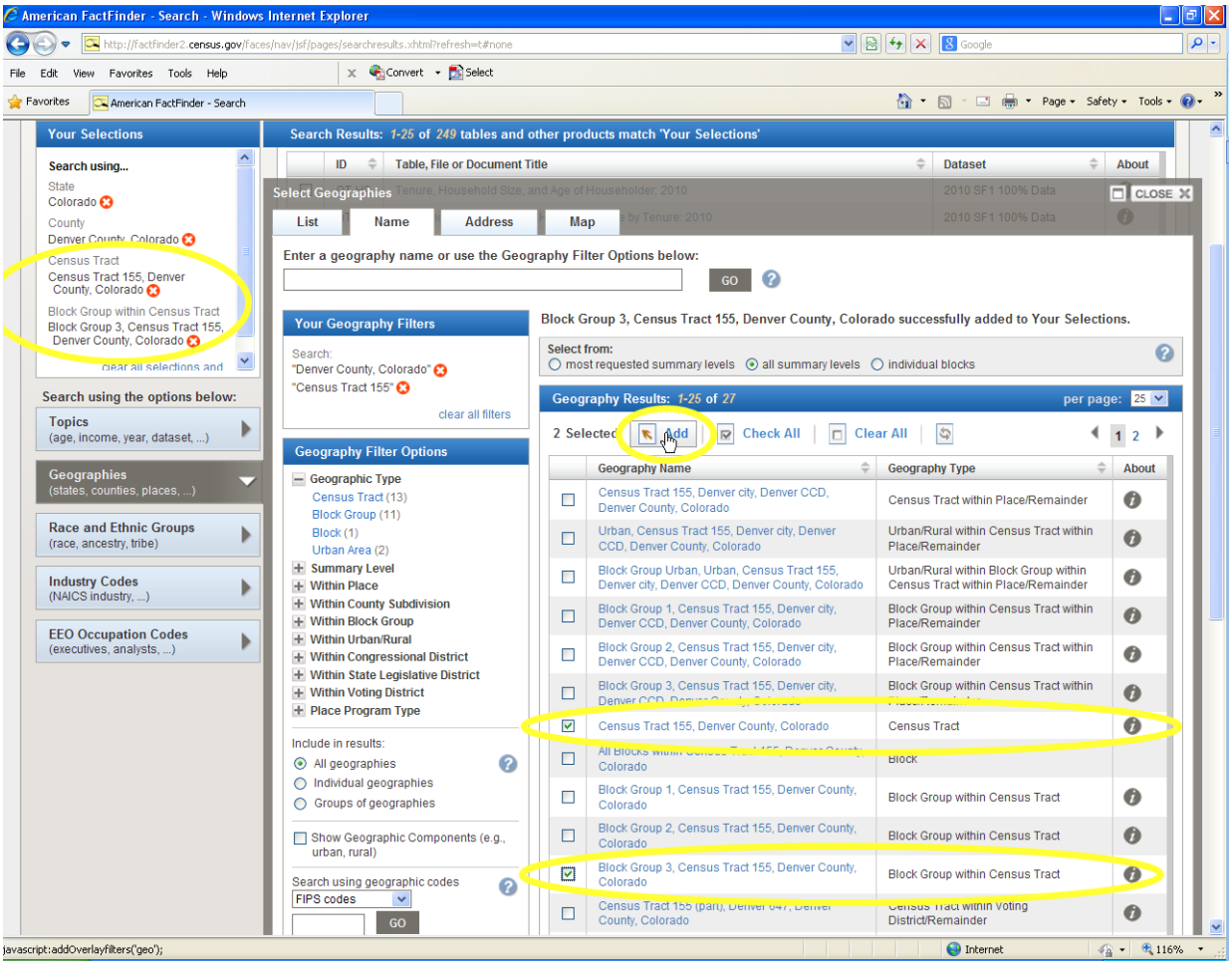
STEP 8- Type *Census Tract #* identified earlier in STEP 4 in the **Enter a geography name** box. *(EX. "CENSUS TRACT 155")*

- Make sure that the **all summary levels** option is selected in the **Select from** box.
- Click **Go**



STEP 9- Select the boxes next to the appropriate **Census Tract** and **Block Group within Census Tract** rows (under Geography Type) from the **Geography Results** shown. *(EX. CENSUS TRACT 155, DENVER COUNTY, COLORADO AND BLOCK GROUP 3, CENSUS TRACT 155, DENVER COUNTY COLORADO)*

- Click the **Add** button. You will see the selections you made appear in the **Your Selections** box on the upper left-hand side of the screen.



- After selections are added, click the **Close** button on the **Select Geographies** box to close out of the Geography results.
- Repeat STEPS 1 - 9 if project is within multiple counties

DEFINE DEMOGRAPHICS

The first step to identify minority populations is to calculate the percent minority populations for the state, the county/counties, and the census tracts or census block groups within the community study area.

To obtain specific information on population, race, and ethnicity:

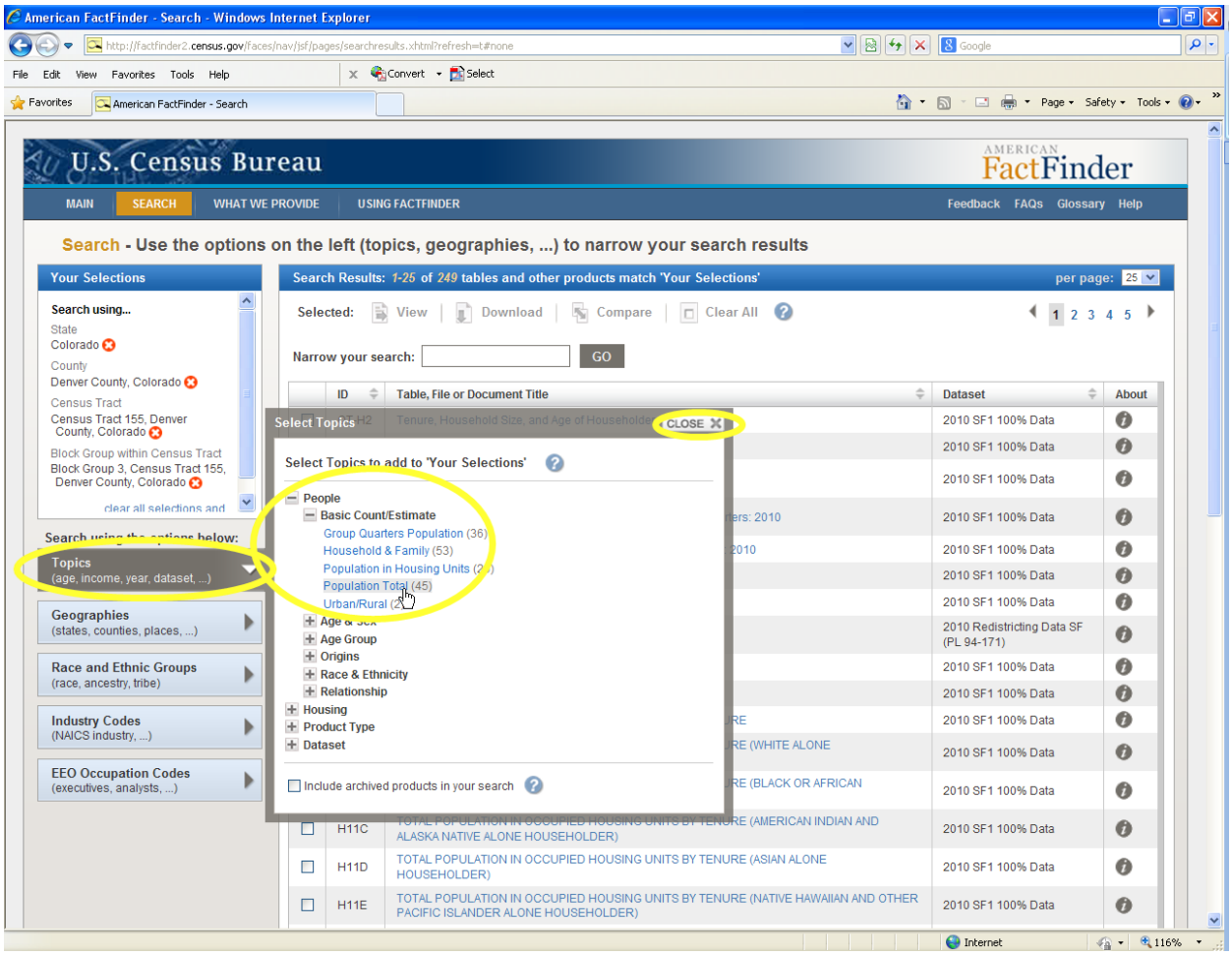
IDENTIFY TOTAL POPULATION

STEP 1- Click the **Topics** option on the left-hand side of the screen. You will see the following topic options: **People**, **Housing**, **Product Type**, **Dataset**.

- Expand the **People** option
  - Expand the **Basic Count/Estimate** subcategory

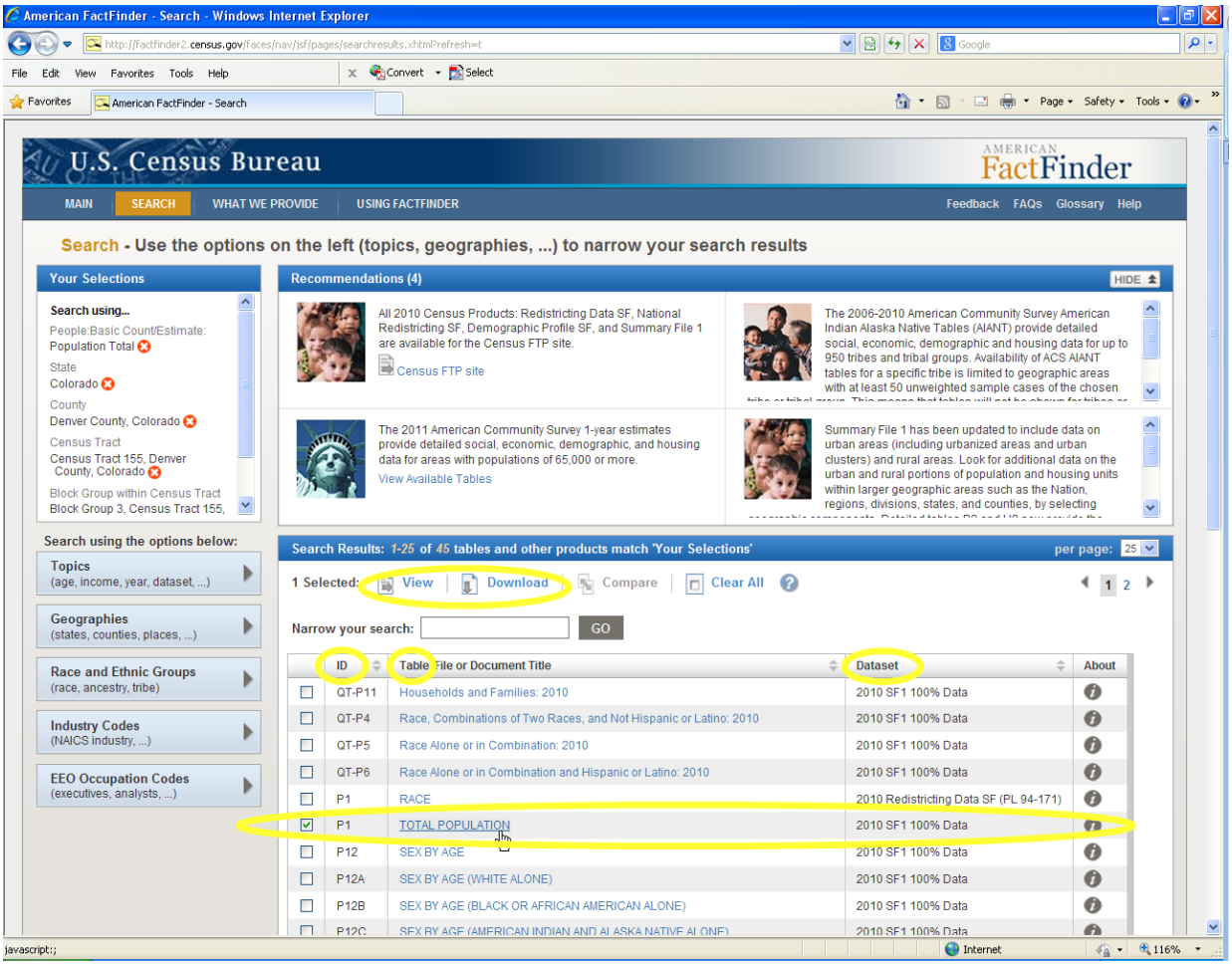
- Click the **Population Total** option

- Click the **Close** button on the **Select Topics** box to view the Search Results. You will see the selections you made appear in the **Your Selections** box on the upper left-hand side of the screen.

