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4.0 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, previously discussed in this manual:

Affected Environment. The components of the affected environment section, which create the project baseline, were introduced in Section 2.1.3; the basic requirements and purpose of the affected environment section are discussed in Section 3.8 of this manual.

Environmental Consequences. The basic requirements and purpose of this section of a NEPA document, including mitigation and monitoring, are discussed in Section 3.9 of this manual.

Resource-specific information to be included in each of these chapters of the NEPA document is presented in the following sections organized by resource area into Sections 4.1 to 4.25.

Within Sections 4.1 through 4.25, the organization is as follows for each resource:

Introduction. Defines a resource, notes why it is important, and provides guidance for evaluating the resource according to NEPA requirements.

Evaluation Process. Identifies who is responsible for evaluating a particular resource, what they should evaluate, and where it should be considered (i.e., defines the Area Of Interest (AOI) 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 chapters of a NEPA document for the resource. 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.

At the end of Section 4, guidance is presented for the following areas that must be considered for all the resources presented in Sections 4.1 through 4.25:

Resource-specific impacts summarized by alternative (Section 4.26)

Resource-specific impacts in a cumulative context (Section 4.27)

Presenting Resources in a NEPA Document

- To achieve consistency in CDOT NEPA documents, resources discussed should be presented in the same order as they appear in Sections 4.1 to 4.25 of this manual.
- When resources are not present or analyzed in the project area, briefly list those resources in the beginning of the affected environment chapter, along with reasons for their not being considered further.
- If the project alternatives have limited potential to impact the resource, state this in the NEPA document and provide a high-level description of the resource in the project area.

Resource-specific impacts and mitigation commitments summarized by project phase (Section 4.28).

The AOI for non-mobile physical resources such as geology and soils may be the same as the project area because impacts to the resource will only occur where it is disturbed. The AOI for non-mobile biological resources such as vegetation may be slightly larger than the project area because emissions or effluents from project activities may indirectly impact plants. The AOI for mobile resources may be larger and shaped differently than the project area. For example, the water resource AOI may extend to the edge of the watershed(s) that contain the project area; wildlife AOIs may vary by species and extend to the boundary of species' home ranges which can be as large as several states. Note that the term "region of influence" (ROI) is typically used in NEPA evaluations to denote the area within which cumulative impacts of the proposed project and other projects should be addressed. This is discussed in Section 4.27.

Additional information that is relevant to specific resources is provided in Section 5, Section 7.1 (Permits and other Regulatory Requirements), and Section 7.2 (Regulations and Policies).

Steps in Analyzing the Resource

- The description of a resource in the affected environment chapter should be limited to an explanation of components affected by the project
- In the impacts analysis, address impacts to a resource by type, discussing alternatives with the same type of impacts together and contrasting those that differ
- Acknowledge project benefits as well as impacts
- Acknowledge commitments to avoid, minimize and reduce impacts defined as part of the proposed action or individual alternatives and then characterize the anticipated impacts accordingly. Repeat mitigation commitments and add additional mitigation measures if additional measures are needed.
- Identify all mitigation measure commitments that are required.
- Prepare the cumulative impact discussion for the resource (Section 4.27 of this manual)

4.1. Air Quality

Air quality discussions address the cleanliness of the air and values provided by the atmosphere. Emissions of pollutants from transportation systems 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.

Air quality is regulated under the 1970 Clean Air Act (CAA) (42 USC 7401 et seq.), as amended in 1977 and 1990. The purpose of the CAA is to protect and enhance air quality to promote public health, welfare, and the productive capacity of the nation. The CAA addresses criteria air pollutants (regulated through the National Ambient Air Quality Standards (NAAQS)), the Prevention of Significant Deterioration (PSD) program, as well as the Hazardous Air Pollutants (HAPs) added in the 1990 amendment. The Environmental Protection Agency (EPA) promulgated regulations to address regional haze in 1999, and continually modifies the regional haze program, most recently in October 2006. Other air quality legislation include the Intermodal Surface Transportation Efficiency Act of 1991[1] (ISTEA) and the more recent Safe, Accountable, Flexible, Efficient Transportation Equity Act – A Legacy for Users (SAFETEA-LU) of 2005.[2]

The two 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 Analysis and Documentation Procedures.[3] In addition, the introduction to this section of the NEPA manual provides guidance on the treatment of resource-specific information that is the same for all resources; Sections 4.26 through 4.29 provide information on multidisciplinary summaries of resource-specific information.

Reasons for Evaluation of Air Quality under NEPA

CDOT conducts air quality evaluations for its projects for a variety of reasons, including the following:

- To protect the state's air quality
- To comply with CDOT's environmental stewardship policy, which ensures the statewide transportation system is constructed and

[1] http://ntl.bts.gov/DOCS/ste.html
[2] http://www.fhwa.dot.gov/safetealu/index.htm
[3] http://www.dot.state.co.us/environmental/CulturalResources/AirQuality/AirQuality06Revisions.pdf

maintained in an environmentally responsible, sustainable, and compliant manner

- The regulations applicable to air quality evaluations are summarized in the sidebar and in Section 7.2.

4.1.1. Air Quality Evaluation Process

The CDOT Environmental Programs Branch (EPB) or Regional Air Quality Specialist evaluates the potential for air quality impacts from a proposed transportation project and then determines if coordination with the Colorado Department of Public Health and the Environment (CDPHE), Air Pollution Control Division (APCD) is required. This evaluation may be conducted by a CDOT Regional Air Quality Specialist, if the region has one. Coordination with APCD involves notifying them of the project, discussing air quality concerns, and determining the appropriate level of analysis required to assess the air quality impacts of the project. This process is discussed further in the following sections. The regional Project Manager will determine early in the scoping process whether the required air quality analyses will be conducted by the EPB, Regional Air Quality Specialist or a hired subcontractor.

Clean Air Act
Transportation Conformity Rule
(23 CFR 771 40, CFR 51 and 93)
(5 CCR 1001–12, Colorado Regulation 10)
Ensures that transportation plans, programs, and projects conform to the state's air quality implementation plan and provide for attainment of the National Ambient Air Quality Standards.
Applicable to nonattainment and maintenance areas.

Intermodal Surface Transportation Efficiency Act of 1971

Congestion Mitigation and Air Quality Improvement (CMAQ) Program (23 USC 149, Sec. 1008)
Assists nonattainment and maintenance areas in reducing transportation emissions by working with them to develop proposals to improve air quality.

CDOT conducts project-level conformity analysis in nonattainment or attainment/maintenance areas[4] for proposed projects included in the Statewide Transportation Improvement Plan (STIP), unless the project is exempt (see discussion in Section 4.1.1). This analysis considers a limited area (such as the right-of-way) surrounding selected intersections. Larger, system-wide air quality assessments are conducted by the lead air quality planning organizations, such as

[4] http://emaps.dphe.state.co.us/APInv/viewer.htm

Denver Regional Council of Governments (DRCOG), which conducts the air modeling for the entire Denver Metro area.

The State Implementation Plan (SIP) establishes the motor vehicle emissions budget. The budget is not a financial figure but rather an emissions limit. In order to demonstrate that the SIP will achieve the emission reductions necessary for compliance, limits are established on the amount of emissions that any one source category can emit. For the on-road mobile source category (i.e., transportation projects) this limit is referred to as the motor vehicle emissions budget (aka the MVEB or "the budget"). Metropolitan Planning Organizations (MPOs) are required to demonstrate that transportation plans and programs stay within these budgets. This is done through the transportation conformity process through a Memorandum of Agreement (MOA) with the APCD and CDOT.

Evaluation of the potential air quality impacts of a transportation project must begin as soon as the design is sufficiently mature to determine if the project will be exempt from or require a project-level conformity analysis.

Emission Sources

Emission sources are typically tracked in five categories: point, area, on-road mobile, non-road (off-road) mobile, and biogenics. CDOT is responsible for addressing on-road mobile and non-road source emissions during construction activities for addressing dust emissions.

Criteria Pollutants and Nonattainment Areas

Under the CAA, EPA sets limits on how much of a pollutant is allowed in the air anywhere in the United States (US). In the 1970 CAA, EPA identified six air pollutants (known as criteria pollutants) that can be harmful to public health and the environment. For each criteria pollutant, health-based (or primary) standards have been established to protect public health with an adequate margin of safety, and 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. Appendix J lists typical sources and effects of criteria pollutants.

For the criteria pollutants, EPA has established NAAQS, a maximum concentration for a specific averaging time (Table 4.1) above which adverse effects on human health may occur.[5]

Table 4.1. National Ambient Air Quality Standards

Pollutant	Averaging Time	NAAQS		
		($\mu g/m^3$)	(ppm)	(ppb)
Ozone (O_3)	**1 hour**	**235**	**0.12**	**120**
	8 hour	**157**	**0.08**	**80**
Carbon Monoxide (CO)	**1 hour**	**40,000**	**35**	**35,000**
	8 hour	**10,000**	**9**	**9,000**
Sulfur Dioxide (SO_2)	**3 hour**	**1,300**	**0.5**	**266**
	24 hour	**365**	**0.14**	**99**
	Annual	**80**	**0.030**	**23**
Nitrogen Dioxide (NO_2)	**Annual**	**100**	**0.053**	**53**
Particulate Matter (PM_{10})	**24 hour**	**150**		
	Annual	**50**		
Particulate Matter ($PM_{2.5}$)	**24 hour**	**35**		
	Annual	**15**		
Lead (Pb)	**Calendar quarter**	**1.5**		

Notes:
[a] Ambient air concentrations refers to the mass of pollutants present in a volume of and can be reported in units of micrograms per cubic meter (µg/m3) or parts per million (ppm).
[b] PM_{10} has been revoked.

The Colorado Department of Public Health and Environment (CDPHE) has been delegated authority by the EPA to administer many of the requirements of the CAA for the state. CDPHE has adopted NAAQS, so there are no ambient air quality standards specific to Colorado.

Nonattainment areas are geographic areas where air quality does not meet NAAQS (please refer to CDPHE's website for current designations[6]). The boundaries of a nonattainment area are ultimately defined by EPA after consultation with the states.

Areas determined to be nonattainment are also given classifications based on the magnitude of the area's problem. Nonattainment classifications are used to specify certain regulatory requirements, establish deadlines for states to submit air quality plans, and determine when an area must be in compliance (attainment) with NAAQS.

For ozone the nonattainment classifications are:

- Marginal

The attainment and non-attainment status of a region may change over time." The attainment/non-attainment status of the region where a project is located should be verified as an early action item for a new project (See CDPHE's website for current designations)

[5] Short averaging times (1, 3, 8, and 24 hours) address short-term exposure while the annual standards address long-term exposure. Longer term standards are set to lower allowable concentrations than are short-term standards to recognize the cumulative effects of long-term exposure.
[6] http://www.cdphe.state.co.us/ap/redesignations.html

- Moderate
- Serious
- Severe
- Extreme

For carbon monoxide and particulate matter the classifications are moderate and serious.

As of the date of publication of this manual, Colorado has 12 nonattainment or attainment/maintenance areas. Once an area has attained the standard, a maintenance plan must be prepared to demonstrate that the standard will be maintained in the future. After the maintenance plan is approved by EPA, the area is re-designated an attainment/maintenance area.

Ozone Early Action Compact (EAC) Areas

EAC areas are those areas that have chosen to implement plans to achieve and maintain compliance with the 8-hour ozone standard earlier than otherwise required under federal CAA requirements and that these areas were about to be designated nonattainment for ozone. At this time, the Denver area is the only 8-hour ozone nonattainment area in the state. The EAC concept was designed to give local areas more control over the selection of control measures to implement in their early action plans. In exchange for submitting an early action plan and for complying with other milestones outlined within the compact, EPA agreed to defer the effective date of the nonattainment designation for any EAC area that was above the standard when 8-hour designations were finalized in June 2004.

Table 4.2. Prevention of Significant Deterioration Incremental Standards

Pollutant	Averaging Time	PSD Increment					
		Class I			Class II		
		($\mu g/m^3$)	(ppm)	(ppb)	($\mu g/m^3$)	(ppm)	(ppb)
NO_2	Annual	2.5	0.0013	1.3	25	0.013	13
Particulate Matter (PM_{10})	24 hour	8			30		
	Annual	4			17		
	3 hour	25	0.0096	9.6	512	0.1956	196
SO_2	24 hour	5	0.0019	1.9	91	0.0348	35
	Annual	2	0.0008	0.8	20	0.0076	8

In 2004, EPA designated the Denver metropolitan area, as well as portions of Larimer and Weld counties, as nonattainment for the 8-hour ozone standard. However, the nonattainment designation is deferred as long as the milestones in the EAC are met. The EAC is an air quality implementation plan that includes control measures to reduce emissions of ozone precursors (volatile organic compounds and oxides of nitrogen) and timelines for complying with the 8-hour ozone standard by December 31, 2007 and maintaining the standard into the future.

Hazardous Air Pollutants

The CAA amendments of 1990 listed 189 pollutants known or suspected to cause serious health problems, and directed EPA to establish emission limits for them. The act also provided a mechanism for amending the original list of pollutants, based on new information about health and environmental effects. There are now 188 HAPs, which also are known as toxic air pollutants or air toxics. Monitoring of ambient concentrations of HAPs is not mandated by the CAA. While monitoring under the CAA is not the norm, some monitoring of selected HAPs is performed in areas where relatively high HAP emissions occur. The monitoring of diesel particulate matter (DPM), one of the 21 Mobile Source Air Toxics (MSATs) and one of the six priority MSATs, may be of importance to certain kinds of projects in certain locations. EPA may propose HAP concentration/exposure limits in the future, but this has not yet occurred. If it does occur and the limits are given formal approval, FHWA and CDOT will develop revised guidance. Without these concentration/exposure limits, detailed

analysis of potential concentrations of HAPs are not useful because they cannot be related to applicable health risk standards.

Collection and Evaluation of Baseline Information

Collection of Baseline Information

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. This information can be found through the National Oceanic and Atmospheric Administration (NOAA), National Weather Service (NWS)[7], CDPHE, and the EPA.

General information includes:

- Climate and air quality data. This information is needed to characterize the general project setting with an emphasis on aspects that are likely to be impacted by the project.

- Historical meteorological data. Information includes wind direction, frequency or diurnal, altitudinal, or seasonal variations that affect dispersion, as it pertains to identifying and characterizing impacts or in developing mitigation measures.

- Historical air monitoring data. Information should display trends in pollutant concentrations in the project vicinity and/or the air quality region, as it pertains to any potential project emissions that could result in concentrations that exceed NAAQS.

Evaluation of Baseline Information

The evaluation of air quality impacts is dictated by federal and state law. The most significant federal air quality regulation that applies to transportation projects is the transportation conformity rule. This rule is implemented in Colorado by the Air Quality Control Commission Regulation 10 (5 Code of Colorado Regulations 1001–12). The purpose of this rule is to implement Section 176 of the CAA, which requires all transportation plans, transportation improvement programs, and transportation projects to:

- Conform to an implementation plan's purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of such standards.

- Ensure that these transportation activities will not cause or contribute to any new violation of any standard, increase the frequency or severity of existing violations of any standard, or delay timely attainment of any standard or any required interim emissions reductions.

[7] (http://www.nws.noaa.gov/)

A prescribed air quality clearance process must be used to evaluate potential impacts that may result from construction of transportation projects. All federal projects in nonattainment or attainment/maintenance areas must have a project-level conformity determination unless they fit into one of the exempt categories described in the sidebar. In either case, air quality issues must be addressed as part of the project environmental clearance process. The level of analysis and documentation for the air quality clearance will vary depending upon the scope of the project and the type of NEPA document being prepared. Categorical Exclusions (CatEx) are "minor projects," and usually require less analysis and documentation than projects that require an Environmental Assessment (EA) or Environmental Impact Statement (EIS).

At the project level, CDOT is primarily concerned with CO and particulate matter, which may be present in either of two sizes: less than 2.5 microns ($PM_{2.5}$) and less than 10 microns (PM_{10}). Since CO is emitted in tailpipe exhaust from motor vehicles, concentrations of CO are higher in the immediate vicinity of roadways and intersections than at other locations. Sources of PM_{10} associated with motor vehicles include tailpipe exhaust, brake and tire wear, re-entrained road dust, which is especially associated with wintertime street sanding, and ground disturbance during construction. $PM_{2.5}$, associated with diesel exhaust and believed to pose greater health risks than PM_{10}, is not a pollutant of concern in Colorado.

Although ozone is not directly emitted by motor vehicles, motor vehicle emissions of Oxides of Nitrogen (NOx) and Volatile Organic Compounds (VOCs) contribute to ozone formation. Ozone is created by the reaction of NOx and VOCs on hot summer days. This reaction takes place over several hours, which allows for mixing and dispersion in the atmosphere; therefore, ozone is generally a regional, rather than localized, pollutant. The Denver metropolitan area is designated as an attainment/maintenance area for the 1-hour ozone standard. Since ozone is a regional pollutant and cannot be analyzed in the vicinity of a particular roadway, a project-level analysis is not required for ozone. A regional ozone analysis is conducted as part of the air quality conformity determination for the Denver Regional Transportation Plan.

Conformity Determination

The first step in the air quality clearance process is to determine if the project is exempt from a conformity determination. Conformity is a way to ensure that federal funding and approval are given to those transportation activities that are consistent with air quality goals. It ensures that emissions attributed to transportation activities do not worsen air quality or interfere with the purpose of the SIP, which is to meet the EPA standards for air quality. The Federal Highway

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)

Federally funded or approved project types included in one of the categories listed in Table 2--Exempt Projects (Appendix 4.1-B) of the transportation conformity rule.

Administration (FHWA) has issued a Transportation Conformity Reference Guide[8] to assist in the conformity process.

In nonattainment and maintenance areas, FHWA and Federal Transit Administration (FTA) projects must be found to conform before they are adopted, accepted, approved or funded before NEPA decision document can be signed. With some exceptions (e.g., safety, landscaping, and other projects with neutral or minimal emissions impacts), transportation projects must meet the following criteria:

- They must be included in a conforming Regional Transportation Plan (RTP) and Statewide Transportation Improvement Program (STIP).

- The design concept and scope of the project that was in place at the time of the Plan and STIP conformity finding must be maintained through implementation.

- The project design concept and scope must be sufficiently defined to ascertain emissions at the time of the conformity determination.

Areas that have carbon monoxide or particulate matter problems must also show that new localized violations of those pollutants will not result from project implementation, and that any existing violations will not be worsened.

The MPO and US Department Of Transportation (USDOT), through FHWA and FTA, have a responsibility to ensure that the transportation plan and program within the metropolitan planning boundaries conform to the SIP. In metropolitan areas, the policy board of each MPO must formally make a conformity determination on its transportation plan and STIP prior to submitting them to the USDOT for an independent review and conformity determination. Coordination with FHWA and the MPO is part of the overall project development process (addressed in Section 2.0). Development of conformity determinations for projects outside of these MPO boundaries is the responsibility of CDOT.

Conformity determinations must be made at least every four years (or more often if changes occur) for plans and STIPs. Certain events, such as SIP revisions that establish or revise a transportation-related emissions budget, or add or delete Transportation Control Measures (TCMs), may trigger new conformity determinations.

If a conformity determination cannot be made within appropriate timeframes, a conformity lapse can occur and no new non-exempt projects may advance until a new determination for the plan and STIP can be made. This affects transit as well as highway projects. There are exceptions for specific categories of projects that are exempt from the conformity process (pursuant to 40 CFR Part 93.126 and 93.128).

[8] http://www.fhwa.dot.gov/environment/conformity/ref_guid/index.htm

TCMs that are included in approved SIPs and projects that have received funding commitments for construction may also proceed during a conformity lapse.

Only those projects that have received approval of Plans, Specifications, and Estimates (PS&E) and transit projects that have received a full funding grant agreement or equivalent approvals prior to the conformity lapse may proceed to construction during a conformity lapse. Project phases that were approved by FHWA prior to the lapse (such as acquisition of right of way) can also proceed, although no subsequent phases can be approved. Environmental review activities can proceed, but FHWA cannot sign FONSIs, RODs, or approve CatExs for non-exempt projects.

Once the regional conformity process for the plan and STIP is successfully completed by the MPO and USDOT, certain projects are also subject to project-level conformity. Project-level conformity applies only to projects that are funded and/or approved by FHWA or FTA. Conformity applies only to projects that are funded and/or approved by FHWA or Federal Transit Administration (FTA) or are considered regionally significant. A conformity determination is not required for state and locally funded projects. If a federally funded or approved project type is included in one of the categories listed in Appendix H of this document, it is exempt. The Regional Project Manager should coordinate with the EPB or Regional Air Quality Specialist to determine if a project is exempt.

Selecting Project Areas for Air Quality Impact Analysis

If a project is not exempt, the EPB or Regional Air Quality Specialist determines which roadways and intersections in the project area will be evaluated for air quality impacts. Only intersections that will be constructed, reconstructed, or modified as part of the project are normally evaluated. If the project will result in an increase in traffic at nearby intersections, these intersections should also be evaluated. To determine which intersections should be evaluated, the Regional Project Manager should provide an analysis of traffic and Level of Service (LOS) to the EPB or Regional Air Quality Specialist. The traffic and LOS analysis should evaluate existing and future (20-year) conditions at all intersections affected by the project for the a.m. and p.m. peak hour periods for all project alternatives, including the No Action Alternative.

The traffic and LOS analysis serves as a screening method to determine if a CO hot-spot analysis is needed. EPA hot-spot modeling guidance indicates the following:

Intersections operating at LOS C or better are not likely to cause a violation of CO standards and therefore do not need to be modeled. For individual projects, if the LOS for the preferred alternative is C or better at all signalized intersections affected by the project for all years and peak hours analyzed, then hot-spot modeling is not required.

However, the conformity rule still requires a qualitative analysis of likely CO impacts.

Hot-spot modeling is required at intersections where the LOS is D or worse. For projects with LOS D that affect more than five or six intersections, a screening procedure based on traffic volumes and level of congestion, that is, volume-to-capacity ratio greater or equal to 0.85, can be used to select the three or four worst-case intersections for hot-spot modeling. If model results for the worst-case intersections do not exceed standards, lower volume intersections would also pass the hot-spot test. The screening procedure reduces the amount of modeling required, yet still complies with the intent of the transportation conformity rule.

Hot-Spot Modeling Process

If the project does not pass the LOS screening test discussed in the previous section, hot-spot modeling is required. Hot spot modeling is a procedure for calculating CO concentrations along roadways and near intersections. The purpose of hot-spot modeling is to determine whether or not the project will cause or contribute to a violation of federal CO standards.

The EPA-approved hot-spot model is the Transportation Air Quality Dispersion Model (CAL3QHC), which predicts carbon monoxide concentrations in the vicinity of intersections affected by a project. The specific information required for CAL3QHC and the modeling process is discussed in the CDOT Air Quality Procedures Manual[9] (Appendix J).

Hotspot assessments are also required for PM_{10}. However, no approved models exist for this purpose; instead of modeling, a qualitative hotspot assessment is performed. EPA and FHWA have issued joint guidance for these types of assessments. In the Denver area, these assessments rely on air quality modeling performed for the PM10 maintenance plan. In other areas, factors such as changes in traffic, emissions, receptor distances, and other elements that can impact concentrations are discussed.

Particulate Matter Hot-Spot Analysis

In March 2006, EPA published a rule for determining which transportation projects must be analyzed for local air quality impacts. EPA specified that projects of air quality concern are certain highway and transit projects that involve significant levels of diesel vehicle traffic, or any other project that is identified the PM SIP as a localized air quality concern:

- New or expanded highway projects that have a significant number of or significant increase in diesel vehicles

[9] http://www.dot.state.co.us/environmental/CulturalResources/AirQuality.asp

- Projects affecting intersections that re at LOS D, E or F with a significant number of diesel vehicles, or those that will change to LOS D, E, or F because of increased traffic volumes from a significant number of diesel vehicles relate to the project;

- New bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location;

- Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location;

- Projects in or affecting locations, areas, or categories of sites which are identified in the PM implementation plan as sites of violation or possible violation.

Particulate matter analyses must be based on the latest planning assumptions. The requirements include:

- Analysis must include the total emissions burden of direct PM emissions which may result from he implementation of the projects summed together with the background concentrations;

- Analyzing the entire transportation project, after the identification of major design features which will significantly impact local concentrations;

- Using consistent assumptions with those used in regional emissions analyses for inputs that are required for both analyses (e.g., temperature, humidity);

- Assuming the implementation of mitigation or control measure only where written commitments for such measures have been obtained; and

- Not considering temporary emissions from construction-related activities which occur only during the construction phase and last five years or less at any individual site.

Hazardous Air Pollutants and Evaluation of Mobile Source Air Toxics

EPA has assessed the 188 HAPs and identified a group of mobile source air toxics (MSATs), as described in EPA's 2007 final rule, Control of Hazardous Air Pollutants from Mobile Sources (72 FR 8428). In 2001, EPA indicated that the majority of adverse health risk came from a subset of six MSATs, which FHWA labels as the priority MSATs. These are benzene, formaldehyde, acetaldehyde, diesel particulate matter/diesel exhaust organic gases, acrolein, and

1,3-butadiene. While these MSATs are considered the priority transportation toxics, the EPA stresses that the lists are subject to change and may be adjusted in future rules.

Air toxics analysis is a continuing area of research. While much work has been done to assess the overall health risk of air toxics, many questions remain unanswered. In particular, the tools and techniques for assessing project-specific health impacts from MSATs are limited. These limitations and more importantly the lack of approved concentration/exposure limits for these MSATs, impede CDOT's and FHWA's ability to evaluate how mobile source health risks should factor into project-level decision making under NEPA. At this time, the emphasis is on evaluating relative emission levels and seeking to reduce those emissions as part of alternative evaluation.

In addition, EPA has not established regulatory concentration targets for the six relevant MSAT pollutants appropriate for use in the project development process.

Nonetheless, air toxics concerns are being raised more frequently on transportation projects during the NEPA process throughout the nation. As the science emerges, CDOT and FHWA are increasingly expected by the public and other agencies to address MSAT impacts in their environmental documents. FHWA has several research projects[10] underway to more clearly define potential risks from MSAT emissions associated with transportation projects. While this research is ongoing, FHWA has issued Interim MSAT Guidance[11] on how these chemicals should be addressed in NEPA documents for highway projects (FHWA, February 3, 2006; Appendix J). Supporting documents[12] are also provided on an FHWA website.

Conditions Requiring Quantitative MSAT Analysis

The project creates or significantly alters a major inter-modal freight facility that has the potential to concentrate high level of diesel particulate matter in a single location.

OR

The project creates new or adds significant capacity to urban highways such as interstates, urban arterials, or urban collector-distributor routes with traffic volumes where the annual average daily traffic is projected to be in the range of 140,000 to 150,000 or greater by the design year.

[10] http://www.fhwa.dot.gov/environment/airtoxic/index.htm

[11] http://nepa.fhwa.dot.gov/ReNEPA/ReNepa.nsf/0/8C9C83B22C680D898525710D00672B45?opendocument&CurrentCategory=NEPA%20Process%20and%20Documentation
http://nepa.fhwa.dot.gov/ReNEPA/ReNepa.nsf/All+Documents/8C9C83B22C680D898525710D00672B45/$FILE/FHWAMSATguidance.pdf

[12] http://nepa.fhwa.dot.gov/ReNEPA/ReNepa.nsf/0/8C9C83B22C680D898525710D00672B45?opendocument&CurrentCategory=NEPA%20Process%20and%20Documentation

AND

The project is proposed to be located in proximity to populated areas or in rural areas, in proximity to concentrations of vulnerable populations (e.g., schools, nursing homes, hospitals).

