RETURN TO SER AR INDEX

From: Adams, Karen K NAE
To: Sneeringer, Paul J NAE
Subject: Indirect and Cumulative Impacts, Work Group Draft Baseline Report
Date: Tuesday, May 08, 2012 12:58:13 PM

---

http://www.dot.gov/execorder/13274/workgroups/icireport.htm

SDMS DocID 518710

Executive Order 13274
Indirect and Cumulative Impacts
Work Group

Draft Baseline Report

March 15, 2005

ICF Consulting conducted the research and prepared this draft report. The report was reviewed by the Indirect and Cumulative Impacts Work Group and incorporates its comments and recommendations to the Task Force.

Acknowledgements

This report was prepared under the direction of the Executive Order 13274 Indirect and Cumulative Impacts Work Group, whose membership included the following individuals.

Lamar S. Smith, CEP	Federal Highway Administration, Work Group Chair
Edward (Ted) Bolling	Council on Environmental Quality, Work Group Chair
Dave Sullivan	Federal Highway Administration
Harold Aikens	Federal Highway Administration
Carol Braegelmann	Federal Transit Administration
Gail Orendorff	Federal Aviation Administration
Joseph Burns	US Fish and Wildlife Service
Ann Campbell	Environmental Protection Agency
Dave Carlson	Environmental Protection Agency
James Gavin	Environmental Protection Agency
Carol Legard	Advisory Council on Historic Preservation
Gilbert, Jack	Texas Department of Transportation, on detail with FHWA
Jennifer Moyer	US Army Corps of Engineers
Nanette Reck	National Oceanic and Atmospheric Administration
Ellen G. LaFayette	US Forest Service

The report was prepared by the following ICF Consulting staff:

Alan Summerville	Senior Vice President
Michael Grant	Project Manager
Brantley Fry	Senior Associate
Todd Stribley	Senior Associate
Neil Sullivan	Senior Associate

Table of Contents

Executive Summary ES-1
Background ES-2
State of the Practice ES-3
Existing Guidance Materials and Training Programs ES-5
Lessons Learned ES-6
Opportunities to Enhance Coordination and Improve Decisionmaking ES-7
Recommended Next Steps ES-9

1. Background 1

2. Requirements for Analysis and Mitigation of Indirect and Cumulative Impacts 5
2.1 Definitions 5
2.2 Analysis Requirements 7
2.2.1 Reasonably Foreseeable Impacts 7
2.2.2 Indirect Impacts 8
2.2.3 Cumulative Impacts 8
2.3 Mitigation Requirements 9

3. Existing Guidance and Training on Indirect and Cumulative Impacts 12
3.1 Guidance Documents 12
3.1.1 Federal Guidance Documents and other General Resources 12
3.1.2 State and Local Guidance Documents 14
3.1.3 Topics Covered in Guidance Documents 15
3.2 Available Training Programs 15
3.2.1 Nationally Available Courses 16
3.2.2 State-level Courses 18
3.3 Assessment of Guidance and Training 19

4. State of the Practice, Lessons Learned, and Opportunities 21
4.1 State of the Practice 21
4.1.1 Overarching Issues 21
4.1.2 Determining Boundaries of Analysis 26
4.1.3 Analysis Methods and Documentation 27
4.1.4 Mitigation 29
4.2 Lessons Learned and Opportunities 31
4.2.1 No One Size Fits All Approach 31
4.2.2 Early Coordination to Agree on Critical Issues and Analysis Boundaries .. 31
4.2.3 Use of GIS and Modeling Tools to Better Characterize Impacts 32
4.2.4 Use of Expert Panels 32
4.2.5 Clear Documentation of both Indirect and Cumulative Impacts 33
4.2.6 Consideration Earlier in Planning 33
4.2.7 Coordination with Local Governments 34

Table of Contents
(continued)

4.2.8 Watershed and Ecosystem-level Approaches to Mitigation 34
4.2.9 Leadership Role 35

5. Case Studies: Notable Practices related to Indirect and Cumulative Impacts . 36
5.1 Planning-level Efforts 36
5.1.1 California: Merced County Partnership for Integrated Planning 37
5.1.2 Oregon: Major Bridge Replacement Program 38
5.2 Projects: Notable Practices in Scoping, Analysis, or Mitigation 39
5.2.1 California: Lincoln Bypass – State Route 65 39
5.2.2 California: State Route 46 40
5.2.3 Colorado: I-25 41
5.2.4 Hawaii: Lahaina Bypass 42
5.2.5 Indiana: I-69 43
5.2.6 Maryland: I-270/US 15 44
5.2.7 Montana: I-15 46
5.2.8 New Hampshire: I-93 46
5.2.9 New York: Lower Manhattan Transportation Recovery Projects 48
5.2.10 North Carolina: Monroe Bypass and Monroe Connector 51
5.2.11 Pennsylvania: Lackawanna Valley Industrial Highway 52
5.2.12 Utah: Southern Corridor 53
5.2.13 Washington: I-405 54
5.2.14 Wisconsin: Highway 12 55
5.2.15 Wisconsin: U.S. 41 56
5.3 Ecosystem Level Approaches to Mitigation 57
5.3.1 Colorado: Shortgrass Prairie Initiative 57
5.3.2 North Carolina: Ecosystem Enhancement Program 58
5.3.3 Washington State: Watershed Mitigation Program 58
5.4 Other Examples 59
5.5 Selected Priority Projects (Not Profiled Above) 59
5.5.1 Kentucky: TransAmerica Corridor (Future I-66) 59
5.5.2 Minnesota/Wisconsin: St. Croix River Crossing Project 60
5.5.3 Montana: US 93 Corridor 61
5.5.4 Ohio/Kentucky: Ohio River Bridges 62
5.5.5 Texas: I-69 Corridor 63
5.5.6 Vermont: Chittenden County Circumferential Highway 64

6. Recommended Next Steps 66
6.1 Products of this Baseline Effort 66
6.2 Further Efforts 66

Appendix A: Laws and Implementing Regulations, and Executive Orders A-1
Appendix B: Case Law B-1
Appendix C: Guidance Documents C-1

Table of Contents
(continued)

Appendix D: Training Courses D-1
Appendix E: List of EISs Reviewed E-1

Executive Summary

On September 18, 2002, President George W. Bush signed Executive Order (EO) 13274, *Environmental Stewardship and Transportation Infrastructure Project Reviews.* This EO established an Interagency Task Force to advance current U.S. Department of Transportation (DOT) and interagency environmental stewardship and streamlining efforts, to coordinate expedited decisionmaking related to transportation projects across Federal agencies, and to bring high-level officials to the table to address priority projects.

The Task Force also recognized the importance of indirect and cumulative impacts, among others, as a potential source of interagency conflict and possible delay in the environmental review process. Therefore, the Task Force established an interagency Work Group on Indirect and Cumulative Impacts to evaluate this topic and identify opportunities where greater interagency coordination and collaboration could lead to improvements in the decisionmaking process for transportation projects.

This report presents "baseline" information developed for the Indirect and Cumulative Impacts Work Group. The purpose of the baseline assessment is to describe existing legal requirements, practices, and challenges being faced in regard to indirect and cumulative impacts; describe opportunities to improve the analysis of indirect and cumulative impacts and interagency agreement on these issues; and to develop recommendations for Task Force consideration.

This document is designed both for the Task Force and for practitioners in transportation and resource agencies to provide a common understanding of requirements, resources and mechanisms currently available to improve the analysis, documentation; and mitigation (avoidance, minimization and compensation) of indirect and cumulative impacts. Drawing on the results of literature reviews, reviews of environmental impact statements (EISs) and associated analyses, interviews with over 50 practitioners (from the Federal Highway Administration, Federal Transit Administration, Federal Aviation Administration, Federal resource agencies, State departments of transportation, metropolitan planning organizations, and consultants), this report contains information on:

- *Requirements for Analysis and Mitigation of Indirect and Cumulative Impacts (Section 2)*, including a summary of laws and regulations that address indirect or cumulative impacts, and a compilation of relevant case law and its implications;

- *Existing Guidance Materials and Training Programs (Section 3)*, including an annotated bibliography summarizing guidance documents, a compilation of existing training programs, and a synthesis of viewpoints from practitioners on the value of these resources and additional guidance and training needs;

- *A Summary of State of the Practice, Lessons Learned, and Opportunities (Section 4)***,** which highlights challenges faced, differences of opinion between transportation and resource agencies, effective practices, and opportunities to improve the quality of analysis and develop interagency consensus; and

- *Case Studies on Indirect and Cumulative Impacts (Section 5)***,** which describe notable practices in regard to project-level analyses, consideration of impacts in planning, ecosystem, and other area-wide level mitigation approaches, as well as practices employed on several of the priority projects selected under EO 13274.

Many of these sections were designed to be immediately and directly useful to transportation and resource agency practitioners in the short term, while the Work Group and Task Force consider additional needs related to policy, guidance, training and collaborative decisionmaking. The report concludes with draft *Recommended Next Steps (Section 6)* for Task Force review.

The draft recommendations and findings on the state of the practice, challenges, and opportunities are summarized below.

Background

The National Environmental Policy Act (NEPA) process is designed to ensure that all direct, indirect and cumulative impacts of a proposed action or project are considered in Federal agencies' decisions to take those actions that could significantly affect the quality of the environment. The Council on Environmental Quality's (CEQ) regulations for implementing the procedural provisions NEPA defines indirect and cumulative effects as follows:

"Indirect effects" are those:

> [W]hich are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

"Cumulative effects" are defined as:

> [T]he impact on the environment that 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.

In addition to NEPA, other statutes require Federal agencies to consider indirect and cumulative effects of transportation improvement projects, including the Clean Water Act (CWA) Section 404 (b)(1) guidelines, the regulations implementing the conformity provisions of the Clean Air Act (CAA), the regulations implementing Section 106 of the National Historic Preservation Act (NHPA), and the regulations implementing Section 7 of the Endangered Species Act (ESA), among others.

State of the Practice

Limited Consideration of Impacts

The state of the practice for both indirect and cumulative impact assessment is evolving towards a greater appreciation of indirect and cumulative effects in transportation decisions, as more scrutiny and challenges are being directed at these issues in the environmental review of transportation infrastructure projects. However, the general state of the practice tends to be characterized by a limited analysis of these impacts, although practice varies widely. A review of EISs found degrees of analyses that ranged from no discussion of these impacts, to brief statements that no indirect and/or cumulative impacts would occur, to more detailed studies that address a wide range of aspects associated with indirect and cumulative impacts. In many cases, indirect and cumulative impacts analyses appear to have received insufficient time or resources devoted to the analysis to fully consider these impacts.

There are several overarching issues related to the consideration of these impacts:

- **Lack of Recognition of Differences between Indirect and Cumulative Impacts**- These issues begin at a fundamental level of understanding of how the terms are defined and the differences between the two types of impacts. At the most basic level, there seems to be considerable confusion in regard to the concepts of indirect and cumulative impacts. For example, indirect and cumulative impacts of a transportation project are often addressed together in one section of an environmental document.

- **Confusion over What Impacts Need to be Analyzed** - In some cases, transportation agencies only examine indirect and cumulative impacts on a resource when direct impacts are "significant." This can be problematic when direct impacts on a resource are not considered to be "significant" but related indirect or cumulative impacts may warrant consideration with respect to the transportation decision at hand.

- **Lack of Rigorous Analysis** - Although a wide range of rigorous methods of analysis is available, transportation EISs historically have not used very rigorous analysis techniques to estimate indirect or cumulative impacts. Many transportation EISs state that indirect or cumulative impacts would or would not occur, but do not present a logical cause and effect relationship for particular resources. More rigorous techniques are available, including use of comparative case analyses, scenario writing, expert panel surveys (Delphi techniques), integrated land use and transportation models, and economic models. A commonly used new technique appears to be use of expert panels, which involves gathering together transportation planners, land use planners, resource agency staff, developers, and other "experts" to develop estimates of land use and other changes that would occur with and/or without a project.

Common Sources of Disagreement

Common sources of disagreement between transportation agencies and resource agencies, and sources of confusion for transportation agencies and consultants, tend to revolve around two broad types of issues: 1) analytic/methodological issues, such as the proper analysis boundaries, approaches, and documentation requirements; and 2) more fundamental issues associated with causality and the appropriate role of transportation agencies in compensating for indirect or cumulative impacts.

Typically, the most contentious issues relate to indirect impacts associated with "induced" land development from highway projects. Cumulative impact issues tend to focus on water resources and habitats of endangered species.

- **Methodological and Analytic Issues** - Given their generally more diffuse nature, compared to the analysis of direct impacts, uncertainties and disagreement over indirect and/or cumulative impact analysis in the environmental review of transportation projects are typically related to several methodological issues:

  - *Analysis boundaries* - Given the need to look at past and future actions, and to examine environmental resources that may not be directly impacted by a project, questions are often raised about the appropriate boundaries of analysis in terms of time and geographic scope, and the appropriate methodologies to use to capture these impacts.

  - *Level of detail and information availability* - Reflecting different authorities and missions, disagreement may arise over how much information is necessary at varying phases of the project development process, and what is considered a reasonable level of detail or approach to analysis. Moreover, the reasonableness or practicality of obtaining information is a common source of disagreement among transportation and resource agencies, particularly in cases where data are limited or difficult to obtain.

  - *Documentation of significance and mitigation* - Disagreement among transportation and resource agencies sometimes relates to the relationship between the "significance" of impacts and the type and extent of appropriate mitigation. Resource agencies often look for a determination of "significance" in the environmental document and may associate this with the threshold for mitigation, whereas FHWA policy does not require a determination of the "significance" of impacts and does not consider it a threshold for compensation of project impacts.

- **Disagreements about Causality and Role of Transportation Agencies in Mitigation** - Mitigation (compensation) for indirect or cumulative impacts is often a very contentious issue for transportation projects, particularly highway projects. NEPA does not specifically require substantive mitigation for project impacts, direct, indirect or cumulative. Rather, NEPA focuses on process and full disclosure. The CEQ regulations require that environmental impact statements (EISs) include

consideration and discussion of possible mitigation (including avoidance, minimization, and compensation) for project impacts, but stops short of requiring mitigation. However, several laws, such as the Clean Water Act and the Endangered Species Act, give Federal agencies the authority to condition permits or other actions on the adequacy of mitigation to meet Federal standards and goals.

Disagreements about mitigation (compensation) for indirect and cumulative impacts do not appear to be related to conflicts in laws or regulations so much as to conflicts in policy interpretations regarding the appropriate role and responsibility of transportation agencies for these impacts. Fundamental disagreements regarding the extent to which the proposed transportation project causes an indirect environmental impact often underlie this issue and make the question of responsibility for mitigation more contentious.

As a policy matter, FHWA supports reasonable levels of mitigation (including avoidance and minimization) for indirect and cumulative impacts.[1] At the same time, given limited transportation funds, transportation agency staff often believe that mitigation (compensation) of indirect or cumulative impacts is not a reasonable or responsible use of Federal transportation funds, particularly if it is believed that the proportion of the indirect or cumulative impact associated with the transportation action is small or if the impact is spatially removed from the transportation project. Most resource agency staff seems to believe that mitigation is appropriate even if the additive impact of the transportation action is small, and that these mitigation actions should include avoiding and minimizing adverse indirect or cumulative impacts. For these agencies, the argument about just being a “drop in the bucket” is problematic since it results in no one taking any action to address real cumulative impacts. Several resource agency staff also indicated that habitat fragmentation is an issue where mitigation should be given greater consideration.

Although transportation agencies are often wary about inclusion of mitigation for indirect or cumulative impacts, there are several examples of transportation dollars being used for mitigation of these types of impacts. The approaches often focus on avoiding or minimizing the extent of impact, and include implementation of access management (including removal of interchanges or access points to discourage induced development), funding of local land use planning capacity so local governments can make better decisions to limit adverse indirect impacts, and purchases of critical habitats or buffers. These actions are often considered environmental “enhancements” rather than mitigation, since these actions are often viewed by transportation agencies as strategies to address impacts beyond those associated with the proposed transportation project.

[1] See “Environmental Impact and Related Procedures” (23 CFR 771.105(d)) and FHWA’s *Interim Guidance: Questions and Answers Regarding Indirect and Cumulative Impact Considerations in the NEPA Process*, January 31, 2003.

Existing Guidance Materials and Training Programs

Several guidance documents and training courses are available to practitioners to help in understanding the concepts, methodologies, and approaches for indirect and cumulative impact assessment. Based on a review of these materials, and discussions with practitioners at State DOTs, FHWA Division Offices, resource agencies, and others in which we asked their opinions of these materials, some common themes emerged:

- **Guidance and training on indirect and cumulative impacts have only become available relatively recently.** Most of the guidance documents and training programs that address indirect and/or cumulative impacts have only become available within the past five to seven years.

- **There is a need for more specific guidance tailored to transportation agencies, especially case studies.** Guidance at the national level tends to be overly general and somewhat abstract. Several State DOTs have developed more focused guidance documents or training courses on indirect and cumulative impacts for transportation projects, which provide guidelines and examples of how to conduct the analyses, and case examples. National-level guidance and training at this level of detail, and more case studies of transportation projects and methods, would be helpful.

- **There is a need to clarify differences between indirect and cumulative impacts, and provide guidance and training on both issues.** The training programs that are nationally available focus on cumulative impacts or indirect impacts separately, while FHWA and State DOT-level guidance documents generally address both topics together. This disconnect may cause confusion among transportation agency staff and their consultants, and make it difficult to take full advantage of the existing training programs.

- **Good training programs are available but they may not be accessible to all or to those who need them most.** Staff may be sent to general NEPA training courses, but due to resource constraints, it may be difficult to attend a multi-day training program focused specifically on indirect or cumulative impacts. Moreover, consultants who are conducting the analyses may not be attending these courses.

- **There may be a need for more training on indirect impacts, in particular**. There are several courses available on cumulative impact assessment; however, only one nationally available course was identified on indirect impacts, and it is not clear to what extent this course is actually being offered and utilized. Given the disagreement that often arise between transportation and resource agencies in regard to indirect impacts, greater attention to the issue of indirect impacts, either through more offerings of the existing training, development of new workshops, or development of combined indirect and cumulative impacts training programs, may be warranted.

Lessons Learned

At the same time that indirect and cumulative impacts have been a source of disagreement between transportation agencies and environmental resource agencies, project experiences also provide lessons on principles and practices that can help facilitate a smoother and more effective process. Two over-arching lessons are:

- **No One Size Fits All Approach** - Although transportation agencies ought to strive to have a greater level of consistency in their analyses, experience with indirect and cumulative impacts suggests that they should not take a "one size fits all" approach. The unique circumstances of the project, critical resources, and past actions should determine the geographic and temporal boundaries for analysis.

- **Importance of Clear Documentation of both Indirect and Cumulative Impacts** - It is important to clearly document and delineate the analysis and findings for both indirect and cumulative impacts. Clear description of these impacts, methodologies applied, and consideration of mitigation is important in order to make clear to decisionmakers, the public and resource agencies that all of these issues have been examined.

Opportunities to Enhance Coordination and Improve Decisionmaking

Building off these lessons and notable practices that have been applied, it is clear that there are several opportunities for improving coordination and obtaining agreements relative to indirect and cumulative impacts. Opportunities include:

- **Early Coordination to Agree on Critical Issues and Analysis Boundaries** - By working together to discuss issues early on, agencies can come to agreement on: 1) the resources that are most likely affected by indirect and cumulative impacts 2) appropriate and reasonable temporal and spatial boundaries for analysis, and 3) the appropriate forecasting methodology for the study. Working with resource agencies early in the process (i.e., during scoping) will benefit the indirect and cumulative impacts analysis later in development of the public document.

- **Use of GIS and Modeling Tools to Better Characterize Impacts** - Analytical tools, such as geographic information systems (GIS) and integrated transportation-land use models provide opportunities to better characterize the geographic scope of effects associated with a project and the level of impact on resources.

- **Use of Expert Panels** – While analytic tools and models can be very helpful in providing quantitative information on potential impacts, several practitioners have noted the uncertainties about the accuracy of models to predict land use impacts of transportation improvement projects, the ease of using these tools, and the cost associated with these tools. Expert panels can be a very effective way to organize

input and gain general consensus on the range of impacts that are reasonable to expect.

- **Consideration of Impacts Earlier in Planning** - Analysis of indirect and cumulative impacts is required at the project development stage. In order to expedite analysis in project development and ensure consideration of the most environmentally beneficial outcomes, the planning process is an important point in which to begin the process of considering indirect and cumulative impacts, and to integrate transportation, land use, and environmental planning. (See also, the Integrated Planning Work Group Baseline Report.)

- **Coordination with Local Governments** – Coordination and partnerships with local governments can be helpful since these agencies have land use authority that can help to avoid, minimize, or mitigate against potential adverse indirect or cumulative impacts. Since local governments often are sponsors of transportation projects, involving these agencies in evaluating indirect and cumulative impacts and considering options to minimize or mitigate these impacts can facilitate development of solutions to improve environmental stewardship and address resource agency concerns about these impacts.

- **Area-wide, Watershed and Ecosystem-level Approaches to Mitigation** - For transportation projects, watershed and ecosystem-level approaches can be a useful way to approach indirect and cumulative impacts, because such broad scale approaches focus on the natural resources within a particular ecosystem or watershed and look at the most critical or high quality resources, rather than focusing narrowly on mitigation at the direct location of impact. Area-wide approaches can be an effective tool to avoid and minimize potential adverse impacts or to compensate for unavoidable impacts.

- **The Role of Federal and State Leadership** - An important opportunity for improving indirect and cumulative impacts analysis stems from strategic leadership and direction from senior officials in transportation and resource agencies at the State and Federal level, to make sure that information is communicated to project managers and consultants responsible for preparing environmental documents and that these issues are addressed thoroughly and consistently.