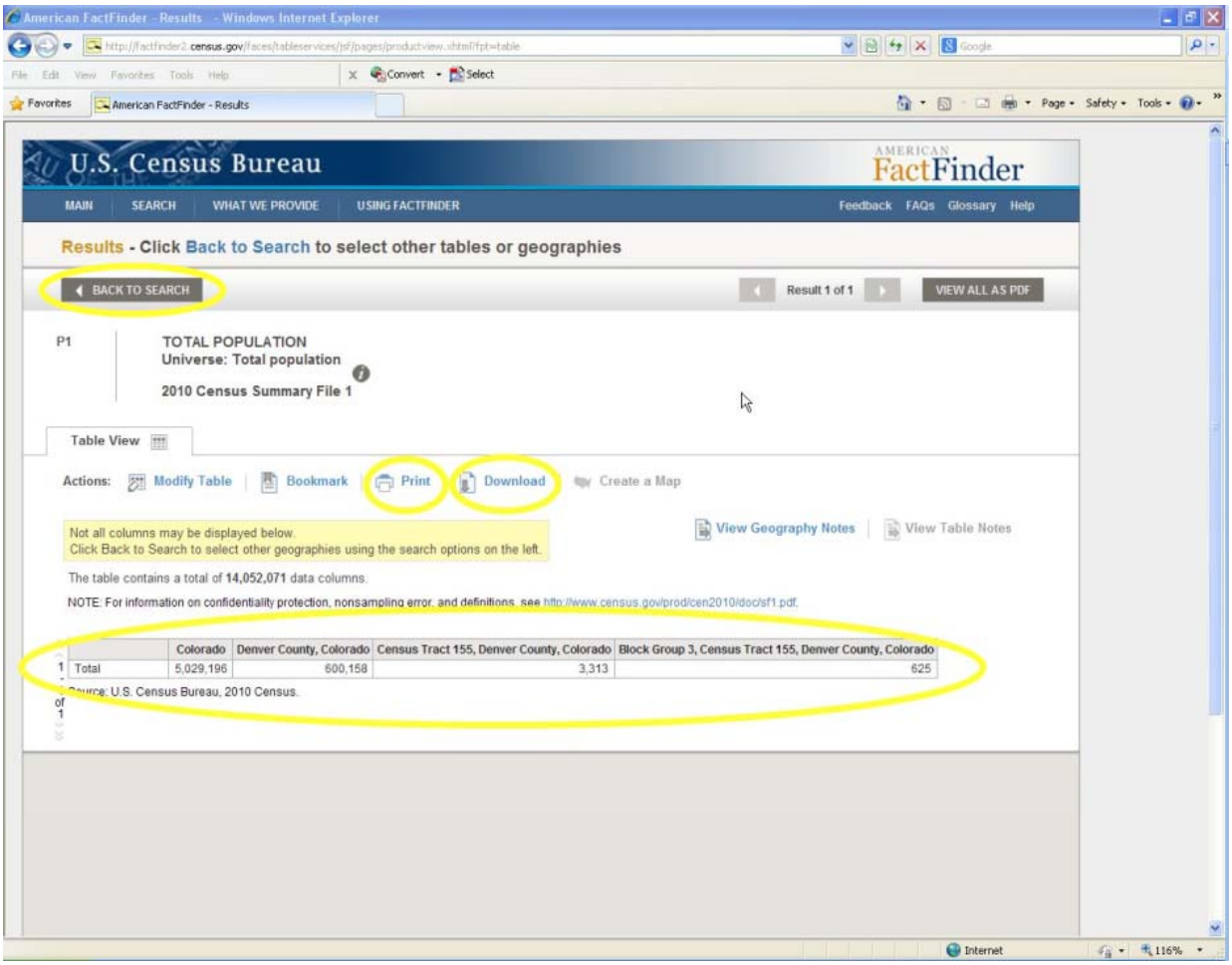


STEP 2- Select the appropriate **ID: Table** for total population figures.

- Select the **P1: Total Population** row from your search results. You can also type the appropriate **ID: Table** in the **Narrow your search box** to find the table. Be sure to select the most recent dataset for the tables (2010 SF1 100% Data at present).



- To view the results click View or Download. The results can be printed or downloaded and formatted into PDF or Excel. Once it is confirmed that the dataset is correct the information should be downloaded and included in the project file. (*EX. TABLE SHOWN BELOW FOR CDOT OFFICE GEOGRAPHICAL LOCATION*)



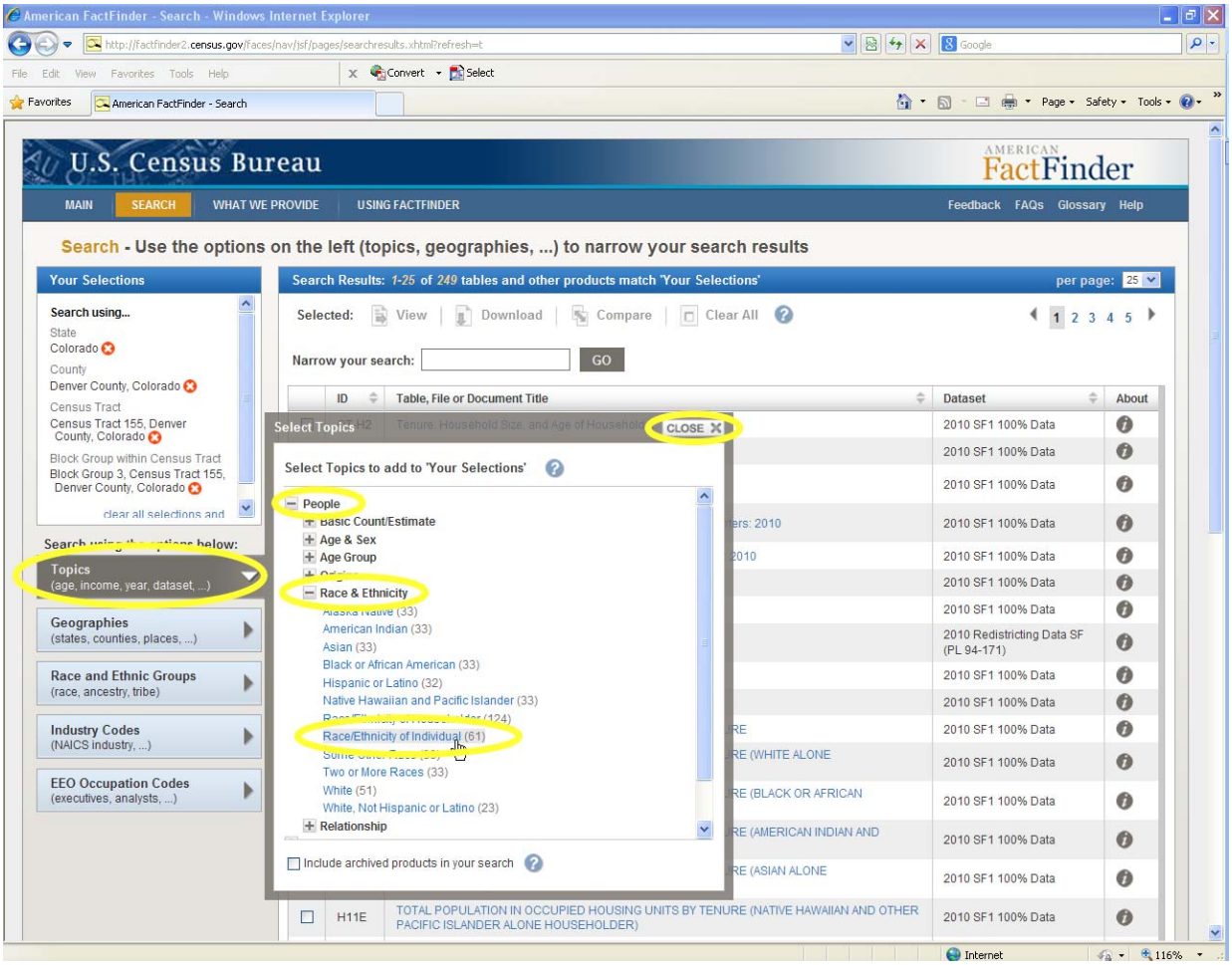
- After the data has been viewed and/or downloaded, click the **Back to Search** button at the top left corner of the screen.

  Delete the **Population Total** category by clicking the small red x from the **Your Selections** box on the upper left-hand side of the screen before proceeding.

IDENTIFY RACE/ETHNICITY

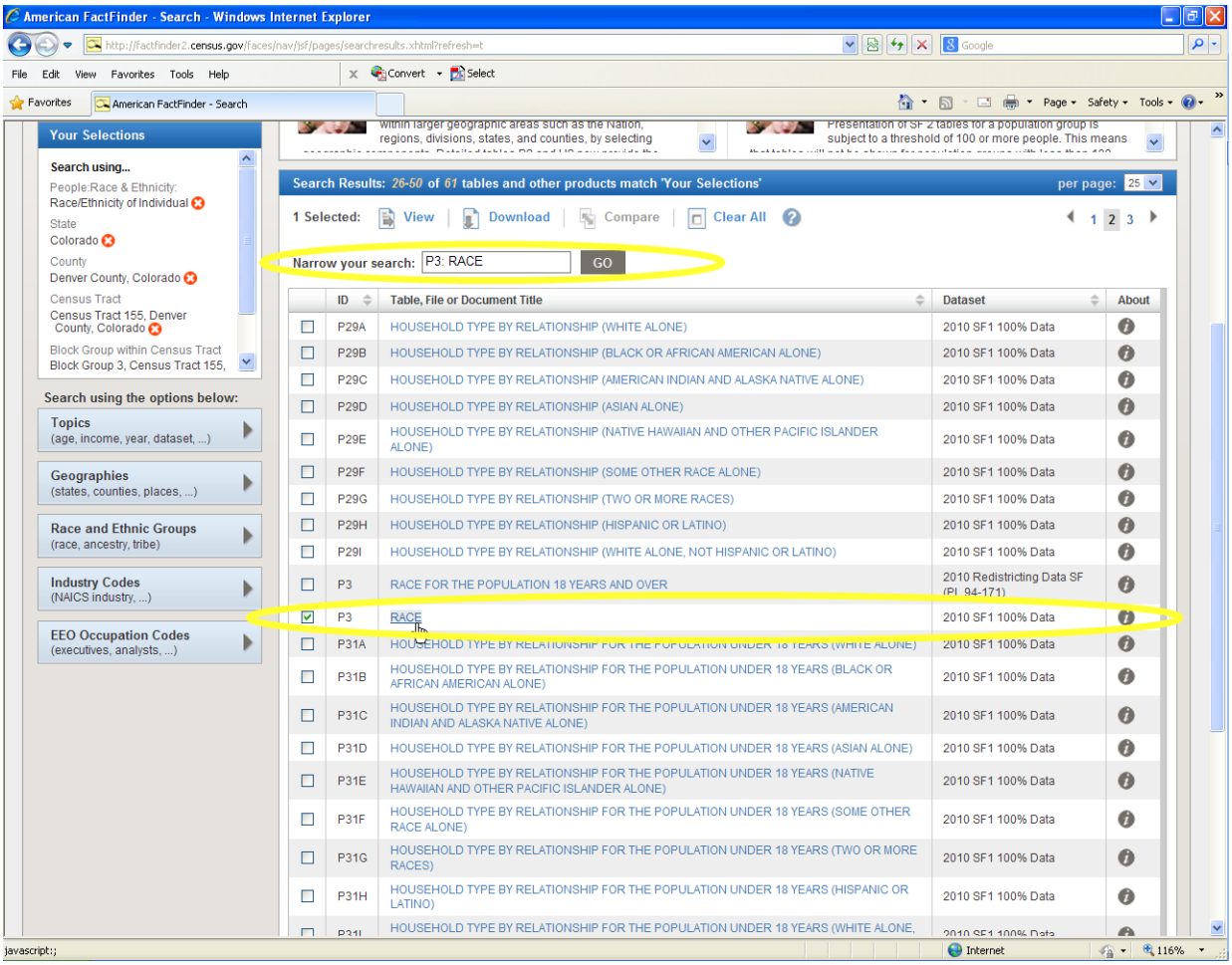
STEP 1- Click the **Topics** option on the left-hand side of the screen. You will see the following topic options: **People**, **Housing**, **Product Type**, **Program**, **Dataset**.