A qualitative analysis is always required (except for projects exempted under FHWA's interim guidance); the guidance also provides specific text to be included in NEPA documents, depending upon the type of analysis conducted.

Other Issues to Consider

CDOT has entered into a MOA with the Colorado Air Pollution Control Division (APCD) regarding procedures for determining project-level conformity. The purpose of the MOA is to identify procedures for CO that ensure compliance of federally funded transportation projects with the federal transportation conformity requirements and NEPA. The consultation process results in an Air Quality Concurrence Letter, signed by APCD. The procedures for obtaining the concurrence letter for an EA/EIS or a CatEx, as well as a description of projects exempt from the project-specific conformity requirements, are described in the MOA[13] (see Appendix J and discussions in Section 5 and Section 7.1.1).

Project air quality clearances are documented according to one of procedures discussed below. The results of the project-level conformity analysis are incorporated into the NEPA document, at which point EPA and FHWA review the conformity determination. EPA must approve the final conformity determination. Coordination with EPA and APCD is discussed in Section 5.

Exempt project: The Air Quality Specialist sends a brief memo or email to the Region Project Manager stating that the project is exempt from a conformity determination according to the conformity regulation (see Appendix J for a sample memo).

CatEx projects that pass the LOS screening test: The 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. Hot-spot modeling is not required. The project must be included in a conforming Regional Transportation Plan (RTP) and Statewide Transportation Improvement Program (STIP) 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 Project Manager. Coordination/concurrence with APCD is not required (see Appendix J for a sample memo).

Modeled CatEx projects: The Air Quality Specialist writes a memo to the project file summarizing the results of the hot-spot analysis and

[13] http://www.dot.state.co.us/environmental/StandardsForms/Forms.asp

stating that the project will not cause or contribute to a violation of air quality standards. An air quality clearance cannot be issued if the hot-spot analysis shows that there would be an exceedance of the 8-hour CO standard. The project must be included in a conforming RTP and STIP. A copy of the memo should be sent to the Project Manager. Coordination/concurrence with APCD is not required (see Appendix J for a sample memo).

EA/EIS projects that pass the LOS screening test: All EA/EIS projects in nonattainment and attainment/maintenance areas require coordination with APCD (see Section 5 and Section 7.1.1). If the project passes the LOS screening test, the Air Quality Specialist sends a letter to APCD stating this fact and requests concurrence that the project complies with the conformity provisions of the CAA. The project must be included in a conforming RTP and STIP.

Modeled EA/EIS projects: For EA/EIS projects in nonattainment and attainment/maintenance areas having intersections that do not pass the LOS screening test (LOS D or worse), CDOT and APCD (see Section 5 and Section 7.1.1) will jointly determine the appropriate level of hot-spot modeling and other analyses needed. The CDOT Air Quality Specialist or project consultant, as appropriate, prepares a report describing the project and summarizing the results of the hot-spot modeling and other analyses. The report and a letter requesting concurrence are sent to APCD. The project must be included in a conforming RTP and STIP.

4.1.2. NEPA Document Sections

The content of the sections on air quality in the affected environment and environmental consequences chapters is discussed below. This air quality information should also be summarized for the multidisciplinary sections discussed in Sections 4.26 through 4.29 of this manual.

Affected Environment

Documentation needs for the Affected Environment section 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 section should contain a discussion of the following three elements:

General Project Setting – Identify the general setting of the project with respect to air quality. For example, is the project located in urban vs. 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 PSD Class I areas (if relevant to the project)

should be analyzed in order to determine how air quality will be impacted by the project actions.

Status of the Air Quality Region – Determine whether the project is located in a nonattainment or attainment/ maintenance area. Identify whether the attainment is for CO, PM_{10}, and/or O_3 and how the project will affect those limits. Describe the regional air quality trends and outlook. Determine whether the project is in a conforming RTP and STIP.

Environmental Consequences

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

- Summarize the impact analysis performed.
- State whether or not the air quality concentrations will remain under the EPA limits.
- Discuss predicted future trends in these concentrations for each of the project alternatives.
- Summarize any MSAT emissions monitoring or modeling.

Include the following documentation in the impact analysis section of NEPA documents:

- EA/EIS projects that pass the LOS screening test (as described in Section 4.1.1)
- Modeled EA/EIS projects (as described in Section 4.1.1)
- Project impacts on PM_{10} concentrations in the project vicinity: The Air Quality Specialist should refer to FHWA's Guidance for Qualitative Project Level Hot Spot Analysis in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas[14]. For large corridor projects, include a discussion and summary table of the corridor area (total burden) PM_{10} emissions for all project alternatives.
- Any impacts (or no impact) on regional ozone concentrations: For large corridor projects, include a discussion and summary table of the corridor area (total burden) emissions of VOCs and NOX.

[14] http://www.fhwa.dot.gov/environment/conformity/pmhotspotguidmemo.htm)(FWHA 2006)

- Project impacts on MSATs: Include the results of the qualitative and/or quantitative MSAT analysis if required by FHWA guidance. For large corridor projects, include a discussion and summary table of the corridor area (total burden) emissions of the six priority MSATs: acetaldehyde, acrolein, benzene, 1,3-butadiene, formaldehyde, and diesel particulate matter and diesel exhaust organic gases (DPM + DEOG). FHWA has developed a standardized discussion of project level MSATs impacts[15] that can be adapted for a specific type of NEPA project (Appendix J).

The air quality mitigation discussion focuses on mitigation measures available during the construction and operation phases, which usually include the following:

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

Other types of mitigation that may be incorporated to improve air quality include 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 (HOV) 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 (signal

[15] http://www.fhwa.dot.gov/environment/airtoxic/020306guidmem.htm

coordination, access control, and intersection improvement), may be added as post-design mitigation or during project operation.

4.2. 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. In addition, the introduction to this section of the manual provides guidance on the treatment of resource-specific information that is the same for all resources; Sections 4.26 through 4.29 provide information on multidisciplinary summaries of resource-specific information.

4.2.1. 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 meet the following goals:

- To ensure that geologic/soil resources are identified and that their natural and economic values, as well as their visual aesthetics, are protected.

- To identify potential negative impacts that the geology or soils could have on the project if not identified and included in the design.

- 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 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 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.

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 erodable 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
- The 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.

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.

4.2.2. NEPA Document Sections

The content of the sections on geologic resources in the affected environment and environmental consequences chapters is discussed below. This geologic resource information should also be summarized for the multidisciplinary sections discussed in Sections 4.26 through 4.29 of this manual.

Affected Environment

The Affected Environment section of the NEPA document describes the existing conditions and uses of the geologic/soil resources within the project area, as shown in the sidebar in Section 4.2.1. 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 4.22 (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.

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

Environmental Consequences

In this section, 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

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.

4.3. Water Quality

Evaluation of water quality includes consideration of surface water, groundwater, and drinking water. Because these components are interrelated, their consideration is best accomplished by evaluating the entire watershed. A watershed is the land area drained by a stream or set of streams. Although floodplains and wetlands are considered water resources, these important resources are discussed separately in this manual: floodplains are discussed in Section 4.4 and wetland resources are discussed in Section 4.5.

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 4.3.

Table 4.3. 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
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, coolantsrust (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

Section 4.3.1 discusses why CDOT evaluates water quality as part of NEPA projects. Section 4.3.2 outlines information that should be included in the Affected Environment, Environmental Consequences, and Mitigation sections of NEPA documents. Appendix J contains the MOA between Colorado Department of Natural Resources (CDNR) and CDOT regarding Senate Bill (SB) 40 Certification, Protection of Fishing Streams. In addition, Section 4.0 of the manual provides guidance on the treatment of resource-specific information that is the same for all resources and Section 4.27 provides guidance on addressing cumulative impacts.

4.3.1. Water Quality Evaluation

The evaluation of water resources is initiated by the CDOT Regional Planning/Environmental Manager (RPEM) in consultation with the Project Engineer. Depending upon the project, the RPEM may conduct the water resource evaluation him/herself or contract with a consultant to prepare the evaluation. It is very important to invite CDOT maintenance personnel into the discussion early to accurately disclose effects from winter maintenance practices and determine the type and need for permanent Best Management Practices (BMPs).

CDOT evaluates water quality impacts for each alternative under detailed consideration, including the No Action.

The water resources evaluation should begin shortly after project scoping to identify sensitive surface water, groundwater, and/or drinking water supplies.

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.

To comply with federal Acts and Executive Orders, state laws, and FHWA technical guidance.

The regulations and certification applicable to water resource evaluations are summarized below and discussed in more detail in Section 7.2.

Clean Water Act (40 CFR Part 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 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 ground water resources.

Colorado Water Quality Control Act (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 Colorado Department of Public Health and Environment (CDPHE). Under this authority, the Colorado Water Quality Control Act was passed and CDPHE helped create the Water Quality Control Commission (WQCC) to provide regulations that keep Colorado in compliance with the Clean Water Act. A complete list of Colorado's water quality regulations are contained on WQCC's website[16]. The webpage contains links to common sources of information utilized 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 federal Clean Water Act, the WQCC has implemented Regulation 61 to list CDOT as a regulated Municipal Separate Storm Sewer System (MS4). An MS4 is a separate storm sewer system owned or operated by public agency, such as a city, town, county, special district, or state or federal agency. A separate storm sewer system is made up of ditches, gutters, storm sewers, and similar means of collecting and conveying runoff that do not connect with a wastewater collection system or treatment plant.

Colorado Discharge Permit System (CDPS)

Section 402 of the Clean Water Act outlines the regulations for complying with the National Pollution Discharge Elimination System or NPDES (implemented by Colorado as the Colorado Discharge Permit System or CDPS). Under NPDES, states were forced to "phase in" EPA regulations that were aimed at reducing point source pollution to

[16] http://www.cdphe.state.co.us/op/wqcc/index.html

streams and lakes. These regulations encouraged states to develop a variety of programs to reduce point source and site runoff pollution during the construction and operation phases of projects. In 1990 EPA issued the Phase I permit. Under Phase I, a MS4 that served greater than 100,000 people was required to obtain a permit. CDOT's Phase I permit required:

- Major revisions to the Erosion Control and Storm Water Quality Guide (CDOT, 2002) and Drainage Design Manual (CDOT, 2004)
- Identification of sensitive water and evaluate any special requirements for these waters
- Preparation of Storm-Water Management Plans (SWMP) for construction projects that disturb five or more acres
- Development of a "New Development/Redevelopment Program" that outlines a process to control water quality during the operation phase.

The CDOT MS4 Permit New Development and Redevelopment Program (CDOT, Feb. 2004) provides direction, criteria, and procedures to ensure that permanent BMPs are incorporated, as appropriate, into CDOT projects. Projects that will fall under CDOT authority, but are initially constructed by others, such as private developers and local governmental entities, also must comply with BMP requirements, regardless of the funding mechanism. The CDOT MS4 Permit New Development and Redevelopment Program, current Phase I/II Colorado Discharge Permit System (CDPS) permit, SWMP preparation guidance, Erosion Control and Storm Water Quality Guide (CDOT, 2002), and Drainage Design Manual are available on the CDOT Water Quality website[17].

It should be noted that some construction projects may occur in areas where two MS4 permits apply. If this is the case, the strictest requirements apply. Phase II also reduced the minimum size of construction projects requiring a CDPS permit from five acres of disturbed area to one acre of disturbed area.

In 1999, MS4s serving less than 100,000 people were required to obtain Phase II MS4 permits that required them to develop a program to reduce point source pollution to lakes and streams by implementing permanent BMPs. A map illustrating the locations of the Phase II areas in Colorado is listed on the CDOT Water Quality website.

Every construction project within CDOT right of way requires a SWMP in CDOT format. Projects that disturb one acre or greater require a SWMP in CDOT format and a CDPS construction storm-water permit from the Water Quality Control Division (WQCD). The CDPS

[17] http://www.dot.state.co.us/environmental/envWaterQual/wqms4.asp

construction permit must be signed by the Resident Engineer. The SWMP is prepared in the final design phase of the project and the CDPS construction permit is 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 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. The permits are discussed further in Section 7.

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 Colorado Division of Wildlife (CDOW) 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 SB 40. If a project meets any of the criteria in SB 40, CDOT must obtain an SB 40 Wildlife Certification from the CDNR or CDOW before construction begins. Under a MOA (Appendix I) 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 SB 40 but are granted a Programmatic SB 40 Certification. This Programmatic Certification gives CDOT the authority to proceed with a project after a letter of notification is sent to CDOW by CDOT RPEM.

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

SB 40 Certification is further discussed in Sections 4.7 and 7.1.

4.3.2. NEPA Document Sections

Water quality modeling and documentation in the Affected Environment and Environmental Consequences sections of EAs and EISs is discussed below. CatExs do not require modeling or extensive documentation. However, the need for permanent BMPs must be considered in Phase I/II areas for CatEx that disturb greater than one acre of soil. It was also recently decided that shouldering material will not be counted as disturbance area. Also, SWMPs must be prepared for every CatEx, regardless of disturbance area. CatExs that are expected to disturb one acre must have a SWMP and apply for a

CDPS construction permit with the WQCD at least 30 days prior to construction.

Examples of the appropriate level of detail for a discussion of water resources in an EA or EIS are provided in Appendix F, Best Examples.

Affected Environment

Documentation needs for the Affected Environment section 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. At a minimum, the Affected Environment section should contain a discussion of the following 11 elements:

Introduction and Table of Common Highway Runoff Pollutants – The introduction should contain a brief description of why we analyze water quality in NEPA documents. Areas to focus on include WQCC regulations and CDPS. A table of common highway pollutants should be included that is similar to Table 4.2.

General Watershed Information – This includes the name of receiving waters and the larger tributaries that they drain to. 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. Lastly, the presence of a Wild and Scenic River needs to be mentioned. Percent impervious surface, percent agricultural land, topographic relief and any other land accounting for 20% 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 plant locations, water quality monitoring data, MS4 permit requirements, water quality modeling preferences, 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 storm water, 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 Clean Water Act Section 303(d) Requirements (impaired waters list and monitoring list). All these regulations are contained on the WQCC webpage.

CDOT New Development and Redevelopment Program Requirements – The author needs to identify waters that meet the definition of sensitive waters in CDOT's Phase I/II MS4 Permit. These are defined as:

- Water quality segments listed on the Division's most recent 303(d) list (Regulation #93) or for which a total maximum daily load 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 Division's most recent Monitoring and Evaluation List (WQCC Regulation #94) 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; or,

- Water quality segments designated by federal or state agencies as a Threatened or Endangered Species Habitat.

It should also be noted if the project falls into one of the Phase I/II areas listed in CDOT's MS4 permit. A brief discussion regarding the construction (erosion and sediment control) and post construction (100% water quality capture volume/80% total suspended solids) requirements of CDOT's permit 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 strict requirements.

Drinking Water Sources, Wellhead Protection Areas – General locations for 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 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.

Graphics – The Affected Environment section should include a map of all surface water and important groundwater features in the vicinity of the project. 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 (WQCC Regulation 93), monitoring and evaluation (WQCC Regulation 94), 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 II MS4 areas. Features such as drinking water supplies, wastewater treatment plants, and wellhead protection areas can be added with the consent of the agency with jurisdiction.

Environmental Consequences

Documentation needs for the Environmental Consequences section 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. 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. 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 Threatened and Endangered (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 Plants – Pollutant loading from roadway runoff that has the potential to affect downstream drinking water supplies and wastewater treatment plants 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 PAHs in highway runoff.

Use Classifications, Impairment/Monitoring Status – Possible changes in stream segment Use Classifications, total maximum daily loads, and Monitoring status due to highway runoff needs to be discussed.

Water Quality Modeling – In certain instances, water quality modeling will be utilized 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 CDOT 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 a 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.

Winter Maintenance – The effects of winter 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 effect on water quality.

Mitigating Potential Impacts

Once effects are assessed in the Environmental Consequences section, mitigation measures need to be evaluated. Best management practices (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 virtually all 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.

Permanent BMPs

Section IV of the New Development and Redevelopment Program outlines a process for determining the need and type for permanent BMPs. The Program points out that permanent BMPs are required for most CDOT projects and some projects that constructed by others but require access to CDOT right of way. 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 the 128 form. Design details are usually provided in the FOR plans IF REQUIRED.

For projects that are covered under the New Development and Redevelopment Program, the goal of the BMP selection process is to provide 100% of the Water Quality Capture Volume for the entire transportation facility or 80% of total suspended solids removal for the entire transportation facility. Design criteria relating to permanent BMPs are also addressed in the following documents:

- Drainage Design Manual (CDOT 2004)[18]
- Urban Storm Drainage Criteria Manual (Urban Drainage and Flood Control District, June 2001 and September 1999)[19]

Construction BMPs

Construction BMPs and a Stormwater Management Plan 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 an acre or more, the project will also require a CDPS construction permit from the WQCD. The permit should be applied for at least 30 days

[18] http://www.casfm.org/papers/cdot_drainage_manual_index.htm
[19] http://www.udfcd.org/downloads/down_critmanual.htm

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.

Winter Maintenance

Mitigation for winter 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 de-icing applications, and product storage practices.

SB 40 Certification

Mitigation for SB 40 impacts generally requires creation, restoration, and/or enhancement of impacted riparian (streamside) areas and a storm-water management plan (SWMP) to address construction-related erosion/sedimentation effects. The CatEx must contain a SWMP, mitigation plan, and signed certification from CDOW 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 threatened and endangered mitigation usually applies to SB 40 and it is helpful to cross reference the wetland and/or threatened and endangered sections of the NEPA document when this is the case.

4.4. 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[20].

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. In addition, the introduction to this Section of the manual provides guidance on the treatment of resource-specific information that is the same for all resources; Sections 4.26 through 4.29 provide information on multidisciplinary summaries of resource-specific information.

[20] Modified from: *Metropolitan Sewer District, Louisville, KY* and Federal Emergency Management Agency (FEMA) General Provision Definitions (44 CFR 59.1)

4.4.1. Floodplain Evaluation Process

The CDOT project engineer in consultation with the environmental resource specialist assigned to the project is responsible for ensuring project impacts on base floodplains and regulatory floodplains.

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.

Significant Impacts: If a preferred alternative includes a significant impact of floodplain encroachment refer to EO 11988.

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, 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 the Federal Emergency Management Agency (FEMA). These regulations are also summarized in Section 7.2.

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.

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 as required by 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 upon 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 here is no floodplain encroachment.

No involvement: There are no floodplains in the vicinity of the proposed alternatives.

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 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). Please refer to the USACE Water Resources Management website[21] for information regarding Corps roles in floodplain management.

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 or economic issues. The Hydraulic Study will discuss the level of risk or environmental impact for each alternative that encroaches on base floodplains or would support base floodplain development, including:

- Flooding risks to residences, other buildings, and crops
- Significant potential for interruption or termination of a transportation facility that is needed for emergency vehicles or provides a community's only evacuation route
- Impacts on natural and beneficial services
- Support of development incompatible or inconsistent with the community's floodplain development plan
- Measures to minimize floodplain impacts
- Measures to restore and preserve the natural and beneficial floodplain services

CDOT's specific procedures for evaluating impacts to floodplains are discussed in Section 2.09 of the CDOT Project Development Manual (CDOT, 2001)[22].

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 National Flood Insurance Program (NFIP) community. Circumstances that would require coordination with the affected NFIP community and FEMA include the following (FHWA memorandum, June 1982; Appendix 5.4-A):

[21] http://www.vtn.iwr.usace.army.mil/floodcontrol/default.htm

[22] http://www.dot.state.co.us/DesignSupport/Project%20Development%20Manual/CDOT%20Project%20Development%20Manual.htm

- 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[23] 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.

Affected Environment Section 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

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 permit that fills part of an existing 100-year floodplain to increase developable land along the Colorado Front Range.

4.4.2. NEPA Document Sections

The content of the sections on floodplains in the affected environment and environmental consequences chapters is discussed below. This floodplain information should also be summarized for the multidisciplinary sections discussed in Sections 4.26 through 4.29 of this manual.

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 section.

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 section, as follows:

[23] http://www.fema.gov/business/nfip/how.shtm

- 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 US Geological Survey (USGS), USACE, the Natural Resource Conservation Service (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.

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 Impact Analysis 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?

Impact Analysis 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

- Can the floodway/floodplain be avoided?

Bridge piers are considered as a floodway encroachment

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.

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 Conditional Letter of Map Revision [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

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 and National Flood Insurance Act (23 CFR 650, Subpart A). This finding should be included in a separate subsection entitled "Only Practicable Alternative Finding." 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

4.5. Wetlands

Based on the definition used by USACE in their Wetlands Delineation Manual (USACE 1987)[24], the term "wetlands" is defined as: "those areas that are inundated or saturated by surface or ground water 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 to aquatic and terrestrial organisms
- Key components of hydrologic systems as reservoirs and for filtration
- Highly regulated

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. In addition, the introduction to this Section of the manual provides guidance on the treatment of resource-specific information that is the same for all resources; Sections 4.26 through 4.29 provide information on multidisciplinary summaries of resource-specific information.

4.5.1. Wetland Evaluation Process

A CDOT wetland specialist in the project region or from EPB, 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 projects and many 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.

Wetland Attributes
- Type
- Acreage
- Plant/animal inhabitants and uses
- Potential uses by humans
- Jurisdictional status
- Water quality
- Functions

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

[24] http://www.spk.usace.army.mil/organizations/cespk-co/regulatory/pdf/delineation_manual.pdf

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 the 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 CDOT NEPA/404 Merger process[25] in alternatives screening and purpose and need development 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:

- Because wetlands provide important habitat components for many aquatic, avian, and wildlife species, including state and federally listed threatened and endangered species.
- To comply with the vision presented in CDOT's Environmental Stewardship Guide.
- 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 Clean Water Act (CWA)

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. Section 401 and 402 certifications are also 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. More detail on the 404 permit process and coordination with USACE is provided in Section 7.0. As part of their CWA responsibilities and before issuing an individual permit, USACE must ensure compliance with 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[26] is to "minimize the destruction, loss or degradation of wetlands and to preserve and enhance the natural and beneficial services of

Wetland Legislation
Clean Water Act
Endangered Species Act
Colorado Senate Bill 40
Section 6(f) of the Department of Transportation Act
Executive Order 11990, Protection of Wetlands
23 CFR 771
23 CFR 777
Technical Advisory T6640.8A

[25] http://www.dot.state.co.us/environmental/StandardsForms/NEPA404Merger.pdf
[26] http://www.epa.gov/owow/wetlands/regs/eo11990.html

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. FHWA has similar requirements, as stated in 23 CFR 777 - Mitigation of Impacts to Wetlands and Natural Habitat Final Rule[27].

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, as discussed in more detail in Section 5. Wetlands legislation is provided later in this section and described in more detail in Section 4.5.1 and in Section 7.0.

Collection and Evaluation of Baseline Information

The AOI considered for wetland resources should include the area where ground disturbance actually occurs and incorporate any wetlands or other watershed components that may be down drainage of and sufficiently close to the ground disturbance that project-related impacts are possible. This wetland AOI should be presented on a figure in the NEPA document.

Describe the physical, chemical, and biological contribution that the AOI provides to the wetland and surrounding habitat. In some cases, areas upstream of the AOI should be considered. For example, a large water source upstream of the wetland may be cut off or altered by the project's drainage system. An alteration would include routing a sheet flow or shall ground flow regime into a culvert. 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 on Cowardin [1979], acreage, plant/animal inhabitants and uses of special interest, and functions and services), and mapped. In addition, their jurisdictional status, water quality, and potential uses by humans should be determined. Wetland functions and values should be determined by applying a CDOT- and USACE-approved wetland functional assessment method. (CDOT is currently funding research on such a method (FACWet) and, once completed, it will be available online[28].

The best literature-based sources of such information on wetland presence include:

- National Wetlands Inventory[29]
- Colorado Natural Heritage Program[30]

[27] http://www.fhwa.dot.gov/environment/fr29de00.pdf
[28] http://www.dot.state.co.us/environmental/Wetlands/default.asp
[29] http://www.fws.gov/nwi/

- USGS National Wetlands Research Center[31]
- 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 status of wetlands in the project area may need to be determined by field survey if not previously completed. The survey should be conducted in accordance with the USACE Wetland Delineation Manual[32] (USACE 1987). Supplements to the 1987 delineation manual[33] 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 threatened/endangered species or critical habitat will be a component of consultation with US Fish and Wildlife Service (USFWS) under the Endangered Species Act (ESA) (see Section 4.8 for further discussion).

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

Because wetland delineations should be performed when the ground is clear of snow, wetland vegetation is well developed, it is best 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 to reviewing the submitted documents, a USACE representative typically reviews the delineation map in the field to determine the 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 an 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 both the map and report, including any required modifications, the impact of the project on the wetlands may be assessed. These data are best displayed in tabular form.

Direct impacts are typically quantified on the basis of acreage and functions disturbed. Precise acreages must be determined for any wetlands that would be physically disturbed because it could not be

[30] http://www.cnhp.colostate.edu/gis.html
[31] http://www.nwrc.usgs.gov/
[32] http://www.spk.usace.army.mil/organizations/cespk-co/regulatory/pdf/delineation_manual.pdf
[33] http://www.usace.army.mil/cw/cecwo/reg/reg_supp.htm

avoided by any of the project alternatives. These data are best determined by overlaying project alternatives with the wetland locations.

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.

In conducting the analysis of wetland impacts, the following guidance from Technical Advisory 6640.8A[34] should be incorporated:

- 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, ground water 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 recommended methods listed below for conducting the functional analysis:

1. Montana Wetland Assessment Method

2. USACE Wetland Management Handbook[35]

Knowing the importance of the wetlands involved 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

[34] http://www.fhwa.dot.gov/legsregs/directives/techadvs/t664008a.htm
[35] http://www.spk.usace.army.mil/organizations/cespk-co/regulatory/pdf/10167.pdf

wetlands, not just those considered jurisdictional under Section 404. Guidance on these approaches includes the following:

- Avoidance, the most 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 Best Management Practices (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. Numerous BMPs are available and can be found online[36]. The effectiveness of BMP is evaluated in a 1999 EPA document[37].

- 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 establishment of new wetlands, restoration, enhancement, and preservation.

- Successful construction of new wetlands elsewhere within the project area or vicinity or the more preferable purchase of credits in established wetland banks. 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 and can be found online[38]. The use of mitigation banks is limited to project impacts that occur in a banks primary or secondary service area. Several wetland 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.

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

[36] http://www.bmpdatabase.org/
[37] http://www.epa.gov/waterscience/stormwater/
[38] http://www.fhwa.dot.gov/environment/wetland/tea21bnk.htm

- 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 each installed compensatory mitigation and establishes success criteria and the duration and frequency of monitoring. CDOT has a growing database that tracks predicted wetland impacts, actual wetland impacts, and actual mitigation measures that are in place.

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 based on the preferred alternative, also being a LEDPA. Note also that, as described more fully in Chapter 7.0, information on wetland impacts and their mitigation must be included in the Wetland Finding[39] (Appendix J) and must be approved by CDOT or FHWA as appropriate based on their current MOA[40]. A Wetland Finding is required when there are greater than 500 square feet of permanent impacts or 1,000 square feet of temporary impacts.