This report documents over twenty case studies of projects or efforts that are notable in terms of their consideration of indirect and/or cumulative impacts, and that exemplify some of the opportunities. Four types of case studies are documented: 1) planning-level efforts, where State or local governments have attempted to consider indirect and cumulative impacts as a means to develop the most environmentally favorable project plans with the goal of expediting environmental review during project development; 2) project-specific cases involving development of EISs or EAs, notable in terms of effective consideration of indirect or cumulative impacts during scoping, rigorous analysis, or use of mitigation to minimize or compensate for adverse impacts; 3) ecosystem-level mitigation efforts; and 4) selected priority projects under EO 13274.

Recommended Next Steps

Based on the findings described above, the following table identifies ten recommended next steps for Task Force review, grouped into three categories that will help improve the processes related to indirect and cumulative impacts analyses.

Recommended Next Steps for Improving Indirect and Cumulative Impacts Analyses	
	Description
1. Outreach and Information Sharing	
Distribute and Raise Awareness of Baseline Materials	The baseline products will be useful to practitioners in advancing the state of practice, including: the summary of legal requirements; the summary of case law; the annotated bibliography of guidance documents; the compilation of relevant training programs; and the case studies of notable practices. The Work Group recommends that the Task Force authorize public outreach to make these materials available to staff in State transportation agencies, metropolitan planning organizations, and Federal agencies involved in the review of environmental documents. Outreach could include: 1. Posting to the web site of the EO 13274 Task Force. 2. Making these materials available through individual Federal agency web sites that address NEPA-related issues, such as the Re:NEPA exchange managed by Federal Highway Administration. 3. Outreach to organizations such as AASHTO. 4. Holding a teleconference, netconference, or workshop(s) in individual regions to make staff at the Federal, State, and local levels more aware of these resources and on-going efforts of the Task Force to tackle these issues.
Implement a Coordinated Communication Effort from FHWA, FTA, and FAA Headquarters to Field Offices	A coordinated communication effort would help provide clear direction and consistency. Because the state of practice is at such as transition stage, ranging from very limited analyses to more comprehensive evaluations, the Federal transportation agency staff can play a key role in helping to ensure that State DOTs, transit agencies, and other project sponsors meet a minimum standard for analysis. Through their own review of environmental documents, the Federal agencies can help to ensure that documents are sufficient.
Recognize Exemplary Practices	The Federal agencies (i.e., FHWA, FTA, FAA, CEQ, or others) should provide recognition for exemplary efforts in regard to analysis, documentation, and mitigation for indirect and cumulative impacts, either by incorporating these into existing recognition efforts (e.g., FHWA's Environmental Excellence Awards), or development of a new program to make exemplary work available as a training tool.
2. Practitioner-Oriented Guidance and Training	
Develop a Compilation of Best Practice Case Studies	A compilation of detailed case studies would be helpful to better communicate best practices and effective procedures. The case studies should address not only highway projects but also airport and transit projects, and be organized in a way that the case studies can be used for discussion in training programs at the national and State levels. These case studies could be drafted by fully

	developing and building on the case studies presented in this report.
Develop More Detailed National-Level Guidance for Transportation Projects	More detailed national-level guidance should be developed and should include delineation of steps for conducting and documenting the analysis. Although the CEQ guidance on cumulative impacts and FHWA interim guidance are available, transportation practitioners generally felt that these guidance documents are somewhat abstract, and that there is a need for more specific and practical guidance that pertains to transportation projects. Several State DOTs have developed their own guidance documents on indirect and cumulative impacts, and these could serve as models for the level of detail desired. The guidance ideally should map out specific steps in the analysis, samples of available tools, and provide checklists so that project sponsors and their consultants are sure to have considered important issues and documented steps taken.
Develop and Implement Workshops for Federal Agency Field Staff, Project Sponsors, and Consultants	Much of the existing national-level training involves multi-day courses that focus on cumulative impacts. These courses may not be accessible to a wide audience and often do not address the indirect impact issues that are related to transportation. Development of a series of short workshops focused on indirect and cumulative impacts analysis for transportation projects would be helpful to: 1) raise awareness of basic concepts and emphasize the importance in streamlining the environmental review process and avoiding lawsuits over projects; and 2) supplement the existing training programs and encourage greater participation in those programs.
3. Development of New Approaches for Consensus Building	
Develop a Coordination Model for Indirect and Cumulative Impacts Analysis	Federal agencies and project sponsors need guidance and information resources to better coordinate in order to avoid misunderstandings and conflicts that can lead to delays in project development. This effort likely would focus on the scoping process and include information on coordination throughout the project development process. This coordination model for transportation projects involving indirect and cumulative impact issues that span applicable statutory requirements would help to focus consultation and agreement on determining appropriate boundaries of analysis, level of detail, addressing situations where data are limited, and when mitigation is required.
Develop Approaches for Integrating Indirect and Cumulative Impacts Analysis into Planning Processes	Integration of indirect and cumulative impacts into planning processes could help to improve decisionmaking and facilitate better analyses of cumulative impacts. Program support is needed to address these issues as the planning stage, and link that with project development. This activity should be coordinated with the Integrated Planning Work Group.
Identify Methods to Address Indirect and Cumulative Impacts in Tiered Environmental Documents	Approaches for addressing indirect and cumulative impacts more effectively in tiered environmental documents should be promoted.
Facilitate Interagency Agreements that Focus on Mitigation	Interagency consensus at the headquarters and field levels should be facilitated with additional attention focused on the appropriateness of mitigation, given different circumstances surrounding indirect and cumulative impacts.

1. Background

On September 18, 2002, President Bush signed Executive Order (EO) 13274, *Environmental Stewardship and Transportation Infrastructure Project Reviews.* This EO established an Interagency Task Force to advance current DOT and interagency environmental stewardship and streamlining efforts, to coordinate expedited decisionmaking related to transportation projects across Federal agencies, and to bring high-level officials to the table to address priority projects. The interagency Task Force identified three areas where Federal coordination and decisionmaking can improve the transportation project development process:

1) Project purpose and need,
2) Indirect and cumulative impacts, and
3) Integrated planning.

The Task Force established an interagency Work Group for each of these areas to focus efforts on overcoming challenges to coordination and developing process improvements.

Recognizing that the overarching goal of the EO is *to promote environmental stewardship in the nation's transportation system and expedite environmental reviews of high-priority transportation infrastructure projects*, the efforts of the Work Groups were designed to accomplish the following:

- First, the products developed by the Work Groups should provide clear and actionable recommendations that the Task Force can use to forge improvements to the transportation decision-making process. More specifically, the Task Force will seek direction from the Work Groups on the necessary improvements to the development of purpose and need statements, the analysis of indirect and cumulative impacts, and the development of integrated plans. That direction must be compiled and presented in a way that enhances the ability of the Task Force to effect change–for example, through the formulation of new policy or more collaborative decision making.

- Second, the products developed by the Work Groups should enhance the project development process that is undertaken by practitioners. Specifically, approaches for improving statements on purpose and need, analyses of indirect and cumulative impacts, and development of integrated plans must be communicated to practitioners in a way that enhances their ability to develop better transportation projects in a more timely and cost-effective fashion.

In forming the Indirect and Cumulative Impacts Work Group, the Task Force recognized the importance of indirect and cumulative impacts as a potential source of interagency concern, conflict and possible delay in the environmental review process, and where greater interagency coordination and collaboration would lead to improvements in the decisionmaking process for transportation projects.

The National Environmental Policy Act (NEPA) process is designed to ensure that all direct, indirect and cumulative effects are considered. Under NEPA, a Federal agency is legally bound to look at the impacts of its proposed actions in light of the broader policy goal of protecting and enhancing the human environment. The NEPA process directs agency attention to possible environmental problems before the agency is committed to a particular alternative and ensures that the public and other agencies have an opportunity to engage in the agency decisionmaking process.

The Council on Environmental Quality's (CEQ) regulations for implementing the procedural provisions of NEPA defines indirect and cumulative effects.

"Indirect effects" are those:

> [W]hich are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

"Cumulative effects" are defined as:

> [T]he impact on the environment that 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.

While the two terms are often used together there are key differences between them that must understood. Indirect impact analysis focuses on the present and reasonably foreseeable future, while cumulative impacts analysis takes into account all past, present, and reasonably foreseeable future actions. Another difference is that indirect impacts are related to the proposed action, whereas cumulative impacts include the effects of actions that are not related to the proposed action, but together with the proposed action can have substantial impacts on the environment. Indirect and cumulative effects are similar in that they include less obvious environmental consequences than direct effects and require additional effort, and perhaps less understood methodologies to analyze. Given the generally more diffuse nature compared to direct impacts, uncertainties and disagreement over indirect and/or cumulative impact analysis in the environmental review of transportation projects are typically related to several issues:

- *Approaches/Methodologies*: Given the need to look at past and future actions, and to examine environmental resources that may not be directly impacted by a project, questions are often raised about the appropriate boundaries of analysis in terms of time and geographic scope, and the appropriate methodologies to use to capture these impacts.

- *Level of detail*: Reflecting different authorities and missions, disagreement may arise over how much information is necessary at varying phases of the project development process, and what is considered a reasonable level of detail or approach to analysis, particularly when information is not available.

- *Information availability:* Transportation agencies often receive comments on their NEPA documents requesting additional information or analyses on impacts to resources. However, in many cases, data needed to fully address an issue is unavailable, not readily available or known to exist, or cannot be reasonably obtained. The reasonableness or practicality of obtaining information is a common source of disagreement or misunderstanding among transportation and resource agencies.

- *Mitigation:* Finally, questions often arise over a lead agency's proposals for mitigation in regard to indirect and cumulative impacts. Failure to reach agreement on the type and extent of mitigation (compensation) has plagued many projects. In particular, transportation agencies have limited control over resulting land use decisions and there is often disagreement over the role of the transportation agency in mitigating these impacts.

In recent years there has been increasing concern about land use development and preservation of open space and fragile ecosystems. Failing to adequately consider and document environmental impacts, commensurate with their potential significance, and failing to seek the input of other agencies and the public, can limit full NEPA compliance. This can result in serious implications in the ultimate quality of a Federal agency's project decisions. Additionally, the public and interest groups can sue on the basis of not adequately considering indirect and cumulative impacts, and conflict among Federal agencies can create delay in project implementation. Thus, transportation agencies are increasingly concerned about how to adequately conduct indirect and cumulative impacts assessments. The Task Force recognized these concerns and the need to bring focused attention to these issues in order to improve environmental stewardship and expedite the environmental review process for transportation projects.

To guide its efforts, the Indirect and Cumulative Impacts Work Group (WG) developed a work plan describing the complexities and challenges associated with these issues. The work plan also includes recommendations to address the challenges. The first priority identified by the Work Group was to develop a baseline of information on existing regulations, guidance documents, and training that pertain to indirect and cumulative impacts for transportation projects, and to identify existing practices and challenges being faced. The purpose of the baseline assessment is to provide information that can be used by the Work Group to develop recommendations to the Task Force, and to provide information that can be disseminated to practitioners in order to advance the current state of practice.

This report presents the results of that baseline assessment, conducted by ICF Consulting for the Work Group. It contains five main sections:

1. **Requirements for Analysis and Mitigation of Indirect and Cumulative Impacts** (Section 2) – This section presents a summary of requirements, as specified in laws and regulations, and as defined by courts through case law.

2. **Existing Guidance Materials and Training Programs** (Section 3) – This section contains an annotated bibliography summarizing guidance documents, and a compilation of existing training programs on indirect and cumulative impacts. It also includes an assessment of guidance and training needs, based on discussions with staff from Federal, State, and local agencies.

3. **State of the Practice, Lessons Learned, and Opportunities (Section 4)** – This section summarizes information obtained through a review of EISs, literature review, and discussions with over 40 staff members from the Federal Highway Administration, Federal resource agencies, State departments of transportation, metropolitan planning organizations, and consultants. It provides a summary of key issues faced by transportation agencies in regard to indirect and cumulative impacts, practices being applied, and opportunities to improve procedures related to indirect and cumulative impacts in order to improve environmental performance and reduce project delays.

4. **Case Studies on Indirect and Cumulative Impacts (Section 5)** – This section contains a set of case studies that were identified for potentially useful practices. The case studies provide lessons that can be applied by practitioners, and could be brought into training programs. This section also includes a summary of indirect and cumulative impact issues, assessment methodologies, and mitigation measures applied for each of the priority projects selected under EO 13274.

5. **Recommended Next Steps (Section 6)** – The report concludes with several recommendations for Work Group review, drawn from the baseline information.

2. Requirements for Analysis and Mitigation of Indirect and Cumulative Impacts

This section identifies and summarizes legal requirements for the analysis and mitigation of indirect and cumulative impacts. This section is an important component of the baseline assessment for several reasons. First, Federal agencies can disagree on the appropriate analysis methodologies and mitigation for indirect or cumulative impacts, and therefore, it is important for agencies to understand the legal basis that forms the foundation for each agency's roles and responsibilities in regard to indirect and cumulative impacts. Second, transportation projects are sometimes sued on the basis of alleged inadequate consideration of indirect and cumulative impacts, and therefore, it is important to understand legal requirements and how courts have interpreted the law in regard to the adequacy of analysis.

This section was developed through two primary activities: 1) a review and summary of relevant laws, regulations, and Executive Orders; and 2) a review and summary of relevant case law.

Two documents were developed as products for the Task Force:

- ***Appendix A*** contains a table identifying laws and regulations relevant to each agency involved in the development or review of transportation infrastructure projects, and summarizes what each says about indirect and cumulative impacts.
- ***Appendix B*** contains a table identifying relevant cases, and includes a summary of the issue addressed is the case, the legal decision, and the implication for transportation projects.

Key points from these two documents are summarized below.

2.1 Definitions

While NEPA does not explicitly mention indirect and cumulative impacts, NEPA makes it the responsibility of the Federal government to "include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on the environmental impact of the proposed action [and] adverse environmental effects which cannot be avoided should the proposal be implemented." [42 U.S.C. 4332(C)].

The Council of Environmental Quality's (CEQ) Regulations for Implementing the Procedural Provisions of NEPA [40 CFR 1500-1508] clarify the requirements by defining direct effects, indirect effects, and cumulative effects.[2]

[2] The terms "effect" and "impact" are used synonymously in the CEQ regulations. 40 CFR 1508.8.

- **Direct Effects.** Those effects caused by the action and occurring at the same time and place. [40 CFR 1508.8].

- **Indirect Effects.**[3] Those effects caused by the action and occurring later in time or farther removed in distance, but still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems. [40 CFR 1508.8].

- **Cumulative Impacts.** Those impacts on the environment, which result 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. [40 CFR 1508.7].

These definitions are reflected in the NEPA-implementing regulations of the various Federal agencies, including agencies of the U.S. Department of Transportation. For example, the FHWA NEPA-implementing regulations [23 CFR 771] reference the CEQ definitions, although they do not explicitly mention indirect or cumulative impacts. Most other Federal laws and regulations do not explicitly define indirect or cumulative impacts, but rely on the CEQ definitions.

The one notable difference is in the definition of cumulative impacts within the Endangered Species Act (ESA). Section 7 requires Federal agencies to cooperate with the Secretaries of Interior (Fish and Wildlife Service) and Commerce (NOAA Fisheries) toward the conservation of listed species. Section 7(a) (1) requires all Federal agencies to review their programs with these natural resource agencies to further the conservation of listed species. Conceivably cumulative effects analysis of future Federal actions could be adequately addressed in the section 7(a)(1) consultations should Federal action agencies choose to do so. There are no implementing regulations that direct these broad mission or program-level consultations. Section 7(a) (2) and its implementing regulations (50 CFR 402) guide project or action specific consultations that may affect listed species or designated critical habitat. These implementing regulations for action-specific consultations of the ESA defines cumulative effects as those effects of *future State or private activities, not including Federal activities that are reasonably certain to occur within the action area of the Federal action subject to consultation* [50 CFR 402.02]. This definition is narrower than the definition in the CEQ regulations for NEPA analysis, since it only addresses future State or private activities that are reasonably certain to

[3] According to the FHWA 2003 Interim Guidance, "'Secondary impact' does not appear, nor is it defined in either the CEQ regulations or related CEQ guidance. However, the term is used in the FHWA's Position Paper: Secondary and Cumulative Impact Assessment In the Highway Project Development Process (April, 1992) but is defined with the CEQ definition of indirect impact. 40 CFR 1508.8. Some authors on this subject have distinguished secondary impacts from indirect impacts, while others; including the FHWA have used the terms interchangeably. For purposes of this [analysis], secondary and indirect impacts mean the same thing."

occur in the future, whereas the NEPA regulations include past, present and reasonably foreseeable future actions, regardless of what agency undertakes such actions. It should be noted, however, that the ESA definition applies only to Section 7 analyses, and not with broader analysis of cumulative impacts required by the NEPA. The Fish and Wildlife Service (FWS) and NOAA Fisheries promote the use of CEQ's regulations and guidance and do not deviate from CEQ's definitions in 40 CFR 1508.7 and 1508.8(b) in NEPA analysis.

The Clean Water Act (CWA) Section 404 (b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material [40 CFR 230 subpart B], likewise, require the determination of cumulative and secondary effects on the aquatic ecosystem. Cumulative effects are defined as *the changes in an aquatic ecosystem that are attributable to the collective effect of a number of individual discharges of dredged or fill material. Although the impact of a particular discharge may constitute a minor change in itself, the cumulative effect of numerous such piecemeal changes can result in a major impairment of the water resources and interfere with the productivity and water quality of existing aquatic ecosystems.*

Secondary effects are defined as *the effects on an aquatic ecosystem that are associated with a discharge of dredged or fill materials, but do not result from the actual placement of the dredged or fill material. Information about secondary effects on aquatic ecosystems shall be considered prior to the time the final section 404 action is taken by permitting authorities.* Like with ESA, the definitions included in the 404(b)(1) guidelines are specifically related to determinations of impact on aquatic resources and the CWA 404 permitting process.

2.2 Analysis Requirements

2.2.1 Reasonably Foreseeable Impacts

As noted above, the CEQ's definitions of indirect effects and cumulative impacts both use the term "reasonably foreseeable" to describe what actions and impacts must be assessed. Courts have interpreted what it means to comply with NEPA requirements for transportation and other Federal projects, and the body of case law related to indirect and cumulative impacts has established some guidelines as to how agencies should address these impacts in compliance with NEPA and the implementing regulations.

One such guideline is that Federal agencies should take a reasonable "hard look" at their proposals in light of available information, analysis and the potential for environmental impacts in making informed decisions to implement an action or alternatives. *Kleppe v. Sierra Club*, 427 U.S. 390 (1976). In taking a hard look agencies are not required to evaluate every conceivable indirect or cumulative impact of the proposed action. The threshold question for determining the scope of the hard look for indirect and cumulative impacts analyses is whether the impacts are "reasonably foreseeable" and should be considered with the direct impacts of the proposed action. *Kleppe v. Sierra Club*, 427 U.S. at 410, 414-15 ("when several proposals for . . . related actions that will have

cumulative or synergistic environmental impact upon a region are pending concurrently before an agency, their environmental consequences must be considered together" but "determination of the extent and effect of these factors, and particularly identification of the geographic area within which they may occur, is a task assigned to the special competency of the appropriate agencies.").

Courts routinely have found that NEPA analyses need not "discuss remote or highly speculative consequences." *Trout Unlimited v. Morton*, 509 F.2d 1276, 1283 (9th Cir. 1974). Courts have defined "reasonably foreseeable" as an action that is "sufficiently likely to occur, that a person of ordinary prudence would take it into account in making a decision." *Sierra Club v. Marsh*, 976 F.2d 763, 767 (1st Cir. 1992)(Sierra Club IV). . Courts have also recognized that "An environmental impact is considered 'too speculative' for inclusion in an EIS if it cannot be described at the time the EIS is drafted with sufficient specificity to make its consideration useful to a reasonable decisionmaker." *Dubois v. U.S. Dept. of Agriculture*, 102 F.3d 1273, 1286 (1st Cir. 1996).

2.2.2 Indirect Impacts

Existing case law provides relatively little guidance on the level of detail required for indirect impacts analyses. Courts have found that a mere listing or cataloging of potential impacts is inadequate. *Friends of Boundary Waters Wilderness v. Dombeck*, 164 F.3d 1115, 1128 (8th Cir. 1999). The court in *Sierra Club IV* found that the impacts analysis need only include the information that is reasonably necessary based on the circumstances surrounding the evaluation of the project. While little guidance exists as to the level of detail appropriate for indirect impacts analysis, courts have consistently found that NEPA analyses should identify and evaluate the growth-inducing effects of transportation projects that are significant, reasonably foreseeable and probable. A statement that growth will increase with or without the project, or that development is inevitable, is insufficient; the agency must provide an adequate discussion of growth-inducing impacts. *Laguna Greenbelt, Inc. v. U.S. DOT*, 42 F.3d 517 (9th Cir. 1994). The court in *City of Davis v. Coleman* (521 F.2d 661, 675-77 (9th Cir. 1975) found that agencies have a duty to discuss growth and development that would be caused by a highway interchange project.

2.2.3 Cumulative Impacts

Case law also provides some guidance on the standards that must be met in regard to cumulative impacts. NEPA analyses must include useful evaluation of the cumulative impacts of past, present, and future projects. The court in *Carmel-by-the-Sea v. U.S. DOT*, 123 F.3d 1142, 1160 (9th Cir 1997) found that this means the environmental analysis must evaluate the combined effects of the actions in sufficient detail to be "useful to the decisionmaker in deciding whether, or how, to alter the program to lessen cumulative impacts." *See also, Neighbors of Cuddy Mountain v. Forest Service*, 137 F.3d 1372, 1379-80 (9th Cir. 1998) ("To 'consider' cumulative effects, some quantified or detailed information is required. General statements about 'possible' effects and 'some

risk' do not constitute a 'hard look' absent a justification regarding why more definitive information could not be provided.").

Factors that indicate that an action or project is reasonably foreseeable for the purposes of cumulative impacts analysis include: whether the project has been Federally approved; whether there is funding pending before any agency for the project; and whether there is evidence of active preparation to make a decision on alternatives to the project. *Clairton Sportmen's Club v. Pennsylvania Turnpike Commission*, 882 F. Supp 455 (W.D. Pa 1995).