- Expand the **People** option
  - Expand the **Race & Ethnicity** subcategory
    - Click the **Race/Ethnicity of Individual** option.
- Click the **Close** button on the **Select Topics** box to view the Search Results. You will see the selections you made appear in the **Your Selections** box on the upper left-hand side of the screen.

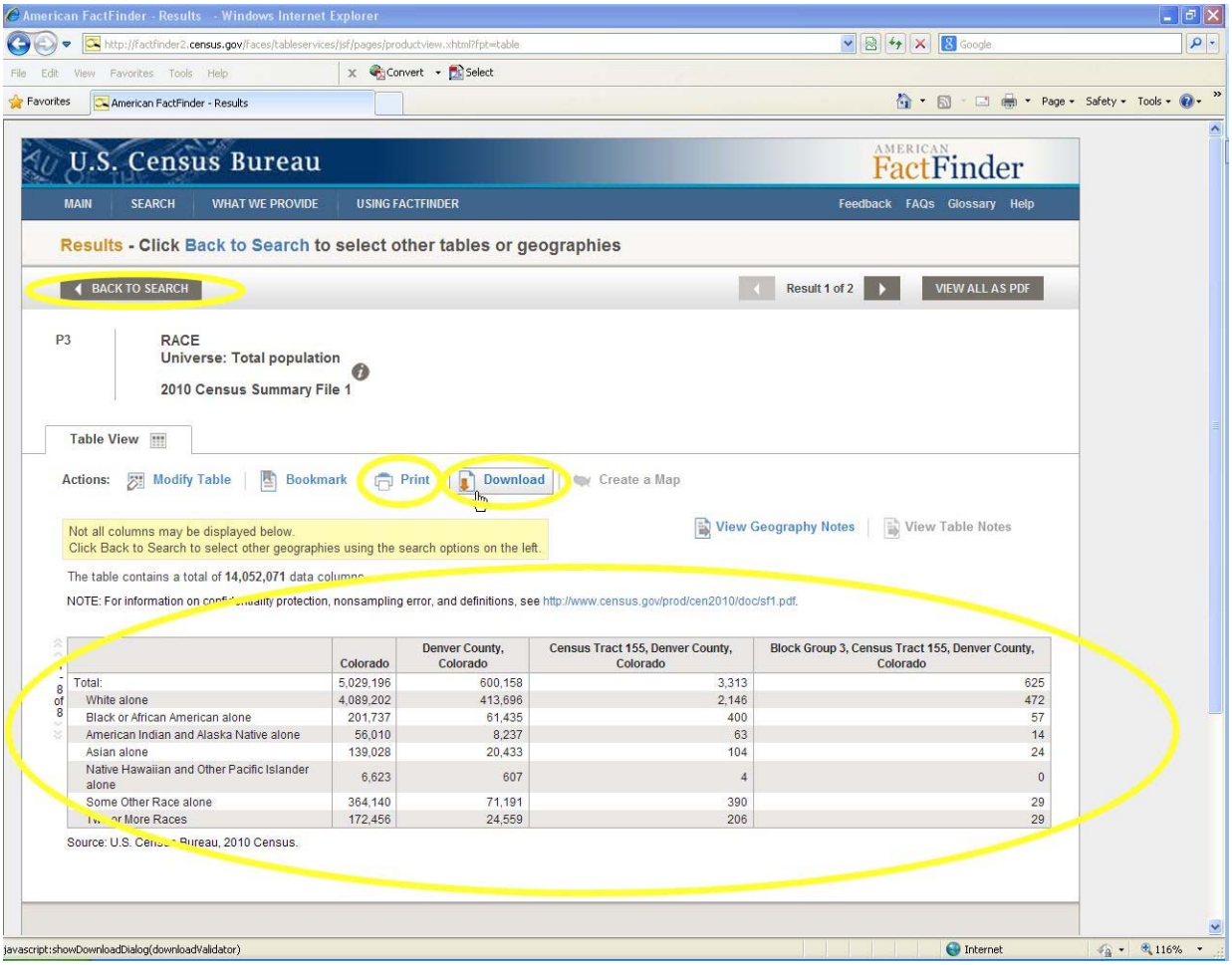


STEP 2- Select the appropriate ID: Table for race figures.

- Select the P3: Race row from your search results. You can also type the appropriate ID: Table in the Narrow your search box to find the table. Be sure to select the most recent datatset for the tables (2010 SF1 100% Data).

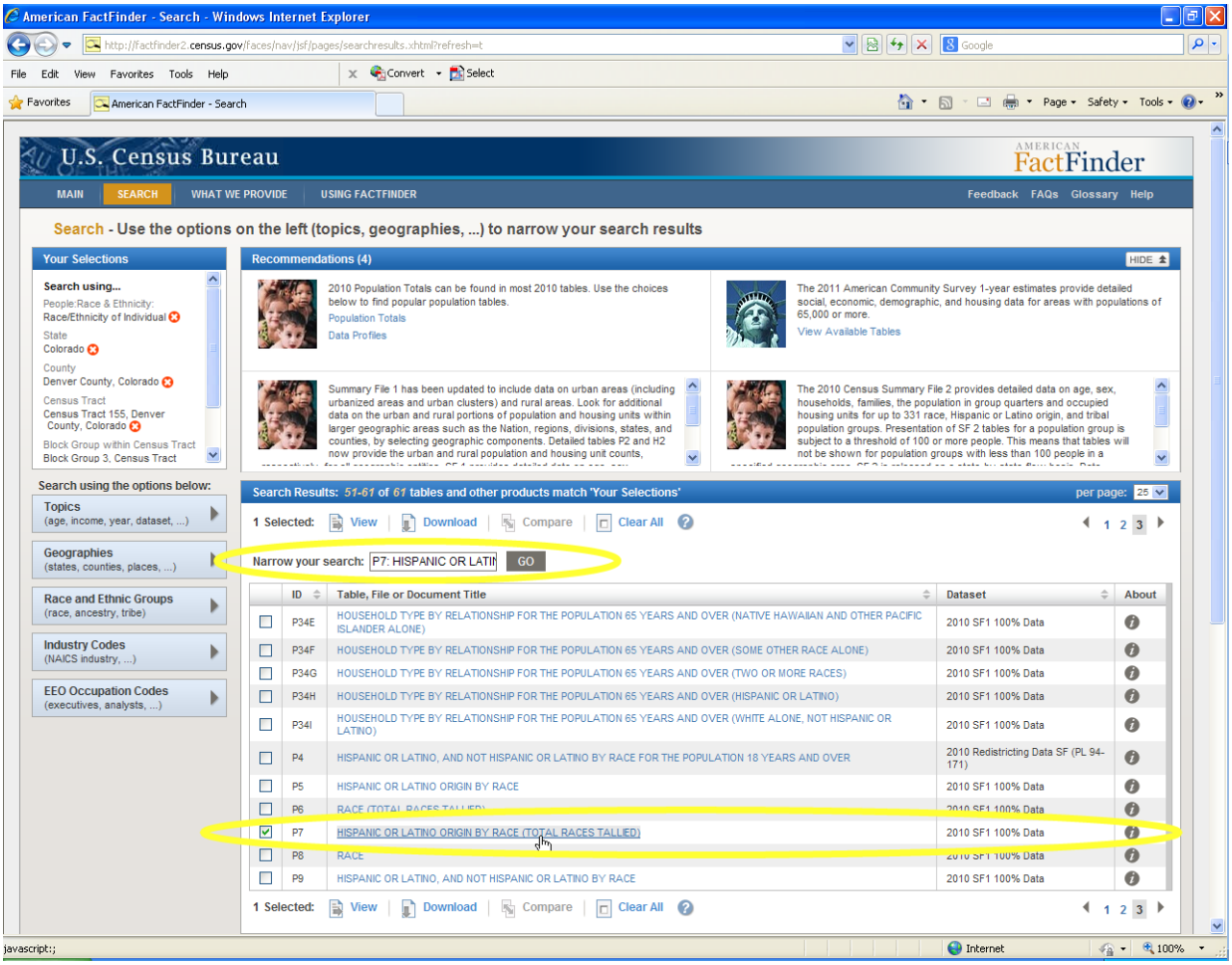


- To view the results click **View** or **Download**. The results can be printed or downloaded and formatted into PDF or Excel. Once it is confirmed that the dataset is correct the information should be downloaded and included in the project file. (*EX. TABLE SHOWN BELOW FOR CDOT OFFICE GEOGRAPHICAL LOCATION*)