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

4.5.2. NEPA Document Sections

The content needed for the sections on wetlands in the affected environment and environmental consequences chapters is discussed below. This wetland information should also be summarized for the multidisciplinary sections discussed in Sections 4.26 through 4.29 of this manual.

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

Affected Environment

The wetlands section of the affected environment should indicate:

- 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?)
- 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

[39] http://www.dot.state.co.us/environmental/StandardsForms/wet%20find%20-%20checklist%20-%208-02.pdf
[40] http://www.dot.state.co.us/environmental/docs/Agreements/006MOA0406.pdf

- The study area, and explains what functional assessment method was employed; 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.

A couple of paragraphs should be sufficient to "paint a picture" of local wetlands. For example:

Wetlands are scarce and often ephemeral in the vicinity of the project. They occur primarily south of State Highway (SH)__ in low lying areas, but are occasionally perched in higher topography on impermeable soils or strata. Some of the area's wetlands occur at the low point of drainage basins lacking a drainage outlet and are thus quite alkaline.

Particularly in the spring, the wetlands near the project are used by migrating water birds as resting and feeding areas. During this period, recreational bird watchers frequent the wetlands. The few wetlands that are permanent are also used as year around habitat by aquatic organisms and during fall migration by water birds. People who watch wildlife and those who hunt and fish frequent the permanent wetlands at appropriate times.

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?

For example:

Because naturally occurring wetlands in the project vicinity are scarce, they have been avoided by roads. Runoff from SH __ does flow into the wetlands south of it, and there are several paved local roads and unpaved roads that also contribute runoff to down drainage wetlands. For the most part, however, these roads are greater than ___ from the wetlands and tend to receive road runoff that has percolated through the soil rather than as surface sheet flow. None of the naturally occurring wetlands are close enough to any roads to flood them. In addition to naturally occurring wetlands, road construction has resulted in the presence of small wetlands in the borrow area. This is particularly true along SH___ and County Road___.

Environmental Consequences

The environmental consequences section for wetlands should clearly address the:

- Acreage of potential direct and indirect impact to wetlands
- Impact to functions (Technical Advisory 6640.8A[41]). 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, shadowing, etc) and indirect impacts (erosion, sedimentation, hydrologic modification, noxious weed invasion, etc) are expected.

Environmental Consequences Section 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

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.

In accordance with Technical Advisory 6640.8A requirements,

if the preferred alternative is located in wetlands, to the fullest extent possible, 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

[41] http://www.fhwa.dot.gov/legsregs/directives/techadvs/t664008a.htm

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.'

See the Wetland Finding Checklist[42] (Appendix J) to enable compliance with the above requirement.

[42] http://www.dot.state.co.us/environmental/StandardsForms/wet%20find%20-%20checklist%20-%208-02.pdf

4.6. 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. Geographic Information System (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 (EO) 13112[43] 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 their 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. In addition, the introduction to this chapter of the manual provides guidance on the treatment of resource-specific information that is the same for all resources; Sections 4.26 through 4.29 provide information on multidisciplinary summaries of resource-specific information.

Vegetation Regulations and Guidance

- See Section 4.4 and 4.5 for regulations that protect vegetation found in floodplains and wetlands, respectively
- See Section 4.6.3 for regulations for noxious weeds
- See Section 4.7 for regulations that protect vegetation because of specified uses by fish and wildlife
- See Section 4.8 for regulations that protect vegetation that is threatened/endangered or otherwise legally protected

4.6.1. Vegetation Evaluation Process

The CDOT RPEM, resource specialist, or environmental project manager are responsible for early identification of vegetation communities, their critical uses, and important species. In fulfilling this

[43] http://www.invasivespeciesinfo.gov/laws/execorder.shtml

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 AOI 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 (ROW) fence should also be surveyed for the presence of noxious weeds that could readily move into the disturbed soils within the AOI. 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 (see noxious weeds, Section 4.6.3, at the end of this resource section). The present or potential uses of vegetation communities and whether they might include threatened/endangered species must also be determined. Section 4.8 further discusses threatened/endangered species.

Vegetation communities within the AOI, 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 determined. Field review is required to determine whether particular plant species are present within the AOI, 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.

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 the vision presented in CDOT's Environmental Stewardship Guide
- 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 AOI 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 threatened/endangered is determined by the importance of that vegetation to the surrounding ecosystem. Riparian vegetation (Section 4.4) and wetlands (Section 4.5), 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 (Section 4.7). Plants that are protected because they are listed as threatened/endangered species or are otherwise legally protected are discussed in Section 4.8.

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% of 1% of the landscaping budget) during reclamation is required on federal-aid projects as noted in FHWA's Landscape and Roadside Development[44] (23 CFR Part 752) and Landscaping and Scenic Enhancement[45] (23 CFR Part 319). The Rules Pertaining To The Administration and Enforcement Of The Colorado Noxious Weed Act[46] (8 CCR 1203-19) identify these plants on three lists. List "A" species are designated for statewide eradication, while the control of List "B" is to be accomplished through state noxious weed management plans. Additionally, vegetation on public lands through which a transportation project passes (e.g., BLM, US Forest Service (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 AOI 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 all vegetation should be kept to a minimum whenever this is reasonably possible.

[44] http://a257.g.akamaitech.net/7/257/2422/04nov20031500/edocket.access.gpo.gov/cfr_2001/aprqtr/23cfr752.4.htm
[45] http://www4.law.cornell.edu/uscode/html/uscode23/usc_sec_23_00000319----000-.html
[46] http://www.ag.state.co.us/CSD/Weeds/statutes/weedrules.pdf

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[47] (GAP) from which 100,000 block datasets depicting vegetation can be downloaded. These data can be characterized as follows:

- CO-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 Zone13, North American Datum 1927 projection, and provided by 30 X 60 minute blocks.
- Metadata is viewable on-screen and downloadable separate from the data.
- All files are gzip files, which can be uncompressed using WinZip.

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

CDOW's Natural Diversity Information Source[48] 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[49]
- USDA Data Gateway[50]
- NatureServ[51]

[47] http://ndis1.nrel.colostate.edu/cogap/
[48] http://ndis.nrel.colostate.edu/exploring.asp
[49] http://data.geocomm.com/
[50] http://datagateway.nrcs.usda.gov/
[51] http://www.natureserve.org/getData/plantData.jsp

- Other sites that are listed in aggregate at the USFWS Geographic Information Systems & Spatial Data[52] portal.

Ultimately, a single source of spatial data will need to be chosen to depict the vegetation in the vegetation AOI. 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 at the Colorado Natural Heritage Program's website[53]. This site 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 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's website on noxious weeds[54]. Links on this 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, threatened and endangered 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 AOI, 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 AOI 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

[52] http://www.fws.gov/data/
[53] http://www.cnhp.colostate.edu/gis.html
[54] http://www.ag.state.co.us/csd/weeds/mapping/WeedInventoryBasics.html

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 AOI 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 AOI 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 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 foreseeable future projects that should be addressed for all resources in the consideration of cumulative impacts is discussed in Section 4.26. 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 AOI 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 CDOW, USFWS, and Natural Resources Conservation Service (NRCS), which are discussed in Section 5, 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 threatened/endangered plant species that may occur in the AOI will need to be analyzed with regard to project impacts. This is discussed in Section 4.8.

4.6.2. NEPA Document Sections

The content of the sections on vegetation in the affected environment and environmental consequences chapters is discussed below. This vegetation information should also be summarized for the multidisciplinary sections discussed in Sections 5 of this manual. Level of detail will vary with species composition, the presence of threatened/endangered species, and the value of the vegetation habitat.

Affected Environment Section of NEPA Document

- Map of the vegetation communities or land cover types in the vegetation area of interest
- 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 threatened/endangered species section so that such plant species will not be overlooked by the reader

Affected Environment

The description of vegetation in the affected environment section 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 AOI for the project
- Describe how the vegetation land cover types within the AOI fit within the regional context (agriculture, forestry products, open space)
- Include a map of the vegetation land cover types within the vegetation AOI and provide a cross reference to the threatened/endangered species 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 section 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
- 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 AOI
- A statement of the likelihood of sensitive species presence and cross-reference to the threatened/endangered 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 SB 40 commitments (1:1 trees, sod fragmentation shrubs)
- Transplanting (moving particularly important plant populations to areas where they would not be disturbed)
- Employing best management practices during construction by using erosion and sediment control BMPs, implementing phased seeding, and containing potential pollutants.

4.6.3. 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 has been declared a noxious weed by the state of Colorado or a local advisory board, and meets one or more of the following criteria:

a) Aggressively invades or is detrimental to economic crops or native plant communities

b) Is poisonous to livestock

c) Is a carrier of detrimental insects, diseases, or parasites

d) 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?

- Because 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.

- Because the spread of noxious weeds can largely be 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-ways in Colorado, and because the ground disturbance caused by construction projects are often colonized by noxious weed species preventing the establishment of native vegetation.

- Because it's the law, and because of 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 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 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

Affected Environment

The affected environment must include areas adjacent and near the project area, not just the project footprint. Describe the existing vegetative conditions in and adjacent to the project area. The following information should 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 threatened/endangered 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, threatened and endangered, and floodplains, as necessary. Tie regulatory requirements to noxious weed information where appropriate.

Impact Analysis

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:

a) 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 shall 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 as both a map and a table, which includes species of weeds, extent, density, regulatory status, and any specific issues related to each weed.

b) 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 the impacts affect wetland, riparian, or other sensitive habitats? 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.

Threatened and endangered species. The document must address the impacts to the identified threatened and endangered species. Will the presence of noxious weeds displace the listed plant or compete with desirable habitat vegetation? The presence of threatened and endangered species in a given area will limit the method of control for noxious weeds. Furthermore, more stringent management practices may be required in a threatened and endangered 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 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, threatened and endangered 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 analysis of impacts in Subsection 2, 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 rights-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 shall never be salvaged if contaminated by noxious weeds or seeds. Importing topsoil onto the project site shall not be allowed unless it is 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, threatened and endangered, 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 dramatically 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. The NEPA document should include mitigation measures in the Impact/Mitigation Summary table as well.

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.

- Those who spray pesticides or herbicides must be licensed by the state as a 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 suitable application.

Noxious Weed surveys can not 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.

4.7. 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 threatened/endangered species (discussed in Section 4.8). 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. In addition, the introduction to this chapter of the manual provides guidance on the treatment of resource-specific information that is the same for all resources; Sections 4.26 through 4.29 provide information on multidisciplinary summaries of resource-specific information.

4.7.1. 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 AOI. Thus, the AOI identified for animals is typically larger than that identified for plants, because animals are mobile.

Whether the species present might include threatened/endangered species must also be determined. These species are discussed further in Section 4.8.

Fish and wildlife species, their populations, and their habitat within the AOI 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 AOI, 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).

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 numerous additional federal and state regulations and extensive guidance for protection of fish and wildlife resources

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 the vision presented in CDOT's Environmental Stewardship Guide.
- To enable compliance with numerous legal mandates that pertain to fish and wildlife.

The primary legal mandates that protect fish and wildlife species are listed at the beginning of this section and explained in more detail in Section 7.0.

There are numerous other federal laws[55] 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 CDOW when the agency plans construction in "any stream or its bank or tributaries."

[55] http://www.fws.gov/laws/laws_digest/resource_laws.htm

In addition, there are state laws[56] 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 intentional take of such species rather than unintentional take or habitat disruption. In addition, CDOW has recommendations on buffer zones and seasonal restrictions for Colorado raptors (Appendix J) 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[57], mentioned in Section 4.6, include information on 597 vertebrate animal species that are typically associated with the land cover types identified in the state.

[56] http://wildlife.state.co.us/RulesRegs/Regulations/
[57] http://ndis1.nrel.colostate.edu/cogap/

- Latilong reports, published originally by CDOW 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.

- 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 described in Schrupp and Cade (1989)

- Distributional information from local CDOW personnel, who should always be consulted

- Natural Diversity Information Source[58], which provides data on 748 animal species in the state

- Online data on reptiles and amphibians from the Colorado Herpetological Society's website[59]

- Colorado Natural Heritage Program (CNHP) website[60], which tracks and ranks Colorado's rare and imperiled species and habitats, not all of which are threatened/endangered

- FHWA Critter Crossing website[61]

- FHWA Invasive Species website[62]

- USFWS Invasive Species website[63]

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[64], or additional scientific sites such as The Birds of North America Online[65] (paid subscription required). 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.

[58] http://ndis.nrel.colostate.edu/wildlife.asp
[59] http://coloherp.org/geo/
[60] http://www.cnhp.colostate.edu/gis.html
[61] http://www.fhwa.dot.gov/environment/wildlifecrossings/index.htm
[62] http://www.fhwa.dot.gov/environment/invasive.htm
[63] http://invasives.fws.gov/
[64] http://www.natureserve.org/explorer/
[65] http://bna.birds.cornell.edu/BNA/

Evaluation of Baseline Information

Once data have been collected on the fish and wildlife species documented or likely to be present in the AOI, 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. Thus, all the species that are likely to use ponderosa pine forests may be assumed to be impacted if project facilities disturb ponderosa pine habitat.

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 instance:

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. An important source of such information is provided in data being developed for the Wildland Project[66]. A large scale map[67] of the components of this project and more detailed information on the Southern Rockies Wildlands[68] projects that cover much of western Colorado provide information on context and how it can be considered[69].

Use species-specific guidance to evaluate impacts when it is available. For example, CDOW guidance on Recommended Buffer Zones and Seasonal Restrictions for Colorado Raptors (Craig 2002; Appendix J) 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

[66] http://www.twp.org/files/pdf/spine_map.pdf
[67] http://www.twp.org/files/pdf/spine_map.pdf
[68] http://www.restoretherockies.org/linkages.htm
[69] http://www.twp.org/cms/page1133.cfm

FHWA Critter Crossing website[70]. They should be implemented to minimize project impacts whenever feasible.

Mitigation measures employed to minimize impacts to other resources (e.g., air quality—Section 4.1, geologic resources—Section 4.2, water quality—Section 4.3, floodplains—Section 4.4, wetlands—Section 4.5, and vegetation—Section 4.6) 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[71] 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

[70] http://www.fhwa.dot.gov/environment/wildlifecrossings/index.htm
[71] http://www.fhwa.dot.gov/environment/wildlifecrossings/main.htm

- 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

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 SGPI[72] 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.

4.7.2. NEPA Document Sections

The content of the sections on fish and wildlife in the affected environment and environmental consequences chapters is discussed below. This fish and wildlife information should also be summarized for the multidisciplinary sections discussed in Sections 4.26 through 4.29 of this manual.

Affected Environment

The affected environment chapter of the NEPA document should:

- Briefly characterize the important fish and wildlife species in the project vicinity

[72] http://www.dot.state.co.us/environmental/Wildlife/Guidelines.asp

- Note whether any of them are expected to be impacted by 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
- Removal or depletion of water from either the Upper Colorado, San Juan, or Platte River basins, which will affect species hundreds of miles downstream
- Increased competition from species that may not otherwise be a factor
- 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 that have been 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 are 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. Prepare the fish and wildlife input for a tabular summary of impacts by alternative.

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

4.8. Threatened/Endangered Species

Threatened and endangered species are species that have been listed pursuant to the Federal Endangered Species Act. The Act 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 FR for listing under Section 4 of the ESA.

- A candidate species is an animal or plant species defined by the Fish and Wildlife Service 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 squawfish, humpback chub, and bonytail chub.

Additional terms are used to describe species that have low populations, but may or may not be formally listed. For example:

- 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—A general term for listed species as well as unlisted ones that are declining in population.

- Imperiled species—Another general term for listed as well as unlisted species that are declining.

Such species are important for all the reasons noted in Section 4.6 and Section 4.7 of this manual for vegetation and fish and wildlife, respectively. In addition, threatened/endangered 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.

The two sections below provide guidance on the treatment of threatened/endangered species for CDOT's NEPA projects. The first section discusses the process for evaluating threatened/endangered species. The second section discusses information on threatened/endangered species that should be in each NEPA document. In addition, the introduction to this Section of the manual provides guidance on the treatment of resource-specific information that is the same for all resources; Sections 4.26 through 4.29 provide information on multidisciplinary summaries of resource-specific information.

4.8.1. Threatened/Endangered Species Evaluation Process

Because threatened/endangered 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. When evaluating threatened/endangered species, refer to Section 4.6 (vegetation) and Section 4.7 (fish and wildlife) in addition to this section, which will concentrate on discussion of the additional requirements for threatened/endangered species, due to their status.

As for plants and animals in general, the CDOT RPEM, resource specialist, or environmental project manager are responsible for early identification of threatened/endangered 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 AOI for threatened/endangered 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 AOI should be large enough to enable consideration of all possible direct or indirect project impacts.

Threatened/endangered species 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 threatened/endangered species and their designated critical habitat must be minimized to ensure compliance with the ESA. Early knowledge that threatened/endangered 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 threatened/endangered species to be conducted at the correct time.

Reasons for Evaluation of Threatened/Endangered Species Under NEPA

CDOT evaluates threatened/endangered species for several reasons:

- Unauthorized take of listed species is subject to both civil and criminal penalties.
- Threatened/endangered species and their designated critical habitat are ecologically important
- To comply with the vision presented in CDOT's Environmental Stewardship Guide
- To comply with several legal mandates that pertain to threatened/endangered species

Threatened/endangered plant and animal species are subject to all of the regulations identified in Section 4.6 for vegetation and in Section 4.7 for fish and wildlife. They are also subject to protection under the ESA and subsequent amendments[73].

- Section 7 of the act requires that "each federal agency . . . in consultation with and with the assistance of the Secretary [of the Interior[74]] 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 act. Unauthorized take of a species listed in accordance with the act 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.

[73] http://www.fws.gov/endangered/esa.html
[74] For other parts of the country where marine species occur, the Secretary of Commerce and the National Marine Fisheries Service share responsibility with the Secretary of the Interior and the USFWS.

Regulations governing interagency cooperation in implementing this act can be found at 50 CFR 402.[75] FWHA Technical Advisory T 6640.8A[76] guidance includes threatened/endangered species among the potentially significant impacts most commonly encountered by highway projects. The State of Colorado also protects threatened/endangered species under Colorado Revised Statutes, Title 33, Article 2.[77]

Collection and Evaluation of Baseline Information Under NEPA

For threatened/endangered 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 informal consultation with USFWS and obtaining concurrence as to whether formal consultation is required for the specific project being proposed. If formal consultation is required, FHWA or another federal agency must prepare a Biological Assessment (BA)[78] and submit it to USFWS in order to obtain their biological opinion[79] as to whether the project jeopardizes a listed species or its habitat. Further information on the USFWS consultation process can be found in Section 5 of this manual and in the Final ESA Intra-Service Consultation Handbook.[80]

Collection of Baseline Information

The first step in addressing threatened/endangered 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 threatened/endangered species in Colorado[81] (Fish and Wildlife Service)
- State listed threatened/endangered species[82] (State of Colorado Department of Natural Resources)
- County-specific species lists from the Natural Diversity Information Source[83]

[75] http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&tpl=/ecfrbrowse/Title50/50cfr402_main_02.tpl
[76] http://www.dot.ca.gov/ser/vol1/sec1/ch1fedlaw/TA6640.txt
[77] http://198.187.128.12/colorado/lpext.dll?f=templates&fn=fs-main.htm&2.0
[78] 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.
[79] 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.
[80] http://training.fws.gov/EC/Resources/ES_Listing_and_Candidate_Assessment/ESA%20Folder/S7book.pdf
[81] http://ecos.fws.gov/tess_public/StateListing.do?status=listed&state=CO
[82] http://wildlife.state.co.us/WildlifeSpecies/SpeciesOfConcern/ThreatenedEndangeredList/ListOfThreatenedAndEndangeredSpecies.htm
[83] http://ndis.nrel.colostate.edu/wildlife.asp

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

- USFWS[84]

- CDOW[85] (additional CDOW data may be obtained through their area biologists[86])

- CNHP[87] (additional CNHP data may be requested via a prescribed process[88])

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 threatened/endangered species being impacted have critical habitat that has been formally designated by USFWS and is legally protected. Be sure to learn whether the threatened/endangered species in the project area of impact have designated critical habitat and obtain a description and map of any such habitat.

Section 4.6 and Section 4.7 of this manual may contain additional sources that include information on threatened/endangered vegetation and fish and wildlife species, respectively.

Evaluation of Baseline Information

The process used to evaluate baseline information for threatened/endangered plant and animal species does not differ from the process used for other plant and animal species populations and is discussed in Section 4.6 and Section 4.7 of this manual. However, the rigor with which these processes are applied to threatened/endangered 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 any designated critical habitat for the threatened/endangered species, the species, or the general habitat they use

[84] http://www.fws.gov/Endangered/wildlife.html
[85] http://wildlife.state.co.us/WildlifeSpecies/SpeciesOfConcern/ThreatenedEndangeredList
[86] http://wildlife.state.co.us/About/OfficesAndPhone/
[87] http://www.cnhp.colostate.edu/gis.html
[88] http://www.cnhp.colostate.edu/er.html#Requests

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 "Threatened/Endangered 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 discussed in Section 5, 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 threatened/endangered 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.

4.8.2. NEPA Document Sections

The content of the sections on threatened/endangered species in the affected environment and environmental consequences chapters is discussed below. This threatened/endangered species information should also be summarized for the multidisciplinary sections discussed in Sections 4.26 through 4.29 of this manual.

Affected Environment

Determine whether the affected environment section on threatened/endangered species should include only these species, or also discuss other species of concern, and title the section appropriately. If other species of concern are not discussed with threatened/endangered species, they should be highlighted in the sections on vegetation and fish and wildlife.

Information on threatened/endangered species in the affected environment chapter should be more detailed and species specific than is provided in the sections on other plants (Section 4.6) and animals (Section 4.7). Discuss each threatened/endangered 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:

1) no effect;

2) may affect but not likely to adversely affect, or

3) adverse affect.

No consultation is required for no effect findings. For a finding of no effect 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 to enter into formal consultation. At the end of formal consultation, the USFWS will issue a biological opinion

Discuss the impacts to each threatened/endangered 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 threatened/endangered species together and contrast those that differ so that similarities and differences in alternative impacts on a threatened/endangered species are clear. Prepare the threatened/endangered species input for a tabular summary of impacts by alternative.

For threatened/endangered 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 Final ESA Section 7 Consultation Handbook[89] outlines the necessary procedure:

[89] http://training.fws.gov/EC/Resources/ES_Listing_and_Candidate_Assessment/ESA%20Folder/S7book.pdf

The action 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 (see Appendix G in the Final ESA Section 7 Consultation Handbook);
- reinitiate the consultation by proposing modification of the action or offering reasonable and prudent alternatives not yet considered; or
- choose to take other action if it believes, after a review of the biological opinion and the best available scientific information, that such action satisfies Section 7(a)(2).

The action agency must notify the USFWS of its final decision on any proposed action that receives a jeopardy or adverse modification biological opinion (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 threatened/endangered species whenever possible.

Historic Property Regulations

- Antiquities Act of 1906
- National Historic Preservation Act of 1966, Section 106, 110 (as amended)
- Archeological Resources Protection Act
- American Indian Religious Freedom Act
- Native American Graves Protection and Repatriation Act
- Surface Transportation and Uniform Relocation Assistance Act of 1987: Section 123
- Colorado Historical, Prehistorical, and Archaeological Resources Act
- Colorado Register of Historic Places Act

4.9. 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.

The two sections below provide guidance on the treatment of historic properties under NEPA. The first section discusses the process for evaluating historic properties. The second section discusses the information that must be in each of the NEPA document sections that address historic properties. In addition, the introduction to this section of the manual provides guidance on the treatment of resource-specific information that is the same for all resources; Sections 4.26 through 4.29 provide information on multidisciplinary summaries of resource-specific information.

4.9.1. Historic Properties Identification and Evaluation Process

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 4.1) 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.

Colorado Cultural Resource Survey Manual

Refer to the Colorado Cultural Resource Survey Manual, Volumes I and II (http://192.70.175.136/crforms/crforms1.htm) 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 resources (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)

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.

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. Some of the more important regulations are listed in the sidebar on the previous page and summarized in Section 7.2.

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 effect historic properties. Adverse effects can occur when historic properties listed on or eligible for listing on the National Register for Historic Places (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 coordination 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.

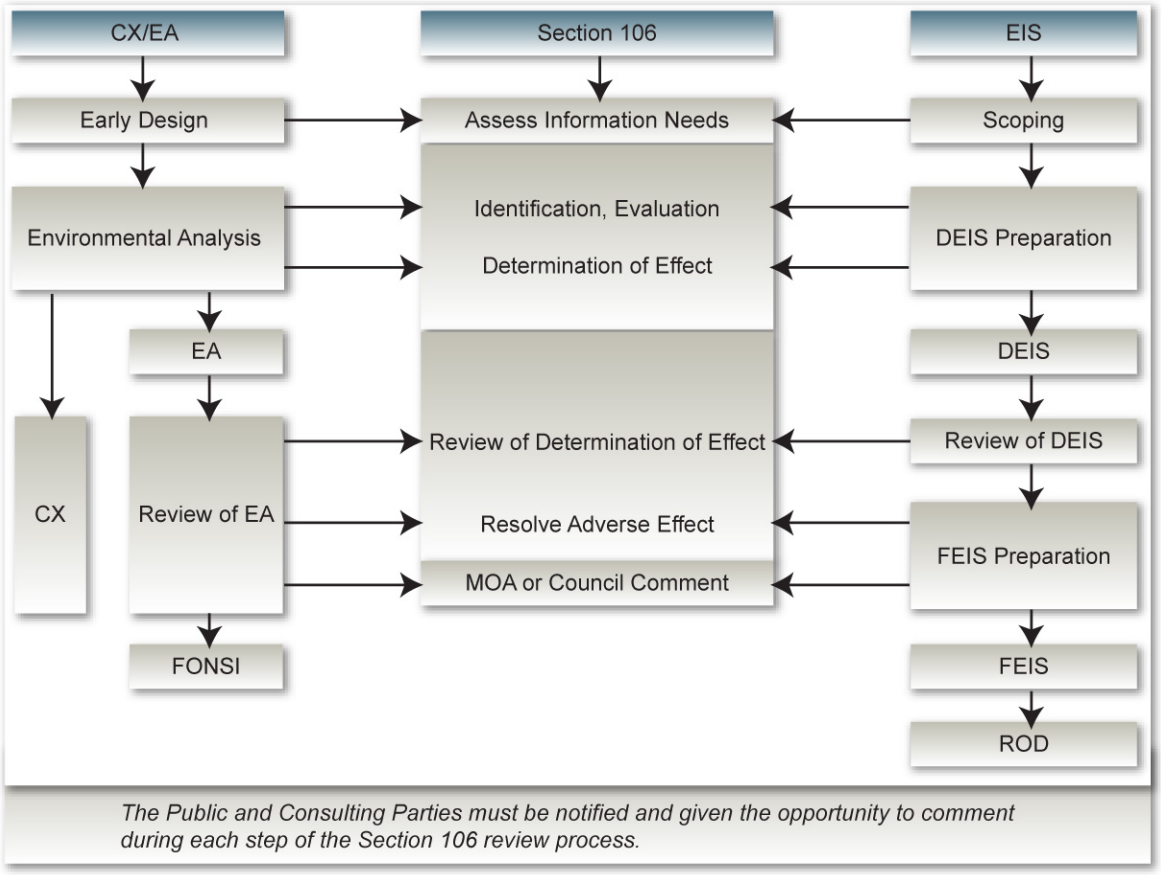
- Adverse Effect – six months or more
- No Adverse Effect – four months
- No Historic Properties Affected – two months

Note: These time frames do not include Section 4(f) evaluations, which are detailed in Section 4.19.