A cumulative impacts analysis should identify the area in which the effects of the proposed project will be felt; the impacts that are expected in that area from the proposed project; other actions – past, present, and proposed, and reasonably foreseeable – that have or are expected to have impacts in the same area; the impacts or expected impacts from these other actions; and the overall impact that can be expected if the individual impacts are allowed to accumulate. *Grand Canyon Trust v. Federal Aviation Administration*, 290 F. 3d 339 (D.C. Cir 2002); *Fritiofson v. Alexander*, 772 F.2d 1225, 1245 (5th Cir. 1985).

2.3 Mitigation Requirements

NEPA does not specifically require substantive mitigation for project impacts, direct, indirect, or cumulative. NEPA focuses on process and full disclosure. The CEQ regulations require that environmental impact statements (EISs) include consideration and discussion of possible mitigation for project impacts, but stops short of requiring mitigation. When the analysis completed by the lead transportation agency does not identify a clear cause-and-effect relationship between the proposed transportation project and a potential indirect impact or where there are cumulative impacts related to other actions, transportation agencies typically do not develop mitigation measures beyond alternative strategies to avoid and minimize the associated direct impacts. This is often a source of disagreement between transportation and environmental resource agencies.

Several laws, such as the Clean Water Act and the Endangered Species Act, give Federal agencies the authority to condition permits or other actions on the adequacy of mitigation to meet Federal standards and goals specified in legislation.

Other Federal laws and regulations have requirements that address mitigation, which may include indirect and cumulative impacts on specific resources. Among others, these include:

- The Clean Water Act (CWA) Section 404 (b)(1) guidelines [40 CFR 230 subpart B], which require analysis of and mitigation for secondary and cumulative effects on aquatic ecosystems. Section 404 of the CWA establishes a permitting program to regulate the discharge of dredged and filled material into waters of the U.S., including wetlands. The basic requirement is that no discharge of dredged or fill material can be permitted if a practicable alternative exists that is less damaging to the aquatic

environment or if the nation's waters would be significantly degraded. Wetland impacts must be avoided where practicable and minimized. Any remaining unavoidable impacts must be compensated for by restoration and creation;

- The regulations implementing Section 106 of the National Historic Preservation Act (NHPA), which define an adverse effect if an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register, and require consideration of indirect and cumulative impacts when applying the criteria of adverse effect of historic properties [36 CFR 800]. When the effect could be adverse, the agency official is to consult with the State Historic Preservation Office and other consulting parties to develop and evaluate alternatives that could avoid, minimize or mitigate the adverse effect;

- The regulations implementing Section 7 of the Endangered Species Act (ESA) , which define indirect and cumulative impacts and require the evaluation of direct, indirect, and cumulative effects on listed species [50 CFR 402] (Note that the definition of cumulative impacts in the ESA is more narrow than the definition in NEPA); and

- The Farmland Protection Policy Act implementing regulations, which apply to projects that are completed by a Federal agency or with assistance from a Federal agency and may irreversibly convert farmland directly or indirectly to nonagricultural use (7 CFR 658).

- The Clean Air Act, which under the Section 309, gives EPA review authority of NEPA documents, including providing comments to the lead agency on mitigation measures "...to avoid or minimize damage to the environment, or to protect, restore, and enhance the environment." EPA comments may include recommendations for mitigation that address the indirect or cumulative effects of the project and are not necessarily constrained by where the action agency has jurisdiction to implement the measures.

- 23 U.S.C. 109(h), which requires FHWA to consider the possible adverse economic, social, and environmental effects of any proposed project and ensure that the final decisions on the project are made in the best overall public interest, taking into consideration the need for fast, safe and efficient transportation, public services, and the costs of eliminating or minimizing such adverse effects.

Some State and local governments also have regulations that are related to the consideration of mitigation for indirect or cumulative impacts.

Provisions regarding FHWA's legal responsibility and authority for mitigating project impacts are found in 23 CFR 771.105(d):

> Measures necessary to mitigate adverse impacts will be incorporated into the action. Measures necessary to mitigate adverse impacts are eligible for Federal funding when the Administration determines that:

> (1) The impacts for which the mitigation is proposed actually result from the Administration action; and
>
> (2) The proposed mitigation represents a reasonable public expenditure after considering the impacts of the action and the benefits of the proposed mitigation measures. In making this determination, the Administration will consider, among other factors, the extent to which the proposed measures would assist in complying with a Federal statute, Executive Order, or Administration regulation or policy.

Provisions regarding FTA's responsibility and authority for mitigating project impacts are the same as for FHWA (found in 49 CFR 622.101, they state that the same procedures found in 23 CFR 771 are to be used). Under 49 U.S.C. Section 47106(c)(1)(C), the FAA may approve a grant for a major airport development project that has a significant adverse effect on natural resources only after finding that no possible and prudent alternative to the project exists and that every reasonable step has been taken to minimize the adverse effect.

3. Existing Guidance and Training on Indirect and Cumulative Impacts

This section of the report identifies existing guidance documents and training courses on indirect and/or cumulative impacts for transportation projects. This information is important as part of the baseline assessment in order to understand what is currently available to practitioners. This section briefly examines these materials, and includes an assessment of guidance and training needs, based on interviews with staff at FHWA, Federal resource agencies, State transportation agencies, metropolitan planning organizations, and consultants.

3.1 Guidance Documents

Several guidance documents (defined broadly to include policy guidance documents, presentations, reports, and articles) are available to practitioners to help in better understanding the concepts, methodologies, and approaches for indirect and cumulative impact assessment. An annotated bibliography of over 50 relevant guidance documents is included in ***Appendix C***. The annotated bibliography is designed as a resource for practitioners, and provides citations, summaries, and web links (when available) for each document. The documents are divided into categories based on the source: Federal agency, State or local agency, or other (which includes Federally-funded research studies, guidebooks, journal articles, and other materials).

The documents provide guidance on analysis and mitigation of indirect and cumulative impacts, information on impact assessment methodologies, and research on relationships between transportation infrastructure development and indirect impacts.

The majority of documents combines guidance on indirect and cumulative impacts, and discuss the assessment approach together as part of a combined process for transportation projects. But, there are some exceptions, and several documents focus specifically on indirect or cumulative effects. None of the guidance documents prescribe a very specific approach or method of assessment that should be used for specific circumstances or types of projects. They typically include general concepts for addressing indirect and/or cumulative effects, analytical outlines of an approach, or information on potential impact assessment methodologies. Several documents provide information on types of analysis methods and tools that can be used as part of the analysis.

3.1.1 Federal Guidance Documents and other General Resources

The Council on Environmental Quality's (CEQ) Handbook, *Considering Cumulative Effects Under the National Environmental Policy Act* (January 1997) is generally considered the most authoritative resource on cumulative impacts assessment. It divides the process into 11 steps to be addressed in the three primary components of environmental impact assessment, as shown in the table below.

Steps in Cumulative Effects Analysis (CEA), from CEQ Handbook (1997)	
	CEA Steps
1. Scoping	1. Identify the significant cumulative effects issues associated with the proposed action and define the assessment goals. 2. Establish the geographic scope for the analysis. 3. Establish the time frame for the analysis. 4. Identify other actions affecting the resources, ecosystems, and Human communities of concern.
2. Describing the Affected Environment	5. Characterize the resources, ecosystems, and human communities identified in scoping in terms of their response to change and capacity to withstand stresses. 6. Characterize the stresses affecting these resources, ecosystems, and human communities and their relation to regulatory thresholds, 7. Define a baseline condition for the resources, ecosystems, and Human communities.
3. Determining the Environmental Consequences	8. Identify the important cause-and-effect relationships between human activities and resources, ecosystems, and human communities. 9. Determine the magnitude and significance of cumulative effects. 10. Modify or add alternatives to avoid, minimize, or mitigate significant cumulative effects. 11. Monitor the cumulative effects of the selected alternative and adapt management.

The U.S. Environmental Protection Agency (EPA)'s guidance document on *Consideration of Cumulative Impacts in EPA Review of NEPA Documents* (1999) is intended for use in conjunction with the CEQ handbook. It was developed to help EPA reviewers of NEPA documents provide accurate and consistent comments on the assessment of cumulative impacts.

The National Cooperative Highway Research Program (NCHRP) has produced the most comprehensive guidance resources on indirect impact assessment for transportation projects. These include NCHRP Report 403: *Guidance for Estimating the Indirect Effects of Proposed Transportation Projects* (1998), and Report 466: *Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects* (2002). These two documents provide a synthesis of regulations, case law, and published literature, and discuss a framework for identifying and analyzing indirect impacts of transportation projects. The framework divides the process into eight steps, as shown in the table below.

Steps in Indirect Effects Analysis, from NCHRP Report 466 (2002)
1. Initial Scoping for Indirect Effects Analysis 1A. Determining general study approach and level of effort required. 1B. Determining the location and extent of the study area
2. Identify Study Area Directions and Goals 2A. Data collection 2B. Public involvement
3. Inventory Notable Features 3A. Assemble inventory of ecosystem conditions. 3B. Assemble inventory of socioeconomic conditions. 3C. Assemble inventory of notable features.
4. Identify Impact-Causing Activities of the Proposed Action and Alternatives
5. Identify Potentially Significant Indirect Effects for Analysis
6. Analyze Indirect Effects
7. Evaluate Analysis Results
8. Assess the Consequences and Develop Appropriate Mitigation and Enhancement Strategies

In addition, NCHRP has developed several additional resources that focus on specific types of impacts. These resource documents include: NCHRP Report 423A: *Land Use Impacts of Transportation: A Guidebook* and NCHRP Report 456: *Guidebook for Assessing the Social and Economic Effects of Transportation Projects.*

Of the DOT agencies, Federal Highway Administration (FHWA) is the only one with formal guidance focused on indirect and cumulative impact assessment. FHWA has issued two guidance documents on the topic, which address both indirect and cumulative effects: a 1992 position paper, which suggests a decisionmaking framework to incorporate these effects in highway project development, and a 2003 Interim Guidance, which is structured as questions and answers regarding consideration of indirect and cumulative impacts in the NEPA process.

Other documents from Federal agencies, including the Federal Aviation Administration (FAA), FHWA, EPA, and Fish and Wildlife Service (FWS) provide perspectives on indirect or cumulative impact analysis, or identify potential impact assessment methodologies.

3.1.2 State and Local Guidance Documents

Several State and local transportation agencies have developed guidance documents in order to provide more specific direction to their staff and consultants in regard to processes for conducing indirect and cumulative impacts analysis. The annotated bibliography includes 15 guidance documents prepared by State and local governments, including, Caltrans; Charlotte County, FL; Colorado DOT; Florida DOT; Georgia DOT; Idaho Transportation Department; Indiana DOT; Maryland State Highway Administration; North Carolina DOT; Oregon DOT; Washington State DOT; and Wisconsin DOT.

Many of these guidance documents rely on the 11 steps outlined in the CEQ Handbook, or some refinement to address indirect and cumulative impacts. The documents typically provide more information on methods associated with each step. For example, the Charlotte County (Florida) guidance uses the 11 steps in the CEQ guidance. The North Carolina guidance documents not only break the process into eight steps, but for each step give specific ways to approach it. For example, it delineates five potential ways to determine a boundary for the analysis: political, commute-shed, growth boundaries, watershed/habitat, and public involvement.

Several documents make suggestions for changes to the overall planning and project development process in the interest of strengthening the indirect and cumulative impacts analysis and ultimately transportation decisionmaking. A study by Florida Atlantic University recommends evaluating secondary and cumulative impacts during the transportation planning process, and having an impartial body to foster mediation. A presentation by Colorado DOT recommends regional-based cumulative impacts analysis, as opposed to individual corridors.

3.1.3 Topics Covered in Guidance Documents

Several guidance documents focus on particular resources—for example, land use, wetlands, or endangered species—while others deal with a wide spectrum of resources. Most are geared toward specific types of transportation projects. While the majority deals with highways, several address airport projects, and one deals with transit. Several link a type of project with an affected resource, such as the impact of highways on land use.

The resource treated most often is land use. EPA's *Projecting Land Use Change* discusses 22 models for predicting land use change, with the goal of helping readers determine which are most appropriate for their analysis. Oregon DOT's *Guidebook* and Wisconsin DOT's *Land Use in Environmental Documents* also focus on land use, specifically the impacts from highway development. NCHRP Report 423A, *Land Use Impacts of Transportation: A Guidebook* also looks at tools for analyzing land use change, while NCHRP's report, *Use of Expert Panels*, delves into one particular method for estimating land use changes.

In addition to documents that provide guidance on methodologies or approaches, other documents focus on research on the types of effects that are associated with transportation projects. For example, EPA's *Our Built and Natural Environments* presents data on the impact of growth patterns on environmental resources.

3.2 Available Training Programs

In addition to guidance documents, training programs can be important in helping to communicate the concepts and approaches outlined in guidance documents into practices. A compilation of training courses relevant to indirect and cumulative impacts is included in ***Appendix D***. The compilation includes information on topics covered in the course, course duration, target audience, locations, and contact information.

This compilation serves two roles: 1) it can be made available to staff in State DOTs, FHWA, State and Federal resource agencies, and consultants to raise their awareness of the various training opportunities available; and 2) the Task Force can use the information in order to identify opportunities for interagency coordination or adoption of training programs and to help ensure that any new guidance or recommendations that come from the Task Force can be incorporated into relevant training programs. Although State-level courses are discussed below, Appendix D does not include courses that have been developed at the State level. Moreover, some training programs available within Federal agencies that are only open to employees of those agencies may not be included, particularly if they are not advertised through public means such as the Internet.

3.2.1 Nationally Available Courses

Most general NEPA courses provide some reference to or information on indirect and cumulative impacts. In addition, several nationally available training courses focus specifically on indirect or cumulative impacts, with the majority of training on cumulative impacts. Some of these courses may include indirect impacts as part of the discussion of cumulative impacts. These courses are primarily offered through private sector trainers, as well as a few Federal agencies, and are highlighted below.

Cumulative Impacts

Seven training courses were identified that focus specifically on cumulative impacts:

- *Duke Environmental Leadership Program - Accounting for Cumulative Effects in the NEPA Process*: This two and one-half day workshop is a review of cumulative effects concepts and principles, scoping techniques, baseline conditions, information sources, and methods for effects identification and prediction. Examples of cumulative effects analysis with possible appropriate responses are presented. Specific topics include: incorporating cumulative effects analysis into the development of alternatives; re-evaluating and modifying alternatives in light of projected cumulative effects; developing appropriate mitigation measures and monitoring their effectiveness; and setting appropriate boundaries for analysis and identifying past, present and future actions.

- *Environmental Impact Training (EIT) - Cumulative Effects Assessment.* This three-day course focuses on the principles and practices for incorporating cumulative effects considerations in the environmental impact assessment (EIA) process. The substantive topics addressed include principles and procedures, determining spatial and temporal boundaries, defining baseline conditions, delineation of reasonably foreseeable future actions, methods for identifying cumulative effects, incorporating cumulative impact considerations in the scoping process, and mitigation and monitoring of cumulative effects. Special attention is given to case studies for defining lessons learned. Dr. Larry Canter and Dr. Sam Atkinson are the principal instructors.

- *Environmental Planning Strategies, Inc. - Conducting Quality Cumulative Impact Analyses under the National Environmental Policy Act (NEPA*)**.** This interactive 2-3 day workshop is highly tailored to the sponsoring Federal and State agency. The training focuses on conducting effective and practical NEPA cumulative impact analyses; selecting the proper scope of analysis; developing an appropriate baseline; and incorporating correct past, present, and reasonably foreseeable future actions. Participants systematically discuss cumulative impacts analysis cases within the framework of NEPA, the CEQ regulations, CEQ guidance, EPA guidance, and legal precedent.

- *Environmental Training & Consulting International - Assessing Cumulative Impacts*. This two-day course focuses on tools for identifying cumulative effects and using the methods of analysis contained in the Council on Environmental Quality cumulative effects guidance.

- *The Shipley Group - Cumulative Impact Analysis and Documentation Process*. This two-day workshop is designed primarily for resource managers and staff who review environmental documents. Topics covered include: understanding the working definition of "cumulative impacts" and the associated compliance minimums for complying with full NEPA disclosure; a review of the CEQ Guidance on cumulative impacts; developing a scoping and public involvement strategy that leads to sound cumulative impact analysis; choosing methodologies for cumulative impact analysis; and documenting cumulative impact analysis in an EIS or EA.

- *U.S. Department of Energy - NEPA: Assessing Cumulative Impacts*. This course contains 16 hours of instruction and is designed to help students recognize cumulative impacts and systematically use the methods of cumulative effects analysis for both environmental impact statements and environmental assessments.

- *U.S. Fish and Wildlife Service – Cumulative Effects Assessment.* This four-day course presents the concepts and approaches for incorporating cumulative effects considerations into environmental impact assessments. Emphasis is placed on the relationships of cumulative effects issues to NEPA documents, transportation projects, and the review of wetland permits under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. Concepts include delineation of spatial and temporal boundaries, methods for identifying cumulative effects, application of predictive methods, and discussion of mitigation and monitoring of cumulative effects.

These courses appear to rely on the CEQ Handbook for the basic approach to assessment, and provide additional detail on scoping, methodologies for impact assessment, and documenting impacts.

Indirect Impacts

Only two training courses were identified that focus specifically on indirect effects:

- *NCHRP Report 466*: *Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects, and supporting slide presentation*. The Desk Reference is supported by a curriculum for providing instruction on the techniques of Report 403. The report and supporting slide presentation are designed as tools that can be used for training, and are geared toward staff at FHWA, State DOTs, and consultants. The course curriculum is free and available on the Internet. The Louis Berger Group authored the NCHRP reports and delivered this training.

- *Methods for Evaluating Secondary and Cumulative Land Use Impacts.* FHWA and the New England Region of the EPA co-sponsored one-day workshops that focused on successful methods used to evaluate potential landuse and change related to proposed transportation projects. The workshops included a review of available methods, guidelines for selection of methods, and a case study on expert panels. It draws on NCHRP Report 423A. The workshops were offered three times in 2003 (in Albany, NY; Hartford, CT; and Boston, MA).

These two training courses are not currently being offered, but resource materials for both are available on the Internet (http://nepa.fhwa.dot.gov).

3.2.2 State-level Courses

Several State DOTs have developed courses or modules on indirect and cumulative impact assessment, which they use to train their own staff and consultants, as well as resource agency staff or others. These State-level courses are not documented in Appendix D, since they are not widely available to all practitioners and they vary widely in scope. The most substantial State-level course that we identified comes from Maryland, and is profiled below:

- *Maryland State Highway Administration, Secondary and Cumulative Effects Analysis (SCEA) training.* This is an on-line training course that includes six modules: 1: How to Determine Which Resources Should be Considered in a SCEA; 2 : How to Establish the SCEA Geographical Boundary; 3 : How to Determine SCEA Time Frames; 4 : How to Develop SCEA Land Use Information; 5 : How to Prepare the Analysis and Reach SCEA Conclusions; and 6: Presentation of SCEA in the Environmental Documentation. It also incorporates several exercises, resources, and review materials (available on the web at: http://www.sha.state.md.us/improvingourcommunity/oppe/scea/index.asp).

In addition, a number of State DOTs have their own NEPA training courses, which include information on indirect and cumulative impacts. For example, the Indiana DOT and FHWA Indiana Division conduct a NEPA training class, in which one module is focused on “Direct, Indirect, and Cumulative Impacts.” This module follows the 11-step methodology for cumulative impact assessment described in CEQ’s guidance,

"Considering Cumulative Effects Under the National Environmental Policy Act" and includes a case study. North Carolina DOT also conducts training.

3.3 Assessment of Guidance and Training

Based on our review of the available training courses, and discussions with practitioners at State DOTs, FHWA Division Offices, resource agencies, and others in which we asked their opinions of the guidance and training available for indirect and cumulative impacts, some common themes emerged:

1) Guidance and training on indirect and cumulative impacts have only become available relatively recently. Most of the guidance documents and training programs that address indirect and/or cumulative impacts have only become available within the past five to seven years. The most important and widely viewed guidance documents were dated as follows: CEQ guidance on cumulative impacts – 1997; NCHRP guidance on estimating indirect effects – 1998; EPA guidance on considering cumulative impacts in EPA review of NEPA documents – 1999; and FHWA interim guidance – 2003. As a result, although NEPA has been around since 1969, these guidance documents, and related training programs, are still at a relatively early stage in terms of helping to shape the way transportation project development is conducted. No specific guidance documents were identified that focus on indirect or cumulative impact assessment for all transportation projects, including transit, railroad, and airport projects.

2) There is a need for more specific guidance tailored to transportation agencies, especially case studies. While guidance documents are available, the guidance at the national level tends to be overly general and somewhat abstract. The CEQ guidance on cumulative impacts, in particular, was noted as being useful at a very high-level, but does not provide enough specificity to be particularly useful to transportation practitioners in terms of guiding how to conduct analysis. Several State DOTs have developed their own guidance documents or training programs in order to provide more specificity in terms of analysis methods and approaches. More specific case studies of transportation projects and methods that have been used on these projects would be helpful.

3) There is a need to clarify differences between indirect and cumulative impacts, and provide guidance and training on both issues. As noted above, the training programs that are nationally available focus on cumulative impacts or indirect impacts separately, while FHWA and State DOT-level guidance documents generally address both topics together. This disconnect may cause confusion among transportation agency staff and their consultants, and make it difficult to take full advantage of the existing training programs. Many of the people interviewed did not clearly distinguish between indirect and cumulative impacts, and at least one person referred to CEQ's guidance as addressing both indirect and cumulative impacts, whereas the focus of that document is on cumulative effects.

4) Good training programs are available but they may not be accessible to all or to those who need them most. Training programs are available for practitioners, and these

programs are generally perceived as being good. The training on cumulative impacts given by Larry Canter of Environmental Impact Training was singled out as a particularly good course. Some interviewees noted, however, that the training might not be accessible to or taken by everyone who needs it. One person noted that while an agency might send staff to general NEPA training, due to resource constraints they would be less likely to allow staff to attend multi-day training focused specifically on indirect impacts or cumulative impacts, since these were perceived as overly narrow topics. Moreover, consultants who are conducting the analyses may not be attending these training courses. In addition, one person noted that while most training focuses on practitioners, it might be useful to have training courses designed for decision-makers so that they can better understand the overall process and their own role in it.