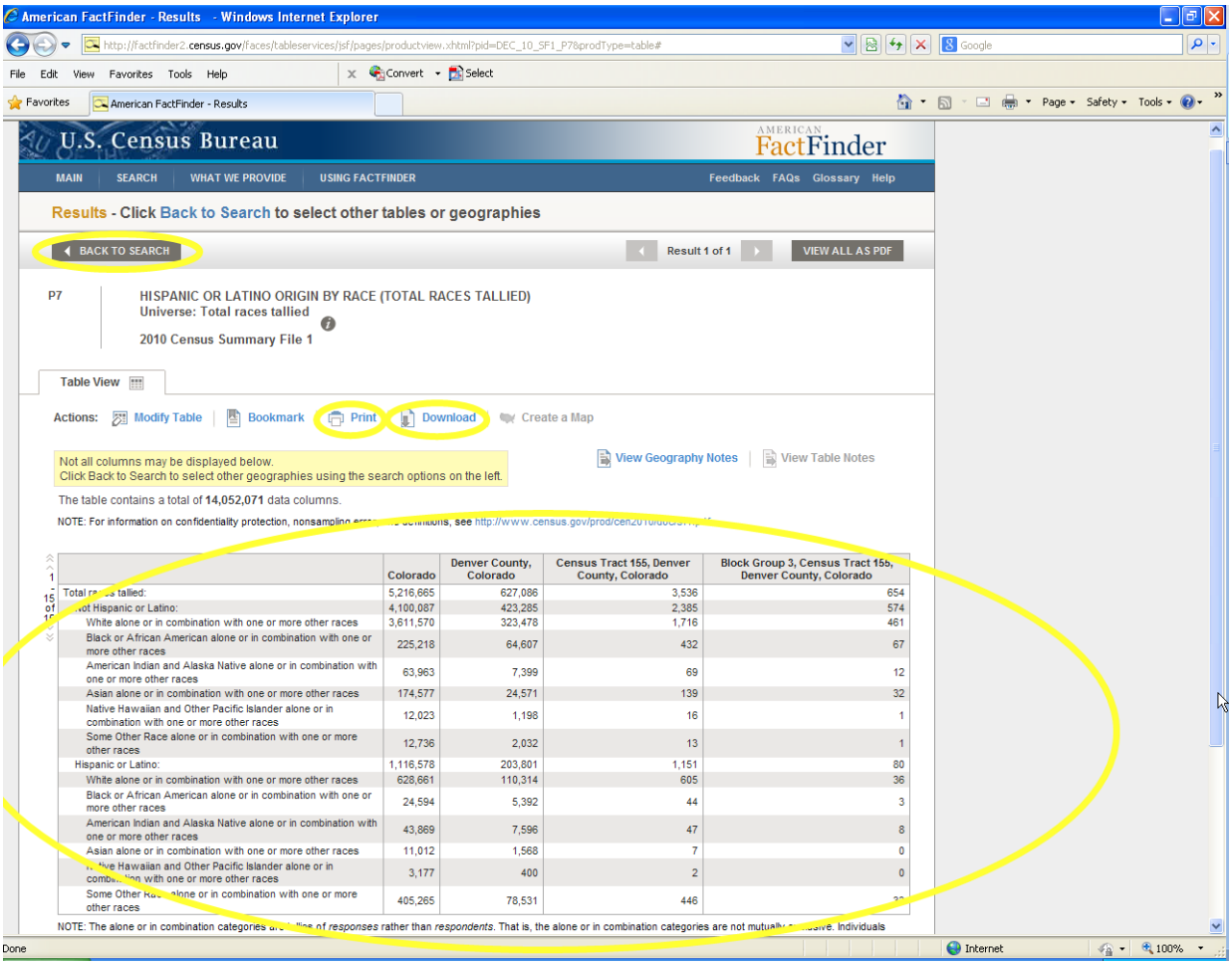


	Colorado	Denver County, Colorado	Census Tract 155, Denver County, Colorado	Block Group 3, Census Tract 155, Denver County, Colorado
Total:	5,029,196	600,158	3,313	625
White alone	4,089,202	413,696	2,146	472
Black or African American alone	201,737	61,435	400	57
American Indian and Alaska Native alone	56,010	8,237	63	14
Asian alone	139,028	20,433	104	24
Native Hawaiian and Other Pacific Islander alone	6,623	607	4	0
Some Other Race alone	364,140	71,191	390	29
Two or More Races	172,456	24,559	206	29

- After the data has been viewed and/or downloaded, click the **Back to Search** button at the top left corner of the screen.
- Unselect the **P3: Race** row from your search results.
- Select the **P5: Hispanic or Latino Origin by Race** row from your search results. You can also type the appropriate **ID: Table** in the **Narrow your search box** to find the table. Be sure to select the most recent datatset for the tables (2010 SF1 100% Data).



- To view the results click **View** or **Download**. The results can be printed or downloaded and formatted into PDF or Excel. Once it is confirmed that the dataset is correct the information should be downloaded and included in the project file. (*EX. TABLE SHOWN BELOW FOR CDOT OFFICE GEOGRAPHICAL LOCATION*)

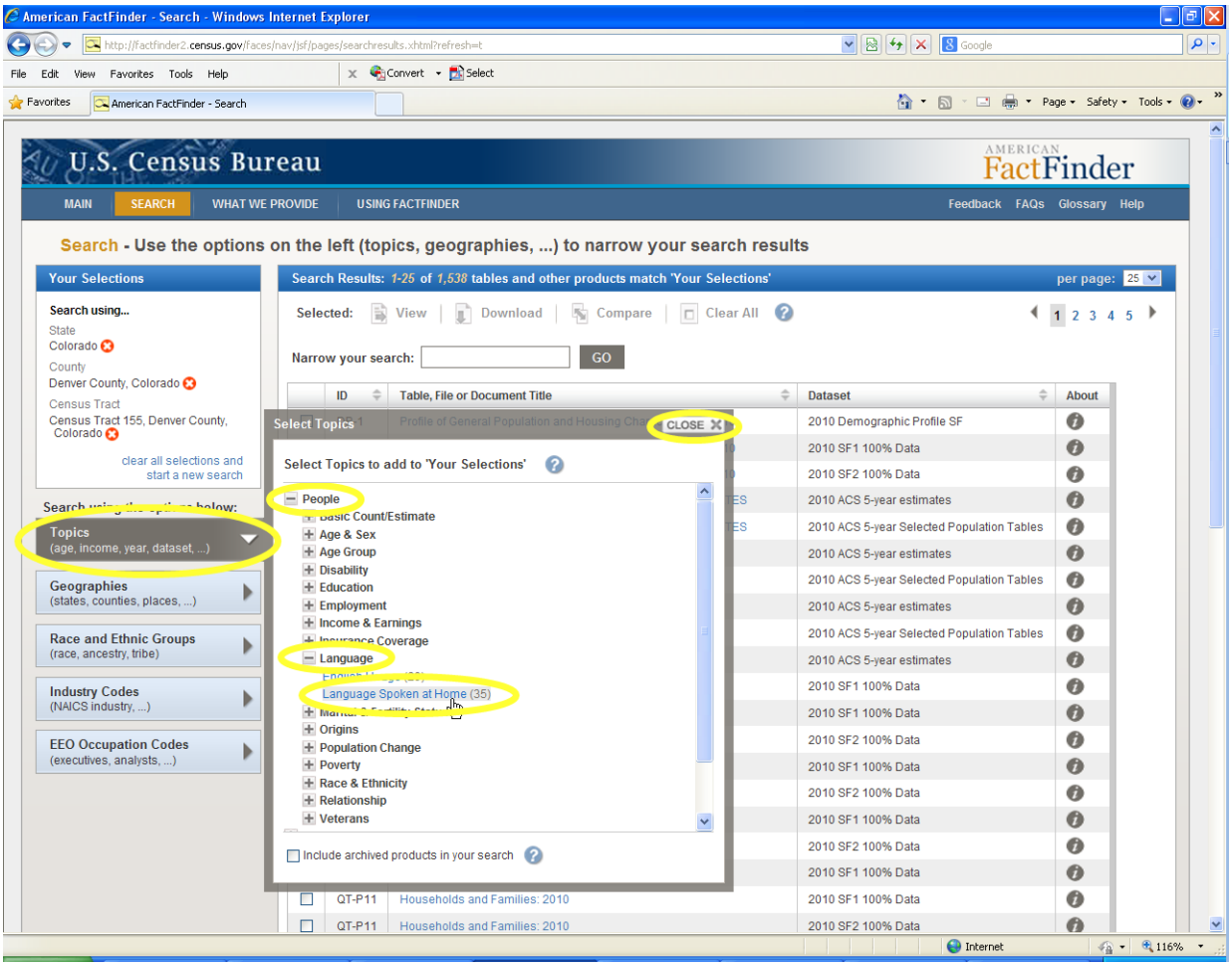


- After the data has been viewed and/or downloaded, click the **Back to Search** button at the top left corner of the screen.
- Delete the **Race/Ethnicity of Individual**, and **Block Group within Census Tract** categories by clicking the small red x from the **Your Selections** box on the upper left-hand side of the screen before proceeding.

IDENTIFY LINGUISTICALLY ISOLATED HOUSEHOLDS (FOR PUBLIC INVOLVEMENT PURPOSES)

STEP 1- Click the **Topics** option on the left-hand side of the screen. You will see the following tab options: **People**, **Housing**, **Product Type**, **Program**, **Dataset**.

- Expand the **People** option
  - Expand the **Language** subcategory
    - Click the **Language Spoken at Home** option.
- Click the **Close** button on the **Select Topics** box to view the Search Results. You will see the selections you made appear in the **Your Selections** box on the upper left-hand side of the screen.

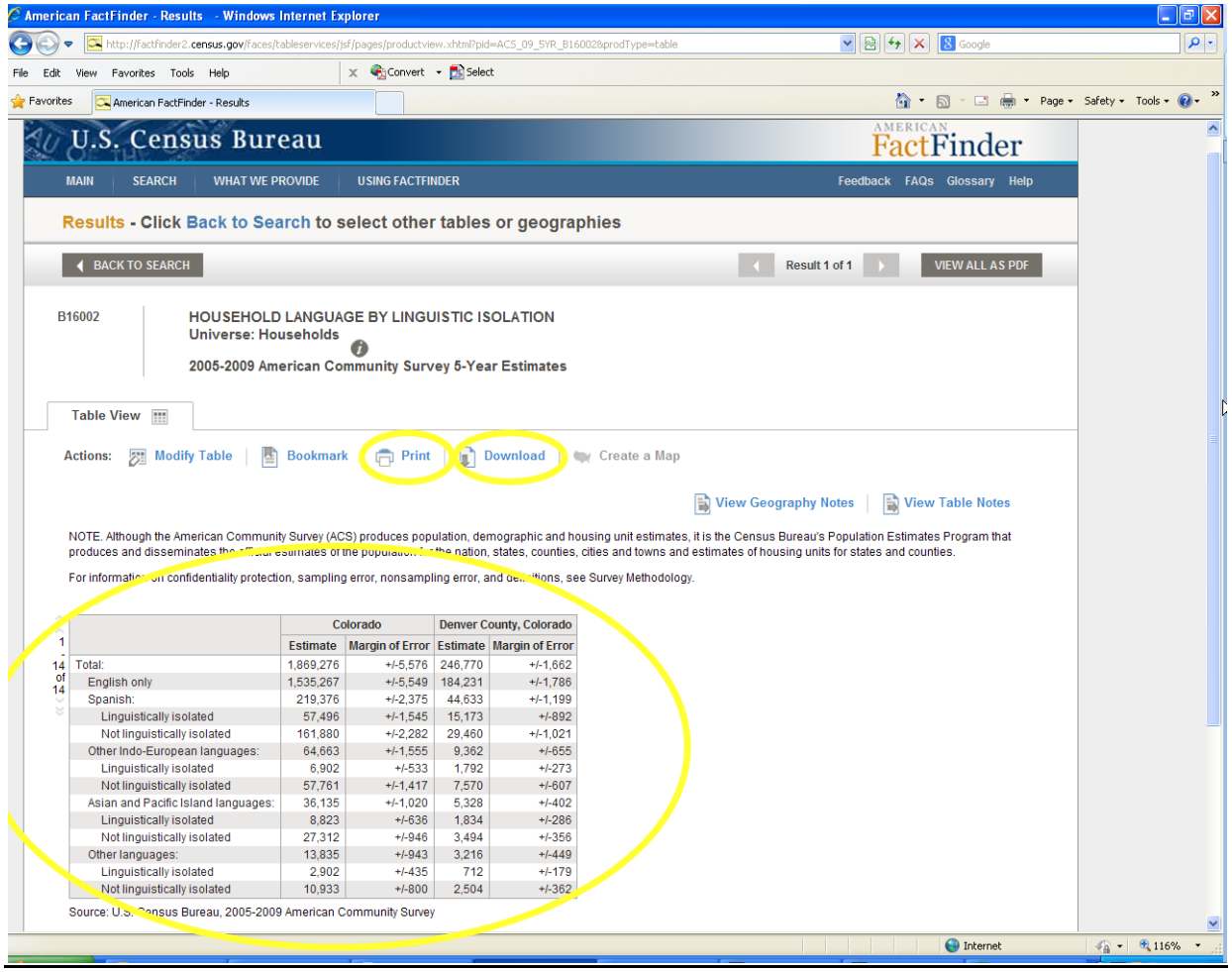


STEP 2- Select the appropriate ID: Table for linguistic isolation figures.