Collection and Evaluation of Baseline Information Under NEPA and Section 106

Section 106 of the National Historic Preservation Act outlines procedures to identify and determine the effects of a project on historic properties. The Section 106 and NEPA processes must be coordinated (Figure 4.1) so that the acquired information can provide the historic properties baseline information required for NEPA analysis.

Figure 4.1. Coordination Between NEPA and Section 106



Source: Colorado historical society office of archaeology & history preservation.

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 Senior Staff

Historian and Senior Staff Archaeologist. The four step process is described in the following sections.

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.

Step 1: Initial Consultation with Participants in Section 106

The RPEM will notify the Senior Staff Historian and/or 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)[90] are 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 later in this section. Native American Consultation. The appropriate EPB 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.

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 http://192.70.175.136/publications/pubindex.htm

Step 2: Identification of Historic Properties

This step 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 listed on the National Register to be afforded protection under the law, as eligible properties are also protected. National Register 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

[90] The APE defined for historic properties is synonymous with the term AOI used for other resources.

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 National Register. Isolated artifacts and features also are generally not NRHP eligible.

If a property is determined not eligible for the National Register, 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. If so, it must be considered under the Colorado Register of Historic Places Act. 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 properties, 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 National Register of Historic Places. Examples of such properties, provided in National Register Bulletin 38, Guidelines for Evaluating and Documenting Traditional Cultural Properties to Parker and King[91] (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;
- 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;

Information to Include in a NEPA Document

- Brief overview of the "whys and whats" of Section 106
- Brief description of SHPO consultation regarding methodology(s) and development of the APEs, file searches, and field inventory(s)
- The number and types of historic properties, and (for historic resources especially) include 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 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.

[91] http://www.cr.nps.gov/nr/publications/bulletins/nrb38/nrb38.pdf

- 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 Senior Staff Historian and Senior Staff Archaeologist are responsible for determining and documenting the APE for each project. In all cases, consultants must coordinate closely with CDOT cultural resources staff and the SHPO to develop an APE, in most cases prior to the intensive-level field survey. 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. 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.

SHPO Concurrence with Determinations of Eligibility

Once potential historic properties are identified within the APE, the Senior Staff Historian, 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 this step, the Senior Staff Historian/Archaeologist or cultural resource consultant applies the criteria of adverse effect to any eligible or listed historic properties within the APE. This process involves

Definition of an Undertaking's Area of Potential Effects (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
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).

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.

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 National Register 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 later in this section.

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.

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.

Step 4: Resolution of Adverse Effects

The purpose of this step 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 MOA outlining agency responsibilities to avoid, minimize, or mitigate adverse effects. In virtually all cases, CDOT Cultural Resource Section staff develop and facilitate 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

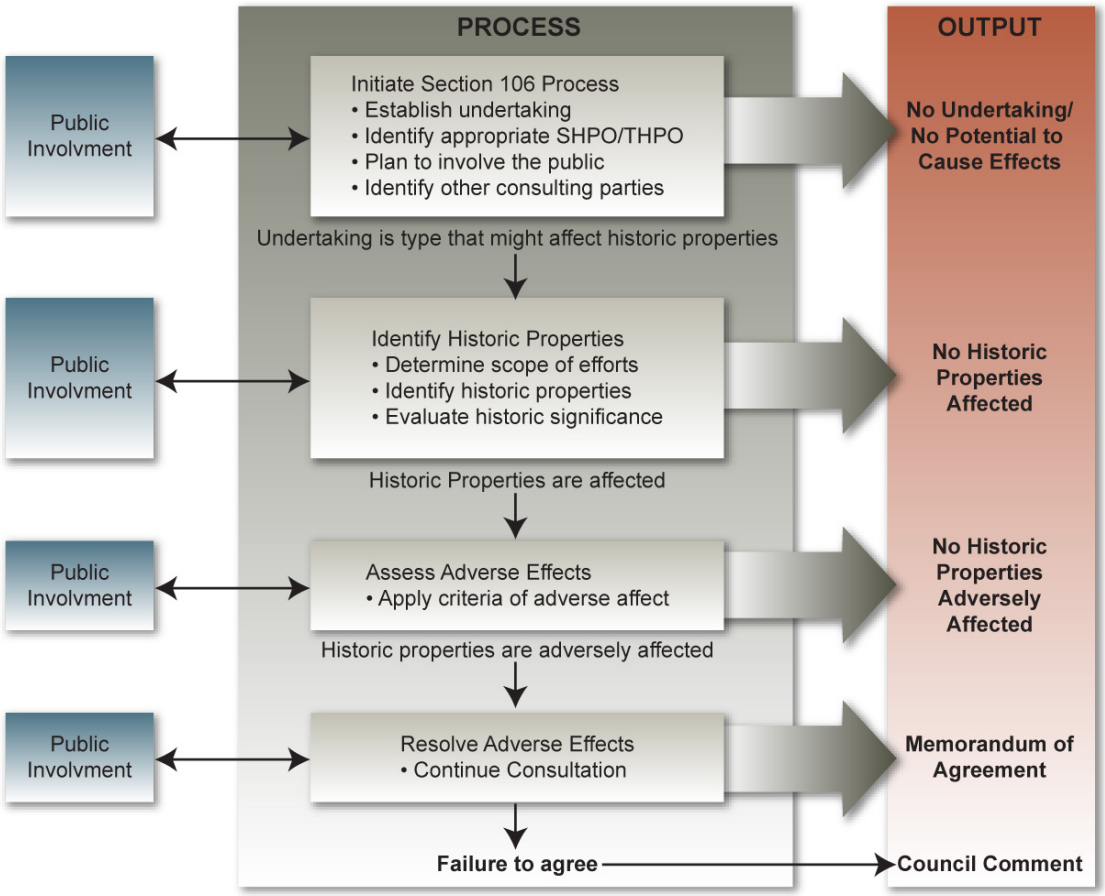
Merging the Section 106 and NEPA processes (see Figure 4.2) provides an opportunity to streamline the approach to historic properties compliance, especially for projects that will or may have complex historic or archaeological resource issues. Determination of the utility of a merger process will be made by CDOT and FHWA early in project planning, and coordinated closely with the SHPO and Advisory Council on Historic Preservation. 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 an 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.

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

- Establishment of the area of potential effect
- 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 and the documentation must meet the standards set forth in 36 CFR 800.8 (c) (1) through 36 CFR 800.8 (c) (5).

Figure 4.2. Combining NEPA and the Steps in the Section 106 Process



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

Other Issues to Consider

Requesting Archaeology and Historic Surveys from CDOT Staff

For most CatEx and other types of smaller-scale undertakings, the Senior Staff Historian and/or Senior Staff Archaeologist (or their staff) will visit the site and conduct a visual 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 4.3), preparing reports and letters, and forwarding documentation to the SHPO, Advisory Council, FHWA, or other agencies, as necessary. Meetings with the SHPO will be scheduled as needed by the Senior Staff Historian and, on rare occasions, by the 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.
- 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, this should be noted and 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 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 Field Inspection Review.

Process for Requesting and Completing Clearance of Historic Resources

RPEMs are encouraged to contact the 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 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

Archeological resources are the material remains of past human life or activities which are of archaeological interest. Prehistoric archeological resources include remains from human activities prior to written records. In Colorado, prehistoric archeological resources date to the time before sustained European contact with Native American

populations. Historic archeological resources are locations with remains from the historic period that can be examined using archeological techniques. Both prehistoric and historic archeological resources often have artifacts and 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 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.

Required Information for Clearance of Historic Resources

- Project number and title, and all appropriate accounting information
- Map showing project location
- Design plans (if available)
- Copy of the 128/463, 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, and so on.
- Project Schedule, with estimates of FIR, FOR, and AD dates
- Written memo or telephone conference with the Senior Staff Historian describing concerns about potentially historic resources or other project-related issues.

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) developed by the Office of Archaeology and Historic Preservation (OAHP).[92] 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 OAHP staff in order to confirm that all pertinent information has been collected for the survey.

[92] http://192.70.175.136/crforms/crforms1.htm

The CDOT Senior Staff Historian does not necessarily need to attend these informal meetings unless required by unusual situations. However, the CDOT 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 Senior Staff Historian and/or Senior Staff Archaeologist.

Consultants must submit all documents generated by the survey directly to the Senior Staff Historian or 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 Senior Staff Historian/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 CDOT Environmental Programs Branch (see Figure 4.3):

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 National Register 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.

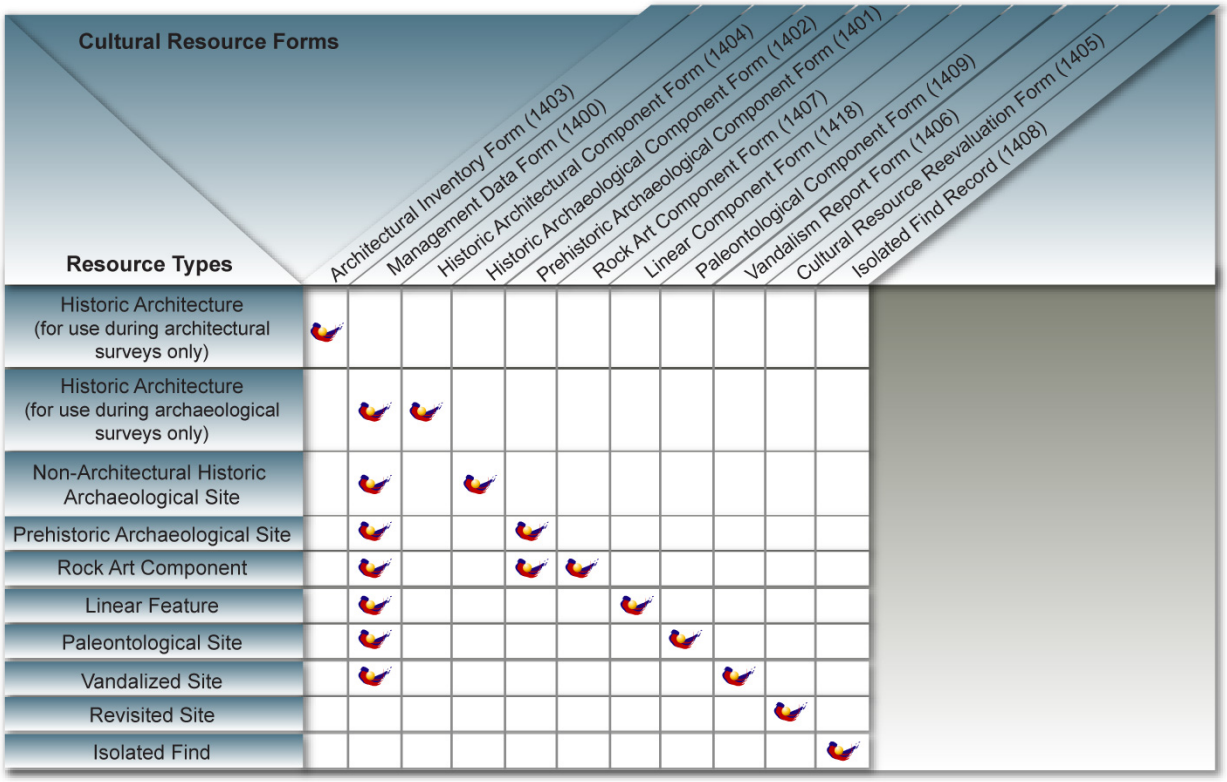
2. 7.5' USGS topographic quadrangles (or photocopied portions thereof) with the Area of Potential Effect clearly marked, and separate quad maps (generally as a report appendix) showing the location of all cultural resources present in the survey area. An explanation of the APE boundaries and why these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

3. 4" x 6" traditional 35 mm 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 EPB on CD or via electronic mail. Samples of these letters are available from the Senior Staff Historian.

Figure 4.3. Cultural Resource Survey Forms – Which Forms to Use When



Note: Additional component forms should be completed as appropriate. Examples of completed forms are available at OAHP.

Colorado Historical Society Office of Archaeology & History Preservation; Colorado Cultural Resource Survey Manual Vol. 2

Native American Consultation

As stipulated in the NHPA and the revised Advisory Council 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 CDOT 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 CDOT Senior Archaeologist will complete all associated tasks in this regard.

4.9.2. NEPA Document Sections

The content of the sections on historic properties in the affected environment and environmental consequences chapters is discussed below. For projects having complex historic resources, these sections shall contain subsections on "Historic Resources," "Archaeological Resources," and "Native American Consultation" to determine its importance in a community. This cultural resource information should also be summarized for the multidisciplinary sections discussed in Sections 4.26 through 4.29 of this manual.

Affected Environment

Brief but thorough data, specific to the historic properties within the APE, must be presented, to include at a minimum the information listed in the sidebar. The affected environment section 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 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 need to be avoided. An adequate document will also be specific when discussing effects and proposed mitigation of adverse effects for eligible sites. Discussion shall focus on properties that require protection under the law (i.e., are NRHP eligible) and exclude information regarding non-NRHP eligible resources.

Environmental Consequences

This section 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 4.1, the fourth step 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

- Brief overview of the “whys and whats” of Section 106
- Brief description of SHPO consultation regarding methodology(s) and development of the APEs, file searches, and field inventory(s)
- The number and types of historic properties, and 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 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.

4.10. 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 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 and the associated rocks 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. In addition, Sections 4.26 through 4.29 provide information on multidisciplinary summaries of resource-specific information.

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.

Land Uses, Prohibitions, Paleontological Resources

- 36 CFR 261.9(i)
- Regulates fossil collection on US forest lands.

4.10.1. Paleontological Evaluation Process

The evaluation of paleontological resources shall be initiated by the RPEM (as project manager) in association with the CDOT Staff Paleontologist assigned to the project.

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 and developed and prior to the formal initiation of the NEPA process.

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 the 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. Further discussion of the permits, laws, and regulations relevant to paleontological resources is provided in Section 7.

For highway projects that cross BLM-administered lands, BLM utilizes the Federal Land Policy and Management Act (FLPMA) of 1976 to regulate the collection of fossils in lieu of 16 USC Section 421–433 (the Antiquities Act of 1906). 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 by 36 CFR 261.9(i), which prohibits "excavating, damaging, or removing any vertebrate fossil or removing any paleontological resource for commercial purposes without a special use authorization." 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 often keeps more detailed data on file where it is readily accessible for CDOT's use.

When CDOT requests a consultant to conduct a paleontological study, the Staff Paleontologist will review the report for sufficiency and thereafter provide the appropriate CDOT region a concurrence or modified concurrence with, or rejection of, the consultant's recommendations.

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.

CDOT prefers consultant paleontological reports 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 assigned to the project. 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 Staff Paleontologist will also be consulted to determine other fossil localities known to him 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 affects to vertebrate fossils where CDOT rights-of-way intersect 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.

4.10.2. NEPA Document Sections

The content of the sections on paleontological resources in the affected environment and environmental consequences chapters is discussed below. This paleontological resource information should also be summarized for the multidisciplinary sections discussed in Sections 4.26 through 4.29 of this manual.

Affected Environment

Information from the paleontological assessment report is used to provide a brief summary in the NEPA document of the paleontology 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 section. 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 section. 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 Freedom of Information Act (FOIA), and must never be reflected on maps or otherwise have specific locational data included in a NEPA document.

A NEPA document should discuss 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 chapter 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 shall 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.

4.11. 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 county or city through land use plans (General Plans, Comprehensive Plans, etc.), zoning, future land use and growth management areas, 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, 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 the manual provides guidance on the treatment of resource-specific information that is the same for all resources. Sections 4.26 through 4.29 provide information on multidisciplinary summaries of resource-specific information.

4.11.1. Land Use Evaluation Process

The RPEM and MPO, if applicable, are responsible for reviewing land use in the area of potential impact and consult with local agencies.

The current land use and future planned 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 the vision presented in CDOT's Environmental Stewardship Guide

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 land use is typically available from regional and local governments. 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 4.22). 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. See further discussion on topics related to induced growth in Sections 4.12, 4.13, 4.14, and

4.27. These sections are Social Resources, Economic Resources, Environmental Justice, and Cumulative Effects, respectively.

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 (Section 6) may be required to characterize, evaluate, and to help develop mitigate this potential impact. This has implications on the project's early planning, budget, schedule, and community buy-in.

4.11.2. NEPA Document Sections

The content of the sections on land use in the affected environment and environmental consequences chapters is discussed below. This land use information should also be summarized for the multidisciplinary sections discussed in Sections 4.26 through 4.29 of this manual.

Affected Environment Section 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.

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 Long Range Transportation Plan 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.

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 required access requirements (accel/decal lanes, signalization…) 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, 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.

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

Environmental Consequences

The land use section of the impacts chapter 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 4.26. 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 palatable 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.

4.12. 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:

- Quality of life
- 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, TOD

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. Section 4.11, Section 4.13, Section 4.14, and Section 4.16 address these concerns, respectively.

The two 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. In addition, the introduction to this section of the manual provides guidance on the treatment of resource-specific information that is the same for all resources; Sections 4.26 through 4.29 provide information on multidisciplinary summaries of resource-specific information.

4.12.1. Social Resource Evaluation Process

The CDOT project engineer (as 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 AOI 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.

Community Resource Regulations and Guidance

- National Environmental Policy Act of 1969
- 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
- Title VI of the Civil Rights Act of 1964
- American Disability 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

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 the vision presented in CDOT's Environmental Stewardship Guide
- 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 regulations are provided in the sidebar and discussed in detail in Section 7.2.

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 an EIS, but should be addressed when an EIS 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 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.

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

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[93] – Quick Tables are a good starting point for data on demographic, social, and housing characteristics for the AOI. 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[94] provide maps for determining community boundaries, physical characteristics, instances of joint land use, and locating activity centers within the AOI.

Local Governments (e.g., city and county planning, labor, and social service departments)—Provide more recent demographic, social, economic, and housing characteristics. Additionally, local governments can 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.

[93] http://factfinder.census.gov/servlet/DatasetMainPageServlet
[94] 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 AOI 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.[95]

- 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.).

[95] 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
- Nondrivers and transit-dependent individuals
- Minority groups
- Low-income individuals and households

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 and 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

Section 4.17 Transportation Resources

- Addresses vehicle travel issues and traffic in detail. The mobility discussion to be provided in this area should focus on the social implications of mobility impacts. Beneficial and adverse effects should be

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 area of interest 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, BLM, and NPS 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.

Affected Environment Section 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

4.12.2. NEPA Document Sections

The content of the sections on social resources in the affected environment and environmental consequences chapters is discussed below. This social resource information should also be summarized for the multidisciplinary sections discussed in Sections 4.26 through 4.29 of this manual.

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 section 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. The community profile enables

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

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 guidebook, Community Impact Assessment − A Quick Reference for Transportation, Section 3[96] (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 guidebook, Community Impact Assessment − A Quick Reference for Transportation, Section 5[97] (FHWA 1996). For a discussion on induced growth-related social impacts, see Section 4.11.

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.

[96] http://www.ciatrans.net/CIA_Quick_Reference/Chapter3.html
[97] http://www.ciatrans.net/CIA_Quick_Reference/Chapter5.html

4.13. 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/acquisitions. Section 4.11, Section 4.12, Section 4.14, and Section 4.16 address these concerns, respectively.

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. In addition, the introduction to this section of the manual provides guidance on the treatment of resource-specific information that is the same for all resources; Sections 4.26 through 4.29 provide information on multidisciplinary summaries of resource-specific information.

4.13.1. Economic Evaluation Process

The CDOT project engineer (as 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

Economic Resource Regulations and Guidance

- National Environmental Policy Act of 1969
- 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

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 the vision presented in CDOT's Environmental Stewardship Guide
- 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 regulations are provided in the sidebar and discussed in detail in Section 7.2.

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 an EIS, but should be addressed when an EIS 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 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 AOI. In Decennial Census Summary File 1 and Summary File 3[98] - 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[99] provide maps for determining community boundaries, physical characteristics, and locating economic activity centers within the AOI.

- Bureau of Economics Regional Publications[100]—Provides Colorado level data down to micropolitan[101] statistical area data on personal income and industry employment.

- Bureau of Labor Unemployment Publications[102]—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.

Evaluation of Baseline Information

Collected baseline information is used to help evaluate the project and delineate the economic study area. Work with engineers and

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

[98] http://factfinder.census.gov/servlet/DatasetMainPageServlet
[99] http://www.census.gov/geo/www/maps/
[100] http://bea.gov/bea/regional/reis/
[101] Adjective pertaining to an urban area with a population between 10,000 and 50,000 (Webster's New Millennium Dictionary of English, Preview Edition, v0.9.6).
[102] http://data.bls.gov/cgi-bin/dsrv?la

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 area of interest, and determine whether they know of economic issues that could constrain the project. The resource agencies that are 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.

4.13.2. NEPA Document Sections

The content of the sections on economic resources in the affected environment and environmental consequences chapters is discussed below. This economic resource information should also be summarized for the multidisciplinary sections discussed in Sections 4.26 through 4.29 of this manual.

Affected Environment

The description of economics in the affected environment section 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 in the text box.

Affected Environment Section of NEPA Document

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 economic impact analysis 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

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

- 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[103] 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.[104]

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 4.11.

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 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.

[103] http://implan.com
[104] 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.

For additional information, consult FHWA's guidebook, Community Impact Assessment − A Quick Reference for Transportation, Section 6[105] (FHWA 1996).

[105] http://www.ciatrans.net/CIA_Quick_Reference/Chapter7.html

4.14. Environmental Justice

Environmental Justice (EJ) is the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws and policies. There are three fundamental principles at the core of environmental justice, as expressed in FHWA's EJ website:

- To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations 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
- Minority and low-income populations, as they apply to EJ, are defined as:
    - Black
    - Hispanic or Latino
    - Asian American
    - American Indian and Alaskan Native
    - Native Hawaiian or Pacific Islander
    - Low-income

The two sections below provide guidance on the treatment of EJ for CDOT's NEPA projects. The first section discusses the process for evaluating EJ. The second section discusses EJ information that should be in each NEPA document. In addition, the introduction to this section of the manual provides guidance on the treatment of resource-specific information that is the same for all resources; Sections 4.26 through 4.29 provide information on multidisciplinary summaries of resource-specific information.

Environmental Justice Regulations and Guidance

- Title VI of the Civil Rights Act of 1964, as amended
- Presidential Executive Order 12898 on Environmental Justice
- Presidential Executive Order 13166 on Environmental Justice
- National Environmental Policy Act of 1969
- 23 USC 140 (Non-discrimination)
- 23 USC 324 (Non-discrimination on basis of sex)
- Americans with Disabilities Act of 1990
- Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, amended 1987
- Title VI Regulations, 49 CFR 21
- Title VI Regulations, 23 CFR 200
- Environmental Impact and Related Procedures, 23 CFR 771
- DOT Order 5610.2 on Environmental Justice
- FHWA Order 6640.23 on Environmental Justice
- Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA)
- 23 USC 109(h), Federal-Aid Highway Act of 1970
- FHWA Environmental Policy Statements 1990 and 1994

4.14.1. Environmental Justice Evaluation Process

The CDOT project engineer (as project manager) and EJ analyst (either in-house EJ analysts or consultants) are responsible for early identification of the minority and low-income populations and their quality of life. 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.

Minority and low-income populations should be identified early and throughout the project. The EJ 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 social consequences for communities beyond the immediate geographic area. In such instances, the study area needs to be expanded to include these other communities.

Proactive community involvement may be necessary to include all segments of society, and could include separate meetings with identified populations and bilingual newsletters. 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. By identifying and alerting decision makers to civil rights issues, the potential for disproportionately high and adverse effects on protected populations can be addressed and resolved early in the transportation development process.

Reasons for Evaluation of EJ Under NEPA

CDOT evaluates EJ for several reasons:

- To ensure a non-discriminatory process
- To comply with the vision presented in CDOT's Environmental Stewardship Guide
- To comply with several legal mandates that pertain to protected populations

Environmental Justice has its origins with 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." In 1994, Executive Order 12898 was issued and gave renewed emphasis to Title VI and added low-income populations to those protected by the principles of environmental justice. CDOT must comply with federal Title VI and environmental justice regulations when implementing transportation projects in Colorado. These regulations are provided in the sidebar and discussed in detail in Section 7.2.

These policies forbid discrimination on the basis of race, color, sex, or national origin in all CDOT programs and activities. Its regulations apply not only to intentional discrimination, but also to policies and practices that have a discriminatory effect. This has been amplified to also require CDOT 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.

Collection and Evaluation of Baseline Information Under NEPA

Collection of Baseline Information

Information to establish the baseline for a population's racial and economic makeup is most readily available from the US Census. Depending on the project's size, complexity, and variability across the AOI, use county level to block level census data on demographics and earnings within the AOI to establish the baseline. The level of detail in the data should also be commensurate with the importance of the anticipated impacts of the project on low income and minority populations. US Census publications for demographics and earnings are easily accessible from both the Decennial Census Summary File 1 and Summary File 3 – Quick Tables[106] or American Community Survey – Selected Data Profiles[107]. Select either the Decennial Census or

[106] http://factfinder.census.gov/servlet/DatasetMainPageServlet

[107] http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=ACS&_submenuId=datasets_1&_lang=en&_ts=

American Community Survey based on which one provides the more recent data.

Public involvement, discussed in Section 6 of this manual, is a particularly important source of information relevant to EJ. Throughout the NEPA process, CDOT project staff must elicit the views of the affected populations through the public scoping process and take those comments into consideration.

For further information, please refer to CDOT's Title VI And Environmental Justice Guidelines for NEPA Projects Rev. 3[108]. Appendix A of that document (Determining Minority and/or Low-income Thresholds During Environmental Development and Project Design) provides particularly relevant information for the collection of baseline information for EJ.

Evaluation of Baseline Information

To evaluate baseline information, first finalize the EJ AOI, as it could vary from multiple counties to specific Census Block data depending on the geography of potential environmental justice impacts and the existing community base. Next, determine if minority populations exist in the study area. If there is more than one minority population in the study area, then the percentage of the minority is the aggregate of all minority persons. Then, determine if low-income populations exist in the study area using the following guidance:

> To determine whether there are low-income populations in a [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 [study] area that will be compared to the county percentage. (CDOT, 2004)

Address the following information to determine any disproportionate affect on any EJ populations that are identified:

- Demographic breakdown of the community by race, color, and national origin
- Population in the study area
- Bodily impairment, infirmity, illness, or death
- Destruction or disruption of man-made or natural resources that benefit community character or ambience
- Destruction or diminution of aesthetic values that disproportionately affect the EJ population

[108] http://www.dot.state.co.us/environmental/StandardsForms/Rev_3_EJ_Guidelines.pdf

- Destruction or disruption of community cohesion or a community's economic vitality
- Destruction or disruption of the availability of public and private facilities
- Relationship of the proposed action to other federal actions that may serve or affect the EJ population
- Any proposed mitigation measures to reduce or avoid impacts on the EJ population.
- Apply mitigation early in the process
- Reduce pollutant loadings through changes in processes or technologies
- Plan and address indirect impacts prior to project initiation
- Assist an affected community to ensure that it receives at least its proportional share of the anticipated benefits of the proposed action (for example, through job training, infrastructure improvements, etc.)
- Establish a community oversight committee to monitor progress and identify potential community concerns
- Consider enhancement measures that will improve the affected area consistent with CDOT's Environmental Stewardship Guide, resolving an impact by repairing or rehabilitating the affected environment, or compensating for the impact by replacing or providing substitute resources or environments
- Relocate affected communities as necessary and in compliance with the Uniform Relocation Assistance Property Acquisition Policies Act of 1970 (the Uniform Act) and within the existing guidelines of the CDOT or FHWA right-of-way programs.
- Develop a list of past, present, and foreseeable future projects that could have similar impacts on these populations. Locate these projects on a map with EJ populations delineated to see what segments of the populations they would collectively impact. Consider cumulative impacts to EJ in relatively general terms, noting which EJ components 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

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 area of interest 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 local minority and low-income populations include local planning agencies (e.g., county, city, and community planning offices), social services agencies, and community groups, as well as the USFS, BLM, and NPS when they manage lands that are traversed by a transportation project.