5) There may be a need for more training focused on indirect impacts, in particular. There are a number of recognized good courses on cumulative impact assessment. At the same time, only one nationally available course and one regional workshop were identified on indirect impacts, and these training opportunities are not currently being offered. Case law and discussions with agency staff generally suggest that indirect impact issues are the most contentious and most common sources of disagreement between transportation and resource agencies. Given the disagreement that often arise between transportation and resource agencies in regard to indirect impacts, greater attention to the issue of indirect impacts, either through more offerings of the existing training, development of new workshops, or development of combined indirect and cumulative impacts training programs, may be warranted.

4. State of the Practice, Lessons Learned, and Opportunities

This section summarizes findings regarding the current state of the practice in regard to indirect and cumulative impacts for transportation projects. It draws from several activities:

1) A review of EIS documents provided by members of the Work Groups from FHWA, FTA, FAA, and EPA. In total, 31 EISs were reviewed: 6 for airport projects from the Federal Aviation Administration (FAA), 8 for transit projects from the Federal Transit Administration (FTA), and 17 for highway projects from the Federal Highway Administration (FHWA). ***Appendix E*** contains a list of the EISs that were reviewed.
2) A review of existing literature, including analysis of unpublished information from National Cooperative Highway Research Program (NCHRP) Project 25-25, Task 3, "Assessment and Mitigation Strategies for Land Development: Impacts of Transportation Improvements," being completed by ICF Consulting; as part of that project, approximately 30 highway EISs were reviewed to identify how they address indirect land use effects of transportation.
3) Discussions with over 50 staff at Federal agencies, including FHWA, FTA, FAA, EPA, the U.S. Army Corps of Engineers, U.S. Forest Service and Fish and Wildlife Service (FWS), National Oceanic and Atmospheric Administration (NOAA); State Departments of Transportation (DOTs) and resource agencies, metropolitan planning organizations (MPOs), State Historic Preservation Officers (SHPOs) and consultants.

This section highlights the current state of practice, challenges facing both project proponents and resource agencies, and lessons learned from project experience. Issues that are addressed include how agencies: (1) define, interpret, and implement the regulations and requirements for indirect and cumulative impacts, (2) determine the boundaries of the analyses, (3) conduct analysis, and (4) determine appropriate mitigation measures and responsibility for the implementation of the mitigation measures. It also identifies several opportunities to enhance the process for addressing indirect and cumulative impacts and to improve environmental stewardship while expediting project delivery.

4.1 State of the Practice

4.1.1 Overarching Issues

The state of the practice for both indirect and cumulative impact assessment is in a transitional stage, as more scrutiny and challenges are being directed at these issues in the environmental review of transportation infrastructure projects. The heightened scrutiny and increased challenges are driven by increased sensitivity to development and its

effects on the natural environment, legal challenges, and resource agencies involvement related to specific resources.

The EISs that are being prepared vary considerably in the level of analysis of indirect and/or cumulative impacts. They range from no analysis, to brief statements that indicate no indirect and/or cumulative impacts would occur, to detailed studies that address a wide range of aspects associated with indirect and cumulative impacts. Some general themes are summarized below:

Confusion about Definitions

In general, the state of practice appears to be characterized by considerable confusion in regard to the concepts of indirect and cumulative impacts, as well as the requirements for analysis and mitigation. Issues encountered start at the fundamental level of understanding how the terms are defined and the differences between the two types of impacts. Confusion stems in part from the use of several terms for indirect impacts, including indirect, induced, and secondary. Also, there seems to be a wide variety of opinion on whether new development is an indirect or cumulative impact.

Confusion in regard to future development stems from whether or not the proponents or reviewers consider: 1) development as reasonably foreseeable and 2) if it would occur only if an alternative were implemented (i.e., "induced development"). Some FHWA and resource agency personnel agreed that in urban areas, new development would occur regardless of implementing an alternative. These impacts would presumably be included in a cumulative impact assessment, but not in an indirect impact assessment. Development activities that would not or could not occur except for the implementation of an alternative would be considered as indirect impacts. But even in the case where development is planned, a transportation project may accelerate the development and/or spatially dictate where such development would occur. Divergent opinions about the cause and effect relationships and the fuzzy lines between planned and induced development create confusion in terms of describing these impacts.

The inclusion of economic development as part of a project purpose and need compounds the complexity of indirect and cumulative impacts. Questions have arisen over whether the induced growth associated with the proposed transportation project should be considered as a direct impact and increase the size of the project study area. (See also the Purpose and Need Work Group Baseline Report.).

Typically transportation agencies address indirect and cumulative impacts together in one indirect and cumulative impacts analysis. While putting these two issues together in one section of an environmental document is not necessarily problematic, it can become an issue if the analysis fails to fully consider these issues, if agencies disagree on the adequacy of analysis, or if it is unclear that both issues have been addressed.

Practice Generally Not Yet Matured

Although there are a number of examples of projects that have conducted very good analyses of indirect and cumulative impacts, the general state of the practice tends to be characterized by a cursory or limited analysis of these impacts. Several people who were interviewed indicated that the state of the practice has not yet matured.

Our review of EISs found that several airport, transit, and highway project environmental documents did not discuss indirect or cumulative impacts. In most cases where these impacts were discussed, only a qualitative analysis was completed and the EISs determined that there were no notable impacts.

Interviews with practitioners, in large part, echoed these findings. In many cases, resource agency staff felt that transportation agencies were not conducting a thorough analysis, or it was characterized as "just fluff." Some transportation agency staff and consultants also noted the limited attention that has historically been given to these impacts. Generally the State DOT provides direction to consultants in terms of how to conduct the analysis, and in some cases, puts scant attention on indirect and cumulative impacts. The budget for an EIS project may implicitly assume little effort for the analysis, or the State DOT may provide basic language reflecting that growth is expected and the project is consistent with land use plans and expect no more in their document.

Given that many of the guidance documents on indirect and cumulative impacts have only been developed in recent years, transportation agencies may be at a transition stage in terms of learning how to effectively conduct analyses of these impacts. At the same time that practices were noted as not yet matured, a number of cases were identified where more rigorous analyses have been conducted, relying on expert panels, modeling, and field research. The divergent levels of analyses contained in the EISs during this transitional stage emphasize the challenges that face both the project proponents and resource agencies, since it is not clear what the standard should be in terms of the rigor of analysis – when is an analysis adequate and when is it not? At what point are indirect or cumulative impacts so far removed (spatially or temporally) from a proposed action that they are not reasonably foreseeable and are not worth the expenditure of resources to study it?

Confusion over What Impacts Need to be Analyzed

In some cases, it was noted that transportation agencies only examine indirect and cumulative impacts on a resource when direct impacts are significant. This may be inconsistent with the CEQ regulation, and is important in particular, because direct impacts on a resource may not be significant, but indirect or cumulative impacts may still be a relevant consideration with respect to the transportation decision at hand.

Confusion may stem from different interpretations of the CEQ regulations in regard to scoping (1501.7 Scoping), which call for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action:

(1) Determine the scope and the significant issues to be analyzed in depth in the environmental impact statement.
(2) Identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review, narrowing the discussion of these issues in the statement to a brief presentation of why they will not have a significant effect on the human environment or providing reference to their coverage elsewhere.

In some cases, it appears that if direct impacts were determined not to be significant, it was assumed that indirect or cumulative impacts would not be significant or should not be examined. However, the CEQ regulations require analysis of direct, indirect, and cumulative impacts, and note that the intensity of impact may relate to "whether the action is related to other actions with individually insignificant but cumulatively significant impacts." [40 CFR 1508.27(b)(7)]

The Most Contentious Issues Relate to Indirect Impacts and Highway Projects

Although indirect and cumulative impacts are both issues in which transportation agencies face uncertainty and in which conflict with resource agencies sometimes arise, the most contentious issues tend to focus on indirect impacts associated with "induced" land use development. These issues are most notable for highway projects.

Among the three primary Federal transportation agencies (FHWA, FTA, and FAA), FHWA projects tend to fall under heavier scrutiny and tend to be more contentious. Transit projects are often seen as having very little or beneficial indirect impacts (i.e., improving air quality by removing cars from the road, facilitating "Smart Growth" development, etc.). Moreover, transit projects are usually located in already developed urban areas and are less likely to have impacts on endangered species and other environmental resources. Although there are a handful of very contentious airport projects, they are not typically perceived as inducing growth as much as responding to growth occurring in a region.

Cumulative Impact Concerns Typically Focus on Land Use, Water Resource, and Habitat Impacts

Most issues with cumulative impacts appear to relate to impacts on water resources and habitats of endangered species. Even though a project may have a small direct impact on wetlands, for example, other existing and reasonably foreseeable developments may have a significant impact on the quality and function of wetlands; in this case, the small impact from the project may be important in the context of its cumulative addition to other actions.

Staff from the U.S. Army Corps of Engineers (ACOE) indicated that for impacts on wetlands, every time that it receives a permit for filling in a wetland, it reviews its internal data base of permits to evaluate the past and future impacts on a particular

wetland. Should the wetland be in significant decline, the Corps will notify the applicant that it may not be able to issue the permit and other alternatives should be pursued. As such, the ACOE is performing a cumulative impact analysis on the wetlands. Implementation of the various regulations under the Clean Water Act (NPDES, TMDL, and wetlands) is approaching a comprehensive watershed approach that addresses cumulative impacts. This practice of reviewing all wetland permits that involve a particular wetland is a fairly common practice and when applied may be relevant to address cumulative impacts; however, the U.S. Army Corps of Engineers would be responsible for such analyses. Implementation of and adherence to NPDES and TMDL regulations under the CWA and its adequacy as a comprehensive watershed approach to addresses cumulative impacts is not a very common practice and has not been applied consistently in NEPA documents.

Air quality has not arisen frequently as an issue in cumulative impact analysis at the project level for highway and transit projects. This may be because regulatory requirements inherently address the cumulative impacts of all reasonably foreseeable projects in a region at the planning stage. Specifically, under the Conformity Regulations of the Clean Air Act, any highway or transit project in an air quality nonattainment or maintenance area must come from a conforming transportation plan and Transportation Improvement Program (TIP). As part of the conformity process, a regional emissions analysis is conducted, in which emissions from the plan must be shown to not exceed the mobile source emissions budget contained within the State Implementation Plan for air quality (or must pass emissions tests) for various years projected into the future. The purpose of the conformity process is to ensure that projects and plans do not adversely affect a region's ability to meet or maintain air quality standards. Consequently, the conformity process essentially ensures that cumulative impacts of highway and transit projects on air quality are considered earlier in the planning process.

Divergent Perspectives about the Role of Transportation in Land Use Development

Disagreements about mitigation for indirect and cumulative impacts do not appear to be related to conflicts in laws or regulations so much as to conflicts in policy interpretations regarding the appropriate role and responsibility of transportation agencies for these impacts. These differences relate in large part to differences in perspectives regarding the role of transportation in changing land development.

Transportation agency staff, particularly in fast growing and urban areas, generally sees their transportation projects as responding to current or anticipated development needs. As a result, they do not view land use development as an indirect impact associated with their transportation projects. Under this perspective, land use development would have occurred with or without the project, and the transportation project is not seen as critical in causing growth to occur. On the other hand, resource agencies are more likely to view transportation projects as having an effect on development patterns, in terms of either the amount or type of development or the rate of growth. Under this perspective, transportation is one of the causes of land use change (or "induced development"), and transportation projects are assigned more responsibility for resulting impacts on habitat,

species, and water quality. These divergent philosophies affect perceptions regarding the boundaries of analysis, level of detail in analysis, and mitigation that should be included for a project.

4.1.2 Determining Boundaries of Analysis

How to determine the appropriate boundaries of analysis in terms of geographic area and time are important issues for indirect and cumulative impacts, since these effects are farther removed and occur later in time than direct project impacts. Transportation agencies often are uncertain how to bound the analysis. In some cases, different perspectives on appropriate boundaries have been a source of disagreement between transportation and resource agencies.

Geographic Boundaries

A wide variety of approaches have been used in regard to the geographic boundaries for indirect and cumulative impact analysis. Most interviewees indicated that the geographic boundaries should be resource specific (e.g. within a particular watershed for water related issues). The resource specific spatial boundaries that were identified include watersheds, air sheds, and contiguous natural areas (forests, prairies, wetlands, and other natural environments), and for cultural resources the development of specific areas of potential effect (APE) for direct, indirect, and cumulative impacts. Ideally, these boundaries should be developed with consideration of boundaries used by resource agencies in their mandated processes.

The divergent views between the transportation agencies and the resource agencies in regard to induced growth provides for divergent interpretations of the spatial boundaries for indirect impact assessment. Given that transportation agencies tend to see their projects as responding to development, rather than facilitating development, their approach often involved analyzing a limited spatial boundary and primarily performing a qualitative analysis of the impacts on the resources in that limited area. For example, one approach used for controlled access highways was to limit the spatial boundary of the analysis to a specific radius around the interchanges, assuming that another other new land use development would not be induced growth since there would be no direct access to the highway. In contrast, resource agencies tend to associate a higher level and spatial component to induced growth from proposed transportation projects, which results in large spatial areas for analysis.

Temporal Boundaries

A variety of temporal boundaries are used for indirect and cumulative impacts analysis, and in many cases, these boundaries are not clearly defined. A common theme identified from discussions with transportation and resource agency staff was that it is appropriate to use the timeframe of the most accurate planning document available and/or the long-range transportation plans for a region. These long-range land use and transportation

plans provide insight as to what the development patterns and transportation system may look like in the future, and typically use a 20-year time horizon.

On the other hand, some transportation agencies indicated that the long-range plans are speculative plans that are subject to modifications and do not represent reasonably foreseeable actions. They felt that regional and State programming documents that provide insight to the forecasted growth and transportation actions over the next five years provides a more accurate forecast and represent more reasonably foreseeable actions. The interviews also identified that some States have county level planning activities that are completed on an annual basis and provide an accurate forecast of future planned activities. In some cases, relatively short time frames are used for the analysis. FAA staff interviewed indicated that they typically only forecast out to three years.

In terms of timeframe for looking back at past actions for a cumulative impacts analysis, most transportation and resource agencies indicated that establishing trends affecting a particular resource was appropriate. They did not provide a specific timeframe for looking backward. It appears that historical analysis is usually conducted by looking for actions of significance in the near past.

4.1.3 Analysis Methods and Documentation

Limited Detail and Rigor of Analysis in Most Cases

As noted earlier, transportation EISs historically have not used very rigorous analysis techniques to estimate indirect or cumulative impacts. A number of resource agency staff indicated that most transportation EISs state that indirect or cumulative impacts would or would not occur, but do not present a logical cause and effect relationship discussion for particular resources. This sometimes means that the analysis is called into question when resource agencies are examining the analysis in the context of their own regulations.

Availability and Use of More Sophisticated Techniques

Wide ranges of rigorous methodologies are available to assess the indirect impacts of transportation projects on land use. These include use of comparative case analyses, scenario writing, Delphi techniques/expert panel surveys, trend extrapolation, build-out/carrying capacity analysis, regression analysis/economic forecasting, simple gravity models, integrated land use and transportation models, and economic models. These types of techniques have been documented and described in a number of guidance documents, including the NCHRP guides on indirect impacts.

Analytic models have inherent tradeoffs between the time and resources needed to run a model successfully, and, the precision, accuracy and resolution that can be achieved with the model. Simple models often provide low resolution with higher variability, whereas complex models are demanding of data, time, and funds, but can give a much finer resolution with good reliability when carefully implemented. The level of resolution,

precision, and resources required to analyze a project is dependent on the magnitude of risk represented by the decisions that will be made using the results of the model selected.

The most commonly used new technique appears to be use of expert panels, which involve gathering together transportation planners, land use planners, resource agency staff, developers, and others to come up with estimates of land use changes that would occur as a result of a project or without the project. Expert panels can utilize a formal Delphi process, modified Delphi process or somewhat less structured approaches. The use of expert panels provides for the development of reasonable assumptions, which can be used to substantiate future conditions.

Divergent Views on Documentation of Significance

Disagreement among transportation and resource agencies sometimes relates to issues associated with whether the significance of impacts is determined. Resource agencies often look for a determination or threshold of significance in the environmental document as a threshold for mitigation. FHWA policy does not require a determination of the significance of impacts in its EISs, nor considers "significance" the threshold for mitigation.

This issue appears to stem in part from differences in interpretation of the CEQ regulations (1502.16 Environmental Consequences), which state that, "It shall include a discussion of:

> (b) Indirect effects and their significance (1508.8)
>
> (h) Means to mitigate adverse environmental impacts (if not fully covered under Section 1502.14)

FHWA guidance, Technical Advisory T 6640.8A dated October 30, 1987, meanwhile, states that:

> "The discussion of the proposed project impacts should not use the term significant in describing the level of impacts. There is no benefit to be gained from its use. If the term significant is used, however, it should be consistent with the CEQ definition and be supported by factual information."

The interviews of both FHWA and resource agency staff highlighted the subtle differences between the CEQ regulations and FHWA's technical advisory. The resource agencies indicated that the indirect and cumulative impact analyses performed by FHWA typically lacked a significance determination, which was seen as a weakness. On the other hand, FHWA indicated that the analyses provided a description of the types of impacts and that it was up to the decision maker, resource agencies, and general public to decide whether or not the impact was significant.

4.1.4 Mitigation

Mitigation Concerns Focus Primarily on Highway Projects

The resource agencies stated that most mitigation issues for indirect or cumulative impacts were associated with documents prepared by FHWA and FAA; most resource agencies noted that there were no issues with FTA documents, as they were focused on transit projects in urban areas. For documents prepared by FHWA, the resource agencies noted, for the most part, that mitigation measures for both indirect and cumulative impacts were not recommended or implemented; however, some particular FHWA divisions did incorporate appropriate mitigation measures for indirect impacts. Some FHWA divisions indicated that they do not develop or implement mitigation measures for cumulative impacts. In documents prepared by FAA, the resource agencies found the mitigation measures were recommended for both indirect and cumulative impacts, but were not enforceable because they are not part of the Record of Decision.

Disagreement about Appropriate Role and Responsibility of Transportation Agency

There is a great deal of disagreement between transportation agencies and resource agencies about the roles and responsibilities of transportation agencies to fund mitigation for indirect and/or cumulative impacts. Mitigation is typically not as critical an issue for FTA and FAA projects as it is for FHWA projects.

Underlying much of the disagreement is fundamental differences regarding causality and the role of the transportation project in causing an indirect or cumulative impact. While determining the causes of growth is complex, disagreements about causality make the issue of responsibility for mitigation more contentious.

As a policy matter, FHWA supports reasonable levels of mitigation for secondary and cumulative impacts.[4] At the same time, given limited transportation funds, transportation agency staff often are concerned about the appropriateness and reasonability of using Federal transportation funds for mitigation of indirect or cumulative impacts, especially if it is believed that the transportation project is not responsible for causing the impact, if the role of transportation is small or if the impact is spatially removed from the transportation project.

One FHWA division indicated that it did not implement mitigation measures for indirect or cumulative impacts since such impacts are addressed in the State level NEPA analysis in which private development activities must undergo environmental review. Others indicated that since the nexus between the transportation project and the indirect impact is somewhat unclear, they did not feel that mitigation would be an appropriate and reasonable use of transportation funds. They indicated that mitigation measures for

[4] See "Environmental Impact and Related Procedures" (23 CFR 771.105(d)) and FHWA's *Interim Guidance: Questions and Answers Regarding Indirect and Cumulative Impact Considerations in the NEPA Process*, January 31, 2003.

indirect or cumulative impacts would only be implemented when required by the conditions of a permit.

For both indirect and cumulative impacts, FHWA staff interviewed often felt that because the proportion of an impact associated with the action is small, FHWA has no responsibility to mitigate the overall adverse indirect or cumulative impacts on a resource. They felt that it would be unfair to put the responsibility of mitigation on the transportation agency if the impact is largely caused by external forces beyond the control of FHWA.

A reoccurring theme put forth by the transportation agencies was that the Federal government and State DOTs have no control over local land use or zoning; therefore, they are typically unable to develop or implement measures to avoid, minimize, or mitigate for indirect impacts on land use, beyond alternatives analysis location options considered in the environmental document.

The resource agencies indicated that it is the responsibility of the transportation agencies to assess and disclose the specific indirect and cumulative impacts by resource, and develop recommendations for mitigation, whether or not they are the implementing authority. They indicated that even if the DOT agency were only responsible for a small portion of the impact, it should develop mitigation measures (starting with avoidance, minimization, and then compensatory mitigation) and specify who (what Federal, State, or local agency or authority) could implement such measures. Most resource agency staff interviewed did not agree with the interpretation that because the proportion of impact associated with the transportation project was found to be small that the agency has no responsibility to mitigate the adverse indirect or cumulative impacts on a resource. The argument about just being “a drop in the bucket” is seen as problematic because it results in no action being taken by anyone to address real cumulative effects.

Concerns about Habitat Fragmentation

Several resource agencies indicated that habitat fragmentation is an issue that it rarely sees in mitigation plans, but warrants greater attention. On rare cases where a State or Federally listed threatened or endangered species may be affected, a wildlife crossing or other feature may be developed to mitigate the fragmentation of its habitat. However, the resource agencies were interested in developing an approach and method to preserve and connect the existing habitats that transportation projects frequently fragment into smaller and smaller areas.

Mitigation has been Applied in Some Cases

Although many transportation and resource agencies have struggled over the reasonableness of mitigation for indirect and cumulative impacts, there are several examples of transportation dollars being used for mitigation, largely focusing on avoidance or minimization of these types of impacts. Examples include:

- Implementation of access management, including removal of interchanges or access points, to discourage induced land use development;
- Funding of local land use planning capacity so that local governments can make better decisions about development in order to limit adverse indirect effects;
- Purchases of critical habitats or buffers in order to protect habitat for threatened or endangered species, as well as to preserve the historic setting of protected cultural resources.