- Select the B16002: Household Language by Linguistic Isolation row from your search results. You can also type the appropriate ID: Table in the Narrow your search box to find the table. Be sure to select the most recent datatset for the tables (Use the most recent ACS 5-year estimates Data).

- To view the results click **View** or **Download**. The results can be printed or downloaded and formatted into PDF or Excel. Once it is confirmed that the dataset is correct the information should be downloaded and included in the project file.

Note: (*EX. TABLE SHOWN BELOW FOR CDOT OFFICE GEOGRAPHICAL LOCATION*) There was no linguistic isolation data available at the census tract level for the CDOT office geographical location example. Data was only available up to the county level. The **Census Tract** category was deleted from the **Your Selections** box on the upper left-hand side of the screen.



	Colorado		Denver County, Colorado	
	Estimate	Margin of Error	Estimate	Margin of Error
Total:	1,869,276	+/-5,576	246,770	+/-1,662
English only	1,535,267	+/-5,549	184,231	+/-1,786
Spanish:	219,376	+/-2,375	44,633	+/-1,199
Linguistically isolated	57,496	+/-1,545	15,173	+/-892
Not linguistically isolated	161,880	+/-2,282	29,460	+/-1,021
Other Indo-European languages:	64,663	+/-1,555	9,362	+/-655
Linguistically isolated	6,902	+/-533	1,792	+/-273
Not linguistically isolated	57,761	+/-1,417	7,570	+/-607
Asian and Pacific Island languages:	36,135	+/-1,020	5,328	+/-402
Linguistically isolated	8,823	+/-636	1,834	+/-286
Not linguistically isolated	27,312	+/-946	3,494	+/-356
Other languages:	13,835	+/-943	3,216	+/-449
Linguistically isolated	2,902	+/-435	712	+/-179
Not linguistically isolated	10,933	+/-800	2,504	+/-362

- After the data has been viewed and/or downloaded, click the **Back to Search** button at the top left corner of the screen.
- Delete the **Language Spoken at Home** category by clicking on the red x from the **Your Selections** box on the upper left-hand side of the screen before proceeding.

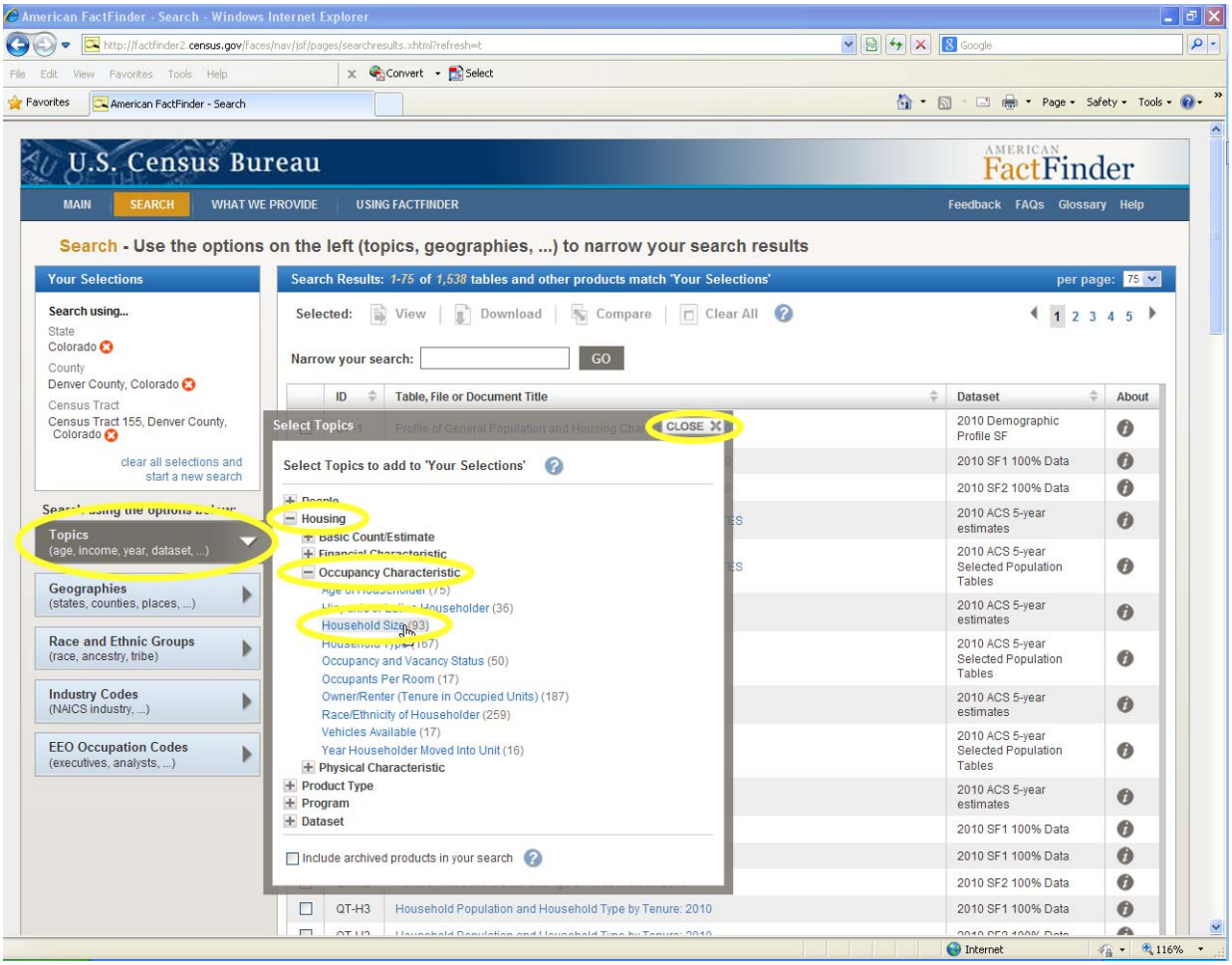
IDENTIFY LOW-INCOME POPULATIONS

The process for identifying low-income populations is provided below, which includes the process for collecting the appropriate data from the US Census and HUD and the low-income threshold calculations.

IDENTIFY HOUSEHOLD SIZE

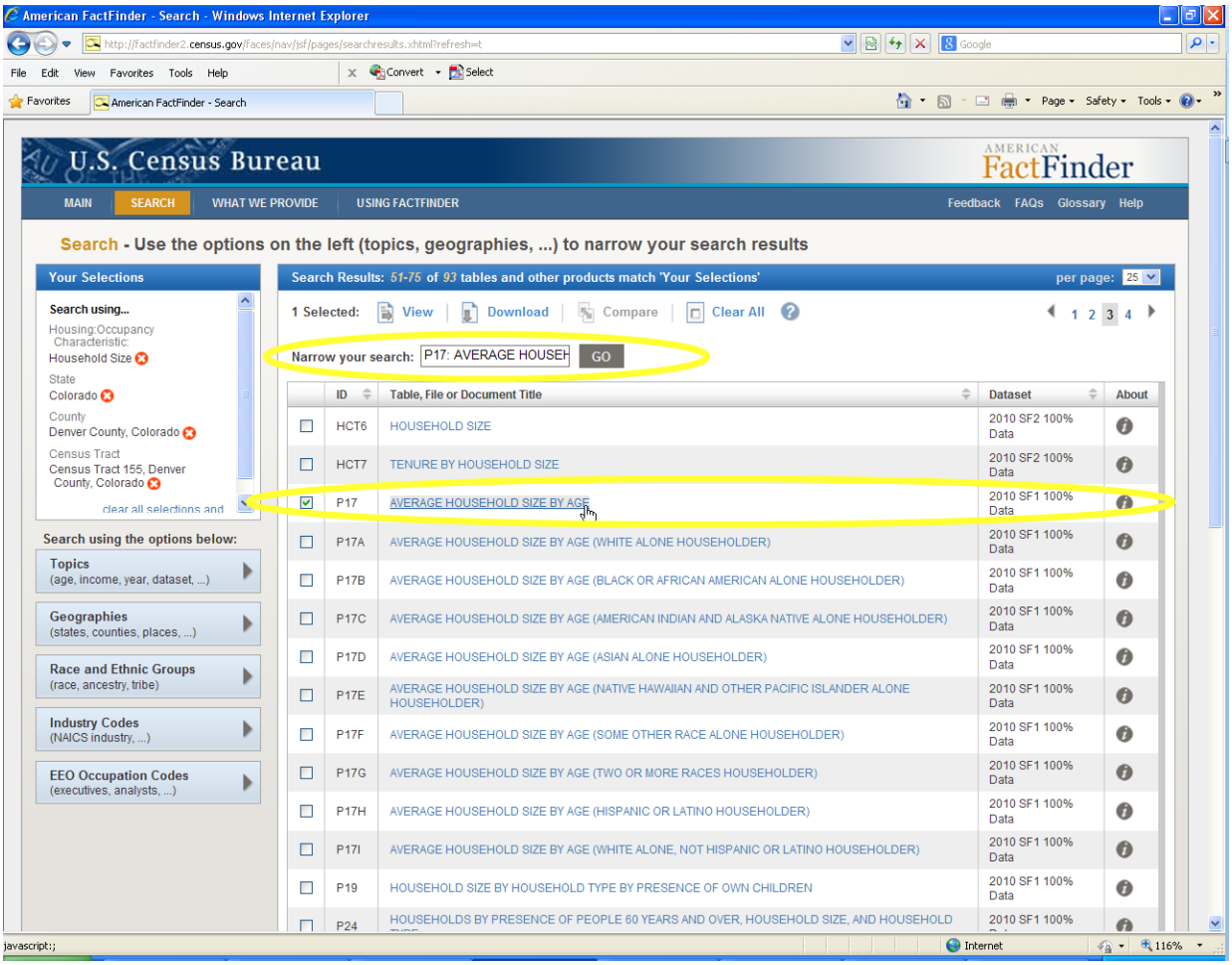
STEP 1- Click the **Topics** option on the left-hand side of the screen. You will see the following tab options: **People**, **Housing**, **Product Type**, **Program**, **Dataset**.

- Expand the **Housing** option
  - Expand the **Occupancy Characteristics** subcategory
    - Click the **Household Size** option.
- Click the **Close** button on the **Select Topics** box to view the Search Results. You will see the selections you made appear in the **Your Selections** box on the upper left-hand side of the screen.