4.14.2. NEPA Document Sections

The content of the sections on environmental justice in the affected environment and environmental consequences chapters is discussed below. This environmental justice information should also be summarized for the multidisciplinary sections discussed in Sections 4.26 through 4.29 of this manual.

Affected Environment

Minority and low-income populations that may be impacted as the result of proposed transportation improvements must be documented in the affected environment section. Describe their race, color, religion, sex, familial status, national origin, and income level in the AOI as a whole. Also describe how these characteristics vary by geography within the AOI and features of the community that are important to these people.

For further information please refer to CDOT's Title VI And Environmental Justice Guidelines for NEPA Projects Rev. 3.[109].

Environmental Consequences

To adequately address environmental justice impacts to minority and low-income populations within the study area, the NEPA document must attend to the following:

- Describe the environmental effects on all communities, including human health, economic, and social effects on all citizens, with special consideration for minority and low-income populations

- Identify any disproportionately high and adverse environmental effects that exist

Document the opportunities provided for community input throughout the project development process, including consultation with affected communities to identify potential effects and possible mitigation

[109] http://www.dot.state.co.us/environmental/StandardsForms/Rev_3_EJ_Guidelines.pdf

measures, and improved accessibility to public meetings, project documents, and project decision makers on EJ populations.

For example, the NEPA document must verify that the selection of an alternative or preferred roadway alignment did not intentionally follow the path of the lowest property values—which could take principally minority neighborhoods or low-income housing—or provide adequate and reasonable economic, social, and engineering justification for its having done so. Similarly, it must show that the proposed improvement does not discriminate by providing access and egress to adjacent neighborhoods that vary with race, color, religion, sex, disability, familial status, national origin, or income level. In short, reasonable assurance must be provided and documented in the files that the selection of a project alternative was not a discriminatory act. Coordination with the FHWA and the Environmental Management Office in highly controversial situations will aid in ensuring that such assurance is adequate.

The NEPA document must present the potential for disproportionately high or adverse impacts from the project alternatives to more severely affect low-income or minority populations than other populations in the study area. Discuss the potential for Environmental Justice impacts as a result of induced growth, as further discussed in Section 4.11.

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. For further information please refer to CDOT's Title VI and Environmental Justice Guidelines for NEPA Projects Rev. 3.[110]

[110] http://www.dot.state.co.us/environmental/StandardsForms/Rev_3_EJ_Guidelines.pdf

4.15. Multimodal Uses (Bikes, Pedestrians)

CDOT encourages and promotes the development and implementation of alternatives to the single-occupant vehicle as a method to improve air quality and increase mobility, capacity, and safety within the transportation system. Users of these alternatives—riders in HOVs or on public transit, bicyclists, and pedestrians—are considered multimodal users.

This section focuses primarily on facilities for bicyclists and pedestrians. The importance of bicycle and pedestrian facilities[111] for commuting and recreation purposes continues to grow nationally. Because public transit facilities are constructed by agencies other than CDOT, they are not addressed in a CDOT NEPA document unless regional transportation districts such as Denver's RTD or FTA are co-lead agencies with responsibility for such facilities. They are therefore not addressed in this section.

HOVs use existing road capacity, require special signage, and may influence traffic projection data and the resource analyses that use them. However, they do not require construction of specific facilities and are therefore not addressed in detail in this section.

The two sections below provide guidance on the treatment of multimodal users for CDOT's NEPA projects. The first section discusses the process for evaluating impacts to multimodal users. The second section discusses multimodal user information that should be included in each NEPA document. In addition, the introduction to this section of the manual provides guidance on the treatment of resource-specific information that is the same for all resources; Sections 4.26 through 4.29 provide information on multidisciplinary summaries of resource-specific information.

[111] Bicycle and pedestrian facilities are any portions of a road or pathway specifically designated as open to bicycle and/or pedestrian travel, regardless of whether such facilities are designed for their exclusive use.

Multimodal Regulations and Guidance

- **FHWA Technical Advisory T6640.8a**—Provides guidance to FHWA field offices and state DOTs on the preparation and processing of environmental and Section 4(f) documents
- **Transportation Equity Act for the 21st Century (TEA-21)** (Bicycle Transportation and Pedestrian Walkways, 23 USC §217)—Requires that bicyclists and pedestrians be given consideration in comprehensive transportation plans developed by MPOs and states. Bicycle facilities and pedestrian walkways should be considered in conjunction with all new construction, reconstruction, or transportation facilities, except where not permitted
- **Safe, Accountable, Flexible, Efficient Transportation Equity Act (SAFETEA-LU)** (Public Law 109-59, Sec. 1404)—Safe Routes to School Program enables and encourages children to walk and bicycle to school, make bicycling and walking safer and more appealing, and to facilitate the planning, development, and implementation of projects and activities in the vicinity of schools

4.15.1. Multimodal Use Evaluation Process

The Resident Engineer is responsible for evaluating and incorporating bicycle and pedestrian facilities in the design of any new construction or reconstruction work.

Planning for transportation choices occurs at the regional level as part of the state's regional transportation planning process; therefore, multimodal uses for the project area should already be outlined in the STIP. Assess the adequacy of available right-of-way and the potential for connectivity for multimodal features along the entire project route.

Multimodal facilities must be considered during the design phase to ensure that there is adequate space along the project to accommodate them.

Reasons for Evaluation of Multimodal Uses under NEPA

CDOT evaluates multimodal uses for several reasons:

- To improve air quality and increase mobility, capacity, and safety within the transportation system
- 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 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 a project level

- To comply with federal and state transportation regulations and advisories.

Federal regulations require that bicycle and pedestrian facilities be incorporated into most new construction and reconstruction transportation projects. Consideration for pedestrian and bicycle design is especially important in areas close to schools and parks. The Rules and Regulations for the Statewide Transportation Planning Process[112] include the requirement that statewide and regional transportation plans consider multimodal transportation. The regulations, advisories, and other guidance applicable to multimodal uses on transportation projects are summarized in the sidebar. These regulations are discussed in detail in Section 7.2.

Collection and Evaluation of Baseline Information under NEPA

Collection of Baseline Information

Information for the multimodal uses section of the NEPA document can be found in the following sources:

- Project design documents: Design documents identify the types of bicycle and pedestrian facilities planned and considered for the project.

- Community transportation plans: Transportation plans for the communities through which the project will cross describe the existing and planned types of multimodal facilities, as well as projected future use of these facilities.

- Local governmental agencies or community interest groups: Groups supporting the development of bicycle and pedestrian facilities on the project typically have information regarding existing and future needs for bicycle/pedestrian facilities in the project area.

Evaluation of Baseline Information

CDOT's policy on impacts to multimodal uses is to avoid impacts whenever possible, minimize impacts if they cannot be avoided, and mitigate the impacts if they cannot be avoided or minimized. CDOT also tries to incorporate multimodal facilities (e.g., multi-purpose trails) into projects whenever they enhance the development of an existing or planned multimodal network. To identify the potential impacts and benefits to multimodal uses under each alternative:

- Prepare maps showing the alignment of the project alternatives overlain with existing and planned multimodal features.

- Using the maps and project design documents, compare the multimodal features of the project alternatives with respect to

[112] http://www.dot.state.co.us/StateWidePlanning/PlansStudies/Docs/604-2-Planning%20Rules%202006%20Revisions051906.pdf

existing and planned multimodal facilities outlined in community transportation plans and information provided by local interest groups.

- Evaluate whether the proposed project features will have negative or positive impacts on the existing and planned multimodal facilities outlined in community transportation plans and information provided by local interest groups.
- Compare and contrast the multimodal features of the alternatives to highlight the similarities and differences among the alternatives.
- Identify any mitigation measures that are available to reduce or eliminate any negative impacts identified.
- Evaluate where modifications in the design of project multimodal facilities might improve the overall multimodal network.

Affected Environment Section of NEPA Document

- Describe the need for bicycle and pedestrian facilities in project area
- Identify community transportation plans that outline bicycle and pedestrian facilities or discuss the need for such facilities if the plan does not address multimodal facilities
- Identify local governmental agencies or community interest groups supporting the development of bicycle and pedestrian facilities on the project
- Describe existing bicycle/pedestrian facilities or systems within the project area

Other Issues to Consider

When agencies such as RTD and FTA that are responsible for some types of multimodal facilities (e.g., public transit) are co-lead agencies on CDOT NEPA projects that include such facilities, extensive coordination is required. Such coordination should be initiated early and should address all aspects of project planning and NEPA analysis to minimize the pitfalls from varied agency perspectives and processes.

4.15.2. NEPA Document Sections

Multimodal uses in the affected environment and environmental consequences chapters of NEPA documents is discussed below. This multimodal use information is also summarized in the multidisciplinary sections discussed in Sections 4.26 through 4.29 of this manual.

Affected Environment

Documentation needs for the affected environment section of EAs and EISs are discussed in this section. At a minimum, the affected environment section should contain a discussion of the following five elements:

Existing Multimodal Facilities – Describe the existing bicycle and pedestrian facility networks in the vicinity of the project.

Multimodal Facility Needs – Identify and discuss the need for bicycle and pedestrian facilities in the project area.

Community Transportation Plans – Identify community transportation plans that outline bicycle and pedestrian facilities or discuss the need for such facilities if the plan does not address multimodal facilities.

Local Government or Community Interest Groups – Identify local governmental agencies or community interest groups supporting the development of bicycle and pedestrian facilities on the project.

Graphics – The affected environment should include maps of existing multimodal systems.

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 in the following four categories of each alternative carried forward for detailed analysis:

Community Needs – Demonstrate that CDOT has fully considered multimodal transportation and has actively coordinated with local government bicycle/pedestrian agencies and public interest groups to understand and meet, where feasible, identified community needs. The information contained in this section should provide a firm understanding of how the local needs and movements of community bicyclists and pedestrians will be met by the proposed facilities.

- Address the accommodation of non-motorized modes of transportation planned by the community as a part of the overall transportation network and documented in the local transportation plan.

- Discuss accommodation of non-motorized modes of transportation within the project area where bicycle and pedestrian facilities have not previously been considered.

Public Law – The impact analysis section must cite 23 USC 109(n), documenting CDOT's full consideration of bicycle and pedestrian alternatives and the provision of reasonable alternatives for the bicycling and walking public.

Expanded Picture – Describe any project components that will benefit the local multi-modal network by being constructed as part of the project or by providing adequate right-of-way for later construction.

Conclusion of Effects – The conclusion should restate the biggest multimodal use concerns associated with each alternative and identify the alternative with the least expected effect on multimodal uses.

Mitigating Potential Impacts

In the discussion of mitigation measures:

- Discuss the manner in which negative impacts on multimodal uses resulting from the alternatives can be mitigated.

- Describe how any facilities of the proposed alternatives that will sever existing multimodal pathways will be dealt with to remove or minimize such impacts.

Impact Analysis/Mitigation Sections of NEPA Document

- Cite 23 USC 109(n) and discuss multimodal alternatives considered
- Describe types of facilities included in alternatives, their logical termini, and interface with other bicycle routes
- Specify that the facilities will be designed in accordance with CDOT directives, manuals, and design guides, as well as AASHTO standards
- Discuss the coordination conducted with local governments and public interest groups concerning the multimodal facilities proposed in the alternatives
- Discuss how the proposed multimodal facilities are consistent with local multimodal facility planning

4.16. Residential/Business/ROW Relocation

Relocation and displacement analysis is a process used to evaluate and address the effects of a transportation action on individual property owners and tenants directly and indirectly impacted by right of way acquisition requirements and associated business and residential disruption. Information gathered through the relocation and displacement analysis process is used as a basis for decision making during the development, refinement, and selection of project alternatives processes (i.e., planning [concept], design, construction, and maintenance). Determinations of significance may influence the NEPA class of action determination. Although the steps in this relocation and displacement analysis process are logically sequential, communities are dynamic; therefore, the analyst must be prepared to reevaluate findings and make adjustments if necessary as the project evolves.

The relocation and displacement analysis of the NEPA document should identify and discuss any residential, business, non-profit association, farm operation, or nonprofit business 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 ROW staff should be involved in all projects where ROW 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 state or region ROW 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. Sections 4.11, 4.12, and 4.13 address these concerns, respectively.

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)

4.16.1. Acquisition and Relocation Evaluation Process

The CDOT project engineer (as project manager) and relocation and displacement analyst (either in-house acquisition and relocation analyst 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/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 AOI 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 ROW 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 ROW acquisitions.

Reasons for Evaluation of Acquisition and Relocation Under NEPA

CDOT evaluates acquisition and relocation for several reasons:

- Acquisition and relocation 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 the vision presented in CDOT's Environmental Stewardship Guide.
- To comply with several legal mandates that pertain to ROW acquisitions.

CDOT must comply with federal relocation regulations when implementing transportation projects in Colorado. These regulations are provided in the sidebar and discussed in detail in Section 7.2. 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.

Collection and Evaluation of Baseline Information Under NEPA

To comply with the FHWA Technical Advisory 6640.8A,[113] information on right-of-way requirements are to be included in the description of project alternatives. The CDOT ROW Manual[114] 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 highway has been selected and approved by the Transportation Commission.

Collection of Baseline Information

The contents of final ROW plans are prescribed in the CDOT ROW Manual and include information that could enable evaluation of relocation/acquisition impacts. However, NEPA analysis occurs between the processes of describing ROW requirements for project alternatives and preparing ROW plans for the selected route of the proposed highway. Relevant data sources are discussed in Section 4.12 (Social Resources) and Section 4.13 (Economic Resources) and coordinated with the CDOT ROW staff.

Evaluation of Baseline Information

To enable identification of relocation/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.

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.

[113] http://www.environment.fhwa.dot.gov/projdev/impTA6640.asp
[114] http://www.dot.state.co.us/ROW_Manual/

- 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

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.

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/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.

- Summary of potential contamination concerns.

- Identification of any publicly owned lands.

Relocation and ROW 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 Act[115] 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 ROW 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. ROW 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 project manager.

4.16.2. NEPA Document Sections

The content of the sections on relocations/acquisitions in the affected environment and environmental consequences chapters is discussed below. This relocation/acquisition information should also be summarized for the multidisciplinary sections discussed in Sections 4.26 through 4.29 of this manual.

Affected Environment Section 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

Affected Environment

Relocation/acquisitions aspects that may be impacted by the project should be described in the affected environment section (as summarized in the side bar). Review Section 4.16.1 to determine other types of project impacts that would require baseline information if they were to occur. Additional information is provided in CDOT's ROW Manual.[116]

Environmental Consequences

It is essential that the relocation/acquisition section in the environmental consequences chapter 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.

[115] http://www.fhwa.dot.gov/REALESTATE/ua/index.htm
[116] http://www.dot.state.co.us/ROW_Manual/

- Provide for the participation and consultation of communities affected by the proposed project throughout the life of project development.

- Discuss such topics as the number of relocations, categorized by residences, businesses, non-profit associations, farm operations, and acreage of ROW acquisitions involved. Review Section 4.16.1 to determine other types of project impacts that could occur and require discussion in the environmental consequences section. 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.

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 Right-of-Way 2006)

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 Right-of-Way 2006)

When acquisition and relocation impacts are identified, the document will discuss possible mitigation. Include the information shown in the sidebar in the NEPA document, as appropriate.

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

4.17. Transportation Resources

Transportation resources include the entire transportation network within the project area, including transit, pedestrian/bicycle facilities, and traffic conditions. Evaluation of these transportation resources provides a framework within which the new transportation project can be considered and evaluated.

The two sections below provide guidance on the treatment of transportation for CDOT's NEPA projects. The first section discusses the process for evaluating transportation. The second section discusses transportation information that should be in each NEPA document. In addition, the introduction to this section of the manual provides guidance on the treatment of resource-specific information that is the same for all resources; Sections 4.26 through 4.29 provide information on multidisciplinary summaries of resource-specific information.

4.17.1. Transportation Evaluation Process

The CDOT traffic engineer is responsible for preparing traffic studies, determining effects of alternatives on the transportation network, and reviewing the applicability of SAFETEA-LU (23 USC 134) and other USDOT regulations and guidance.

Evaluation of the transportation network within the project area should include transit, pedestrian/bicycle facilities, and traffic conditions.

The transportation evaluation should be ongoing as alternatives for the proposed action are being designed and developed.

Reasons for Evaluation of Transportation Under NEPA

CDOT evaluates transportation for several reasons:

- Traffic congestion contributes to air quality emissions, and degrades LOS
- To comply with the vision presented in CDOT's Environmental Stewardship Guide
- To comply with several legal mandates that pertain to 23 USC 134 and to evaluate compliance with air quality laws and regulations.

Collection and Evaluation of Baseline Information Under NEPA

Methods documented in the Transportation Research Board's Highway Capacity Manual, latest Edition, should be used in the traffic analysis. The result of such an analysis is a LOS rating, which is a qualitative assessment of the traffic flow for a given roadway facility. LOS is described by a letter designation ranging from "A" to "F" with LOS A representing essentially uninterrupted flow, and LOS F representing a breakdown of traffic flow with excessive congestion and delay. LOS can be calculated using highway capacity software.

The Transportation Equity Act for the 21st Century requires explicit consideration of safety in the 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 corridor. The LOSS formulation categorizes four levels of "potential for accident reduction," I through IV. Level I indicates a better than expected safety performance and thus a low potential for accident reduction. Level IV indicates an accident history significantly greater than expected for a given roadway type, thus possessing a high potential for accident reduction. Detail the existing level(s) of LOSS in the project area.

To assess transportation resource impacts, there are several different techniques for travel demand forecasting from which to choose, depending on the requirements of the analysis. These techniques, discussed below, differ in complexity, cost, level of effort, sophistication, and accuracy, but each has it's place in travel forecasting.

Sketch Tools—Sketch planning is the preliminary screening of possible configurations or concepts. It is the least costly approach to assessing transportation resource impacts and is used to compare a large number of proposed policies in enough analytical detail to support broad policy decisions. Useful in both long- and short-range regional planning and in preliminary corridor analysis, sketch planning yields aggregate estimates of capital and operating costs, patronage, corridor traffic flows, LOS, energy consumption, and air pollution.

Traditional Tools—Traditional tools apply the kind of detail appropriate to tactical planning; they deal with many fewer alternatives than sketch tools, but in much greater detail. Inputs include the location of principal highway facilities and delineated transit routes. At this level of analysis the outputs are detailed estimates of transit fleet size and operating requirements for specific service areas, refined cost and patronage forecasts, and LOS measures for specific geographical areas.

The cost of examining an alternative at the traditional level is 10–20 times the cost in sketch planning. However, default models, which dispense with many data requirements, can be used for a less expensive first look. Plans can be analyzed in detail and problems uncovered at this stage will suggest a return to sketch planning to accommodate new constraints.

Micro-analysis Tools—Micro-analysis tools provide the most detailed analysis, and are most applicable when nearing project implementation. For example, a detailed evaluation of the extension, rescheduling, or repricing of existing bus service can be performed to analyze passenger and vehicle flows through a transportation terminal or activity center. This tool can also compare possible routing and shuttling strategies for a demand-activated system. Final analysis at this level is prohibitively expensive except for subsystems where

Travel Demand Forecasting

- Determine the technique depending on the requirements of the analysis and availability of information. Some projects can use a simple spreadsheet, others will need a complex computer model.
- Require preparation of a Travel Demand Forecasting technical report (see Appendix J), which details the specific data, assumptions and process (type of analysis) used in the forecasting.

implementation is very likely, and design refinements would bring substantial increases in service or significant reductions of cost. It is most effective in near-term planning when a great many outside variables can be accurately observed or estimated. It is sometimes necessary, however, to use micro-analysis tools to supplement the output of traditional longer-range planning.

Since the goal of most transportation projects is to resolve transportation problems, engineers are unlikely to inadvertently trade one transportation problem for another. Therefore, many projected transportation impacts are resolved during project design. However, not all transportation impacts can be resolved in this manner. Once the latter impacts have been identified, measures to mitigate them must be addressed, especially for traffic congestion. Mitigation is typically performed through Transportation Systems Management (TSM) and Transportation Demand Management (TDM), including demand-side strategies, such as the following:

TSM strategies focus on changing transportation system operation, typically by improving traffic flow and reducing traveler delay. Such programs can also reduce emissions by changing vehicle speeds, reducing rapid vehicle accelerations and decelerations, and reducing vehicle idling. The strategies used may be under the umbrella of Intelligent Transportation Systems (ITS) (e.g., signal synchronization/intersection improvements, speed control, shifting/separating freight movements), or focus on encouraging changes in driving behavior (e.g., educational information, incentives, or restrictions on driving speeds, operating patterns, and idling).

TDM is changing or reducing demand for car use by encouraging the behavioral change of household choices of travel. The objective is to reduce the number of vehicles using highway facilities while providing a wide variety of mobility options for those who wish to travel. Examples of TDM measures are:

- Including or improving pedestrian-oriented design elements, such as short pedestrian crossings, wide sidewalks, and street trees
- Requiring users of parking to pay the costs of it directly, as opposed to sharing the costs indirectly with others through increased rents, tax subsidies, and so on.
- Including and improving transit infrastructure, such as subway entrances, bus stops, and so on.
- Subsidizing transit costs for employees or residents
- Bicycle-friendly facilities, including secure bike storage areas and showers

Demand-side strategies are designed to better balance people's need to travel a particular route at a particular time with the capacity of available facilities to efficiently handle this demand. The focus of demand-side strategies is to provide people with enhanced travel choices—from choices in travel mode (such as driving, using transit or bicycling), to choices in travel route and trip departure-time—and to provide incentives and information for people to make informed travel choices. For example, many sports and concert venues provide incentives for people to arrive a little early or stay a little late, essentially spreading the "peak" of the demand to travel to/from the building, reducing traffic congestion, and improving the visitor's overall experience. Incentives for businesses to adopt flex time or telecommuting strategies are also a demand-side strategy that results in spreading the demand peak.

4.17.2. NEPA Document Sections

Transportation resources in the affected environment and environmental consequences chapters of NEPA documents is discussed below. This transportation information is also summarized in the multidisciplinary sections discussed in Sections 4.26 through 4.29 of this manual.

Affected Environment

Documentation needs for the affected environment section of EAs and EISs are discussed in this section. At a minimum, the affected environment section should contain a discussion of the following six elements:

Existing Transportation System – Existing transportation system, its various modes, and how the modes are connected and interrelate to form the transportation network.

Traffic Volume – Including information on existing traffic volumes based on counts either obtained by a contractor or CDOT.

Roadway Network – Discuss the roadway network by regional planning categories (freeway, major regional arterial, principal arterial, and minor arterials) for ease of use in travel-demand modeling.

Traffic Studies and Models – Information from traffic studies and models, if developed, should be of sufficient detail to establish a baseline that enables impacts to the transportation network in the AOI to be identified.

LOS and LOSS – Detail the LOS and LOSS in the project area. Provide detailed traffic safety, transit service, surface street, and freeway circulation, freight and rail service, and pedestrian/bicycle facilities as needed in relation to potential impacts.

Graphics – The affected environment should include maps of the existing transportation network.

Affected Environment Section of NEPA Document

- Existing transportation system, its various modes, and how the modes are connected and interrelate to form the transportation network
- Information on existing traffic volumes
- Analysis of traffic operations in the project area using the Transportation Research Board's Highway Capacity Manual, latest Edition. Explore other performance measures such as "fee-to-use" for comparison to transit alternatives.
- Detail the LOS and LOSS in the project area.

Environmental Consequences

Documentation needs for the environmental consequences section of EAs and EISs are discussed in this section. At minimum, the environmental consequences section should compare the affects of each alternative carried forward for detailed analysis in the following three categories and all analysis should be for existing and horizon year conditions:

- Traffic Studies and Models – Discuss outputs from the travel demand model including:
- LOS
- AM/PM Peak Hour peak hour traffic volumes
- Hours of congestion at intersections and along freeway intersections
- Turning movement volumes at intersections and interchange ramps
- Additional travel time during peak hours (Travel Rate Index)
- Detail the existing level(s) of LOSS in the project area for each alternative.
- Evaluate Transit/HOV access associated with each alternative as well as the mobility of pedestrians and bicycles relative to access, connectivity with other facilities (north/south vs. east/west), and horizontal and vertical clearance.
- Cumulative Impacts – Develop a list of past, present, and foreseeable future projects that may impact similar transportation components. Discuss cumulative impacts to transportation in more general terms, noting which transportation 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.
- Conclusion of Effects – The conclusion should restate the biggest transportation concerns associated with each alternative and identify the alternative with the least expected effect on transportation resources.

Mitigating Potential Impacts

Describe project design elements that avoid impacts to the existing transportation network. Detail the proposed mitigation measures and describe how they will mitigate the impact for which they were developed.

4.18. 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, storm water 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. In addition, the introduction to this section of the manual provides guidance on the treatment of resource-specific information that is the same for all resources, Sections 4.26 through 4.29 provide information on multidisciplinary summaries of resource-specific information.

Utility and Railroad Clearance Documentation

Utilities

- See Project Development Manual, 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***
- See Project Development Manual, Section 5.04 Railroad Involvement for clearance process

4.18.1. 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 AOI 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 in the preliminary engineering phase of project development (once all viable alternatives have been established), coordination with the Region Utility Engineer and the Region Railroad Coordinator will be initiated.

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 AOI. 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 the vision presented in CDOT's Environmental Stewardship Guide.
- To comply with several legal mandates.

The legal mandates include CRS 38-5-101, Eminent Domain Act; CRS 43-1-225, 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 (see the CDOT Utility Manual[117]).

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)

Collection and Evaluation of Baseline Information Under NEPA

CDOT has established procedures in the Project Development Manual[118] (PDM), Section 5.03 (Utility Involvement[119]), 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 PS&E 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 PDM, Section 5.04 (Railroad Involvement[120]), for coordinating with railroad companies when a railroad facility may be impacted by a project.

[117] http://www.dot.state.co.us/UtilityProgram/Manual/

[118] http://www.dot.state.co.us/DesignSupport/Project%20Development%20Manual/CDOT%20Project%20Development%20Manual.htm

[119] http://www.dot.state.co.us/DesignSupport/Project%20Development%20Manual/PDM_SECT6_2001.doc

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 4.27. 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 railroads in relatively general terms, noting which utilities and railroads 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.