In some cases, the State DOT has also worked with local governments to implement ordinances to regulate the type and density of development in sensitive areas or to obtain local government commitments in regard to access control. Several State DOTs, including those in California, North Carolina, and Maryland have undertaken these actions. These actions are often considered "enhancements" rather than mitigation by transportation agencies since they see these actions as addressing broader environmental issues than the impacts caused by the project.

4.2 Lessons Learned and Opportunities

At the same time that indirect and cumulative impacts assessments have been a source of disagreement between transportation agencies and environmental resource agencies, experiences faced by transportation and resource agencies provide lessons on principles and practices that can help facilitate a smoother and more effective process. Moreover, innovative practices that have been tested suggest that there are several opportunities for improving coordination and gaining agreement on indirect and cumulative impacts. This section summarizes some of those lessons and opportunities, and Chapter 5 provides case studies that exemplify some of these principles.

4.2.1 No One Size Fits All Approach

Although transportation agencies should be consistent in their analyses, experience with indirect and cumulative impacts suggests that they should not take a "one size fits all" approach. The boundaries of analysis will and should vary, based on the particular circumstances of the project and based on the particular resources that are affected. Since indirect and cumulative impacts are usually farther removed from a project than direct impacts and the impacts on a resource may extend beyond the construction footprint, the boundaries should reflect broader areas. Resource-oriented boundaries can be an effective way to bound the analysis, and to help ensure consistency with requirements that resource agencies need to address in their review and permitting.

4.2.2 Early Coordination to Agree on Critical Issues and Analysis Boundaries

Working with resource agencies early in the process (i.e., during scoping) will benefit the ICI analysis later in development of the document. By working together to discuss issues

early on, agencies can come to agreement on: 1) the important resources that are most likely affected by indirect and cumulative impacts, 2) appropriate and reasonable temporal and spatial boundaries for analysis, and 3) the appropriate forecasting methodology for the study.

Conducting a detailed indirect and cumulative impacts analysis can take considerable time and effort. To develop a rigorous analysis of the indirect impacts associated with a project, one typically would need to talk to developers, land use planners, and others to assess what the impact of the project might be in terms of shifting or inducing new development. Cumulative impacts analysis requires collecting data on all manner of past present and new development planned in a corridor or region by Federal, State, and local agencies, or private developers.

Both DOT and resource agency staff indicated that identifying the resources that may be impacted either indirectly or cumulatively early on in the environmental review process aids in avoiding conflict after the draft document has been made public. Early consultation will help to define the analysis more clearly, so that agencies agree on the most important resources and impacts that need to be documented in the most detail. Examples of early consultation in the case studies in Section 5 include the Lower Manhattan Transportation Recovery Projects and I-5 in Helena, Montana.

4.2.3 Use of GIS and Modeling Tools to Better Characterize Impacts

Analytical tools, such as geographic information systems (GIS) and integrated transportation-land use models are becoming more common place and enhance the ability to address the potential indirect and cumulative impacts of transportation projects. These tools provide opportunities to better characterize the geographic scope of effects associated with a project and the level of impact on resources. Several examples of use of analytic tools and models are included in Section 5, including case studies of I-69 in Indiana and I-405 in Washington.

4.2.4 Use of Expert Panels

At the same time that analytic tools and models can be very helpful in providing quantitative information on potential impacts, several people noted uncertainties about the accuracy of models to predict land use impacts of transportation improvement projects, as well as the difficulty or cost associated these tools. They emphasized the importance of hearing from real people, including local land use planners, developers, and businesses to characterize what might happen in regard to land use in response to a transportation project.

Expert panels can be a very effective way to organize input and gain general consensus on the range of impacts that might be expected. The use of expert panels seems to be an effective way to determine what is “reasonably foreseeable” since it utilized the judgments of reasonable people. A structured expert panel approach can rely on quantitative data from models to reality test the results and provide ranges around potential impacts. Findings from expert panels in regard to shifts in development patterns

can be overlaid on environmental and geographic information in a GIS to better explore the extent of potential indirect impacts on resources. Several examples of expert panels are included as case studies in Section 5, including I-270/US 15 in Maryland, I-93 in New Hampshire, and US 41 in Wisconsin.

4.2.5 Clear Documentation of both Indirect and Cumulative Impacts

A key lesson from the case law is the importance of clearly documenting and delineating the analysis and findings for both indirect and cumulative impacts. The Chittenden County Circumferential Highway (CCCH) priority project is a case in point. For this project, FHWA believed that the analysis was adequate, but the court found that analysis was lacking. When indirect and cumulative impacts are lumped together or not delineated clearly, this may be problematic for resource agencies in meeting their statutory requirements, and may be a potential rationale for legal challenge.

4.2.6 Consideration Earlier in Planning

Analysis of indirect and cumulative impacts is required at the project development stage under NEPA. However, in order to expedite analysis in project development and ensure the most environmentally beneficial outcomes, the planning process is an important point in which to begin the process of considering indirect and cumulative impacts, and to integrate transportation, land use, and environmental planning. Addressing indirect or cumulative impacts from transportation projects often involves development of land use controls or planning to better shape growth, purchasing of buffers, etc., which may be most appropriately explored at the planning stage.

The planning process can help to inform several necessary components of indirect and cumulative impacts assessment: 1) forecasts of expected population growth, employment growth, and land use development; 2) identification of critical habitats, threatened or endangered species, and other critical resources from a regional perspective; 3) identification of planned future projects, including transportation projects, expected development projects (e.g., new retail centers, residential communities, etc.), and major capital improvements (e.g., water sewers, utilities); and 4) identification of past projects and activities that should be incorporated into the analysis.

A regional approach to data collection could be very effective to expedite the process of analyzing cumulative impacts for individual projects, especially in an area that is expecting rapid growth and development of a number of transportation projects in the near future. Although this requires more upfront work in planning, the individual project analyses would be based on shared data, is consistent with other analyses and should be easier and quicker to assemble. Ideally, addressing these issues early in planning would also help to avoid pitfalls down the road in regard to individual projects, and result in better environmental stewardship.

Effectively addressing indirect and cumulative impacts, therefore, necessarily implies a greater emphasis on integrating planning with the NEPA process. Several examples of

more integrated planning approaches are profiled in the case studies in Section 5, including integrated planning activities in Merced County, California, and a programmatic approach to major bridge replacements in Oregon. In addition, Colorado DOT is taking a regional approach to cumulative impacts assessment, and North Carolina DOT is beginning a regional cumulative impacts analysis in the Ashville area. The Integrated Planning Work Group Baseline Report also identifies several other efforts to integrate planning, which may be useful case studies for addressing indirect and cumulative impact issues.

4.2.7 Coordination with Local Governments

Coordination and partnerships with local governments can be helpful in working out agreements between transportation and resource agencies since local governments have land use authority that can help to avoid, minimize, or mitigate against potential adverse indirect or cumulative impacts. Since local governments often are sponsors of transportation projects, involving these agencies in evaluating indirect and cumulative impacts and considering options to minimize or mitigate these impacts can facilitate development of solutions to improve environmental stewardship and address resource agency concerns about these impacts.

4.2.8 Area-wide, Watershed and Ecosystem-level Approaches to Mitigation

For transportation projects, watershed and ecosystem-level approaches to mitigation can be a useful way to approach indirect and cumulative impacts. Such broad scale approaches focus on the natural resources within a particular ecosystem or watershed, and look at the most critical or high quality resources, rather than focusing narrowly on mitigating at the direct location of impact.

An example of an area-wide approach is the development of wetland banks to perform the same functions and values as those that would be adversely affected. Such mitigation measures review the ecosystems within the region being affected and work with the various resource agencies to develop mitigation measures that take the ecosystem into account.

Habitat fragmentation was brought up by several resource agencies as an issue that is not fully addressed or mitigated as a cumulative impact. Although wildlife crossings and drift fencing are often implemented to address direct impacts, agencies recognized the potential value of taking a broader look at addressing habitat connectivity, perhaps through development of wildlife crossings in other areas not directly impacted by a project, in order to assist in sustaining the health and connectivity of habitats and wildlife populations. These approaches, however, have not generally been able to be applied.

In addition to compensatory mitigation, watershed and ecosystem approaches can help to avoid or minimize potential adverse indirect or cumulative impacts. For example, by identifying and protecting habitats that are of the highest priority (i.e., through easements,

management agreements, land preservation programs), an ecosystem approach can help to ensure that any indirect land use impacts associated with transportation projects do not affect these critical areas.

Several States are moving forward on ecosystem approaches, and a few notable cases of ecosystem-level mitigation approaches are profiled in Section 5, including initiatives undertaken in Colorado, North Carolina, and Washington State.

4.2.9 Leadership Role

An important mechanism to improve indirect and cumulative impacts analysis related to the transportation project development process is the strategic leadership and direction that comes from senior officials in transportation and resource agencies at the State and Federal level.

Historically, indirect and cumulative impacts may have been seen as a box to check off in NEPA analysis, after direct effects have been thoroughly analyzed. While that is changing in many places for a variety of reasons, substantial changes in this practice require leadership at State DOTs, FHWA, FAA, and FTA to emphasize the importance of the analysis, to clearly provide direction on minimum standards and procedures and to make it an integral part of the project development process, starting in scoping.

Leadership is also needed to facilitate a greater understanding between transportation agency and resource agency staffs regarding the most controversial areas where there are persistent fundamental differences of opinion or interpretation of the laws and regulations specific to NEPA or individual resource protection. For example, the disagreement related to the appropriateness and responsibility of the transportation agency to mitigate for certain indirect and/or cumulative impacts. These areas have been discussed previously in this report

Changes are already occurring in transportation agencies, focusing on environmental stewardship, public involvement, and collaborative decisionmaking. These changes parallel the culture change that is needed to effectively address indirect and cumulative impacts. As discussed in Section 3, several State DOTs have developed their own guidance documents or training programs on indirect and cumulative impacts. These types of activities help to create the understanding of these impacts and emphasize the importance of the analysis. At the same time, resource agencies can provide leadership to their staff in terms of more effective ways to engage in the transportation planning and scoping process so that potentially adverse impacts can be avoided or minimized and decisions can be made on the most critical or threatened resources.

5. Case Studies: Notable Practices related to Indirect and Cumulative Impacts

This section provides case studies of projects or efforts that are notable in terms of their consideration of indirect and/or cumulative impacts. These case studies were identified through discussions with agency staff, literature review, and an internal review of EISs provided by FHWA, FTA, and FAA. The case studies are grouped into four categories:

- **Planning-level efforts**: These are cases where State or local governments have attempted to include consideration of indirect and cumulative impacts in the planning process, as a means to develop the least environmentally damaging projects and to expedite environmental review during project development.

- **Projects**: These are project-specific cases involving development of EISs or EAs, which are notable in terms of effective consideration during scoping, rigorous analysis, or use of mitigation to minimize or compensate for adverse impacts.

- **Area-wide (Ecosystem-level) mitigation:** These cases focus on broader efforts to mitigate for project impacts at a regional level rather than mitigating locally and solely for direct project impacts. These approaches often are designed to help avoid and minimize potential adverse indirect and cumulative impacts.

- **Selected priority projects (not profiled above):** These cases provide information on the priority projects under EO 13274. We attempted to collect information about each of the priority projects to identify issues regarding indirect or cumulative impacts, methodologies used, and whether mitigation was included. Although several of the priority projects are profiled below, we were not able to gather enough information on several projects at this time to develop a case study.

For each of the case studies below, information was primarily gathered from available documents, including EISs and other materials written about each project or effort. Only a limited number of contacts were made directly with project sponsors or other staff involved in these efforts. Although the case studies are each noteworthy in some regard, they are not necessarily "best practices" that should be replicated by others. In order to develop these into more detailed case studies for training purposes, the Federal agencies need to agree on what constitutes "best practice," and more detail on the experiences of individuals involved in the projects should be collected.

5.1 Planning-level Efforts

In addition to the two case studies profiled below, the EO 13274 Integrated Planning Work Group Baseline Report includes several case studies that address efforts relevant to indirect and cumulative impacts.

5.1.1 California: Merced County Partnership for Integrated Planning

The Partnership for Integrated Planning (PIP) is an effort of the Merced County Association of Governments (MCAG) that focuses on addressing environmental issues in the transportation planning process with the goal to expedite the environmental review process for resulting transportation projects. Merced County is a rural county, but is rapidly growing in population and is planned for several major new developments, including a new home to a University of California campus. As a result, the region's transportation plan will need to include a number of major transportation infrastructure projects to support planned growth.

In developing PIP, MCAG hoped to address environmental issues, including potential cumulative impacts, early in planning as a means to lessen adverse environmental impacts and support faster decisionmaking in project development. The PIP has three goals: 1) streamline the project delivery process for individual transportation projects that will be going through CEQA and NEPA compliance based on the groundwork that has been laid at the planning stage; 2) lesson environmental impacts through use of geographic information systems (GIS) data and work with resource agencies to identify hot spots for environmental resources; and 3) involve community groups in the planning process.

One of the key PIP components was the development of a Cumulative Impact Advisory Panel, which focused on the potential cumulative impacts of alternative plan scenarios. Rather than simply looking at the regional plan scenarios in the context of their direct impacts on environmental and community resources, development of the Advisory Panel was an early attempt to develop guidance on cumulative impacts at the planning level and to consider the cumulative effects of transportation projects under various plan scenarios. The Cumulative Impact Advisory Panel consisted of staff from MCAG, the U.S. Fish and Wildlife Service, the U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, NOAA Fishers, FHWA, and the California Department of Transportation. A neutral facilitator from Common Ground (Center for Cooperative Solutions) and neutral coordinator from U.C. Davis Information Center for the Environment were used to manage the Advisory Panel.

According to MCAG, the CI Advisory Panel faced several challenges, the most important of which was limited understanding of each agency's responsibilities and perspectives. Another key challenge was the lack of directly applicable guidance on addressing cumulative impacts at the planning level, and the paradigm shift required for applying project-level experience related to cumulative impacts in a regional planning setting. It was recognized that project-level analysis would still need to be conducted at a later time, and so the resource agencies were not signing off on projects and their level of impact.

Moreover, staff acknowledged that MCAG does not have land use authority, which limits the extent to which it can control indirect and cumulative impacts associated with proposed projects. However, the better understanding of projects and each agency's perspectives will hopefully lay a strong foundation for cumulative analysis that will later

be conducted at the project level. The Advisory Panel was successful in brining agencies to the table, engaging them in the planning process, and fostering a better understanding of their roles and missions, which was judged by MCAG as a key success of the process.

The regional planning process used Uplan, a GIS-based urban growth model that predicts where growth will occur based on factors such as proximity to infrastructure, including roads. Uplan was used to analyze five different scenarios, including land use and transportation policies, as part of the environmental analysis and cumulative impacts analysis, and was instrumental in analyzing cumulative impacts at the planning stage. The model overlays geographic data in layers, including transportation systems (roads, railways, airports), hydrology (i.e., lakes, rivers, flood zones), public lands (i.e., parks, refuges), agriculture (i.e., farmlands, grazing lands), habitats (i.e., wetlands, vernal pools) and cultural resources. The gathering and sharing of data layers required actively involvement of resource agencies in providing data, reviewing it for accuracy, and providing rankings in regard to environmentally sensitive areas. Resource agencies were asked to highlight environmental hot spots where growth should not occur. This allowed planners to know what is critical to protect from the resource agencies' perspectives, and to identify the most attractive areas for growth with the least amount of adverse impact. The analysis, however, highlighted constraints and tradeoffs faced in the region, particularly because the areas identified as most sensitive to protect by agricultural agencies were generally the opposite of those noted by environmental resource agencies.

5.1.2 Oregon: Major Bridge Replacement Program

Oregon DOT (ODOT) sought to streamline the replacement process for roughly 350 bridges across the State. They developed a Major Bridge Replacement Program, which uses a programmatic approach to the various Federal and State fish and wildlife environmental reviews. This program relies on interagency involvement and trust, early coordination with stakeholders, and uses a tiered NEPA approach to improve stewardship and streamlining.

This "one process" approach to replacing its aging bridges is based on batched programmatic permits and agreements with resource agencies. For example, ODOT signed a joint biological opinion for the Endangered Species Act (ESA) with FWS and NOAA, a Regional General Permit with USACE, and a programmatic approach to managing State archaeological excavation permitting in collaboration with sate tribal groups.

Also, ODOT convened a series of meetings with USACE, NOAA, FWS, and Oregon State Lands to develop aesthetic and "green bridge" performance standards at the very beginning of the Major Bridge Replacement Program. These agreed-upon standards allow ODOT to trust designers and construction crews to devise ways to meet the standards for each bridge, obviating the involvement of resource agencies in the design process. The performance standards also show how early coordination, and specifically early environmental commitment, is feasible among stakeholders.

Early coordination has also taken the form of mitigation banking. Using a programmatic approach that combines wetland mitigation and ESA conservation into one agreement, ODOT and resource agencies determined conservation priorities and identified multiple new sites for mitigation banking. ODOT hopes that this early buy-in from resource agencies will be helpful in streamlining mitigation in the future.

The tiered NEPA approach to the bridge replacements involves collecting environmental and engineering data on each bridge and conducting programmatic, batched, and streamlined consultation. Once the programmatic piece of the bridge replacement review has been competed, each bridge will require only minimal attention from resource agencies.

Further information:
http://environment.fhwa.dot.gov/strmlng/newsletters/sep04nl.htm.

5.2 Projects: Notable Practices in Scoping, Analysis, or Mitigation

5.2.1 California: Lincoln Bypass – State Route 65

Notable Practices: Inclusion of measures to avoid adverse indirect impacts

The California DOT (Caltrans) proposed constructing a bypass around the city of Lincoln in Placer County to relieve congestion and facilitate movement of freight around the city. While the Draft EIS was completed in November 2001, EPA and U.S. Army Corps of Engineers (ACE) raised objections to the treatment of indirect and cumulative impacts. Therefore Caltrans prepared a separate document analyzing these impacts, which was submitted to EPA in June 2003. EPA agreed to the preferred alternative in July 2003, along with the mitigation measures.

The ICI analysis begins with caveats about the difficulty of separating indirect and cumulative impacts related to the project from those growth effects predicted by the local jurisdictions, and discussed the problems of obtaining background data. It uses a four-mile circle around the project as the study area, which is based on a Caltrans standard for ICI. In a discussion of land use trends, the report notes that Lincoln is anticipated to grow nearly 400 percent from 2000 to 2025. There are 11 road projects planned in Lincoln, and one major infrastructure project (a wastewater treatment facility), with no major projects planned for the rest of the county. Because of the high existing growth rate, the report concludes that growth would occur with or without the proposed bypass.

The bypass may, however, affect the pace and location of growth. Three areas near particular interchanges are expected to reap additional growth due to the proximity of the bypass, and some are anticipated to change their zoning from agricultural to industrial to accommodate growth. Currently less than 10 percent of the land in the study area is developed. Over 85 percent of farmland is covered by the Williamson Act, which provides lower property taxes for open space lands maintained as such (instead of taxes

based on the highest and best value of the land). Within the study area are over 1,000 parcels that will not be renewed for such protection.

The cumulative analysis discusses three types of resources: agricultural land, wildlife habitat, and wetlands. It lists three completed road projects and six planned, and nine development projects with the acreages and projected population for each. The cumulative loss of farmland in the area is estimated at 1,934 acres (234 from the project). Loss of habitat lands is estimated at 25 acres (11 from the project), and wetlands loss is estimated at 85 acres (19 from the project). Mitigation measures include a habitat conservation plan for Placer County and the Aitken Ranch mitigation site.

The proposed Lincoln Bypass includes conservation easements near the Wise Road interchange as a component of the project. The easement would avoid potential indirect effects to aquatic resources at an estimated cost of $3.9 million. The acquisition plan will be presented in greater detail in the Final EIS.

Further information:
Project web site, including link to DEIS: www.dot.ca.gov/dist3/projects/lincoln/ index.htm

ICI Analysis: *Indirect and Cumulative Impact Analysis, Lincoln Bypass – State Route 65, Place County, California.* Prepared by Caltrans, 2003.

5.2.2 California: State Route 46

Notable Practices: Relatively detailed cumulative impact analysis

This project, in San Luis Obispo County, California, will improve Highway 46 from U.S. 101 east to the Kern County line. The road originates in Paso Robles and is two lanes with few passing opportunities. The improvements will convert the road into a four-lane expressway. This road is a key east-west thoroughfare, and predictions estimate that traffic volume will increase faster than population growth in the region. This land is primarily used for agricultural space, with segments of mountainous terrain. The report analyzed the cumulative impacts to all land within one mile of the corridor. The highway corridor is home to numerous sensitive animal and plant species, which were included as resources in the cumulative impact analysis.

The Draft EIS was released in February 2003. In the Cumulative Impacts chapter, it lists each project built or planned within the corridor that affected one of the 15 resources. The report also includes each existing or planned road or development project that could cumulatively impact the resources. For example, the report lists each subdivision recently constructed or planned in the SR 46 corridor with its location and the specific resources it could impact when combined with the highway improvement. Most research on the resources and other impacts in the corridor was obtained from local planning departments, State transportation offices, and databases, including an encroachment permit database. The report presents a description of the current impacts on each resource and if and how the highway could contribute to these impacts.

In addition to residential, commercial and transportation development impacts, the analysis investigates agricultural impacts that may contribute to cumulative impacts. One current impact to farmland is the conversion of basic crop farming to luxury crop farming, in the form of wineries. The report states that while this is an impact on the farmland, the SR 46 improvement will not cause any cumulative impacts. Another impact considered was oak tree loss. Many developments currently proceeding along the corridor are removing oak trees. California law states that mitigation for oak tree loss must replace twice the number of trees that are removed. The report found that this process is not mitigating the loss of the habitats and ecosystems around the trees, just mitigating a net loss of trees in the region. The plans of the SR 46 corridor project state that oak trees will be planted in areas already occupied by oak trees, instead of areas for landscaping. The report concluded that there are currently cumulative impacts to oak tree habitats, but the construction of the highway will not contribute to the impacts.