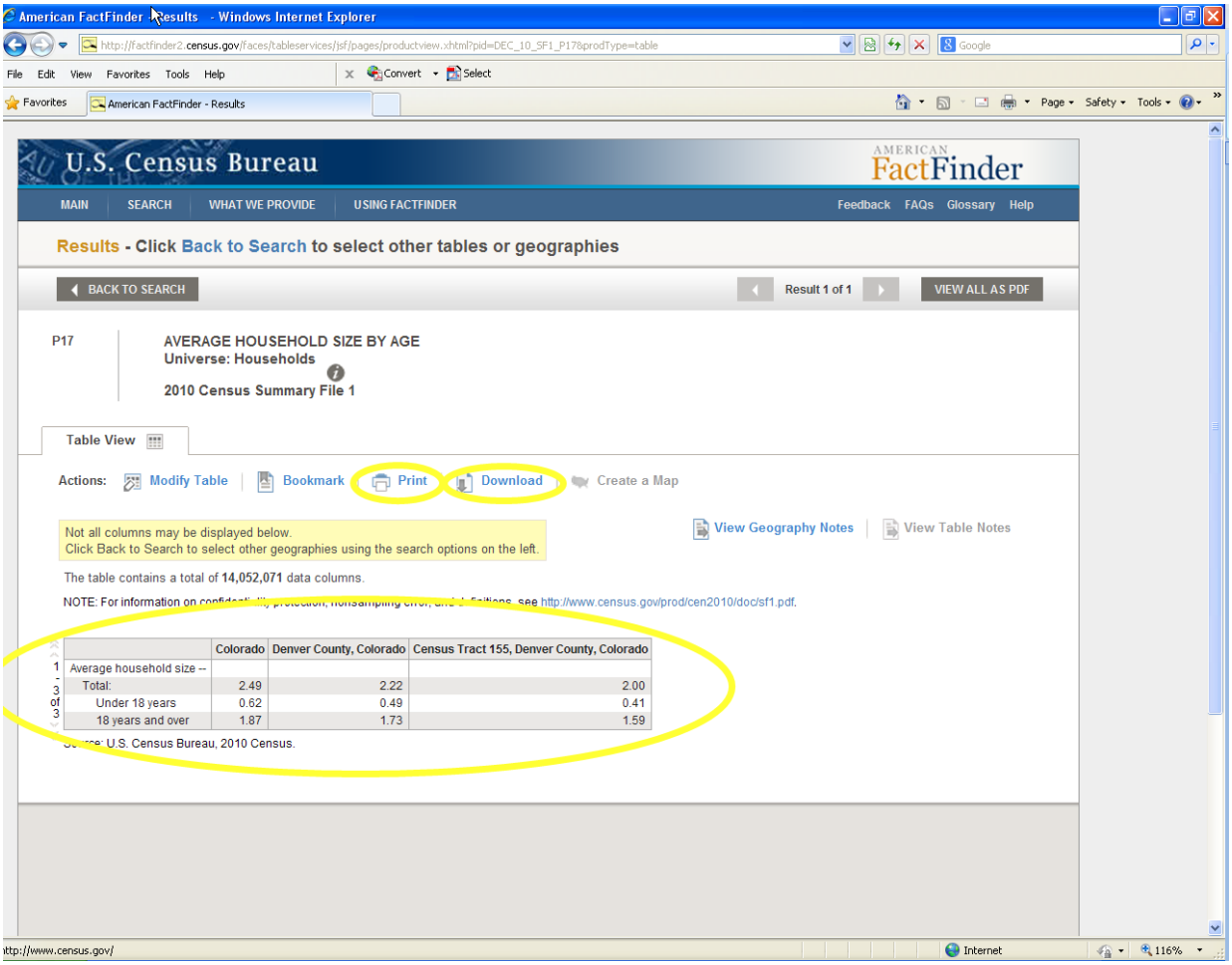


STEP 2- Select the appropriate **ID: Table** for household size.

- Select the **P17: Average Household Size by Age** row from your search results. You can also type the appropriate **ID: Table** in the **Narrow your search box** to find the table. The values will normally be some whole number plus a decimal, e.g., 3.25. Be sure to select the most recent datatset for the tables (2010 SF1 100% Data).



- To view the results click **View** or **Download**. The results can be printed or downloaded and formatted into PDF or Excel for future reference. Once it is confirmed that the dataset is correct the information should be downloaded and included in the project file. (*Ex. Table shown below for CDOT office geographical location*)



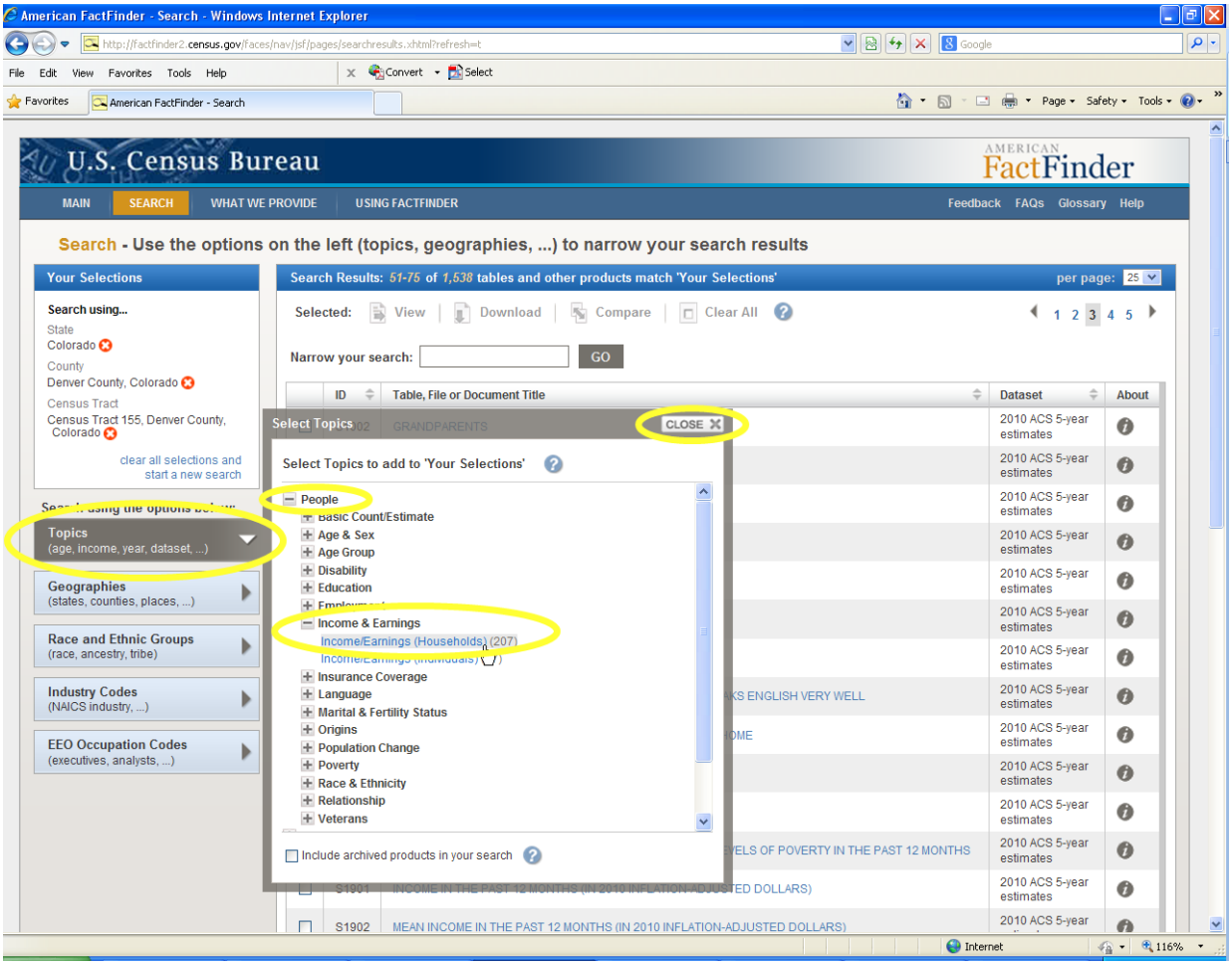
- After the data has been viewed and/or downloaded click the **Back to Search** button at the top left corner of the screen.
- Delete the **Household Size** and **P17: Average Household Size by Age** categories by clicking on the red x from the **Your Selections** box on the upper left-hand side of the screen before proceeding.

IDENTIFY TOTAL HOUSEHOLDS & HOUSEHOLD INCOME

To obtain the total households and table of ranges of household incomes, use the most recent US Census American Community Survey 5-year Estimates, when available. Data is provided down to the Census Tract level, but is not yet available at the block group level. The low-income households will be based on the low-income threshold calculation (see below).

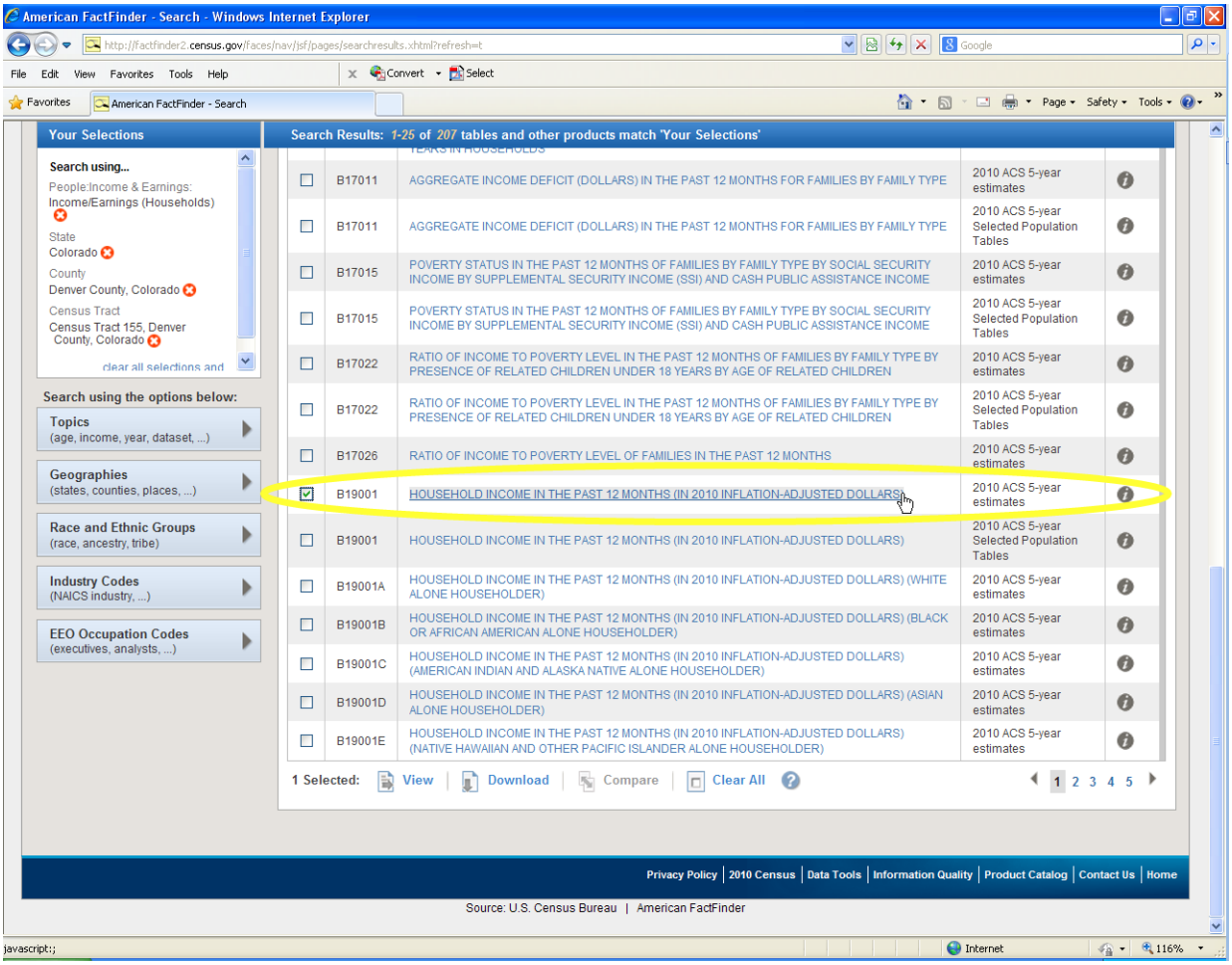
STEP 1- Click the **Topics** option on the left-hand side of the screen. You will see the following tab options: **People**, **Housing**, **Product Type**, **Program**, **Dataset**.