4.18.2. NEPA Document Sections

The content of the sections on utilities and railroads in the affected environment and environmental consequences chapters is discussed below. This utility and railroad information should also be summarized for the multidisciplinary sections discussed in Sections 4.26 through 4.29 of this manual.

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 section 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 side bar, as well as any unique information necessary to evaluate potential impacts, will be included.

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

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.

120 http://www.dot.state.co.us/DesignSupport/Project%20Development%20Manual/PDM_SECT6_2001.doc

4.19. Section 4(f) Evaluation

4.19.1. Legislative Background

Section 4(f) has been part of federal law since 1966 when it was enacted as Section 4(f) of the USDOT Act. In January 1983, when the USDOT Act was recoded, Section 4(f) was amended and codified in 49 USC Section 303. The substantive provisions of Section 4(f) apply only to agencies within the USDOT.

On August 10, 2005, Section 6009(a) of the SAFETEA-LU, Public Law 109-59, amended existing Section 4(f) legislation at Section 138 of Title 23 and Section 303 of Title 49, US Code. 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 impact is a category of impacts to Section 4(f) resources established in SAFETEA-LU whose 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.

A Section 4(f) resource is a property that functions or is designated as a significant publicly-owned public park, recreation area, wildlife or waterfowl refuge, or historic site (regardless of ownership). 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.”

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 addition, the introduction to this section of the manual provides guidance on the treatment of resource-specific information that is the same for all resources; Sections 4.26 through 4.29 provide information on multidisciplinary summaries of resource-specific information.

4.19.2. Section 4(f) Evaluation Process

The RPEM prepares the formal documentation to evaluate uses to Section 4(f) lands.

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: (1) land from a Section 4(f) site that is acquired for a transportation project, (2) the occupancy of the land is adverse in terms of the statute's preservationist purposes, or (3) the proximity uses of the transportation project are so great that the purposes for which the Section 4(f) site exists are substantially impaired (normally referred to by courts as a constructive use).

The Section 4(f) evaluation should be completed when alternatives for the proposed action are first being designed and developed,. The 4(f) evaluation can be completed as part of the NEPA process.

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.

Collection and Evaluation of Baseline Information

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:

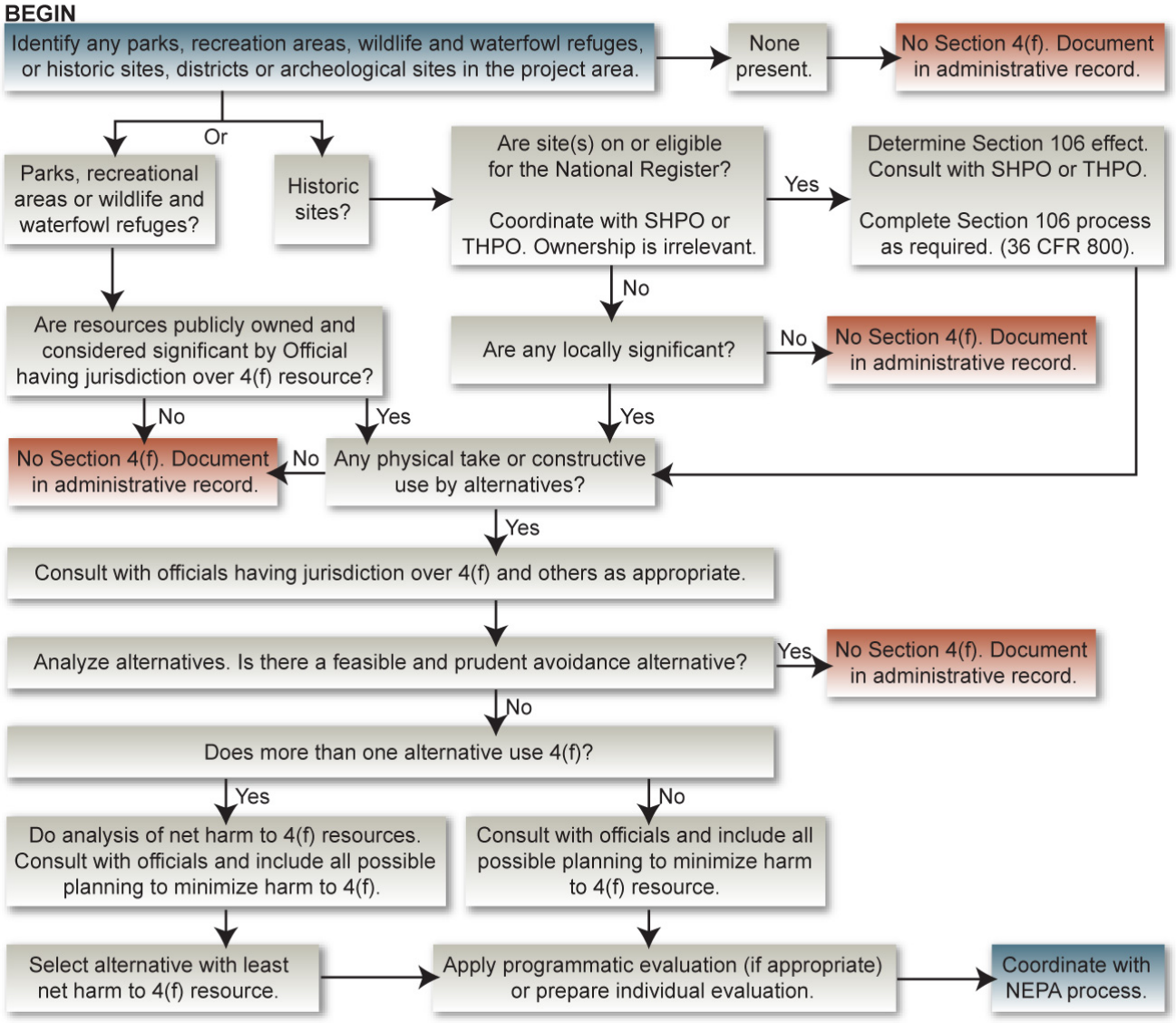
- Officially designated publicly owned parks, recreation areas, wildlife or waterfowl refuges (to qualify, parks and recreation areas must be open to the entire public during their hours of operation) A property that requires fees for public access does not disqualify the property as a Section 4(f) resource
- Properties that the agency having jurisdiction over the land determines have a primary purpose or function and are considered significant for purposes of use as a park, recreation area, or refuge
- Publicly owned school playgrounds or publicly owned fairgrounds (under certain circumstances they are only included if they are

open to the public and have a recreational purpose as their main purpose)

- Publicly owned waters of designated wild and scenic rivers
- Historic sites on or eligible for the National Register of Historic Places
- Trails
- Archaeological sites on or eligible for the National Register of Historic Places and that warrant preservation in place as determined by FHWA and the SHPO

Once a Section 4(f) property is identified within the project area, the project or undertaking must entail 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 4.4.

Figure 4.4 Section 4(f) Evaluation Diagram



Evaluation of Baseline Information

Compliance with Section 4(f) can be established through either a Nationwide Section 4(f) Programmatic Evaluation that is approved at the FHWA Division Office level or a Section 4(f) Evaluation that requires FHWA legal and external agency review prior to approval.

Programmatic Evaluations

FHWA developed five nationwide programmatic applications for Section 4(f) properties[121]. For EAs and CatExs they may only be used for projects designed to improve operational characteristics, safety, and/or the physical condition of an existing highway on essentially the same alignment (i.e., the 4(f) lands must be located adjacent to the

[121] http://www.environment.fhwa.dot.gov/projdev/4fnspeval.asp

existing highway.) Each of the five types of programmatic evaluation has specific criteria and are listed below. A detailed description of their specific standards 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[122]

- Final Nationwide Section 4(f) Evaluation and Approval for Federally Aided Highway Projects With Minor Involvements With Historic Sites[123]

- Programmatic Section 4(f) Evaluation and Approval for FHWA Projects That Necessitate the Use of Historic Bridges[124]

- Section 4(f) Statement and Determination for Independent Bikeway or Walkway Construction Projects[125]

- Section 4(f) Evaluation and Approval for Transportation Projects That Have a Net Benefit to a Section 4(f) Property[126] This programmatic can be used on any project regardless of the NEPA processing option. The key to the net benefit programmatic is that there is a benefit to the resource by it being used.

For historic and archaeological properties there are specified project conditions:

- For historic properties, the project must not require the major alteration of the characteristics that qualify the 4(f) property for the National Register.

- For archaeological properties, the project must not require the disturbance or removal of resources determined to be important for preservation in place.

With the exception of the Net Benefits analysis, these programmatic evaluations cannot be used if any of the following conditions exist:

- Construction of transportation facilities on a new alignment

- Projects for which an EIS is prepared

- Specific conditions of the selected programmatic application are not met

[122] http://www.environment.fhwa.dot.gov/projdev/4fmparks.asp
[123] http://www.environment.fhwa.dot.gov/projdev/4fmhist.asp
[124] http://www.environment.fhwa.dot.gov/projdev/4fbridge.asp
[125] http://www.environment.fhwa.dot.gov/projdev/4fbikeways.asp
[126] http://www.environment.fhwa.dot.gov/projdev/4fnetbenefits.asp

- Projects have Section 4(f) uses that do not meet the programmatic 4(f) criteria for use

- Proximity uses resulting in constructive use are involved

Suggested Outline for Section 4(f) Evaluation

Introduction and Summary
A. Alternatives Evaluation Process from NEPA
B. Historic Properties
   1. Overview of properties
   2. Description of resource (repeat items 2. through 5. for each property as necessary)
   3. Project impacts
   4. Avoidance alternatives
   5. Minimization of harm
C. Parks and Recreation Resources
   1. Overview of resources
   2. Description of resource (repeat items 2. through 5. for each property as necessary)
   3. Project impacts
   4. Avoidance alternatives
   5. Minimization of harm
D. Coordination
E. Section 4(f) Finding

The programmatic evaluation requires the same coordination and documentation as regular 4(f) procedures, including proof that there is no prudent and feasible alternative to the use of 4(f) lands and that all measures to minimize harm have been taken. In addition, the programmatic evaluation must demonstrate that the project meets the criteria of the appropriate nationwide programmatic agreement. The advantage of using a programmatic evaluation is that there is no requirement to circulate the draft 4(f) evaluation to the Department of the Interior (DOI), the US Department of Agriculture (USDA), or Housing and Urban Development (HUD). There is also the advantage of not needing a Legal Sufficiency review on programmatic that you do need on regular Section 4(f) evaluations (final4(f)). Complete Section 4(f) documentation should be retained in the project file as a matter of public record.

Several agencies have a role in approving programmatic 4(f) evaluations. The SHPO is the official with jurisdiction for historic and archaeological properties. The CDOT Senior Staff Historian, FHWA operations engineer, and FHWA environmental staff review preliminary programmatic 4(f) evaluations. The CDOT EPB Manager, RPEM, and FHWA division administrator approve the final version of programmatic 4(f) evaluations.

Determining De Minimis Impacts to Section 4(f) Resources

SAFETEA-LU Section 6009(a) amends existing 4(f) legislation so that the process and approval of projects is simplified when the USDOT determines that certain uses of 4(f) properties are minor (de minimis) in nature. If, after consideration of any impact avoidance, minimization, and mitigation or enhancement measures, FHWA determines that CDOT transportation projects result in a de minimis use of a Section 4(f) property, an analysis of avoidance alternatives is not necessary and the Section 4(f) process is complete.

When there are multiple 4(f) resources present on a project, de minimis impact findings must be made for each individual 4(f) resource. De minimis impact criteria and associated determination requirements are different for historic sites than for parks, recreation areas, and wildlife and waterfowl refuges.

Historic Properties

According to SAFETEA-LU Section 6009 and the December 2005 Guidance for Determining De Minimis Impacts to Section 4(f) Resources, 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"; (2) there is written concurrence from the SHPO and/or Tribal Historic Preservation Officer (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 reviews of the Section 106 consulting parties have been considered.

Publicly Owned Parks, Recreation Areas, and Wildlife or Waterfowl Refuges

De minimis impacts on 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 4(f) resource. 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 4(f), and the public must be afforded the opportunity to review and comment on the effects of the project on the identified 4(f) resource(s). 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 "used" 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.

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 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 occupancy of a 4(f) property, when the project does not already meet FHWA's temporary occupancy exception criteria.

CDOT and local agencies must work with FHWA to complete the analysis. The FHWA division administrator is responsible for making the de minimis impact finding.

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. There are instances (e.g., certain categorical exclusions 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. Similarly, 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 Guidance on Determining De Minimis Impacts to Section 4(f) Resources.[127]

Section 4(f) Evaluation

The Section 4(f) alternatives analysis is incorporated into an EIS or EA as an appendix". A description of the process and the findings of the Section 4(f) evaluation are still included in the body of the NEPA document.

Follow the procedures described in FHWA Technical Advisory T6640.8A when there is Section 4(f) involvement. The FHWA Western Resource Center's Section 4(f) Checklist (Appendix 5.19-A) provides additional information regarding constructive use and how to approach discussing certain resources not protected by Section 4(f). If a proposed alternative involves more than one Section 4(f) resource, a separate 4(f) evaluation must be conducted for each 4(f) resource involved. A Section 4(f) evaluation document may contain several Section 4(f) resources evaluated individually. The suggested outline for the Section 4(f) Evaluation is shown in the sidebar.

[127] http://www.fhwa.dot.gov/hep/guidedeminimis.htm

4.19.3. NEPA Document Sections

The information and results of the Section 4(f) evaluation are included in the affected environment and environmental consequences chapters of the NEPA document. Information that should be included in each of the chapters are discussed below. In addition, information that is specific to the Section 4(f) compliance and approval process is provided in the third section. This Section 4(f) evaluation information should also be summarized for the multidisciplinary sections discussed in Sections 4.26 through 4.29 of this manual.

Affected Environment

The following Section 4(f) information (programmatic or Section 4(f) evaluation) should be presented in the affected environment section of the draft NEPA document or used as supporting documentation for a CatEx:

- Verification of all information from the preliminary project stages
- Type and description of each 4(f) resource, including whether existing or planned, involved in each alternative
- Detailed map or drawing of sufficient scale to identify the relationship of the alternatives to the 4(f) resource (any identified Section 4(f) properties should be shown on a map with the project footprint overlain)
- Amount of land of each resource required for each alternative
- Ownership of the 4(f) resource and information on leases, easements, and so on
- Existing and planned facilities, functions, or activities that are affected by the project for each 4(f) resource
- Type of public access to the resource
- Use of the resource

Environmental Consequences

The following information should be provided in the Section 4(f) resource section environmental consequences chapter of the draft NEPA document.

- Analysis of use required to be considered and, if there is no use, documentation to support that conclusion (refer to Content of Section 4(f) Evaluation for the required issues to be analyzed)
- Evidence of coordination and consultation with the agency with jurisdiction for each Section 4(f) Resource

- A build alternative that avoids each Section 4(f) resource or the reasons why such an avoidance alternative is not feasible or prudent

Section 4(f) Compliance and Approvals

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.

NEPA Documents

Final NEPA Documents

The following information should be presented in the final NEPA document 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 and, as appropriate, the USDA or Department of Housing and Urban Development
- Updated documentation of coordination and consultation with the agency having jurisdiction over the resource
- Documentation that the preferred alternative has the least net use on Section 4(f) resources
- If FHWA headquarters has determined there is “constructive use,” include documentation to that effect, as well as the following information:
- Documentation that the authority having jurisdiction over the Section 4(f) property agrees with conversion and acceptability of the replacement property
- Documentation that the NPS Regional Director has approved the conversion of the 4(f) property and replacement
- Identification of the commitment to acquire 4(f) replacement property

Tiered NEPA Documents

When a first-tier, broad scale EIS is prepared, and the detailed information necessary to complete the Section 4(f) evaluation is not available, the evaluation is based on potential uses to Section 4(f) land and whether those uses could have a bearing on the decision. A preliminary determination is then made regarding whether there are feasible and prudent locations or alternatives for the action to avoid the use of the Section 4(f) land. If the information is available, the preliminary determination will also take into account planning to minimize harm. Decisions made at the first-tier level should not preclude opportunities to minimize harm at subsequent stages in the development process. The preliminary determination is included in the first-tier EIS.

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 that "there are unique problems or unusual factors involved in the use of alternatives that avoid these properties or that the cost, social, economic, and environmental impacts, or community disruption resulting from such alternatives reach extraordinary magnitudes" (23 CFR 771.135(a)(2)) and include this specific language.

- A discussion of the basis for concluding that the proposed action includes all possible planning to minimize harm to the Section 4(f) property. When there are no feasible and prudent alternatives that avoid the use of Section 4(f) land, the final Section 4(f) evaluation must demonstrate that the preferred alternative is a feasible and prudent alternative with least harm to the Section 4(f) resources.

- 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 questions raised. When new alternatives or modifications to existing alternatives are identified and will not be given further consideration, the basis for dismissing these alternatives should be provided and supported by factual information. Where Section 6(f) land is involved, the NPS's position on the land transfer 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.” (23 CFR 771.135(i) and (j)

4.19.4. Section 4(f) Evaluation Processing, Review, and Approval

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 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 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 and any entities with jurisdiction over a Section 4(f) resource included in the evaluation. Review may also be required by USDA and HUD. These outside agencies are given a 45-day review period.

Once the external agency review is complete, an FHWA legal sufficiency review is required prior to approval of the final Section 4(f) evaluation. For 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.

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. This may occur under the following conditions, as outlined in the Section 4(f) regulations:

- A proposed modification of the alignment or design would require the use of Section 4(f) property after the CatEx, FONSI, draft EIS, or final EIS has been processed.

- The Administration determines, after processing the CatEx, FONSI, draft EIS, or final EIS 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.

- If it is determined that a Section 4(f) evaluation is required after the CatEx, FONSI, or final EIS 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.

Final Section 4(f) Approval can take up to a year or more to process. It is important to start the process early.

For full Section 4(f) evaluations with CatExs, the CDOT Staff Historian, FHWA operations engineer, 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 CDOT 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 prior to circulation of the draft NEPA document. CDOT regional staff will forward the document to the FHWA operations engineer, who forwards it to Washington, D.C. If FHWA headquarters approves the determination of constructive use, the draft NEPA document is processed normally.

Final Section 4(f) Approval

There is no permit associated with Section 4(f). 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 4(f) property or to minimize harm to any 4(f) property affected by the project.

4.20. Section 6(f) Evaluation

Section 6(f)(3) of the Land and Water Conservation Fund Act of 1965 as amended, is the cornerstone of federal compliance efforts to ensure that the federal investments in Land and Water Conservation Fund assistance are being maintained in public outdoor recreation use.

The two sections below provide guidance on the treatment of Section 6(f) evaluation for CDOT's NEPA projects. The first section discusses the process for evaluating Section 6(f). The second section discusses Section 6(f) evaluation information that should be in each NEPA document. In addition, the introduction to this Section of the manual provides guidance on the treatment of resource-specific information that is the same for all resources; Sections 4.26 through 4.29 provide information on multidisciplinary summaries of resource-specific information.

4.20.1. Section 6(f) Evaluation Process

The RPEM is responsible for reviewing the applicability of the Land and Water Conservation Fund Act.

Section 6(f) properties are those purchased with Land and Water Conservation funds. 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. Normally, any federally funded transportation project requiring the conversion of recreational or park land covered by Section 6(f) will also involve Section 4(f). The coordination and agreements entered into as part of completing CDOT's 6(f) responsibilities, therefore, should be reflected in the Section 4(f) evaluation. Regardless of the mitigation proposed, the Section 4(f) Evaluation should document the National Park Service's tentative position relative to Section 6(f) conversion.

The Section 6(f) evaluation should be completed when alternatives for the proposed action are first being designed and developed,.

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
- To comply with the vision presented in CDOT's Environmental Stewardship Guide
- To comply with several legal mandates that pertain to the Land and Water Conservation Fund Act, Section 6(f)(3)

Section 6(f) of the Act assures that once an area has been funded with Land and Water Conservation Fund assistance, it is continually maintained in public recreation use unless NPS approves substitution

property of reasonably equivalent usefulness and location and of at least equal fair market value.

State and local governments often obtain grants through the Land and Water Conservation Fund Act to acquire or make improvements to parks and recreation areas. Section 6(f) of this Act prohibits the conversion of property acquired or developed with these grants to a non-recreational purpose without the approval of the DOI's NPS. Section 6(f) directs the NPS to assure that replacement lands of equal value, location, and usefulness are provided as conditions to such conversions. Consequently, where conversions of Section 6(f) land are proposed for highway projects, replacement lands will be necessary. Importantly, Section 6(f) applies to all transportation projects involving such a conversion whether or not federal funding is being utilized for the project.

Normally, any federally funded transportation project requiring the conversion of recreational or park land covered by Section 6(f) will also involve Section 4(f).

Collection and Evaluation of Baseline Information Under NEPA

For non-federal projects requiring a NEPA-like analysis, a Section 6(f) Land Replacement Plan is required if Land and Water Conservation Act funding was used in improving the public outdoor recreational resource. The region will develop the plan in cooperation with the Section 6(f) property owner and coordinate the Land Replacement Plan with CDPHE for concurrence. In some cases, it may be advisable to obtain a binding agreement concerning the Land Replacement Plan. Once the CDPHE concurs with the plan, the region will submit the plan to the NPS for their concurrence. The region will then work with the NPS, CDPHE, and the Section 6(f) land owners to resolve any comments. Upon concurrence in the plan by the NPS, the region will incorporate it into the environmental document.

As a part of the Section 4(f) Evaluation for federal-aid transportation improvements, the region must determine ownership of the property and whether or not the Section 4(f) resource was purchased or some improvement made to the property using Land and Water Conservation Act funds. Once it is determined that Land and Water Conservation Act funds were used to purchase the property, then Section 6(f) of the act applies.

The CDOT Region, in cooperation with the local government land owner, must identify replacement land of equal value, location, and usefulness before a transfer of property under Section 6(f) can occur. The process is as follows:

- Upon identification of such land(s), the region and the local government must develop a written plan as part of the Section 4(f) mitigation, which demonstrates that the Section 6(f) replacement land is acceptable to the local government entity. The plan must

also include any special conditions, mutually agreed to by both parties, as deemed necessary, to bring about equal value, location, and usefulness in the replacement land as required under Section 6(f).

- Coordination with the NPS will occur during the process of the draft and final Section 4(f) Evaluations.

- Upon agreement with the plan by the region and the local government, the region will submit the Section 6(f) Land Replacement Plan to the CDPHE for concurrence. The CDPHE may comment on the plan to resolve any issues.

- Upon acceptance of the plan by the CDPHE, a letter concurring in the Section 6(f) Land Replacement Plan will be sent by the CDPHE to the region with a copy to the local government.

- The region will then discuss the Section 6(f) property and the plan, as mitigation, in the Section 4(f) Evaluation.

- The plan and the CDPHE concurrence letter should be incorporated into the appendix of the Section 4(f) Evaluation.

For Programmatic Section 4(f) Evaluations, the Section 6(f) issue is to be resolved prior to processing the Programmatic Section 4(f) Evaluation. In this case, the region, through FHWA, would work directly with the NPS to obtain concurrence in the Section 6(f) Land Replacement Plan. The results of this coordination effort would be documented in the appendix of the Programmatic 4(f) Evaluation and submitted to FHWA for approval. If the NPS objects to the conversion or transfer of the land under Section 6(f), then an individual Section 4(f) Evaluation must be prepared.

For individual Section 4(f) Evaluations involving Section 6(f) properties, the normal process outlined in Section 4.19 of this manual is followed.

The conversion of the Section 6(f) land to transportation right-of-way and the acquisition of the replacement land occur during the right-of-way acquisition phase. Subsequent reevaluations must include, in their Mitigation Status and Commitment Compliance sections, status discussions on the implementation of the Section 6(f) Land Replacement Plan. Coordination with the CDPHE and the NPS must occur to assure their cooperation in the land conversion transaction. The CDPHE 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 the public outdoor recreational uses of the Section 6(f) property it is meant to replace. Therefore, the acquisition or conversion of the Section 6(f) land cannot take place until after the replacement land has been purchased and integrated into the recreational facility involved. Be aware that because the functional replacement must occur prior to the conversion of the 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 development of the Land Replacement Plan, as failure to implement the Land Replacement Plan will cause delays in subsequent project construction.

4.20.2. NEPA Document Sections

The content of the sections on Section 6(f) evaluation in the affected environment and environmental consequences chapters is discussed below. This Section 6(f) information should also be summarized for the multidisciplinary sections discussed in Sections 4.26 through 4.29 of this manual.

Affected Environment

The affected environment section of the NEPA document should include the definition of the Section 6(f) resource, 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, location, and use.

Environmental Consequences

In the environmental consequences section, identify Section 6(f) lands that would be impacted by any of the project alternatives as well as any lands that proposed to replace them. Show these properties on a map and describe them. Focus particularly on any losses or gains in specific attributes associated with the purposes for which the properties were acquired.

4.21. 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.

In addition, the introduction to this Section of the manual provides guidance on the treatment of resource-specific information that is the same for all resources; Sections 4.26 through 4.29 provide information on multidisciplinary summaries of resource-specific information.

Farmland Regulations and Guidance

- 7 CFR Part 658 – Farmland Protection Act
- 23 CFR Part 771 – Environmental Impact and Related Procedures
- FHWA Technical Advisory T6640.8A, Guidance for Preparing and Processing Environmental and Section 4(f) Documents (http://www.fhwa.dot.gov/legsregs/directives/techadvs.htm)

4.21.1. Farmland Evaluation Process

The RPEM 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 4.5 is a representation of the steps involved in the completion of a Farmland Protection Policy Act Analysis.

Reasons for Evaluation of Farmlands Under NEPA

CDOT evaluates farmlands for several reasons:

- To enable identification and protection of important farmlands
- To comply with the vision presented in CDOT's Environmental Stewardship Guide
- 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.

Farmlands Clearance Documentation

- Identify whether conversion of farmland may occur
- If so, follow process outlined in Appendix H for 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

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.