Further information:
Project web site, including DEIS: www.dot.ca.gov/dist05/projects/safer46/

Project fact sheet: www.dot.ca.gov/hq/transprog/stip/2004%20ITIP/screens/05-0226a.pdf

5.2.3 Colorado: I-25

Notable Practices: Use of expert panel, regional approach to cumulative impacts analysis

The I-25 Environmental Assessment (EA) was prepared by the Colorado Department of Transportation (CDOT) and the Federal Highway Administration (FHWA) to document the expected impacts of proposed capacity improvements to Interstate 25 through the Pikes Peak Region in El Paso County, Colorado. The 45-year-old Interstate 25 is the only existing freeway in a region with more than a half million residents. The typical roadway section on I-25 consists of just two through-lanes in each direction (two northbound lanes and two southbound lanes). The Proposed Action includes adding through-lanes for a 26-mile segment of I-25 from State Highway 105 in Monument to South Academy Boulevard, including 12 miles of lanes reserved in peak hours for use by high occupancy vehicles (buses and carpools). The proposed action would reconstruct the seven interchanges to include the bridges and underpasses associated with the interchanges. The new interchanges will be planned to accommodate future traffic demands projected to the year 2025.

I-25 is only one of several major transportation corridors in the region planned for capacity expansion in the decade ahead. In addition, the construction of new houses, schools, shopping and employment centers to serve at least 200,000 additional residents by the year 2025 will affect the environment in different ways. In conjunction with the I-25 EA, CDOT prepared a report examining the cumulative effects of foreseeable development in the region. Panels of experts on natural and community resources were convened to explore these issues. They focused their analysis on six key environmental aspects: landscape patterns, water quality and quantity, air quality, transportation, noise and visual character.

The regional view puts the impacts of the I-25 improvements into perspective. For example, widening I-25 will add 0.4 square mile of impervious surface in the region, while the combined effect of all development will be about 170 square miles. Similarly, of the wetland area likely to be disturbed by development through the year 2025, up to 450 acres may be affected; I-25 will be affecting ten acres and replacing them all.

The full report, entitled "Sustaining Nature and Community in the Pikes Peak Region: A Sourcebook for Analyzing Cumulative Effects" is included as an Appendix to the I-25 EA. It includes numerous recommendations for both policy-level and project-level approaches designed to promote a more sustainable community.

Further information:
Sustaining Nature and Community in the Pikes Peak Region: A Sourcebook for Analyzing Cumulative Effects.

5.2.4 Hawaii: Lahaina Bypass

Notable Practices: Relatively detailed cumulative impact analysis

The Lahaina Bypass project will expand the Honoapiilani Highway along the western coast of Maui and divert traffic around congested downtown Lahaina. Currently, the two-lane highway is the main thoroughfare for travelers in the area. The cumulative impact analysis highlights seven transportation and non-transportation projects that were built or are proposed t, in the vicinity of the bypass. Some of the highway projects that have been built will become segments of the future bypass. The Final EIS was completed in 2002.

The cumulative impact analysis divided the seven nearby projects into three groups: existing transportation improvements, planned transportation improvements and non-transportation related improvements. To determine potential cumulative impacts, individual impacts were analyzed for each nearby project. Baseline data was compiled summarizing the current conditions in the area. Project planners analyzed the effect each project had or could have on 12 predetermined resources: water quality, air quality, land use, cultural resources, noise, topography, plant/animal life, visual resources, public facilities, utilities and transportation. The report included a matrix with each project analyzed, and each sensitive resource that could be affected. Most data to analyze the impacts was obtained from public documents, project reviews and approvals and discussions with participating agencies. The project staff examined the cumulative impacts the bypass could have on the resources by combining the impacts all nearby projects had individually, and analyzing baseline data with the trends affecting the corridor. A second matrix lists each resource with the baseline situation, combined effect of each group of projects, mitigation suggested and cumulative impact on the resource.

After analyzing the cumulative impacts, the resources were divided into two groups, based on the degree of impact, and effectiveness of mitigation. The cumulative impacts on six resources were found to be adverse but non-significant and the impacts on the other six were found to be potentially adverse, but avoidable with mitigation measures.

The report summarizes the six resources which are adverse but non-significant adverse, and provides an explanation of why some resources were designated as potentially adverse. The analysis mentions the possible effects of secondary impacts in the West Maui region. The report does not investigate possible indirect impacts, but highlights regional planning documents that the community has utilized to contain and coordinate new growth.

5.2.5 Indiana: I-69

Notable Practices: Analysis using regional economic and land use model

I-69 is a proposed new highway from Indianapolis to Evansville that forms part of the "NAFTA Highway" stretching from Canada to Mexico. The alignment selected in January 2003 (3C) would be approximately 140 miles. The EIS process is being completed in two tiers; the Tier I Draft EIS, which looked at five corridors, was completed in July 2002, and the FEIS in December 2003. A Record of Decision for the FEIS was signed in March, 2004. Tier II EISs will cover individual segments of the alignment.

The Tier I FEIS uses the statewide Major Corridor Investment Analysis Benefit System (MCIBAS) to forecast direct and indirect land use change. MCIABS links a regional economic model with a transportation model (the Indiana Statewide Travel Demand Model) to determine conversion of land for residential and commercial use. To create indirect land use forecasts for each of five economic analysis areas (covering the 26 affected counties), the FEIS takes county-level population and employment forecasts for 2025 and feeds them into the travel demand model, which models the transportation impacts. Then those impacts are input into MCIBAS to determine increases in population and employment for each of the five economic analysis regions, and converts to changes in land use using standard densities.

In addition, indirect impacts at potential interchanges were modeled using a study of commercial development at rural and small town interchanges. In the land use impacts chapter, the Tier I FEIS lists whether each of the 26 counties has a comprehensive plan (13 do) and if so, states whether the plan accounts for I-69. It also estimates the number of acres that would be developed due to indirect impacts under the individual alternatives; however, these are not compared to a no-build scenario. The acreages range from 490-650 for Alternative A to 1,045-1,330 for Alternative 5B. The direct impacts are much higher, because the highway represents new construction. The preferred alternative (3C) would require create direct impacts of 5,860 acres and indirect impacts of 1,045-1,320 acres. Indirect impacts are not incorporated into the other resource chapters.

For the cumulative impacts analysis, a separate chapter, the 11-step method included in the CEQ Handbook was utilized. In the scoping stage, the involved agencies decided to look at three resources for the indirect and cumulative impacts: farmland, forests, and wetlands. (While endangered species were considered, it was decided that the trends in forest and wetlands provided sufficient information.) The Tier I FEIS looked at the 26

counties through a forecast date of 2025. The FEIS describes 11 other projects (public and private, transportation and land use) that might affect the cumulative impacts analysis. Baseline historic data on farmland, forests, and wetlands was collected throughout the State. While farmland and wetlands have been gradually declining, the percentage of forest in southwest Indiana has been rising since 1950 and has reached a plateau. The FEIS then compares the amount of projected loss of farmland, forests, and wetlands overall to the projected loss due to direct and indirect impacts from I-69, and finds that I-69 losses account for a very small percentage of overall losses in these three categories (for the preferred alternative, losses amount to 1.1 percent of lost farmland, 0.1 percent of lost forests, and 0.04 percent of lost wetlands).

For the Tier II studies, the corridor is divided into six segments. These environmental studies are underway and are not expected to be completed until late 2005 through early 2007. The Tier II EISs will also define the exact alignments under consideration.

Further information:
Tier 1 FEIS: www.deis.i69indyevn.org/FEIS/index.html
Tier 2 Project Web Site: www.i69indyevn.org/index.html

5.2.6 Maryland: I-270/US 15

Notable Practices: Use of expert panel

I-270/US-15, an approximately 25-mile corridor outside the Washington, DC beltway, has been growing rapidly. This Draft EIS, completed in 2002, looks at a variety of ways to alleviate congestion: transportation demand management techniques, highway improvements (both SOV and HOV additions, as well as collector-distributor lanes, HOV direct access ramps, and new or improved interchanges), bus rapid transit, and light rail transit. The alternatives studied combine various elements of these strategies. Selection of a preferred alternative was scheduled to take place in 2003, after which work would begin on a Final EIS; however, as of May 2004 a preferred alternative had not yet been identified.

Maryland has guidelines, last updated in 2000, for determining secondary and cumulative effects analysis (SCEA). They call for incorporating SCEA into the scoping phase (including assessing data availability), developing one consistent study area boundary and time frame for all SCEA, and performing the analysis with readily available data. It recommends obtaining information regarding projected and approved future development from local governments (including access management), and in complex cases convening an expert land use panel.

The SCEA forms one lengthy chapter in the DEIS. The 531-square mile boundary was determined through a combination of areas of traffic influence, TAZs, census tract boundaries, watershed and subwatersheds, parks, county area planning boundaries, water and sewer locations, and Priority Funding Areas (developed areas designated by the State as locations for growth). The time period for analysis was 1970 (shortly before I-270 was built) to 2025 (the deign year for the project). The DEIS then catalogs development 75

projects—mostly residential, but some commercial—and 15 transportation projects in the two counties. The analysis itself used trend analysis, interviews with local officials, and overlays; much of the data was obtained from the region's MPO.

The Expert Land Use Panel considered a study area composed of 19 forecast zones based on regional TAZs. Their analysis was conducted in two phases. In Phase I each panel member wrote a qualitative appraisal of general land use changes based on three scenarios (no-build, highway, and transit). In Phase II each panel member individually determined population and employment for each zone for the design year, 2025, for four scenarios (no-build, base case master plan, light rail/highway, and bus/HOV/highway).

These forecasts were combined into a blended average for the panel. The panel found that for eight of the 19 zones development under the base case master plan (implementation of transportation improvements accounted for in county plans) and no-build alternatives was substantially different than in the build alternatives, and that in three of those zones there would likely be land use changes not accounted for in the plans. For the entire study area, the build alternative population forecasts were 24,000 more people than the no-build (an increase of four percent) while employment forecasts were 12,000 more jobs (an increase of three percent).

Land use data, which is presented in residential, employment, and open space acreages, is derived from the Maryland-National Capital Parks and Planning Commission, the regional planning agency for these counties. Trend analysis was used to project future effects, and overlays combined land use projections with land use controls to create future scenarios.

The chapter contained a briefer write-up on a variety of other resources. Parklands and farmlands might experience some secondary impacts due to development pressure, but these could be mitigated with strong stewardship techniques. For cultural resources (61 historic properties and 413 archeological sites within the SCEA boundary), there may also be cumulative impacts due to pressure from development, but secondary impacts will be addressed through the Section 106 process. For surface water, the Monocacy River and Seneca Creek may be affected by development pressure into those areas that are not part of protected parkland. While secondary impacts to floodplains and wetlands are not anticipated, there may be cumulative impacts to floodplains with other development. For forests, wildlife dependent on forests, and aquatic life, both indirect and cumulative effects will be minimal.

Further information:
DEIS:
www.sha.state.md.us/businesswithsha/projects/oppe/brochures/Envro_docs/is270_us15/docs/cover.pdf

The Use of Expert Panels in Analyzing Transportation and Land Use Alternatives. Samuel N. Seskin, Katherine Gray Still, and John Boroski, Parsons Brinckerhoff Quade & Douglas, Inc. National Cooperative Highway Research Program, Project 8-36, Task 4. April, 2002. Appendix, including case study write-ups, available online at http://nepa.fhwa.dot.gov/ReNEPA/ReNepa.nsf/All+Documents/CCECF4D789DB510E85256CE6006142A0/$FILE/appendix_1.pdf

5.2.7 Montana: I-15

Notable Practices: Interagency consideration of impacts in scoping

The Montana Department of Transportation (MDT) prepared an EIS for the section of I-15 that runs through Helena. The EIS was mandated by the Supreme Court of Montana as a replacement for an EIS completed in 1992 that selected an interchange at Forestvale Road as the preferred alternative for reducing congestion in that area. After a series of public hearings in 1997, MDT began moving forward with the interchange, but a 1999 lawsuit halted the project and led to the requirement for a new EIS. The FEIS was completed in November 2003.

A Land Use Advisory Group forecast indirect land use impacts. The Group analyzed three scenarios: a no-build, a north interchange, and a south interchange. Then they took estimates of new households (10,000), new retail employment (3,600), and new non-retail employment (14,500) and allocated them throughout three neighborhoods. The underlying assumption is that the project will not change the amount of growth anticipated, but rather influence its location. Then those allocations were used to look at projected traffic at three key intersections. The land use chapter uses these estimates to discuss each sub-area within the study area.

For each intersection, the FEIS estimates (using the Helena Urban Travel Demand Model) the amount of traffic generated under the no-build scenario compared to the two build scenarios. The traffic generated by the build scenarios ranges from 10 to 25 percent of the intersections' total traffic.

Indirect impacts are discussed qualitatively within each resource section; for example, in the air quality section, the FEIS states that the project may contribute to increased emissions from heating systems in new construction, electric generation, lawn mower use, and manufacturing processes.

The cumulative impacts analysis began with contacting various agencies for input on scoping. The boundaries included identified planning area boundaries and a 40-year time frame. It then identifies dozens of transportation, development, and infrastructure projects permitted, under construction,, or recently completed. The section identifies three broad areas of cumulative impacts: land use (changes is growth patterns), water quality (largely runoff from increased development) and resources (demand for water and the possibility of aquifer depletion, and the possibility that septic systems could increase groundwater leaching), and ecological (a minor impacts to local species). These discussions are qualitative in nature. The section concludes by citing a study of sprawl's impact on water resources and generally recommending smart growth strategies.

Further information:
FEIS: www.i-15helenaeis.com/default.htm (Click on "project web site," then "FEIS.")

5.2.8 New Hampshire: I-93

Notable Practices: Use of expert panel, mitigation/enhancement

This project will widen a four-lane highway to eight lanes for a 20-mile stretch from the Massachusetts border to Manchester. It also includes interchange improvements and park-and-ride lots. The Draft EIS was completed in 2002, and the Final EIS in April 2004. The project has been controversial because of its potential indirect impacts on land use development, as well as its proposal to fill 70 acres of wetlands. This project was also selected by U.S. DOT as one of the priority projects under EO 13247.

A 14-member panel developed population and employment forecasts for 29 communities (an area of 824 square miles); a few panelists opted to include other areas. The panel first did base case scenarios, then made forecasts for build alternatives. Individual panel members' forecasts were combined into a "blended allocation" (average of the mean and the median) for all 29 zones. Current population for the 29 zones is 605,000, while employment is 298,000. Under the no-build scenario in 2020, population was forecast at was 743,000 and employment at 397,000, while for the build scenario it was 784,000 population and 419,000 employment. The greatest percentage increases are in small municipalities not directly on the corridor, but the greatest total increases are in the largest municipalities. New Hampshire municipalities are expected to grow more than those in Massachusetts.

The project team used existing trends in average household size, land conversion rates, employment density in different categories, and individual towns' build-out scenarios to estimate future land use. Under the no-build scenario, 60,500 acres of land would be converted to residential use; under the build scenario, 79,800 acres would be converted. Small and mid-size towns require more land conversion because of large-lot zoning. Five communities would not be able to accommodate new growth unless they change their zoning ordinances. For commercial land use, the no-build scenario would require conversion of 4,000 acres at low density and 2,200 acres at high density; for the build scenario, the low density would require 4,900 acres and the high density 2,600 acres.

The section concludes with a qualitative discussion of the impacts of secondary land use changes, such as the potential for growth pressure on resource lands and the rate at which wetlands are filled throughout the State. In general the EIS states that the most important lands are already protected and that most communities have sufficient undeveloped land to meet their future growth needs. While most of the other resource sections within the EIS (such as noise, visual impacts, etc) mention secondary impacts, they generally conclude that there are too many unknowns about where future growth will occur to make meaningful predictions about impacts based on secondary land use, or that the impacts will be minimal.

The only resource section to include a cumulative impacts analysis is Socioeconomic Impacts. This section lists a number of projects recently completed or planned in the vicinity (both transportation and land development), and a number of potential qualitative cumulative impacts. Several are positive, such as better transportation and a more diverse

regional economy, but more are negative, such as development pressure, potential water shortages, need for greater public facilities, and a loss of existing character.

While technically not referred to as mitigation, the FEIS includes the I-93 Technical Assistance Program (TAP) developed by NHDOT as a "project enhancement." The program aims to support five "primary" communities impacted by the project, and a number of "secondary" communities over five years, culminating in a process that is hoped to extend beyond the initial timeframe. Approximately 80 percent of the $3.5 million budget comes from Federal transportation dollars; the remaining 20 percent from State transportation funds.

The types of activities covered by the TAP are expected to range from direct technical assistance to communities to support more integrated planning, to build-out analyses for future growth alternatives, to the development of specific tools and materials to support local planning and conservation efforts. Three committees—one representing the member communities, another representing regional planning commissions and State and Federal agencies, and a third representing a variety of statewide interests (e.g., realtors, environmentalists, etc.)—are expected to guide the TAP program. It is hoped that they will continue to function far beyond the initial five-year project timeframe. NHDOT itself notes the uniqueness of the approach and its interest for integrating transportation and land use in the future in its TAP information sheet:

It is not customary for this type of program to be part of a major highway project such as I-93, and many stakeholders see it as a unique opportunity to provide much needed assistance to the towns with the corridor as they respond to continuing high rates of growth. The State also sees the project as a way to test different approaches and tools to help communities grow smarter, and hope that it can be a model for integrating transportation and land use in other parts of the State.

Further information:
I-93 Project Web Site, including DEIS and FEIS: www.state.nh.us/dot/10418c/study.htm

The Use of Expert Panels in Analyzing Transportation and Land Use Alternatives. Samuel N. Seskin, Katherine Gray Still, and John Boroski, Parsons Brinckerhoff Quade & Douglas, Inc. National Cooperative Highway Research Program, Project 8-36, Task 4. April, 2002. Appendix, including case study write-ups, available online at http://nepa.fhwa.dot.gov/ReNEPA/ReNepa.nsf/All+Documents/CCECF4D789DB510E85256CE6006142A0/$FILE/appendix_1.pdf

Fact Sheet, I-93 Technical Assistance Program (no date).

5.2.9 New York: Lower Manhattan Transportation Recovery Projects

Notable Practices: Interagency consideration of impacts in scoping, coordinated analysis for multiple projects, inclusion of mitigation

The Lower Manhattan Transportation Recovery Projects are designed to rebuild and enhance the transit system serving Lower Manhattan that was damaged by the terrorist attacks on September 11, 2001. This effort was selected as one of the priority projects

under EO 13274, and includes $4.75 billion in projects administered by the Federal Transit Administration (FTA), including the Port Authority Trans Hudson (Path) Station at the World Trade Center, the South Ferry Terminal, and the Fulton Street Transit Center. Two other federally funded Lower Manhattan Recovery Projects include the redevelopment of Route 9A by the Federal Highway Administration (FHWA) and New York State DOT, and the World Trade Center Memorial and Redevelopment Plan, which are being developed by the U.S. Department of Housing and Urban Development (HUD) and the Lower Manhattan Development Corporation (LMDC). Although the nature and circumstances of these projects is unique, the approach that was developed to address cumulative impacts is an example of an effective process that could potentially be applied in other locations where several projects are planned within a given area.

The redevelopment of Lower Manhattan includes transportation and development projects being sponsored by both public and private groups. Although funded and planned separately, and having independent utility from each other, it was recognized that the construction and operation of these various projects would have a cumulative effect on the character and quality of Lower Manhattan and the region, as a whole, both during construction and in the long-term. Given such large-scale development within a dense urban area, and the proximity of the projects to one another, the lead Federal agencies, in cooperation with the local project sponsors, developed a framework for the analysis of cumulative effects for projects being reviewed under the National Environmental Policy Act (NEPA).

Working together with resource agencies, the lead Federal agencies originally explored with FEMA the concept of doing overall cumulative impacts analysis for all projects; however, it was recognized that such an approach could delay the development of the necessary environmental documents. Instead, it was determined that individual projects would proceed through the NEPA process, but use a common framework and analysis approach for all projects.

To guide this process, FTA prepared a guidance document on the Approach to Cumulative Effects Analysis for the Lower Manhattan Recovery Effort (July 2003). The approach described in FTA's guidance ensures consistency among projects through a coordinated set of analysis assumptions and methodologies for all of the transportation recovery projects. As individual projects advance through the NEPA process, the analysis and any identified impacts are incorporated into the documentation of later projects to ensure a consistent, up-to-date, and comprehensive evaluation of potential cumulative effects. This cumulative effects assessment considers the five major federally funded Lower Manhattan Recovery Projects as well as other public and private developments in the vicinity of the Port Authority of New York and New Jersey's (PANYNJ) Permanent World Trade Center (WTC) PATH Terminal.

The Federal agencies agreed to focus the cumulative impacts study on the five most sensitive resources most prone to potential cumulative adverse effects: air quality, noise and vibration, historic/cultural resources, business/economic interests, and vehicular and pedestrian access and circulation. In addition, although the cumulative effects analysis

considers both the potential short-term (construction period) and long-term (operational period) impacts of the five Lower Manhattan Recovery Projects, as well as other projects that are anticipated to be undertaken in Lower Manhattan, the cumulative impacts analysis concentrates on the construction period, recognizing that this would be the greatest period of impact, given the intense level of construction planned in a dense urban area. It also was recognized that the short-term construction-related effects are generally adverse while the long-term effects are generally beneficial, given that the projects have been planned with the specific purpose of supporting the economic recovery of Lower Manhattan while enhancing the environment of the area.

The local project sponsors coordinated amongst themselves and with Federal agencies to develop consistent methodologies, assumptions, data sources, and impact criteria for the evaluation of impacts for the five cumulative effects subject areas. Moreover, the project sponsors agreed to a consistent set of Environmental Performance Commitments (EPCs) for these resource areas to be implemented as part of their projects in order to minimize or avoid adverse impacts during construction. The EPCs involved "up front" commitments for actions such as use of acoustic barriers and walled enclosures around certain construction activities, electrification of construction equipment, and use of low-emissions equipment.