- Expand the **People** option
  - Expand the **Income & Earnings** subcategory
    - Click the **Income/Earnings (Households)** option.
- Click the **Close** button on the **Select Topics** box to view the Search Results. You will see the selections you made appear in the **Your Selections** box on the upper left-hand side of the screen.

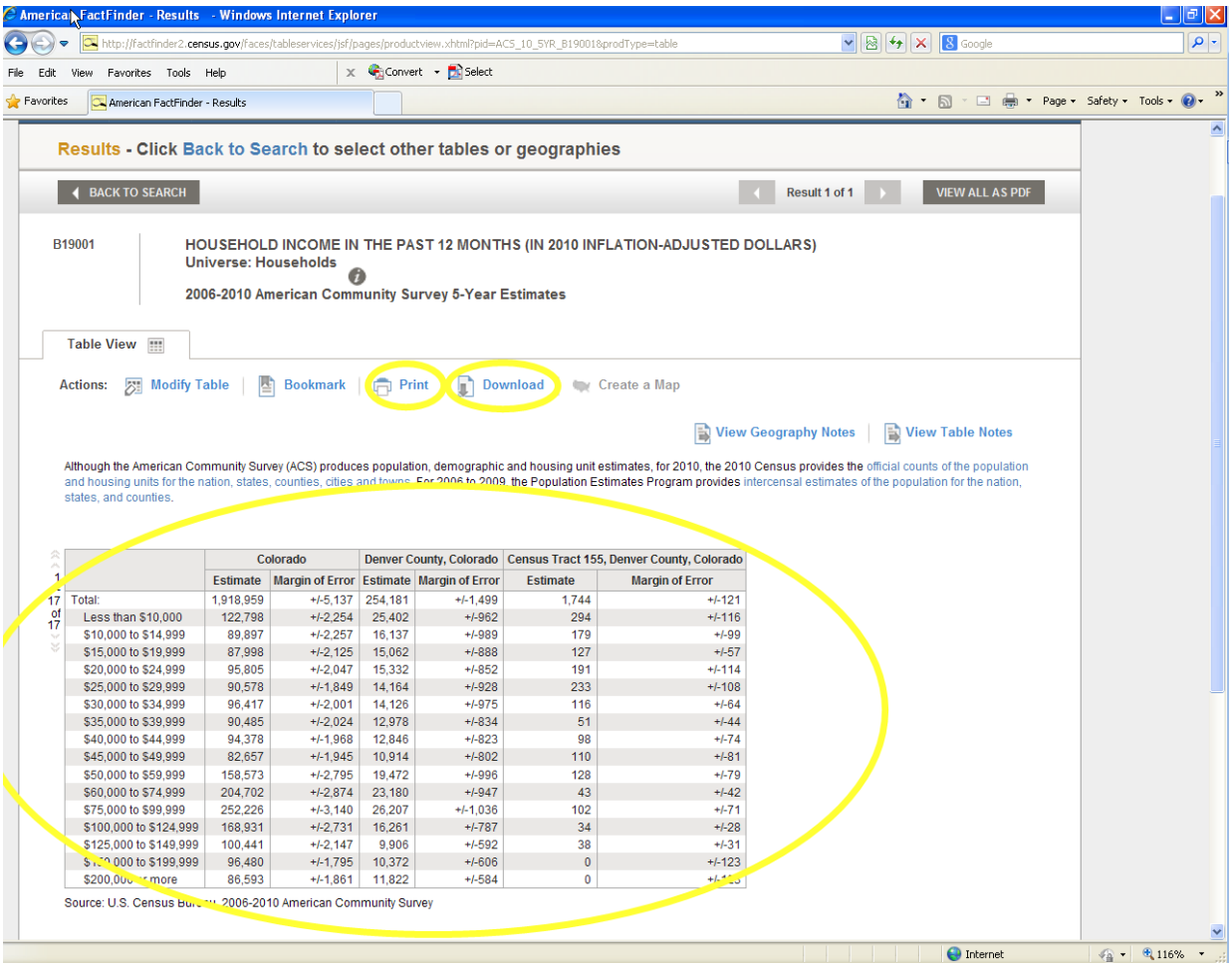


STEP 2- Select the appropriate **ID: Table** for household income.

- Select the **B19001: Household Income in the Past 12 Months (In Inflation-Adjusted Dollars)** row from your search results. You can also type the appropriate **ID: Table** in the **Narrow your search box** to find the table. Be sure to select the most recent datatset for the tables (Use Most Recent ACS 5-year estimates Data).



- To view the results click **View** or **Download**. The results can be printed or downloaded and formatted into PDF or Excel for future reference. Once it is confirmed that the dataset is correct the information should be downloaded and included in the project file. (*Ex. Table shown below for CDOT office geographical location*)



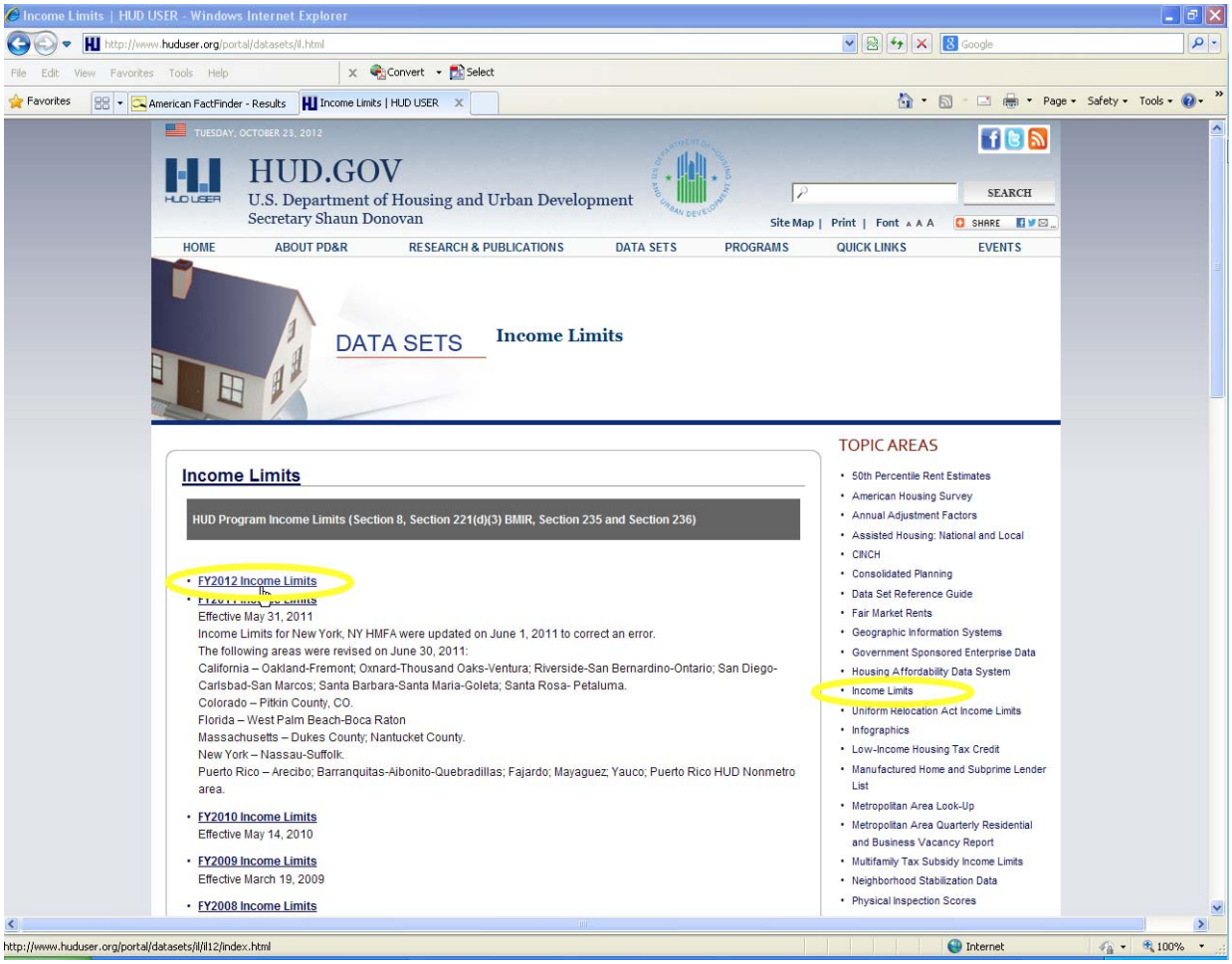
	Colorado		Denver County, Colorado		Census Tract 155, Denver County, Colorado	
	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error
Total:	1,918,959	+/-5,137	254,181	+/-1,499	1,744	+/-121
Less than $10,000	122,798	+/-2,254	25,402	+/-962	294	+/-116
$10,000 to $14,999	89,897	+/-2,257	16,137	+/-989	179	+/-99
$15,000 to $19,999	87,998	+/-2,125	15,062	+/-888	127	+/-57
$20,000 to $24,999	95,805	+/-2,047	15,332	+/-852	191	+/-114
$25,000 to $29,999	90,578	+/-1,849	14,164	+/-928	233	+/-108
$30,000 to $34,999	96,417	+/-2,001	14,126	+/-975	116	+/-64
$35,000 to $39,999	90,485	+/-2,024	12,978	+/-834	51	+/-44
$40,000 to $44,999	94,378	+/-1,968	12,846	+/-823	98	+/-74
$45,000 to $49,999	82,657	+/-1,945	10,914	+/-802	110	+/-81
$50,000 to $59,999	158,573	+/-2,795	19,472	+/-996	128	+/-79
$60,000 to $74,999	204,702	+/-2,874	23,180	+/-947	43	+/-42
$75,000 to $99,999	252,226	+/-3,140	26,207	+/-1,036	102	+/-71
$100,000 to $124,999	168,931	+/-2,731	16,261	+/-787	34	+/-28
$125,000 to $149,999	100,441	+/-2,147	9,906	+/-592	38	+/-31
$150,000 to $199,999	96,480	+/-1,795	10,372	+/-606	0	+/-123
$200,000 or more	86,593	+/-1,861	11,822	+/-584	0	[illegible]

IDENTIFY MEDIAN HOUSEHOLD INCOME

STEP 1- Go to the HUD website at: http://www.huduser.org/portal/datasets/il/il12/index.html to obtain the 30 percent median household income data set.

STEP 2- Click **Income Limits** from the **Topic Areas** on the right-hand side of the page.