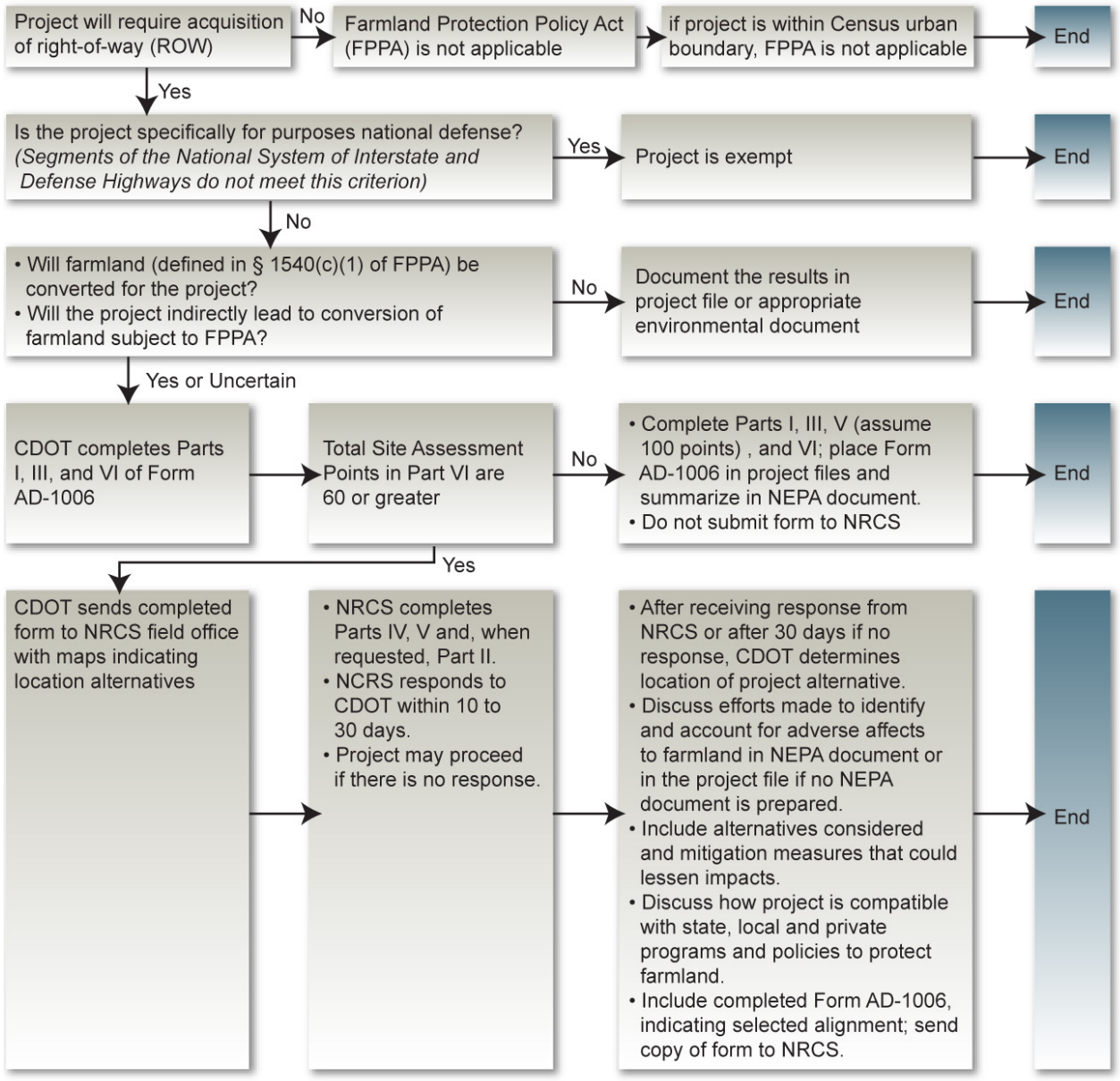
- Unique farmland is land other than prime farmland that is used for production of specific high-value food and fiber crops. It has the special combination of soil quality, location, growing season, and moisture supply needed to produce sustained high quality or high yields of specific crops.

- 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 AOI is identified as farmland the RPEM should complete the farmland conversion impact rating, NRCS form AD 1006 and submit it to NRCS for review. Instructions for completing the NRCS form AD-1006 are included in Appendix H. Figure 4.5 is a flow diagram for completing the farmland protection act analysis. Note: for corridor projects, Form NRCS-CPA-106 should be used (Appendix H).

Figure 4.5.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 and other environmental considerations. 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.

4.21.2. NEPA Document Sections

The content of the sections on farmlands in the affected environment and environmental consequences chapters is discussed below. This farmland information should also be summarized for the multidisciplinary sections discussed in Sections 4.26 through 4.29 of this manual.

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
- Its economic and cultural importance to the region

An EA or EIS typically should include only one to three paragraphs concerning farmland resources in Affected Environment, Environmental Consequences and Mitigation section(s).

Environmental Consequences

This section of the NEPA document summarizes the efforts taken during the farmland clearance process. In addition, 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.

4.22. Noise

> Noise, defined as unwanted or excessive sound, 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 and 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. (FHWA 2000)

Many transportation projects, during both construction and operation, cause noise levels to either decrease or increase. Noise associated with a project is thus an impact on the existing 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 setting and the noise level are important in determining the impacts of noise, which may affect people, structures, and wildlife adversely. Noise may also affect land use or economics and are a component of the impacts addressed in Section 4.11 and Section 4.13, respectively.

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. In addition, the introduction to this section of the manual provides guidance on the treatment of resource-specific information that is the same for all resources; Sections 4.26 through 4.29 provide information on multidisciplinary summaries of resource-specific information.

4.22.1. Noise Evaluation Process

The regional project engineer (as project manager) in coordination with the Regional Planning and Environmental Manager (RPEM), the EPB noise specialist, EBA specialist, and the regional environmental staff are responsible for ensuring that appropriate noise analyses and mitigation measures are performed. Typically, a consultant is hired to perform the noise analyses, prepare the noise technical report, and recommend mitigation measures as part of these studies.

Noise analyses must be performed on all Type I projects[128] if: "noise sensitive receivers are present within the project study zone. This

[128] 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 2002). Type II projects are proposed federal-aid projects for noise abatement on an

study zone is defined as a 500-foot distance in all directions from the edge of proposed improvements throughout the extent of the project. This 500-foot 'halo' defines the extents for the noise analysis and shall include receivers on all sides of the highway" (CDOT 2002).

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. If it is determined that noise barriers or other mitigation measures will be required, 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.

Noise Regulations and Guidance

- Federal-Aid Highway Act Of 1970
- Noise Control Act Of 1972
- FHWA Highway Traffic Noise Analysis and Abatement Policy and Guidance
- CDOT Noise Analysis and Abatement Guidelines
- 23 CFR 772, FHWA Noise Regulations

Reasons for Evaluation of Noise Under NEPA

CDOT evaluates noise for several reasons:

- Noise could adversely affect people, structures, and wildlife
- To comply with the vision presented in CDOT's Environmental Stewardship Guide
- To comply with several legal mandates that pertain to the measurement and control of noise, particularly in specified settings`

Regulations and guidance on noise are provided in the sidebar and discussed further in Section 7.

Both FHWA and CDOT now have well-developed guidance and protocols for evaluating noise. This guidance focuses on the analysis of noise impacts on people. It does not address the impacts of related vibration or the impacts of noise and vibration on structures or wildlife.

A synopsis of information related to FHWA noise policy and guidance can be found on their Highway Traffic Noise Regulations and Guidance web site.[129] A synopsis of information related to CDOT noise guidelines can be found on their Environmental Noise Guidelines and Policies webpage.[130] The two key working documents used by these agencies are FHWA's 1995 Highway Traffic Noise Analysis and Abatement Policy and Guidance [131] and CDOT's 2002 Noise Analysis

existing highway and are not mandatory according to FHWA guidelines. CDOT does not currently administer a Type II program.

[129] http://www.fhwa.dot.gov/environment/noise/mem_nois.htm

[130] http://www.dot.state.co.us/environmental/CulturalResources/NoiseGuidelines.asp

[131] http://www.fhwa.dot.gov/environment/polguid.pdf

and Abatement Guidelines.[132] 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 2002 Noise Analysis and Abatement Guidelines.[133] Please refer to those guidelines for further detail before implementing a noise analysis under NEPA.

Collection of Baseline Information (Step 1 and Step 2)

The baseline information needed to perform a noise analysis is dictated by the requirements of the prescribed process. Taken nearly verbatim from the CDOT Noise Manual,[134] there are five steps that should be completed to analyze noise for each project alternative:

- Identification of land uses
- Determination of existing noise levels
- Prediction of traffic noise levels
- Determination of traffic noise impacts
- Identification and evaluation of noise abatement measures for reducing or eliminating the traffic noise impacts, including construction noise.

Step 1—Identification of Land Uses. Land uses adjacent to a highway project should be assigned to one of five categories on the basis of the use described in Table 4.4. Most land uses along highway corridors will fall under Categories B, C, or D Pursuant t0 23 CFR 772.9(B)1. The use of Category A should be extremely rare and only considered for special facilities. Exterior areas having frequent human use are the primary locations where mitigation of traffic noise impacts is considered. The Table 4.4 Noise Abatement Criteria (NAC) are provided in Hourly Equivalent Sound Level (Leq(h)) units.[135]

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[132] http://www.dot.state.co.us/environmental/CulturalResources/Noise/CDOT%20Noise%20Guidelines%20Dec%2002.pdf

[133] CDOT projects initiated prior to December 1, 2002, remain under the authority of the preceding 1995 guidelines.

[134] http://www.dot.state.co.us/environmental/CulturalResources/Noise/NoiseManual.pdf

[135] 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.

To complete Step 1, information on land uses must be obtained within a noise study area defined by a 500-foot distance in all directions from the proposed edge of the proposed improvements throughout the project extent of the project. This information is used to characterize the affected environment and to determine the noise level at which noise abatement must be considered. They are not to be used as a noise design goal, or as a federal standard. As will be explained below, traffic noise impacts can also occur at levels below these values.

Step 2—Determination of Existing Noise Levels. Existing noise levels should be determined by field monitoring, and use of a Traffic Noise Model (TNM) version 2.5 or "latest approved version" noise prediction model[136] for all noise analyses that began after May 2, 2005. This FHWA model was evaluated for use in Colorado by Hankard et al. (2006),[137] and is available for a fee from the McTrans Traffic Noise Model 2.5 website.[138] There is also an FHWA Traffic Noise Model website[139] maintained by the Volpe Center Acoustics Facility, but it is currently unavailable.

Table 4.4. CDOT Noise Abatement Criteria (NAC)

Category	Leq(h)[a]	Description of Activity Category Use
A	56 (Exterior)	Lands where serenity and quiet are of extraordinary significance and serve an important public need and where preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	66 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	71 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	--	Undeveloped lands.
E[b]	51 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Source: CDOT Noise Analysis and Abatement Guidelines, December 2002.
[a] Hourly A-Weighted Sound Level in Decibels (dBA)
[b] Please refer to discussion of special noise abatement considerations on pp. 6–7 of the CDOT Noise Analysis and Abatement Guidelines, December 2002.

In general, changes in noise levels less than 3 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, to an observer, the sound at a level of 70 dBA would seem twice as loud as a sound level of 60 dBA. Estimates of sound levels are 30–40 dBA in a quiet residential area at night, 40–50 dBA during the day, while >140 dBA results in physical pain.

[136] The STAMINA 2.0 noise model, with Colorado-specific reference emission levels, may still be used for projects that began before May 2, 2005.
[137] http://www.dot.state.co.us/Publications/PDFFiles/tnm.pdf
[138] http://mctrans.ce.ufl.edu/featured/trafficNoise/
[139] http://www.fhwa.dot.gov/environment/noise/tnm.index.htm

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 the model. Such validation can be done when a project consists of an existing highway, but not when it consists of a new highway in a new location. It is desirable to monitor noise when noise levels are greatest, but this is not entirely 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 event will be when both the traffic volume and speed are the highest.

To complete Step 2, noise measurements, together with data on traffic conditions (e.g., volume and speed by vehicle type), meteorology (e.g., temperature, relative humidity, average wind speed, relative wind direction), and terrain (e.g., ground type, heavy trucks and barriers, flow control devices, berms, and parallel barriers), must be collected from as many locations as necessary to characterize noise environment, which could be one in some cases. The data on traffic and terrain are to be used in the TNM 2.5 model to predict noise at each location. The predicted noise is compared with the measured values and the model adjusted accordingly for the location.

Evaluation of Baseline Information (Step 3, Step 4, and Step 5)

During Step 3 (prediction of traffic noise levels), noise levels of the proposed project are predicted using the model that was validated by comparing its predictions of existing noise against measured values. In Step 4 (determination of traffic noise impacts), the noise levels predicted for each alternative are compared to the measured noise levels and to the NAC levels in Table 4.4 to quantify noise impacts. In Step 5 (identification/evaluation of alternative noise abatement measures to reduce/eliminate traffic noise impacts, including construction noise) mitigation measures are considered as appropriate for the impacts identified.

Step 3—Prediction of Traffic Noise Levels. Future traffic noise levels should be predicted with the TNM 2.5 model for all potential project alternatives, including the No Action Alternative. Specific noise inputs for the model 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. Modeling should focus on all receivers of noise that are in the front row and on the first floor adjacent to the noise source because these are the locations most likely to be impacted by project noise. Receivers in the second and third row and on the second and third floor should be included as warranted. In addition, FHWA requires noise analysis for undeveloped lands where development is “planned, designed, and programmed.” In other words, if building permits have been issued for a development, the noise analysis must be performed on that area as if the development already existed.

To complete Step 3, data on traffic entry type, relative humidity, temperature, default ground type, user-defined vehicles, pavement type, and receiver height above the ground must be assigned for the locations where noise is to be predicted. Common assumptions may be used for all locations. Additionally, specific assumptions regarding the future situation at modeled locations can be input to the model. Refer to FHWA and CDOT TNM users guides in Appendix J.

Step 4—Determination of Traffic Noise Impacts. The existing and predicted noise levels for each project alternative should be compared to the NAC levels in Table 4.4 to determine traffic noise impacts. Based on these procedures, a traffic noise impact occurs when projected traffic noise levels meet or exceed the NAC, *or* when projected traffic noise levels substantially exceed existing noise levels. Thus, for a category B (residential) receiver, the noise level that would trigger identification of an impact would be 66 dBA; 71 dBA is the impact criterion for a category C receptor. CDOT defines noise levels that "substantially exceed the existing noise levels" as those resulting in a predicted increase of 10 dBA or more over the existing levels, even if the highest predicted levels are below the NAC. Thus, if the existing noise level for a category B receiver was 46 dBA, a predicted noise level of 59 dBA would result in identification of an impact, despite the fact that the 66 dBA NAC had not been surpassed.

Step 5—Identification and Evaluation of Feasibility and Reasonableness of Noise Abatement Measures. Noise abatement measures should be identified and evaluated whenever traffic noise levels meet or exceed the Noise Abatement Criteria or when there is a substantial increase above existing noise levels. FHWA guidance directs that noise abatement be designed to provide a substantial noise reduction, rather than to achieve a certain noise level, such as the NAC. The 5 dBA value is important in that, in general, a reduction of this magnitude is considered to be "readily perceptible" to the average human ear, whereas a 3 dBA change is barely perceptible. CDOT has set a noise reduction goal of 10 dBA. CDOT has defined a reduction of at least 5 dBA to be a substantial reduction, a reduction of less than 3 dBA to be unacceptable, and a reduction between 3 and 5 dBA be marginal at best.

CDOT's guidelines identify two main elements in the consideration of noise abatement: feasibility and reasonableness. FHWA guidelines direct that any noise abatement measure found to be both reasonable and feasible be considered.

Feasibility. Feasibility deals with the engineering considerations that would provide a substantial noise reduction, such as whether or not, given the topography, a continuous noise barrier could actually be built. Other considerations include drainage requirements, other noise sources in the area such as aircraft or trains, and access issues such as driveways, sidewalks, and alleys. Feasibility also includes any "fatal

flaw" safety or maintenance issues associated with a proposed noise barrier:

A fatal flaw is a problem with the design of a barrier 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.

Reasonableness. Determining the reasonableness of a noise abatement measure is much more subjective in its approach than determination of feasibility.

Reasonableness requires common sense and judgment by the decision maker and is based on a number of factors, such as the following:

- Number and type of receivers
- Future traffic noise levels
- Increase in future noise levels from existing levels
- Cost of the proposed abatement measures (calculated and expressed in terms of barrier cost per impacted receiver per decibel reduction, using a base cost value)
- Desires of impacted receivers
- Existence of development
- Type of development
- CDOT form 1209 used to determine and document reasonable and feasible

A four-tiered scale is used to classify each of the above points for reasonableness. Each category is classified as very reasonable, reasonable, marginally reasonable, and unreasonable. All receptors that are predicted to receive at least a 3 dBA reduction in noise levels are included in a cost analysis. Final determination of overall reasonableness is made after consideration of all factors on a case-by-case basis. However, regardless of all factors, noise barriers will generally not be built if most of the affected receivers do not want them.

Usually, the construction of noise barriers[140] is the only practical noise abatement solution. Other measures (e.g., planting of vegetation, acquisition of a buffer zone, traffic management, and alterations of pavement type or texture) are often not possible or too complex to routinely consider. While noise barriers are the most common form of noise abatement, all five types of noise abatement listed at 23 CFR 772.13 must be considered.

Under CDOT guidelines, extraordinary abatement measures (e.g., insulation of structures) are allowed only if normal noise abatement measures are not feasible or reasonable and only for public or non-profit buildings (not interior portions of private residences). The only exception to this is when a noise impact is severe (i.e., where current or predicted noise levels are 75 dBA or more, or when predicted noise levels would be at least 30 dBA over existing noise levels).

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 noise analysis procedure can be found in CDOT's Environmental Noise Guidelines and Policies website[141] and websites addressing the TNM model (McTrans Traffic Noise Model 2.5 website[142]; FHWA Traffic Noise Model website[143]). The EPB Noise Specialist should be consulted prior to completion or submission of a final noise analysis.

4.22.2. NEPA Document Sections

Noise in the affected environment and environmental consequences chapters of NEPA documents is discussed below. This noise information is also summarized in the multidisciplinary sections discussed in Sections 4.26 through 4.29 of this manual.

Analysis of noise is typically documented in a noise technical report as well as in a NEPA document. A few CatExs and most EA noise studies will include a stand-alone noise analysis report that will be summarized in the EA or CatEx, although a brief and less technical noise analysis can be placed directly into the noise section of the EA document. Due to the nature of most EIS projects, a separate noise technical report is mandatory, and may be included in an EIS technical appendix or incorporated by reference and maintained in the project administrative record. Noise studies for Tier 1 NEPA documents are very general in nature and cannot be used to make detailed impact determinations and mitigation commitments.

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[140] Noise barriers are solid structures placed between noise receptors and roadways and typically are either earth berms or noise walls. Earth berms are large earthen mounds placed between the roadway and the receptor. They require a lot of land and typically display a natural, attractive appearance. Noise walls require much less space and can be constructed out of concrete, masonry, or other materials. Combination barriers, which place a wall on top of a berm, have also been constructed.

[141] http://www.dot.state.co.us/environmental/CulturalResources/NoiseGuidelines.asp

[142] http://mctrans.ce.ufl.edu/featured/trafficNoise/

[143] http://www.thewalljournal.com/a1f04/tnm/

Prior to preparation of a NEPA document, the noise technical report is prepared for most projects. In some cases, a full noise analysis report may not be needed and a memorandum to the project file may suffice. However, a full noise technical report will likely be needed if mitigation measures are to be recommended based on the analysis, so that these recommendations are documented thoroughly.

In the noise technical report, a short section should be included addressing construction noise. In general, this will contain no more than an explanation of what can be done during project construction to minimize the noise generated by actual construction events. This section should address such measures as utilizing well-maintained equipment and limiting work to certain hours. Although there are computer models that can predict levels of construction noise, these are of very limited use and are not required by CDOT.

The noise technical report must include discussion of each of the five steps of the noise analysis. It must also include a completed version of CDOT Form 1209, CDOT Noise Abatement Determination Worksheet.[144] This is basically a checklist for the analysis steps and determination of feasibility and reasonableness, with sections provided for narrative descriptions of the overall decision.

A project is considered "cleared" when a final analysis has been submitted and reviewed by the region noise specialist (if applicable) and the EPB Noise Specialist. All comments submitted during these reviews must be resolved before the analysis can be finalized.

Affected Environment Section 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

Affected Environment

Documentation for the affected environment section of EAs and EISs is discussed in this section. At a minimum, the affected environment section 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 tabulation of the measured and modeled noise levels, and briefly discuss how and where these were calculated plus any relevant points regarding how they differ.

Impact Analysis Section 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

Environmental Consequences

Documentation for the environmental consequences section of EAs and EISs is discussed in this section. The process of noise impact

144 http://www.dot.state.co.us/environmental/CulturalResources/Noise/CDOT%20Noise%20Guidelines%20Dec%2002.pdf

analysis is discussed above in describing the noise technical report. The information presented in the NEPA document on noise impacts and their analysis is typically a summary of the information in the noise technical report. At minimum, the environmental consequences section should compare the affects of each alternative carried forward for detailed analysis in the following three categories:

Summary of the Noise Technical Report – The summary must be sufficiently detailed to support the identification of noise impacts at specific locations based on NAC exceedance or substantial increases in noise (as discussed above). It must provide a foundation for and justify any need for mitigation measures as follows:

- Document location-specific noise impacts and their basis.

- The conclusion should restate the biggest noise concerns associated with each alternative and identify the alternative with the least expected effect on the different categories of receivers.

Mitigating Potential Impacts

The anticipated need for measures to mitigate noise impacts is an important factor in determining the complexity of noise analysis. The noise barriers that are typically used to mitigate noise are costly. Therefore, it is important to thoroughly describe mitigation measures for the specific locations where they are recommended. Note whether residual noise impacts will remain after the suggested mitigation measures are applied, and quantify them if possible.

There is some flexibility regarding the level of analysis required in draft and final EISs. Normally, both impact determinations and mitigation recommendations are made in the draft EIS. However, for some projects (e.g., projects having numerous alternatives under consideration in the draft EIS), it may be appropriate to identify mitigation measures after the draft EIS has been released and document them in the final EIS.

4.23. Visual Resources/Aesthetics

Visual resources include those features that define the visual character of an area. These can be important natural features, vistas, or viewsheds, but can also include urban or community visual characteristics, including architecture, skylines, or other characteristics that create a visual definition for an area.

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. In addition, the introduction to this section of the manual provides guidance on the treatment of resource-specific information that is the same for all resources; Sections 4.26 through 4.29 provide information on multidisciplinary summaries of resource-specific information.

4.23.1. Visual Resource/Aesthetic Evaluation Process

The project engineer (as project manager), together with the EPB visual resource specialist, is responsible for the evaluation of visual resources and aesthetics. Typically the development of a visual resource/aesthetics baseline and evaluation of potential project impacts is done by a consultant. The public should also contribute to identification of visual resources/aesthetics because they are important in defining "a sense of place" for the local community.

All visual resources/aesthetics that are visible from key observation points within the project area should be evaluated.

The presence of visual resources/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/aesthetics should be collected as early as possible during project development. Identification of local visual resources and aesthetics should be a goal of the first public scoping meetings.

Reasons for Evaluation of Visual Resources/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 comply with the vision presented in CDOT's Environmental Stewardship Guide

- To comply with legal mandates or guidance that refer to visual resources and aesthetics in the context of NEPA implementation

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 Guidance for Preparing Environmental and Section 4(f) Documents[145] includes visual impacts among those that should be evaluated in a NEPA document. The FHWA Streamlined Environmental Impact Statement (EIS) Review and Approval Process[146] includes visual resources among the 16 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 Colorado Regional Transportation Planning Guidebook[147] include visual resources. CDOT's vision regarding context-sensitive solutions is provided in Chief Engineer's Policy Memo 26[148].

Visual Resource/Aesthetics Regulations and Guidance

- Guidance for Preparing Environmental and Section 4(f) Documents
- Streamlined Environmental Impact Statement (EIS) Review and Approval Process
- Colorado Regional Transportation Planning Guidebook

In addition to guidance relating specifically to visual resources/aesthetics, is guidance on context-sensitive solutions, since being sensitive to a project's context includes being sensitive to its visual setting. Direction on how such solutions should be developed is provided on the FHWA Context Sensitive Solutions website,[149] in the FHWA document on Flexibility in Highway Design,[150] and on the Context Sensitive Solutions Organization website.[151]

Collection and Evaluation of Baseline Information Under NEPA

Collection of Baseline Information

Information on locally important visual resources/aesthetics should be gathered from the local community at public scoping meetings. The AOI of the proposed project is composed of its viewshed.[152] In addition, survey the views and vistas in the AOI to determine whether there are visual resources/aesthetics that the project should avoid. When a project involves modification of an existing roadway, a quick survey of visual resources/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

[145] http://www.fhwa.dot.gov/legsregs/directives/techadvs/t664008a.htm
[146] http://environment.fhwa.dot.gov/guidebook/vol2/doc7b.pdf
[147] http://www.dot.state.co.us/StatewidePlanning/PlansStudies/originals/Regional_Planning_Guidebook_2003.pdf
[148] http://www.dot.state.co.us/DesignSupport/Policy%20Memos/026%20Context%20Sensitive%20Solutions%20(CSS)%20Vision%20for%20CDOT.pdf
[149] http://www.fhwa.dot.gov/environment/flex/index.htm
[150] www.fhwa.dot.gov/environment/flex/index.htm
[151] http://www.contextsensitivesolutions.org/
[152] The area that can be seen from various viewpoints within the project area.

baseline information on the scenic quality of an area and its sensitivity to modification, as well as to identify particular visual "treasures." Creating visual models that use topography to determine viewsheds from specified vantage points can also be used.

In addition to impacts of the project on the physical character of locally important visual resources/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 viewsheds include the alignment of any of the project alternatives.

Evaluation of Baseline Information

The importance of visual resources/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 (Technical Advisory 6640.8A[153]). 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 appear to be used when detailed analysis is required.[154]

These more detailed protocols evaluate the scenic quality and sensitivity of an AOI. Sensitivity is based on such factors as the type of users, amount of use, public interest, adjacent land uses, special areas, and other factors. A prescribed or ad hoc rating scale may be used to delineate and evaluate scenic quality and sensitivity. The AOI is often subdivided into mapping distance zones (e.g., foreground, middleground, background, and seldom-seen zones) on the basis of their visibility. Finally the AOI is typically assigned to visual resource management classes that have established objectives[155] for retention of the existing character of the landscape, the level of change

[153] http://www.fhwa.dot.gov/legsregs/directives/techadvs/t664008a.htm

[154] Both of these appear to date from the 1980s and there appear to be no plans to update them or offer training on this type of analysis (see online discussion on FHWA Visual Impact Assessment). Neither of these documents is cited under the FHWA Policy and Guidance heading for Aesthetics in the FHWA Environmental Handbook.

[155] 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.
Class III Objective: To partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate.
Class IV Objective: To provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high.

permissible in the landscape, and the extent to which a proposed project is required to blend into the landscape.

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 viewsheds 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.

Other Issues to Consider

More information on how to approach the evaluation of visual resources/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[156]). A review of such guidance can help to identify the types of issues that should be considered in an analysis of visual resources/aesthetics for CDOT.

4.23.2. NEPA Document Sections

Affected Environment Section 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

Visual resources/aesthetics in the affected environment and environmental consequences chapters of NEPA documents is discussed below. This visual resource/aesthetic information is also summarized in the multidisciplinary sections discussed in Sections 4.26 through 4.29 of this manual.

Affected Environment

Documentation for the affected environment section of EAs and EISs are discussed in this section. At a minimum, the affected environment section should contain a discussion of the following three elements:

Existing Visual Resources/Aesthetics – Describe the general visual character of the AOI and identify important visual resources/aesthetics that are present.

Common Viewpoints – Note any other travel routes (hiking trails, biking trails, scenic byways, favored local routes) in the AOI that have important views of the location.

Graphics – The affected environment should include topographic maps and photographs of the important visual resources/aesthetics identified.

[156] http://www.blm.gov/nstc/VRM/8410.html

Environmental Consequences

Documentation needs for the Environmental Consequences section of EAs and EISs are discussed in this section. At 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 viewsheds and seek 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 viewshed 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 viewshed 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 viewsheds as the basis for a text discussion of impacts.

As noted in FHWA Technical Advisory 6640.8a,[157] "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 6640.8a[158] 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.