For the transportation (i.e. traffic, pedestrians and transit), air quality and noise categories, predictive quantitative models were used to determine the impacts. For cultural resources and economics a more qualitative approach was undertaken. With respect to cultural resources, the cumulative effects analysis focused on each resource potentially impacted by individual projects and noted where effects may be cumulative. For the effects on local businesses, much of the analysis focused on commitments by project sponsors to maintain access during construction.

Coordination efforts among the project sponsors included working group meetings with all of the project sponsors to address general coordination issues as well as technical subjects (e.g. construction assessment; traffic modeling; air quality emissions factors; etc.). Some of these coordination meetings have also involved participation from other local and State agencies such as the New York City Department of Transportation (NYCDOT), the New York State Historic Preservation Officer (SHPO), and the New York Stat Department of Environmental Conservation (NYSDEC). Meetings were held at least weekly and sometimes two or three times per week.

In addition to the numerous coordination meetings that have been organized and attended by the project sponsors, there has been ongoing communication in a less formal setting to ensure consistency between the environmental documents to the extent possible. This has included frequent correspondence between the environmental consultants as well as peer review.

Although the intense level of coordination was clearly related to the unique nature of the projects and high national priority being placed on them, the general framework applied for these projects could be a useful model for other areas, particularly those that are

expecting to see rapid growth and may be planning several transportation projects in a small area.

Further information:
Federal Transit Administration and The Port Authority of New York and New Jersey. *Permanent WTC PATH Terminal: Draft Environmental Impact Statement.* May 2004.

5.2.10 North Carolina: Monroe Bypass and Monroe Connector

Notable Practices: Relatively rigorous consideration of cumulative impacts, inclusion of mitigation

The Monroe Bypass and Monroe Connector are two proposed controlled access highways in Union County, North Carolina, outside of Charlotte. Union County is the fastest growing county in North Carolina, and traffic congestion and projected new development are expected to create the need for new transportation facilities. Together, the Monroe Bypass and Monroe Connector will relocate US 74 around the City of Monroe and several towns in Union County, and allow travelers to bypass 39 traffic signals along U.S. 74. The existing US 74 serves regional travel and commuting traffic between employment centers in Charlotte and communities in Union County.

NEPA studies were initiated on the Monroe Bypass in June 1994, an Environmental Assessment was approved in March 1996, and a FONSI was approved in June 1997. The Monroe Connector's DEIS was completed in November 2003, and in the process of conducting the environmental evaluation, indirect and cumulative impacts of the Connector were considered along with impacts due to the Monroe Bypass and several other highway projects recently completed or planned for the region. Through this analysis, a potential cumulative impact was identified on an endangered freshwater mussel. The Carolina heel-splitter is a small, freshwater mussel native to North Carolina and South Carolina. Listed as endangered within its entire range on June 30, 1993, there are only four known remaining populations, and two populations occur within Goose Creek and Waxhaw Creek in Union County. Due to the explosive growth in the region, and resulting deterioration in water quality, the habitat of the heel-splitter is being increasingly threatened.

Although neither project has a direct impact on the creeks where the Carolina heel-splitter are located, it was recognized that the Monroe Bypass and Monroe Connector could create an indirect and cumulative impact on the endangered mussel, especially when considering all of the other development expected in the county. As part of the cumulative impact analysis, NCDOT examined the magnitude of land use change potential associated with the road projects, considering factors such as changes in accessibility, forecasted growth, water/sewer availability, and public policy. In order to address impacts on the heel-splitter, the U.S. Fish and Wildlife Service proposed a package of land use controls to mitigate against potential indirect and cumulative impacts on the species. These measures included development of 100-foot buffers along intermittent streams, 200-foot buffers along perennial streams, a maximum of 1 dwelling

unit per 2 acres in the creek sub-watersheds, and no sewage treatment plant in either sub-watershed (Union County had proposed developing a sewage treatment plan in this area, and this measure would require abandoning the proposed site).

As part of the indirect and cumulative impact analysis, NCDOT examined three scenarios: no build, build without U.S. Fish & Wildlife controls, and build with U.S. Fish & Wildlife controls. NCDOT does not have any control over local land use decisions and so is limited in terms of its ability to implement controls. NCDOT is currently working with the local municipalities to implement the watershed protection ordinances proposed by the U.S. Fish & Wildlife service. A Biological Assessment is being prepared, and ordinances will be listed as minimization and mitigation for indirect and cumulative impacts to the mussel. Union County is coordinating with the US Fish and Wildlife Service, US Army Corps of Engineers, and the NC DWQ regarding development controls and other measures (in addition to the conditions listed in the Monroe Bypass Section 401 Water Quality Certification) that would be designed to protect the endangered Carolina heel-splitter mussel in Duck Creek, Goose Creek, and Waxhaw Creek (outside the Monroe Bypass/Monroe Connector Impact Area). It is expected that the development controls and/or other measures agreed to as conditions of the Monroe Bypass Section 404 Permit also would be sufficient mitigation for the Monroe Connector.

Further information:
U.S. Department of Transportation, Federal Highway Administration, and North Carolina Department of Transportation. US 74 Monroe Connector. Draft Environmental Impact Statement (DEIS). US 74 Improvements, I-485 to US 601, Union and Mecklenburg Counties, Federal Aid Project No. STPNHF-74(21), State Project No. 8.1690501, TIP No. R-3329, October 2003. Available at: http://www.ncdot.org/projects/us74/deis.html

5.2.11 Pennsylvania: Lackawanna Valley Industrial Highway

Notable Practices: Addresses a transportation project whose purpose included economic development, inclusion of mitigation/enhancement

The Lackawanna Valley Industrial Highway (LVIH) in Pennsylvania (completed in 1999 and known since as the Governor Robert P. Casey Highway) is a new multi-lane, approximately 16-mile, limited access highway in northeastern Pennsylvania. One of the goals in constructing the highway was to realize economic development opportunities. However, this induced development was expected to impact regional environmental resources outside of the construction corridor within which the roadway was built. During studies conducted for the EIS, over 1,000 historic buildings were identified, plus hundreds of other cultural resources such as artifacts from the region's mining history. The project team developed a three-step approach to conducting the secondary and cumulative impacts analysis for these resources:

1. Identify locations for potential development. The two main sources of information were the Lackawanna Heritage Valley Plan, developed by a coalition of local jurisdictions and the county to identify economic development goals, and from

interviews with and information provided directly by the 12 affected jurisdictions, the county, the MPO, and the chamber of commerce.

2. Identify potential impacts to cultural resources. These were based on mapping, soils data, other existing information, and professional judgment.

3. Identify potential mitigation measures. The main mitigation measure proposed was for FHWA to fund development of a regional planning document that would serve to guide development and reduce impacts.

Several factors made this planning approach feasible. First, the valley topography limits the areas of developable land. Second, the Plan for the Lackawanna Heritage Valley (written in 1991) has already collected data about cultural resources. Finally, despite fears that local agencies might see this as encroaching on local land use decisions, the municipalities welcomed the chance to cooperate on developing the plan.

The resulting document, the 1995 Lackawanna Valley Corridor Plan, examines traffic, economic, environmental, land development and other community impacts. It also includes a land use plan with detailed recommendations for transportation, conservation, housing, environmental protection, utilities, mine spoils reclamation, community facilities, and a set of sample land development regulations. The Plan has helped shift some development from areas designated for open space and draw attention to cultural resources since the highway was completed in 1999.

Further information:
Presentation prepared for National Conference on Transportation and Environment for the 21st Century, Pittsburgh, PA July 22-26, 2000. *Lackawanna Valley Industrial Highway: Secondary and Cumulative Impacts Analysis and Cultural Resources*, by Kenneth J. Basalik, Ph.D. and Kathleen H. Quinn. Available online at http://itre.ncsu.edu/a1f05/Lackawanna.htm

5.2.12 Utah: Southern Corridor

Notable Practices: Development of a "Smart Growth" chapter

The Southern Corridor project in Utah is a new divided highway connecting St. George with a new regional airport and Hurricane, a distance of approximately 20 to 26 miles, depending on the alignment selected. The Draft EIS was released in April 2003 and a Final EIS is currently being prepared. In May 2004, several local environmental groups indicated that they would file suit over the DEIS, which they said did not give sufficient attention or protection to several endangered plant species.

The DEIS treats indirect and cumulative impacts within the individual resource analyses. Indirect land use impacts include more accelerated conversion of farmland to development, but the DEIS assumes that the build and no-built alternatives would both result in equal population growth. The land use discussion is entirely qualitative, comparing the scenarios with existing plans for the affected jurisdictions. However, the cumulative impacts discussion shows that the project would contribute to only one

percent of developable land being converted (in a county of 1.5 million acres, 310,000 are considered developable). It also compares a smart growth scenario to current development scenarios to show that between 4,600 and 10,300 acres could be conserved through more compact development patterns that would use less land for residential and road development (industrial and commercial conversion were identical under both scenarios).

Other discussions of indirect and cumulative impacts generally refer back to the potential for conversion of undeveloped land to development. There are some other indirect impacts, such as the potential for the new road to bisect and thus disrupt animal grazing ands. These discussions are generally qualitative, and do not cite specific methodologies. The forecast year is generally 2030.

As a mitigation measure, the DEIS recommends a smart growth development strategy, which is discussed in a separate chapter. EPA, FHWA, Utah DOT, and Envision Utah (a private group promoting planning for more compact development) have been working with local governments on land use alternatives to reduce the environmental impacts of the project. The population in the study area is expected to grow from 67,000 in 2000 to 209,000 in 2030, an increase of over 200 percent. The chapter gives a detailed explanation of smart growth, its differences from conventional development, and its environmental implications, citing various studies to support its conclusions. A comparison of the 85,000 acres of land available for development with the same population shows potential outcomes under conventional and smart growth scenarios, including land use (described above), water consumption, infrastructure cost, energy use, vehicle miles traveled, and air emissions. In all cases, the smart growth scenario shows considerable reductions over the conventional growth scenarios. Detailed assumptions are not shown. Finally, the chapter discusses efforts of the local municipalities to incorporate smart growth principles into their planning efforts, and some suggestions for implementation.

Further information:
Project web site, including link to DEIS: www.udot.utah.gov/sc/

5.2.13 Washington: I-405

Notable Practices: Use of modeling to predict indirect impacts

This is a $7.6 billion, multi-modal corridor project for the I-405 highway in Washington State. Listed in the FEIS are the following components: implement a TDM program; expand capacity of local bus system; implement new bus rapid transit within corridor; implement new fixed-guideway high-capacity transit within corridor; expand capacity of existing I-405 freeway; and expand capacity and improve continuity of the adjacent arterial network.

The FEIS used the DRAM/EMPAL model to predict indirect and cumulative population, employment, and household growth in the study area for all alternatives through 2020. For each of the four counties under study, the model produced an estimate of population

and employment by community that accounts for anticipated growth based on the I-405 project as well as other projects contained in the regional transportation plan Destination 2030, and several other major highway and transit projects. The build alternatives were then compared to the no-build alternative to assess the difference. The preferred alternative shows a difference from the no-build scenario of between one and two percent. A series of color-coded maps shows where more intensive development is expected to take place.

These land use estimates are then used to make other forecasts as well. The model was used to calculate vehicle miles traveled, vehicle hours traveled, and vehicle trips for each alternative. The model estimated the increase in impervious area using estimates of housing and employment increases and translated those figures into acreage lost. The overall increase in impervious area with the preferred alternative would increase from 32 percent (current) to 40 percent. Cumulative development (in acres) with the I-405 Corridor Program improvements is about one to eight percent of the expected growth over the next twenty years.

The cumulative analysis, which is combined with the secondary impacts in a separate chapter, considered impacts on air quality, energy, surface water, wetlands, fish and aquatic habitat, and farmlands. The study areas for analysis differed depending on the individual resource, and most were forecast through 2030. For air quality, the land use and transportation impacts were used to forecast carbon monoxide, hydrocarbons, and nitrous oxides. Gasoline consumption in gallons was modeled based on VMT, average speed, and fuel consumption rate. Surface water impacts are discussed qualitatively based on the amount of impervious area. Wetlands and fish/aquatic habitat are suggested to be vulnerable to changes in overall growth patterns, but the difference throughout the region between the alternatives is slight. Finally, the preferred alternative is likely to result in the loss of only 20 acres of farmland more than the no-build alternative.

Further information:
FEIS: www.wsdot.wa.gov/projects/I-405/feis/

5.2.14 Wisconsin: Highway 12

Notable Practices: Inclusion of mitigation

Highway 12 between Sauk City and Middleton is being widened from two to four lanes. The rationale for the project was to improve safety and capacity between Sauk City and Middleton. The road had a fairly high accident rate, including fatalities, particularly on a hilly and curvy stretch of the road in Sauk County. The corridor now under construction measures 18 miles.

The Draft EIS was released in 1995. There was some controversy about the issue of whether the secondary impact analysis had properly taken account of potential impacts to the Baraboo Range National Natural Landmark (a 51,000-acre area also known as the Baraboo Hills), so a Supplemental Draft EIS was prepared.

As part of this, Wisconsin DOT completed a lengthy (100 pages) secondary impacts analysis. For a study area of ten counties, it looks at seven potential scenarios and used three analytical methods: a commuter distribution analysis, a travel time vs. commuter distribution analysis, and a regional growth analysis. Each of these individual analyses was then reviewed by an expert panel to forecast population growth for the year 2020. The commuter distribution analysis was prepared by looking at the percentage of commuters in each of 333 local jurisdictions traveling to Madison. This analysis showed that the percentage of commuters working in Madison did not increase significantly with the presence of a four-lane highway (with some caveats). The travel time vs. commuter distribution analysis graphed the travel time to Madison against the percent commuting to Madison, which was highly correlated. This analysis showed that for towns and cities along Highway 12, the percentage of commuters to Madison would increase from zero to eight percent, depending on the jurisdiction. The regional growth analysis compared the population growth over the period 1980 to 1995 of cities and towns along two-lane highways to those along four-lane highways. Based on weighted averages, the jurisdictions on four-lane highways grew 7.8 percent faster. Beyond 25 miles from Madison, the relationship between distance and growth rate was quite weak.

The EPA, not satisfied with this analysis, hired the Argonne National Laboratory to review the analysis technique. Argonne's report questioned the methodology, but the Final EIS was accepted in 1998. However, a memorandum of agreement (MOA) between Federal and State agencies on mitigation was signed in 1999, including a statement that more analysis would be completed. In addition to more analysis, the MOA specified mitigation efforts, including the purchase of conservation easements and access restrictions. The conservation easements are in process, with implementation varying between the two affected counties (clustering away from the roadway versus purchases adjacent to the roadway). Wisconsin DOT agreed to spend up to $15 million on various aspects of land preservation.

The road is being built in three sections; one is already completed, and the other two will be done in 2004 and 2005. Land conservation work continues through the two counties, local jurisdictions, and private land trusts.

Further information:
Project web site: www.dot.wisconsin.gov/projects/d1/us12/index.htm

5.2.15 Wisconsin: U.S. 41

Notable Practices: Use of expert panel

The U.S. Highway 41 project study area is located in Oconto and Marinette Counties in northeast Wisconsin. The proposed 21.4-mile project extends from Oconto to Peshtigo. The existing road is the last piece of two-lane highway along US-41. The proposal is to develop US-41 as a four-lane divided highway with access management that will allow for uninterrupted travel with a 55 mph speed limit. A bypass of both Oconto and Peshtigo are considered. For several years, Wisconsin DOT was conducting a State DEIS as well as a Federal EA. Due to concerns regarding wetlands, Wisconsin DOT has

reevaluated this approach and has decided to go forward with an EIS, which is anticipated to be completed in 2005.

An expert panel, conducted and sponsored by the Wisconsin Department of Transportation (WISDOT) in January-February 1998, was done as part of the EIS documentation for the US-41 Major Project. The panel went through a Delphi Survey process to identify the likely secondary and cumulative land use impacts of several highway alignment options in the towns of Peshtigo and Oconto, where improvements to US-41 were proposed to address operational and safety concerns. Three alignment alternatives were considered in Oconto and five alternatives were considered in Peshtigo. Within each city, the alternatives generally included improvements to the existing roadway (e.g., widening, new traffic signals and turn lanes), creating one-way couplets, and various bypass alignments (new roadways). The panel also completed a map exercise to display predicted land use changes.

Mail surveys were used with different stakeholders to assess their opinion on which alignments would most affect different types of land use (agricultural, commercial, residential, etc.). Potential impacts are described using a series of maps. The various alternatives are then analyzed to show whether other resources would be affected; for various alternatives, wetlands and fragmentation of wildlife habitat could occur. Finally, the analysis provides a long list of tools that can be used to manage land development impacts.

Further information:
Project web site: www.dot.wisconsin.gov/projects/d3/us41oconto/index.htm

Indirect and Cumulative Impacts Analysis, USH 41 Oconto – Peshigo. Prepared by Wisconsin DOT, Division of Transportation Districts, District 3, 1998.

The Use of Expert Panels in Analyzing Transportation and Land Use Alternatives. Samuel N. Seskin, Katherine Gray Still, and John Boroski, Parsons Brinckerhoff Quade & Douglas, Inc. National Cooperative Highway Research Program, Project 8-36, Task 4. April, 2002. Appendix, including case study write-ups, available online at http://nepa.fhwa.dot.gov/ReNEPA/ReNepa.nsf/All+Documents/CCECF4D789DB510E85256CE6006142A0/$FILE/appendix_1.pdf

5.3 Ecosystem Level Approaches to Mitigation

5.3.1 Colorado: Shortgrass Prairie Initiative

CDOT's Shortgrass Prairie Initiative emerged from a shared vision that public transportation agencies can use funds for environmental mitigation more effectively while making a significant contribution to recovery of declining ecosystems. Many native species that inhabit North America's imperiled shortgrass prairie ecosystem are currently listed as threatened, endangered, proposed, or candidate species under the Federal Endangered Species Act (ESA). This initiative seeks to conserve from 15,000 to 50,000 acres of Colorado's shortgrass prairie habitat, via easements and management agreements in perpetuity, to mitigate for environmental impacts from proposed transportation projects over the next 20 years. The program is designed to satisfy current and future

ESA Section 7 consultation requirements for a range of listed and non-listed species, thus avoiding future project and process delays while protecting and enhancing the environment. By contributing to a multi-species recovery effort in an integrated and comprehensive manner, the partners will promote the recovery of listed species, help prevent listing of additional species, use public funds more efficiently, improve the project development process, and offset permanent habitat loss through large scale habitat protection.

5.3.2 North Carolina: Ecosystem Enhancement Program

The North Carolina Ecosystem Enhancement Program (EEP) was established in 2003 by a memorandum of agreement between the North Carolina Department of Environment and Natural Resources, the NC Department of Transportation and the Wilmington District of the US Army Corps of Engineers. NCDOT sponsored inter-agency meetings for two years to improve the Army Corps Section 404 permitting process, which resulted in the MOA. The EEP combines the North Carolina Wetlands Restoration Program and the NCDOT.122 to increase watershed restoration efficiency and cost-effectiveness.

The EPP also calls for compensatory mitigation for impacts affecting aquatic resources and the integration of this mitigation into broad wetlands restoration initiatives. An inter-agency team, made up of State and Federal agency representatives, was assembled to use the EPP to create a framework for assessing watershed planning and restoration projects in the State. This team was also responsible for the development of a methodology to designate certain areas as Targeted Local Watersheds (TLW), where planning and restoration activities are concentrated. The assets and problems of local watersheds are compared to determine which should become TLWs. A matrix compares the restoration needs and opportunities of each local watershed, and includes analysis of potential future impacts to determine where mitigation efforts should be concentrated.

5.3.3 Washington State: Watershed Mitigation Program

Washington State DOT first introduced the Watershed Mitigation Program in 2003 to identify mitigation opportunities and utilize an ecosystem-based mitigation process. The goal was to streamline the transportation permitting process, and improve State environmental quality. The program was developed after the enactment of the Environmental Permit Streamlining Act of 2001. The Washington DOT uses a ‘Watershed Characterization’ process to determine current conditions and possible mitigation measures, while including local watershed priorities and reducing overall mitigation costs. The methodology established in this program focuses mitigation projects on improving ‘core ecosystem processes.’ These processes include the flow of water, sediment and the location of large wood. This methodology strives to mitigate these core processes at an ‘ecosystem scale.’

The Watershed Mitigation Program is divided into three parts. WSDOT first performs the watershed characterization and assesses cumulative impacts. Then, specific project sites are analyzed, and lastly, mitigation alternatives are determined. Spatial data, including geographic information systems, are used to perform the characterization and assess

cumulative impacts. During the first step, current land uses and conditions assist the creation of spatial and temporal scales for impact and mitigation analyses. Datasets are developed of potential restoration sites that help to determine which resources are found in the extended assessment area. This data can then help to determine the potential impacts to resources, and plan the most effective mitigation options.

5.4 Other Examples

The following projects were mentioned during the interviews as good examples of either indirect or cumulative impacts analysis, but time limitations and/or the relative unavailability of the environmental documents did not allow to us investigate further:

- **Atlantic City International Airport, FEIS Sept. 2003**
- **Kahului Airport master plan, Maui County FEIS 1997**- example of an EIS with potentially significant cumulative impacts, because it was possible that flight passengers might inadvertently bring in invasive non-native species. FAA worked with NPS to develop mitigation measures such as in-flight videos to demonstrate to passengers the potential harm in bringing in non-native plants and animals.
- **I-26, North Carolina**
- **I-69, Minnesota –** potential impacts to fish and wildlife habitat; development of a corridor management plan.
- **Louisville Airport, EIS 1998**
- **Proposed Runway 5L/23R, New Overnight Express Air Cargo Sorting and Distribution Facility, FEIS Nov. 2001 –** example of a detailed indirect and cumulative impacts analysis.
- **South Orange County Infrastructure Improvement Project (SOCTIIP)** - example of extensive induced growth analysis.
- **State Route 167, Pierce County, Washington**
- **Tacoma Water Habitat Conservation EIS, 2001** - example of good cumulative impacts analysis, by analyzing impacts on 32 species, for a non-transportation project. Tacoma Water, a public water agency, for a Habitat Conservation Plan developed this EIS.