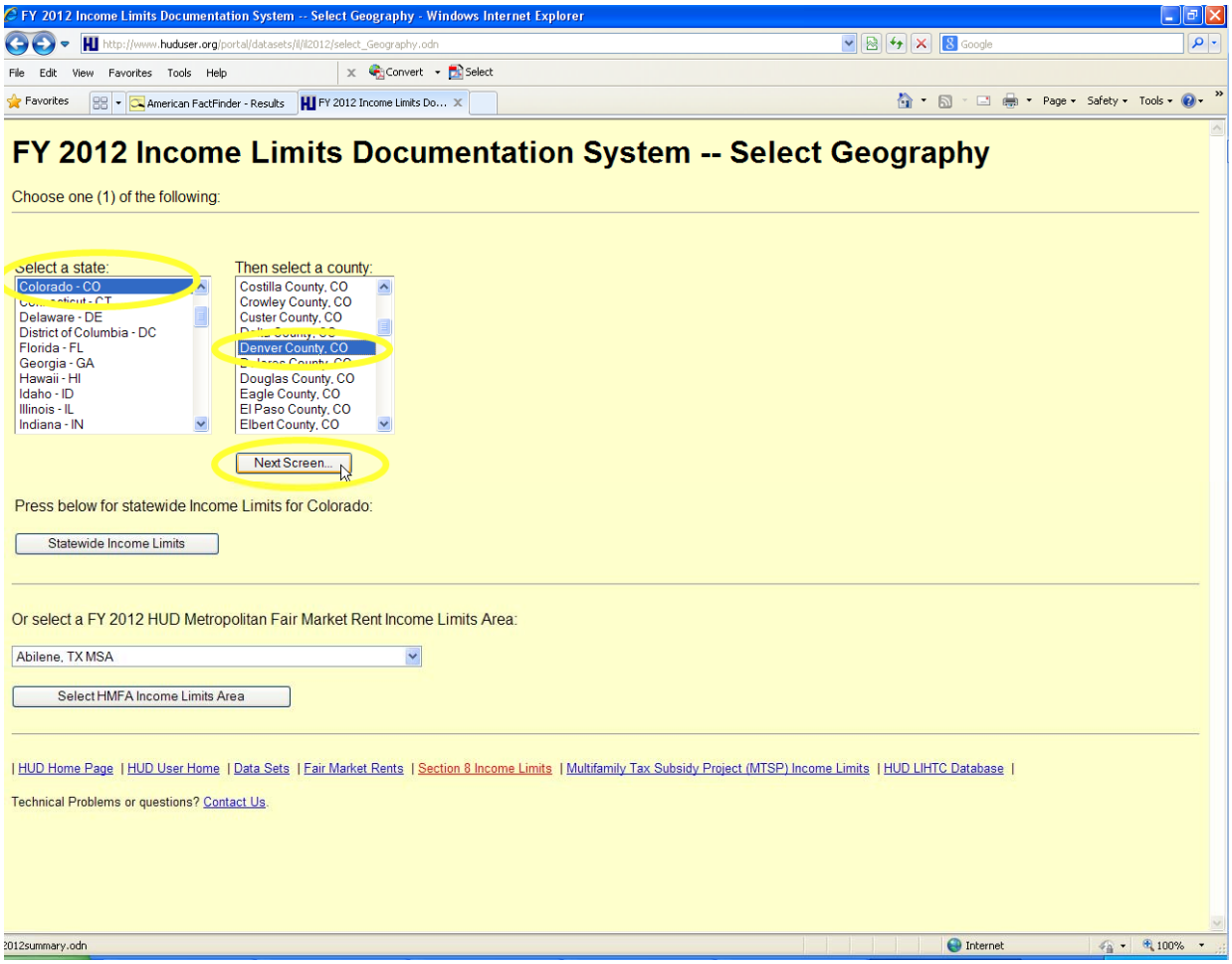
STEP 3- Click the most recent **FY Income Limits** from the Income Limits box.



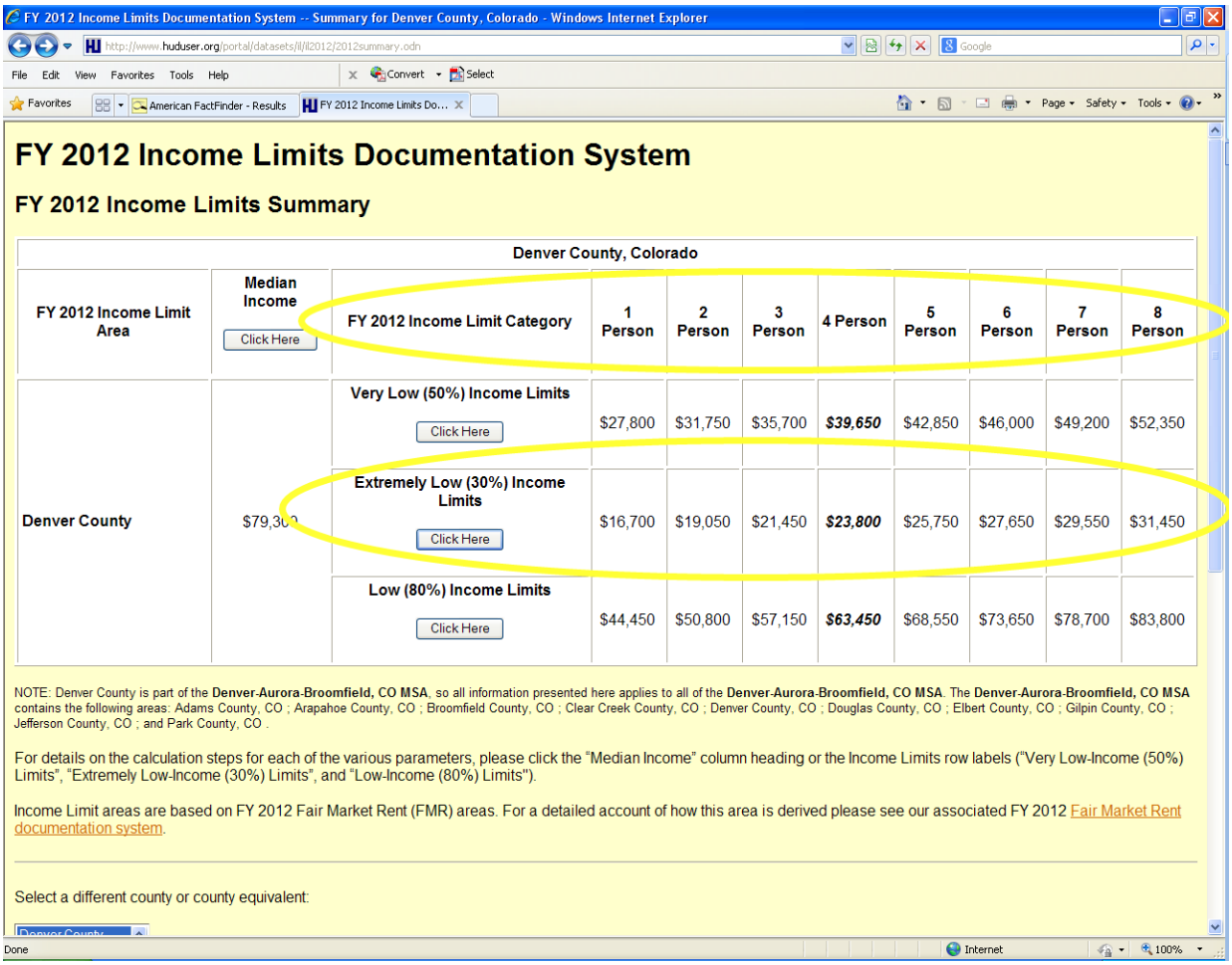
STEP 4- Click the most recent FY Income Limits Documentation from the Income Limits box.

STEP 5- Select the appropriate geography within the community study area.

- Select **Colorado** from the **Select a state** box.
- Select the appropriate county/counties from the **Select a county** box. *(EX. DENVER COUNTY)*
- Click the **Next Screen…** button.



STEP 6- Find the 30 percent median income for the appropriate county or counties in the community study area and then find the 30 % of median extremely low-income thresholds for the whole number above and below the average household size (e.g., if the average household size is 2.27, use the data from the FY Income Limit Category for the 2 person and 3 person household) by referring to the income amounts shown in the table.



FY 2012 Income Limits Documentation System -- Summary for Denver County, Colorado - Windows Internet Explorer

http://www.huduser.org/portal/datasets/il/il2012/2012summary.odn

FY 2012 Income Limits Documentation System

FY 2012 Income Limits Summary

Denver County, Colorado										
FY 2012 Income Limit Area	Median Income (Click Here)	FY 2012 Income Limit Category	1 Person	2 Person	3 Person	4 Person	5 Person	6 Person	7 Person	8 Person
Denver County	$79,300	Very Low (50%) Income Limits (Click Here)	$27,800	$31,750	$35,700	***$39,650***	$42,850	$46,000	$49,200	$52,350
		Extremely Low (30%) Income Limits (Click Here)	$16,700	$19,050	$21,450	***$23,800***	$25,750	$27,650	$29,550	$31,450
		Low (80%) Income Limits (Click Here)	$44,450	$50,800	$57,150	***$63,450***	$68,550	$73,650	$78,700	$83,800

NOTE: Denver County is part of the **Denver-Aurora-Broomfield, CO MSA**, so all information presented here applies to all of the **Denver-Aurora-Broomfield, CO MSA**. The **Denver-Aurora-Broomfield, CO MSA** contains the following areas: Adams County, CO ; Arapahoe County, CO ; Broomfield County, CO ; Clear Creek County, CO ; Denver County, CO ; Douglas County, CO ; Elbert County, CO ; Gilpin County, CO ; Jefferson County, CO ; and Park County, CO .

For details on the calculation steps for each of the various parameters, please click the "Median Income" column heading or the Income Limits row labels ("Very Low-Income (50%) Limits", "Extremely Low-Income (30%) Limits", and "Low-Income (80%) Limits").

Income Limit areas are based on FY 2012 Fair Market Rent (FMR) areas. For a detailed account of how this area is derived please see our associated FY 2012 Fair Market Rent documentation system.

Select a different county or county equivalent:

STEP 7- Subtract the lower extremely low-income threshold dollar number from the higher low-income threshold dollar number and multiply by the decimal portion of the average household size (e.g., if 2.27, multiply by .27). Add this number to the lower whole dollar number (30 % of median low-income) identified in the last step. This will give you the low-income threshold amount for the actual average household size for the county.

- Calculate the extremely low-income threshold number and percentage of extremely low-income households for each census tract in your community study area. Use the county-level household size (# of low-income households (county level)/total # of households in census tract/block group). A detailed calculation example is provided below.

Note: If there are multiple counties in your community study area, follow these steps for each county.

EXTREMELY LOW-INCOME METHODOLOGY EXAMPLE

The following is an example extremely low-income calculation (Sample taken from "Environmental Justice in Transportation Planning Phase II, CDOT Research Branch, December 2003.)

DATA ASSUMPTIONS

The average household size is 3.25 people per household for this county, as provided in the 2010 Census data.

Extremely low-income thresholds for County X

Persons per household	1	2	3	4	5	6	7	8
Extremely Low-Income Limits	$24,450	$27,950	$31,450	$34,950	$37,750	$40,550	$43,350	$46,150

Tract 1, County X household income totals

Household Income	Total Households
Total	1,190
Less than $10,000	50
$10,000 to $14,999	60
$15,000 to $19,999	70
$20,000 to $24,999	80
$25,000 to $29,999	90
$30,000 to $34,999	100
$35,000 to $39,999	100
$40,000 to $44,999	200
$45,000 to $49,999	100
$50,000 to $59,999	100
$60,000 to $74,999	100
$75,000 to $99,999	100
$100,000 to $124,999	100
$125,000 to $149,999	100
$150,000 to $199,999	100
$200,000 or more	100

Given the data presented above, the number of households that are considered to be extremely low income in Tract 1 is calculated as follows.

LOW-INCOME THRESHOLDS

The value of the threshold extremely low-income based on an average 3.25 person household is calculated as follows:

- The average household is between 4 persons and 3 persons, so: $34,950 (4-person household income) minus $31,450 (3-person household income) = $3,500.
- $3,500 multiplied by 0.25 (decimal portion of county average household size) = $875
- Extremely low-income threshold for Tract 1: $31,450 (3-person household income) + $875 = $32,325

Referring back to the total household income, the total number of households with incomes at or below $32,325 would be 450, or a total of the number of households within the first six income categories (refer to example table above) below the threshold range ($0 to $34,999), or 50+60+70+80+90+100=450.