[157] http://www.fhwa.dot.gov/legsregs/directives/techadvs/t664008a.htm
[158] http://www.fhwa.dot.gov/legsregs/directives/techadvs/t664008a.htm

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 National Park Service), 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/aesthetics.

Mitigating Potential Impacts

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/aesthetics impacts). In either case, the final NEPA document should identify any proposed mitigation for the preferred alternative.

Mitigation of impacts to visual resources/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 shape, texture, and color to help it blend in with the surrounding landscape
- Construction on the backside of hillsides included in important viewsheds
- Routing of alternatives away from visual resources/aesthetics that might be damaged
- Inclusion of turnouts, parking areas, and signage that promote public enjoyment of visual resources/aesthetics from the project

- Planting to soften/minimize cuts, fills, bridge abutments, and so on, mitigate vegetation taken, and block negative views

4.24. Energy

Energy[159] resources typically include liquid or gaseous fuels, petroleum products, or electricity. 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. Wise use is also important to minimize the impacts to air and water resources discussed in Section 4.1 and Section 4.3 of this manual.

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. In addition, the introduction to this section of the manual provides guidance on the treatment of resource-specific information that is the same for all resources; Sections 4.26 through 4.29 provide information on multidisciplinary summaries of resource-specific information.

Energy Regulations and Guidance

- National Energy Policy Act of 2005 (http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=109_cong_bills&docid=f:h6enr.txt.pdf) provides incentives for traditional energy production and for newer, more efficient energy technologies and conservation.
- Executive Order 13211 (http://www.ofee.gov/eo/eo13211.html) requires preparation of a Statement of Energy Effects from federal agencies responsible for "significant energy actions"
- FHWA policy on Environmental Best Practices (http://www.fhwa.dot.gov/flh/greening.htm) mentions energy efficiency in numerous contexts
- SAFETEA-LU Section 1121 identifies fuel efficient vehicles among the exceptions that may be allowed in HOV lanes

4.24.1. Energy Evaluation Process

The project engineer (in the capacity of project manager and project designer) is responsible for evaluating energy use and conservation associated with the project. The engineering staff of consultants who calculate and evaluate energy use support the CDOT engineer.

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

[159] The term "energy" is used in a 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.

- To comply with the vision presented in CDOT's Environmental Stewardship Guide

- To comply with several legal mandates that pertain to energy production, use, and conservation

The regulations and guidance listed in the 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. For example, EPB is developing an Environmental Management System (EMS) for Division of Transportation Development[160] office operations that includes among its goals the conservation of energy. CDOT's Lighting Design Guide,[161] 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.

Affected Environment Section 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

4.24.2. NEPA Document Sections

The content of the sections on energy in the affected environment and environmental consequences chapters is discussed below. This energy information should also be summarized for the multidisciplinary sections discussed in Sections 4.26 through 4.29 of this manual.

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.

160 http://www.dot.state.co.us/environmental/Hazardous/docs/EMSDTDOfficePlanFocusDraft22806.pdf

161 http://www.dot.state.co.us/DesignSupport/Lighting%20Design%20Guide/CDOT%20Design%20Guide%2002-28-06.doc

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 selected the energy conservation measures to be implemented for that alternative should be highlighted. Measures to conserve energy 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

Environmental Consequences Section of NEPA Document

- Variations in construction and operational energy requirements and impacts among alternatives
- Conservation opportunities
- General mitigation approaches to conserve energy for all alternatives
- Focus on detailed energy conservation measures for the preferred alternative

4.25. Hazardous Substances

The term hazardous materials is an all-inclusive term for materials that are regulated as a solid waste, hazardous waste, and other wastes contaminated with hazardous substances, radioactive materials, petroleum fuels, toxic substances, and pollutants.

The discovery of hazardous substances within the proposed project area may have an adverse impact on timely completion of the project; therefore, an assessment of potential areas of contamination should be conducted as early in the project development process as possible. This assessment will:

- Supply information for property evaluation during the acquisition process
- Assess project alternatives for feasibility based on impacts from hazardous materials
- Limit or avoid CDOT liability during right-of-way acquisition
- Allow estimation of the cost of any required remediation
- Prevent delay claims during construction
- Identify worker safety concerns
- Develop specific materials management or institutional controls required during construction

When hazardous substances are discovered early in the project development process, the affected areas can either be avoided entirely or addressed in a timely manner.

Petroleum contamination from adjacent properties is the most likely hazardous substance that will be encountered. Non-petroleum contamination is found less often, but may be more costly and time consuming to address. All projects must consider the potential to encounter contamination within the project limits; therefore, an investigation of the proposed project area for all alternatives must be evaluated.

Hazardous Substance Regulations

Resource Conservation and Recovery Act (RCRA) (40 CFR Parts 260–299)
RCRA is the primary law governing the 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.)
CERCLA established prohibitions and requirements concerning closed and abandoned hazardous waste sites; provided for liability of persons responsible for releases of hazardous waste at these sites; and established a trust fund to provide for cleanup when no responsible party could be identified.

Standards and Practices for All Appropriate Inquiries (40 CFR Part 312)
The regulation 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.

Colorado Hazardous Waste Regulations (6 CCR 1007-3, Part 260)

UST Remediation Colorado Department of Labor and Employment-Division of Oil and Public Safety (7CCR 1101-14)

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

In addition, the introduction to this section of the manual provides guidance on the treatment of resource-specific information that is the same for all resources; Sections 4.26 through 4.29 provide information on multidisciplinary summaries of resource-specific information.

4.25.1. Hazardous Substance Evaluation Process

The RPEM or designee should be responsible for completing hazardous substance studies and for determining the potential for encountering hazardous substances on a CDOT project.

The goal of a hazardous substance study is to provide information needed for planning efforts related to hazardous substances and contaminated sites. They should be conducted wherever information on past and present uses indicates that hazardous substances might be present.

Although sites containing hazardous substances affect relatively few projects, their discovery late in the project development process or during construction can lead to unexpected and costly delays or unexpected remedial costs. Hazardous substance issues should be resolved prior to construction of the project and prior to right-of-way acquisition.

Reasons for Evaluation of Hazardous Substances Under NEPA

Site assessments to evaluate hazardous substances at proposed project areas are conducted for several reasons:

- To identify potential soil and groundwater contamination issues during the planning process so they do not affect a project in terms of mitigation, cost, schedule, and project personnel health and safety issues.
- 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 state and federal regulations and laws.

The regulations that apply to the acquisition, investigation, and cleanup of sites containing hazardous materials that may be present in a project area are shown in the sidebar. EPA has delegated enforcement of the federal hazardous waste regulations to CDPHE. These regulations are further discussed in Section 7.2.

4.25.2. Collection and Evaluation of Baseline Information

The first step in collecting baseline information regarding the presence of hazardous substances in a project area is conducting a Modified Phase I Environmental Site Assessment (MESA). The MESA is prepared during the project development phase and will be a supporting technical report for the EA or EIS. This report evaluates the corridor or project area for the potential presence of soil and groundwater contamination, asbestos-containing materials, and heavy metal–based paint.

The information gathered during the MESA (see Table 4.5) is obtained from readily available sources and provides a low to moderate level of detail about each individual property. Due to the large number of sites involved in corridor or other large projects, it is not practical to obtain site access and interview individual property owners.

ASTM and AAI Guidance
The guidance will be modified because of access issues and a modified methodology followed for the MESA.

The MESA should be conducted according to the following guidance and regulations:

- American Society for Testing of Materials (ASTM) Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process
- EPA, Standards and Practices for All Appropriate Inquiries, 40 CFR Part 312

CDOT requires the ASTM minimum search radius be extended by 0.25–1 mile or a distance that the environmental professional

determines is sufficient when the project footprint is uncertain. When a site is known or suspected to contain hazardous substances, CDOT's first preference is to realign the project to avoid this area. If this site must be acquired for right-of-way, an Individual Phase I Environmental Site Assessment may be performed. The same procedures are used to gather information for a Modified ESA as for a MESA, except that a site reconnaissance, not a windshield survey, is required. The Modified MESA also must discuss the area to be acquired by CDOT and how excavation, dewatering, and other construction practices may affect the hazardous substances. The Modified ESA may be conducted after the NEPA document is completed.

Table 4.5 Information to be Included in a MESA

Information	How Obtained
Overall impression of project area and adjacent properties	Site reconnaissance or "windshield survey" of properties
Historical uses of sites in or adjacent to project area	Review of readily available documents
Identified hazardous waste or spill sites within 1 mile of project areas	Review of readily available local, state, and federal databases
Indication of any clandestine drug lab enforcement actions that may have occurred at any of the sites (See Drug Lab Checklist, Appendix J)	Review of local police and state law enforcement records
Map and addresses of sites that may impact the project area due to presence of hazardous materials/wastes	Screening of sites identified in above process by distance and groundwater flow Review of previous investigations at these sites Interviews with relevant agency and regulatory staff regarding potential historic releases from identified sites
A map and general project description, including the project footprint and any right-of-way to be acquired	Project footprint and features obtained from CDOT
Brief description of the environmental setting (topography, geology, and groundwater hydrology, including estimated depth to groundwater and shallow groundwater flow direction)	USGS, Colorado Geological Survey, State Engineers Office, and CDPHE Water Quality Control Division reports
Sites requiring additional evaluation or investigation before right-of way acquisition, alternative feasibility assessment, project design, or construction	Assessment of all information gathered during MESA

Note: Items shaded in blue are required by CDOT, but not required by ASTM standards or EPA guidance.

Affected Environment Section of NEPA Document

- Text description of work performed during the MESA
- Summary of reports and databases compiled during the 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

For CatEx projects, an Initial Site Assessment (ISA) and ISA Checklist (CDOT Form 881, Appendix H) are prepared during the project development phase. The ISA can also be used during right-of-way acquisition for properties where there is little reason to expect hazardous substances to be present. The ISA requires a site reconnaissance and a search of local records for clandestine drug lab enforcement activities. Procedures for the ISA are provided in the CDOT Right-of-Way Manual (2003) and the ASTM Standard Practice for Environmental Site Assessments: Transaction Screening Process. The conclusions of the ISA for CatEx projects must be documented on CDOT Form 128, CatEx Determination (Appendix H).

Other Issues to Consider

Investigators conducting assessments of sites containing hazardous substances must also evaluate sites that are known to have been used or suspected of having been used as laboratories for production of methamphetamine according the procedures in the Meth Lab ISA Checklist[162] (Appendix J).

If hazardous substances are identified in a project area that cannot be avoided (e.g., the project must go through this property), CDOT must coordinate with CDPHE, Hazardous Materials and Waste Management Division, and/or EPA to determine the required mitigation.

4.25.3. NEPA Document Sections

The content of the sections on hazardous substances in the affected environment and environmental consequences chapters is discussed below. This hazardous substance information should also be summarized for the multidisciplinary sections discussed in Sections 4.26 through 4.29 of this manual. Examples of the appropriate level of detail for a discussion of hazardous substances in an EA or EIS are provided in the "Best of" Examples located in Appendix F of this manual. In addition, several examples of MESAs are provided on CDOT's Hazardous Waste/Sustainability website.[163] A flowchart summarizing the process for evaluating the presence of hazardous substances at a project site and mitigation for these sites shown in Figure 4.6.

Affected Environment

The hazardous substance section of the affected environment chapter in the NEPA document should be based on the results of the MESA and include the information in the sidebar, at a minimum.

Environmental Consequences

The discussion of hazardous substances in the environmental consequences chapter should do the following:

[162] http://www.dot.state.co.us/environmental/Hazardous/docs/Methlabbrochure012606.pdf
[163] http://www.dot.state.co.us/environmental/Hazardous/default.asp

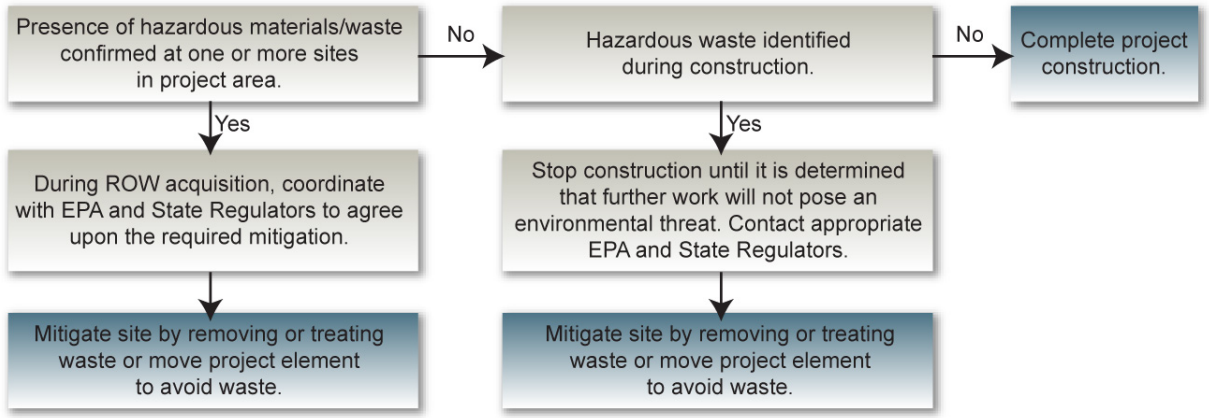
- Identify the types and locations of any hazardous substances that may affect the project, using the conclusions of the ESA, Modified ESA, or ISA.
- Provide a map that shows the proposed project alignments and the nature and location of known or suspected hazardous substances.
- Discuss where, specifically, the hazardous substances are located with respect to project activities that will take place on site, for example, hazardous substances are located in soil at the site and excavation for a storm sewer will cross the site, and how these substances may impact the proposed project elements for each alternative.
- Note where further investigation of some sites is necessary before the property is acquired.
- Discuss the potential for dispersal of hazardous substances through project-related activities.
- Note whether any hazardous substances will be used during project construction or operation and, if so, how these will be handled to avoid impacts.

If the ESA, Modified ESA, or ISA identifies one or more sites within the project area that are known or suspected to contain hazardous substances (e.g., a former sanitary landfill, public dump, gasoline station, manufacturing site, etc.), there are several methods to mitigate the impact of the hazardous substance on the project. The three primary mitigation methods are altering the alignment to avoid the contamination, modifying the project construction procedures, or re-mediating the site to remove the contamination. All of these actions associated with potential hazardous materials sites should be considered during the alternatives screening process.

Environmental Consequences Section 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 the Preferred Alternative
- Discussion of hazardous substance use associated with project construction or operation

Figure 4.6 Mitigation Process for CDOT Projects



4.26. Environmental Consequences by Alternative

At the end of the resource-specific discussions in the environmental consequences chapter of a NEPA document, summarize, compare, and contrast impacts, mitigation measures, and residual impacts by alternative rather than by resource in a table that is introduced briefly with text.

A useful way to organize this table is shown in Table 4.6 where alternatives are column headings listed from left to right, starting with the No Action Alternative and progressing toward the alternative reflecting the greatest change,[164] and resources are listed on the table's stub. To highlight differences among the alternatives, it is helpful to state "Same as Alternative X" when an alternative has the same impact as an alternative to the left of it.

Following the alternatives summary table, rank the alternatives on the basis of their relative degree of impact to each resource. If some of the resources are more important[165] in the area than others, an alternate approach is to weight these resources more heavily and incorporate this weighting into the ranking scale. Whatever the approach used in ranking the alternatives (and weighting the alternatives, if this is done), describe the approach in detail so that the context of the information in the table will be clear.

Discuss the relative rank of the alternatives and use this information to select a preferred alternative, when this is appropriate. Selection of a preferred alternative may be done in a draft NEPA document. It must be done in the final NEPA document, since this will be the basis of the FONSI or ROD that directs project implementation.

[164] An alternate way to arrange the alternatives is to list them from greatest to least environmental impact. However they are arranged, note the basis for the arrangement of alternatives in the text.
[165] A resource might be considered more important if it is irreplaceable (e.g., historic or archeological resources), is more ancient (e.g., a species and its gene pool versus a historic building), or is incurring excessive cumulative impacts because other projects have, will soon, or are impacting it as well (e.g., wetlands).

Table 4.6. Example of an Alternative Summary Table					
Resource[1]	**Alternatives**				
	No Action	**A**	**B**	**C**	**D**
Air Quality	No impacts to air quality beyond existing background	PM10 and O_3 concentrations would be above guidelines Residual impacts from slight exceedances of guidelines	The net increase in NOx, PM_{10}, and O_3 would exceed CDPHE Guidelines Residual impacts from slight exceedances of guidelines	PM_{10} and O_3 concentrations would be above guidelines and NOx concentrations would approach guidelines Residual impacts from slight exceedances of guidelines	PM_{10} concentrations would be above guidelines Residual impacts from slight exceedances of guidelines
Geologic Resources	etc.	etc.	etc.	etc.	etc.
Water Resources					
Floodplains					
Wetlands					
Vegetation					
Fish And Wildlife					
Threatened/Endangered Species					
Historic Properties					
Paleontological Resources					
Paleontological Evaluation Process					
Land Use					
Social Resources					
Economic Resources					
Environmental Justice					
Multimodal Users (Bikes, Pedestrians)					
Housing/Business/Row Relocation					
Transportation Resources					
Utilities And Railroad					
Section 4(f) Evaluation					
Section 6(f) Evaluation					
Farmlands					
Noise					
Visual Resources And Aesthetics					
Energy					
Hazardous Substances					

Note: All resources are listed, even those not considered in detail in the NEPA document, so that the reason for their omission can be stated and the table is complete.

[1] The existing situation is listed in the first column, with proposed alternatives arranged in increasing order of impact.

4.27. Cumulative Impacts

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. Cumulative impacts are defined in Section 1508.7 of Council of Environmental Quality (CEQ)'s Regulations for Implementing NEPA[166] 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 (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

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, 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 projects. 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.

4.27.1. Cumulative Impact Process

The project engineer (as project manager), together with the specialists responsible for each environmental resource that is

[166] http://www.nepa.gov/nepa/regs/ceq/toc_ceq.htm

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 ROI,[167] regardless of their ownership, sponsorship, or funding source, should be evaluated for each resource. 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. Whenever possible, further impacts on the resources identified should be avoided/minimized through project design.

Cumulative Effects Regulations and Guidance

- CEQ Regulations Implementing NEPA (http://www.nepa.gov/nepa/regs/ceq/toc_ceq.htm)
- Considering Cumulative Effects under NEPA (http://ceq.eh.doe.gov/nepa/ccenepa/sec2.pdf)
- FHWA Technical Advisory T6640.8a (http://environment.fhwa.dot.gov/projdev/impTA6640.htm)
- FHWA Secondary and Cumulative Impact Assessment in the Highway Project Development Process (http://environment.fhwa.dot.gov/guidebook/content/Secondary_Cumulative_Impact_Assessmt.htm)
- CDOT Environmental Stewardship Guide (http://www.dot.state.co.us/US50E/pdf/ESGuide5-12-05e-book.pdf)
- Guidance On The Consideration Of Past Actions In Cumulative Effects Analysis (http://www.eh.doe.gov/nepa/ceq_cumulativeguidance_6_24_05.pdf)

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 the vision presented in CDOT's Environmental Stewardship Guide
- 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,[168] which were issued in 1978, introduce the consideration of cumulative impacts. The concept of cumulative impacts has continued to be developed and refined through

[167] Region of Influence: The physical area that bounds the environmental, sociological, economic, or cultural resources of interest for the purpose of cumulative analysis.
[168] http://www.nepa.gov/nepa/regs/ceq/toc_ceq.htm

subsequent guidance from CEQ and federal agencies (e.g., Considering Cumulative Effects, Modernizing NEPA Implementation,[169] Consideration of Cumulative Impacts in EPA Review of NEPA Documents[170]).

Evaluation of Cumulative Impacts Under NEPA

Collection of Baseline Information

The main components in the cumulative 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 (ROI) boundaries for the cumulative analysis based on all resources of concern and all of the actions that may contribute.[171] 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 ROI 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.

[169] http://ceq.eh.doe.gov/nepa/ccenepa/sec2.pdf
[170] http://www.epa.gov/compliance/resources/policies/nepa/cumulative.pdf
[171] Variation in the areas for which resource data are available may also influence the size of the ROI. 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.

  - 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,[172] 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, do the following:

[172] http://www.eh.doe.gov/nepa/ceq_cumulativeguidance_6_24_05.pdf

- Characterize each resource within the project ROI 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, 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 Regulations for Implementing NEPA,[173] 1500.5(k)).

4.27.2. NEPA Document Sections

The description of cumulative impacts in the NEPA document should:

- Provide a brief summary of cumulative impacts

- Present the cumulative impact analysis methodology. This section would include the temporal and spatial boundaries used, the baseline condition used (typically documented in the affected

[173] http://www.nepa.gov/nepa/regs/ceq/toc_ceq.htm

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. The first sentence should define the ROI for the resource, followed by a discussion of the types of anticipated cumulative impacts. Conclude the discussion with how the cumulative impacts would vary by alternative.

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. Table 4.6 and Table 4.7 may provide a useful way to present cumulative impacts if a project is complex.

4.28. Impact/Mitigation Summary by Project Phase

In a NEPA document, impacts and their mitigation measures are discussed in resource-specific sections throughout the environmental consequences chapter (see Sections 4.1-4.25 of this manual). At the end of the resource-specific sections, a summary of impacts for each of the alternatives being considered is provided (see Section 4.26 of this manual) and the cumulative impacts of each of the project alternatives with other past, present, and anticipated future projects in the ROI are evaluated (see Section 4.27 of this manual). Although the preferred alternative is included in these presentations, it is combined with other information in a discussion that is more evaluative than directive in style. A summary of the impacts and mitigation measures associated with the preferred alternative would be helpful in focusing the evaluation of the alternatives toward the alternative that will be implemented with specific mitigation commitments.

4.28.1. Impact/Mitigation Summary Process

Review the resource specific impacts and mitigation measures associated with the preferred alternative. Put them into a tabular format such as that illustrated in Table 4.7. Each mitigation measure should be directly related to an impact. To facilitate the usefulness of the summary table to CDOT personnel and contractors, divide the summarized impact/mitigation information into the following five project phases:

Pre-construction. Between approval of project implementation and the initiation of construction. May involve set up of parking areas, staging areas for equipment and supplies, and construction zone demarcation. May occur in one area of the project while construction, operation, or monitoring phases are ongoing in other parts of the project.

Construction. From beginning to end of project construction when equipment is used for the purpose of building the project. Ends when project operations can begin. May occur in one area of the project while pre-construction, operation, or monitoring phases are ongoing in other parts of the project.

Operation. Use of the constructed project for its intended purpose. May occur in one area of the project while pre-construction, construction, maintenance, or monitoring phases are ongoing in other parts of the project.

Maintenance. Overlaps after a lag period with the operation phase, often involving more frequent or more extensive upkeep activities as the project ages and/or project use intensifies. May occur in one area of the project while operation or monitoring is ongoing in other parts of the project.

Monitoring. Overlaps all of the above phases, as mitigation commitments, including BMPs, and maintenance actions are checked,

verified, and measured as necessary to ensure their effectiveness throughout the life of the project.

These phases may overlap in time, but are useful constructs when packaging impacts and mitigation.

4.29. NEPA Document Sections

At the end of all NEPA documents (this may be a draft or final NEPA document) summarize the impacts and mitigation measures for the preferred alternative in a succinct tabular format such as that illustrated in Table 4.7. After the table has been refined and included as a commitment in either a FONSI or ROD, the information in this table is intended to be used as a "pull-out" to direct engineers, contractors, and maintenance personnel throughout the life of the project.

To the extent possible, include all information needed to implement the mitigation measure or monitoring action in the table. Include the footnote at the bottom of Table 4.7 when the table is placed in the FONSI or ROD and include a commitment in the text of the NEPA document that introduces the table, stating that it will be used as a component of RFPs and contracts for contractors and as a component of CDOT work crew directives.

Table 4.7. Example Impact/Mitigation Summary by Project Phase			
Required Action (Mitigation Commitment)	**Frequency of Action**	**Details for Action Implementation**	**Impact to be Prevented**
Pre-construction			
1. Contain runoff of water from project parking and staging areas	Throughout pre-construction and construction phases	a. Select sites for parking and staging areas away from streams and where runoff can be contained b. Surround sites with berms to contain spills within them c. Set up diversions to slow surface flow and direct it around sites (e.g., straw bales, silt fence)	Prevent erosion, chemical contamination
2. etc.	etc.	a. etc.	etc.
Construction			
1. Prepare washout pits for cement trucks	Complete at least two days before concrete is to be poured	a. Establish pit where surface flow from heavy rain can't flood or breach it b. Line pit so that solids are contained c. Truck liner with dried solids to approved landfill	Prevent chemical contamination
2. Construct in fuel storage areas and use to contain all fuels	Complete at least two days before first fuel storage drums arrive in staging area	a. Site fuel storage area away from vehicle parking and supply storage areas b. Select sites away from streams and where runoff can be contained c. Surround fuel storage area with berms d. Set up diversions to slow surface flow and direct it around sites (e.g., straw bales, silt fence)	Prevent chemical contamination
3. Wash equipment	Before bringing in equipment onto project site or moving it to a new staging area	a. Wash equipment down on a concrete pad or in a lined pit b. Contain wash water c. Treat wash water to remove chemicals and weed seeds	Prevent spread of invasive species
4. Construct the road on the downhill side of Pond X	Schedule construction during fall or early winter	a. Note: This is a mitigation measure that has been incorporated into project design	Avoid impacting amphibian populations that breed in the pond and move uphill to aestivate after metamorphosis in the pond
Operation			
1. Document road kills	Whenever encountered	a. Provide highway patrol and maintenance workers with software on handheld GPS units b. Ensure that software has easy pick lists to enable all pertinent information regarding road kill to be entered easily c. Establish recognition program or other incentives for good road kill record keeping	Prevent road kill by identifying locations where roadway design improvements are needed
2. etc.	etc.	a. etc.	etc.
Maintenance			
1. Clear debris from underpasses and culverts	As required to enable free passage of water, fish, and wildlife as appropriate	a. Keep an initial log of area runoff events and amount of debris in each underpass and culvert b. Maintain log until understanding of cause and effect have been established ("heavy rain on north side of Poudre River near Ted's Place causes culverts on SH 14 to	Prevent road kill by enabling fish and wildlife to safely cross under road Prevent flooding by facilitating stable runoff

Table 4.7. Example Impact/Mitigation Summary by Project Phase			
Required Action (Mitigation Commitment)	**Frequency of Action**	**Details for Action Implementation**	**Impact to be Prevented**
		collect debris between mileposts A and B") c. Write down conclusions regarding cause and effect as a way to pass on institutional knowledge d. Goal is for maintenance crews to know which underpasses and culverts need to be checked most often and prioritize them—and then keep a record for new crew members to follow	
2. etc.	etc.	a. etc.	etc.
Monitoring			
Pre-construction1.	Daily	a. Before work begins, site foreman should walk perimeter to ensure berms, diversions, and silt fence are in place and have not been breached	Ensure erosion and chemical contamination are being prevented
Maintenance1	Sporadic, unannounced inspections of underpasses and culverts	a. After precipitation events, check random sample of underpasses and culverts with sampling design stratified by geography and likelihood of debris clogging b. Document presence of any debris c. Document use of underpass and culverts by fish and wildlife by noting any fish on updrainage side of structure and looking for wildlife tracks at structure entrance/exit	Ensure that passage of water, fish, and wildlife is being successfully enabled and flooding is being prevented