5.5 Selected Priority Projects (Not Profiled Above)

5.5.1 Kentucky: TransAmerica Corridor (Future I-66)

The proposed project is a 27-mile segment of the TransAmerica Corridor (Future I-66) between London and Somerset. The project was identified as an economic development initiative in Federal statute. A Draft EIS is underway and is slated for completion in summer 2005. The baseline research has indicated that there are no major cumulative impacts in the study area. FHWA has begun to look at indirect impacts, and the Draft EIS will contain more information and analyses.

Land-use impacts remain a major concern for planners. FHWA is planning to study the sprawl that might occur after the highway is built but has not yet decided how it will do

so. Because the surrounding communities are economically depressed, many citizens in the corridor hope that the road will spur growth and development,.

The area of potential effect was determined during the scoping process. Some members of the public and an advocacy group protested that the area's boundaries were too narrow, so FHWA widened it. A citizens' committee was formed to make recommendations concerning the location, effects, and mitigation of the proposed project. A subcommittee is looking specifically at the potential economic impacts of the project.

5.5.2 Minnesota/Wisconsin: St. Croix River Crossing Project

The St. Croix River, separating Wisconsin from Minnesota, is designated by the National Park Service (NPS) as a "wild and scenic river." As such, it is subject to a "no proliferation" policy on bridges: if a new bridge replaces an old one, the old one must be demolished. At Stillwater, MN, the St. Croix River is spanned by a historic lift bridge built in 1931, one of only two remaining in Minnesota and a local icon. The bridge requires either replacement or major rehabilitation for safety reasons, and growing vehicle use means that congestion is increasing.

Minnesota DOT (MnDOT) and Wisconsin DOT (WiDOT) proposed a replacement bridge, which was approved by NPS in 1995. An environmental advocacy group brought a lawsuit against the ROD, claiming that the environmental review process had not evaluated all the relevant impacts. As a result, NPS withdrew its approval, stating that preserving the wild and scenic character of the river required removing the lift bridge once the replacement was constructed. Historic preservation groups, who argued that the bridge should be retained for its historic and cultural value, opposed this decision. Due to the controversy and lack of permits, the project stalled in early 2001.

The U.S. Institute for Environmental Conflict Resolution, an independent Federal agency housed at the Morris Udall Foundation in Tucson, AZ, was asked in summer 2001 to help resolve the stakeholder conflicts. One early decision was to separate the process of identifying a new bridge alignment from the process of determining whether to preserve the historic bridge. The ten agencies involved (FHWA, NPS, Advisory Council on Historic Preservation, the City of Stillwater, and the Departments of Transportation, Natural Resources, and State Historic Preservation Officers of both States) agreed to re-start the process along the proposed lines. After a lengthy stakeholder involvement process, a Supplementary Draft EIS was issued in August 2004; the public comment period is open through October.

Only the land use chapter discusses indirect impacts on a quantitative basis; indirect impacts to other resources are referred to in passing or considered in the cumulative impacts chapter. Indirect impacts were assessed through reference to existing studies linking transportation improvements to development, a panel discussion with local planning officials, and an analysis of growth patterns based on a reverse scenario. Since local growth estimates assume a new bridge, the analysis looked at how growth patterns might change if the bridge is not built, based on regional travel accessibility. This

analysis showed that the area would probably not gain about 25,000 residents if a new bridge were not built, a decrease of 36 percent over projections. A spatial analysis shows that if a bridge is not built, more growth will take place on the Minnesota side and less growth will take place on the Wisconsin side, with the greatest redistributions taking place in the vicinity of the bridge itself.

The cumulative impacts chapter does not link specific impacts to the four build alternatives under consideration, but rather discusses them broadly. The geographic area for analysis includes five counties, and the time frame backwards extends to 1980 and forwards to 2025, dates for which historic information and projections were readily available. The chapter then summarizes the existing condition, summarizes potential impacts, identifies other projects that might affect the resource, and discusses the potential for cumulative impacts. The analysis was discussed and approved by a subset of the stakeholder group, which included seven State and Federal agencies and several citizens' groups.

The analysis lays out percentage of developed land and population by county, for the current year and projected in 2030. It then identifies and describes 11 State projects (in both States), nine county projects, 11 local projects, and four private projects. According to the analysis, cumulative impacts such as conversion of undeveloped land and intensification of already developed land due to growth pressure from greater transportation accessibility could occur unless local jurisdictions have land use controls in place. Some farmland (no acreage is quantified) could be lost to development pressure, although most prime farmland is protected. There would be no significant impacts to social resources or the regional economy. For most natural resources (air, noise, wetlands, water quality and quantity, aquatic resources, wildlife, parks/recreation, aesthetics) cumulative impacts are not anticipated due to either little effect or proposed mitigation measures in place (for example, stormwater management practices in effect would negate impacts on water quality and quantity).Vegetation may experience negative cumulative impacts due to development that removes trees. Predictions of impacts to archeological and cultural resources are mixed (the chapter includes a tables listing each resources individually and potential impacts under each alternative), and the report recommends revisiting the issue with the final determination and mitigation measures. All alternatives would have an adverse effect on the lift bridge.

5.5.3 Montana: US 93 Corridor

The US 93 corridor covers 283 miles in Montana from the Idaho border to the Canadian border. Of particular interest is the 56-mile segment from Evaro to Polson. All but one-half mile of that segment is located within the Flathead Indian Reservation. For that segment, the Montana DOT initially proposed upgrading the highway to an undivided four-lane highway. The Confederated Salish and Kootenai Tribes opposed the construction of a four-lane highway, in part because they believed it would accelerate non-tribal development within the reservation.

A ROD for the Evaro to Paulson segment was signed in 1996. The ROD designated the location of the highway but deferred construction until FHWA, Montana DOT, and the Tribes could agree on design features and mitigation measures. The 1996 EIS contained an analysis of indirect and cumulative impacts on wetlands.

In December 2000, the three governments signed a Memorandum of Agreement (MOA) detailing the highway design and specific mitigation measures. After the signing of the MOA, FHWA and Montana DOT re-evaluated the EIS and modified the ROD in 2001. FHWA and Montana DOT determined that the indirect and cumulative impacts on wetlands resulting from the MOA lane configuration would be similar to the impacts described in the 1996 EIS.

Because Native Americans assign cultural and religious meaning to their surroundings, the boundary for the analysis of indirect and cumulative impacts was defined as the viewshed between the two mountain ranges on either side of the highway.

5.5.4 Ohio/Kentucky: Ohio River Bridges

For this project, nine different bridge locations spanning the Ohio River between Louisville, KY and southern Indiana were considered, and two will be built. The project also includes reconstruction of a major highway interchange. The Draft EIS was released in November 2001, with the Final EIS in April 2003. The project was selected as a priority project for environmental streamlining.

Two important potential issues for the ICIC analysis were identified: induced growth and loss of critical habitat for threatened and endangered species. The Federal, State, and local agencies involved with the project held a day-long meeting in April 2001 to come to agreement on the issues and methodology. The indirect and cumulative impacts analysis for the bridges project followed a seven-step process based on the 11-step CEQ guidance:

1. Identify resources affected. This baseline data was grouped into three categories: land use and community resources, historic and cultural resources, and ecological resources.

2. Identify spatial boundaries. Considerations included the area of traffic influence, community boundaries, and watersheds. Different analysis boundaries were selected for each resource group. Defining the boundaries was an iterative process as information was collected and analyzed.

3. Identify temporal boundaries. Time frames for analysis were based on available historic information, such as photographs of previous land use patterns, and ecological information from the inception of NEPA in the 1970s. A horizon of 2025 was used, based on MPO population and employment forecasts.

4. Identify other major actions affecting resources. The project team developed a list of 18 major projects either ongoing or expected to occur in the near future, divided into four categories: economic development (commercial and residential development),

parks/recreation projects, water or energy-related projects, and transportation infrastructure projects.

5. Characterize resources and establish baseline conditions and trends. The project team developed six baseline reports, based on field studies and seasonal surveys, interviews with local officials, a Section 106 consultation process for cultural resources, and existing data such as historic photographs and air quality trends. Flow charts captured case and effect.

6. Determine Impacts and Environmental Consequences. The analysis of indirect and cumulative impacts included a literature review to determine estimates of land use change, site analysis to show development patterns and future growth, case study analysis to compare the project to other highway and bridge projects, an expert panel to gain insights from local planning officials and real estate developers, and GIS and overlay mapping. Impacts were summarized in a 16-page table.

7. Address Mitigation/Monitoring Opportunities and Document Results. The mitigation measures adopted include context-sensitive design, limitations on tree cutting, best management practices to minimize stormwater runoff, control measures to reduce air pollution during construction, noise barriers, construction and bridge design techniques to minimize disturbances to rivers and streams, and site specific mitigation for a number of historic properties.

5.5.5 Texas: I-69 Corridor

I-69 is a proposed 1,000-mile multimodal corridor from northeast Texas to the Texas-Mexico border near Laredo and the Lower Rio Grande Valley. The NEPA review is being conducted as a tiered process. The Tier 1 Record of Decision will provide authority for Texas DOT to preserve a corridor composed of three to 13 segments of independent utility. The Tier 1 Notice of Intent was published in January 2004, and the expected completion date for Tier 1 Draft EIS is spring 2005.

The Draft EIS is still in the early stages of development. The consultants for I-69 have been asked to present their plan for analyzing indirect and cumulative impacts for the Tier 1 EIS. FHWA has not decided how the analysis of indirect and cumulative impacts will differ between Tier 1 and Tier 2.

FHWA also has not decided how it will determine the existing conditions of the potentially impacted resources in the tiered NEPA process it is using. The most likely option is to assemble an expert panel that includes representatives from all of the relevant resource agencies. This panel would assess the current state of resources within the study area and develop methodologies for analyzing the potential impacts of the project.

Induced growth is likely to be an issue of concern. The project is multimodal, so there will be locations for freight transfer facilities, train stations, and connections to ports. These facilities will spur growth, as will highway interchanges.

5.5.6 Vermont: Chittenden County Circumferential Highway

This project is a 16-mile, limited-access highway that would serve as a bypass around Burlington. An EIS was completed in 1986, and a four-mile section of the highway was built in 1993. In 2002, FHWA prepared an environmental assessment(EA)/reevaluation for a portion of the project to identify changes in project-induced impacts since completion of the EIS. This reevaluation was revised twice in 2003, in part to address EPA's concerns about the induced growth likely to result from the project.

The final revised EA/reevaluation contained three analyses of induced growth. The first analysis used the Chittenden County MPO's Integrated Transportation and Land Use Model. The second analysis used the Statewide Transportation Demand Forecast Model to consider how the project would affect traffic patterns throughout the State. The third analysis examined the validity of the population and traffic projections from the 1986 EIS.

The project area was defined as Chittenden County. This decision was based on the assessment that the project would affect accessibility to most areas of the county and that few areas outside the county would experience improved accessibility. A study of travel times was used to help define the project area.

The 1986 Final EIS and the revised EA/reevaluation both determined that the project would not, in and of itself, materially affect the amount of growth or development within Chittenden County. However, the two documents determined that the project would influence the distribution of the county's existing growth potential. In October 2003, a group of plaintiffs filed a lawsuit alleging violations of NEPA and Section 4(f) of the DOT Act. The alleged violations included failure to adequately analyze the indirect and cumulative impacts of the project.

In May 2004, the U.S. District Court for the District of Vermont issued a ruling with the following findings:

- Neither the 1986 Final EIS nor the 2003 revised EA/reevaluation adequately discussed the potential cumulative impact of the planned highway improvements in the region or of other major development projects in the area;

- The 1986 Final EIS did not support its assumptions about indirect impacts with any analysis and did not discuss any mitigation measures;

- The 1986 Final EIS failed to address indirect and cumulative impacts on agricultural resources;

- A 1997 study of the project's indirect impacts on agricultural lands does not satisfy NEPA, even though it was eventually included as an appendix to the final revised EA/reevaluation;

- The 1986 Final EIS did not discuss the potential detrimental impact on areas from which population and resources would be drained; and

- The 1986 Final EIS did not discuss any development pressure on towns not directly adjacent to the project.

Based on these and other findings, the Court concluded that the environmental documentation for construction of further segments of the project were legally inadequate. In addition to other conditions, the Court ruled that construction could not proceed without NEPA-compliant documentation of indirect and cumulative impacts.

6. Recommended Next Steps

6.1 Products of this Baseline Effort

This baseline effort was conducted in order to inform both the Working Group and Task Force about the state of the practice and opportunities for improving the project development process for transportation projects. Many of the products of this effort will be useful to practitioners in advancing the state of practice. These include:

- The summary of legal requirements, as described in Section 2 of this report and Appendix A.
- The summary of case law, as described in Section 2 of this report and Appendix B.
- The annotated bibliography of guidance documents contained in Appendix C.
- The compilation of relevant training programs described in Section 3 and in Appendix D.
- The case studies of notable practices contained in Section 5 of this report.

The Work Group recommends that the Task Force conduct outreach and information sharing to make these materials available to staff in State transportation agencies, metropolitan planning organizations, and Federal agencies involved in the review of environmental documents. Outreach could include:

- Posting to the web site of the EO 13274 Task Force;
- Making these materials available through individual Federal agency web sites that address NEPA-related issues, such as the Re:NEPA exchange managed by Federal Highway Administration;
- Outreach to organizations such as the American Association of State Highway and Transportation Officials (AASHTO) and the American Public Transportation Association (APTA); and/or
- Holding a teleconference, netconference, or workshop(s) in individual regions to make staff at the Federal, State, and local levels more aware of these resources and on-going efforts of the Task Force to tackle these issues.

6.2 Further Efforts

The baseline information compiled in this report clearly emphasizes the need for Federal leadership in promoting greater understanding of the requirements for indirect and cumulative impacts assessment (under NEPA and other laws and regulations), available analysis methodologies, and coordination approaches. The Work Group recommends the following next steps, grouped into three general categories:

1. Outreach and Information Sharing

Information sharing is important in order to improve understanding of indirect and cumulative impact concepts, requirements, and assessment methodologies, and to raise

the profile of these issues. In addition to distributing baseline materials collected by the Work Group, recommended next steps are to:

- **Implement a coordinated communication effort from FHWA, FTA, and FAA Headquarters to the field offices.** A coordinated communication effort would help provide clear direction and consistency. Because the state of practice is at such as transition stage, ranging from very limited analyses to more comprehensive evaluations, the Federal transportation agency staff can play a key role in helping to ensure that State DOTs, transit agencies, and other project sponsors meet a minimum standard for analysis. Through their own review of environmental documents, the Federal agencies can help to ensure that documents are sufficient.
- **Provide recognition for exemplary practices, as a means to motivate and draw attention to these successful efforts.** The Federal agencies (i.e., FHWA, FTA, FAA, CEQ, or others) should provide recognition for exemplary efforts in regard to analysis, documentation, and mitigation for indirect and cumulative impacts, either by incorporating these into existing recognition efforts (e.g., FHWA's Environmental Excellence Awards), or development of a new program to make exemplary work available as a training tool.

2. Practitioner-Oriented Guidance and Training

In addition to activities to raise the profile of indirect and cumulative impacts assessment within transportation agencies, more detailed practitioner-oriented guidance and training are needed in order to advance the state of practice in terms of analysis and documentation of indirect and cumulative impacts. Recommended next steps are to:

- **Develop a compilation of "best practice" case studies appropriate for use in training programs, building off the case studies in this report.** A compilation of detailed case studies would be helpful to better communicate best practices and effective procedures. The case studies should address not only highway projects but also airport and transit projects, and be organized in a way that the case studies can be used for discussion in training programs at the national and levels.
- **Develop more detailed national-level guidance for transportation projects, including delineation of steps for conducting and documenting the analysis.** Although the CEQ guidance on cumulative impacts and FHWA interim guidance are available, transportation practitioners generally felt that these guidance documents are somewhat abstract, and that there is a need for more specific and practical guidance that pertains to transportation projects. Several State DOTs have developed their own guidance documents on indirect and cumulative impacts, and these could serve as a model for the level of detailed desired. The guidance ideally should map out specific steps in the analysis, samples of available tools, and provide checklists so that project sponsors and their consultants are sure to have considered important issues and documented steps taken.
- **Develop and implement a series of workshops to reach federal agency field staff, project sponsors, and consultants.** Much of the existing national-level training involves multi-day courses that focus on cumulative impacts. These courses may not

be accessible to a wide audience and do not address the indirect impact issues that are related to transportation. Development of a series of short workshops focused on indirect and cumulative impacts analysis for transportation projects would be helpful to: 1) raise awareness of basic concepts and emphasize the importance in streamlining the environmental review process and avoiding lawsuits over projects, and 2) supplement the existing training programs and encourage greater participation in those programs.

3. Development of New Approaches for Consensus Building

In order to develop a more streamlined process that improves environmental outcomes, new approaches for consensus building among Federal agencies and project sponsors are needed. Recommended next steps are to:

- **Develop a coordination "model" for indirect and cumulative impacts analysis.** Federal agencies and project sponsors need guidance on how to better coordinate in order to avoid disagreements that can lead to delays in project development. This guidance would likely focus on the scoping phase, and include information about coordination throughout the project development process. This coordination model for transportation projects would span applicable statutory requirements and would help to focus consultation and agreement on the proper boundaries of analysis, level of detail, how to address data limitation, and mitigation.
- **Develop approaches for integrating indirect and cumulative impacts analysis into the planning process.** As noted above, integration of indirect and cumulative impacts into planning processes could help to improve decisionmaking and facilitate better analyses of cumulative impacts. Additional guidance is needed on how to address these issues as the planning stage, and link that with project development. This activity should be coordinated with the Integrated Planning Work Group.
- **Identify methods to address indirect and cumulative impacts in Tiered environmental documents.** Approaches for addressing indirect and cumulative impacts more effectively in tiered environmental documents should be promoted.
- **Facilitate interagency agreements at the headquarters and field level on mitigation for indirect and cumulative impacts.** There is a need to facilitate interagency consensus at the headquarters and field levels on the appropriateness of mitigation, given different circumstances surrounding indirect and cumulative impacts. These agreements would help to ensure that field staff are better able to come to agreement on whether or not to include mitigation and what types of mitigation for indirect or cumulative impacts, based on a shared understanding of appropriate conditions.

Appendix A:
Laws and Implementing Regulations, and Executive Orders

			Indirect and Cumulative Impacts
General Laws and Regulations			
National Environmental Policy Act: 42 U.S.C. 4321-4335 40 CFR Part 1500 23 CFR 771 49 CFR 520	CEQ	NEPA declares it a national policy to encourage productive and enjoyable harmony between man and the environment and promote efforts to better understand and prevent damage to ecological systems and natural resources important to the nation. Agencies are required to prepare a detailed environmental impact statement for any major Federal action significantly affecting the environment. The Act also establishes the Council on Environmental Quality to review government policies and programs for conformity with NEPA.	"Cumulative impact" is the impact on the environment that 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. (Sec. 1508.7) Indirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems. (Sec. 1508.8) The following parts of the CEQ regulations address mitigation measures: Sec 1502.14(f) - Requires inclusion of appropriate mitigation measures not already included in the proposed action or alternatives. Sec 1502.16(h) – It shall include discussions of… (h) Means to mitigate adverse environmental impacts. Sec. 1503.3(d) - When a cooperating agency with jurisdiction by law objects to or expresses reservations about the proposal on grounds of environmental impacts, the agency expressing the objection or reservation shall specify the mitigation measures it considers necessary to allow the agency to grant or approve applicable permit, license, or related requirements or concurrences. Sec. 1505.2(c) - State whether all practicable means to avoid

			Indirect and Cumulative Impacts
			or minimize environmental harm from the alternative selected have been adopted, and if not, why they were not. A monitoring and enforcement program shall be adopted and summarized where applicable for any mitigation. Sec. 1505.3 - Mitigation (Sec. 1505.2(c)) and other conditions established in the environmental impact statement or during its review and committed as part of the decision shall be implemented by the lead agency or other appropriate consenting agency. Sec. 1508.20 – Provides the definition of Mitigation. Note that there is no discussion of mitigation that is specific to direct, indirect, or cumulative impacts.
Uniform Relocation Assistance and Real Property Acquisition Act: 42 U.S.C. 4601 et seq. 49 CFR 24	DOT	Establishes uniform land acquisition policies for all Federal agencies, and establishes requirements for the uniform and equitable treatment of persons displaced from their homes, businesses or farms by Federal or Federally assisted programs, including land acquisition.	No specific mention of indirect or cumulative impacts or the development of mitigation measures.
Executive Order 12898 – Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations	EPA, All Agencies	Requires each Federal agency to make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States.	Addresses cumulative impacts. Sec. 3-3. Research, Data Collection, and Analysis, paragraph (b) states: Environmental human health analyses, whenever practicable and appropriate, shall identify multiple and cumulative exposures.

			Indirect and Cumulative Impacts
Title VI of the Civil Rights Act: 42 U.S.C. § 2000d et seq.	All Agencies	Title VI of the Act prohibits discrimination on the basis of race, color, and national origin in programs and activities receiving Federal financial assistance. Recipient/grantors are required to ensure nondiscrimination in the application or renewal of grants in accordance with applicable civil rights laws.	No specific mention of indirect or cumulative impacts or the development of mitigation measures.
Transportation Laws and Regulations			
Transportation Equity Act for the 21st Century of 1998 (TEA-21) and Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) 23 U.S.C. 103(i)(13) 23 U.S.C. 133(b)(11) 16 U.S.C. 1261 23 CFR 771 23 CFR 777: Mitigation of Impacts to Wetlands and Natural Habitat	DOT	TEA-21 builds on the initiatives established in the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), which was the previous major authorizing legislation for surface transportation. This new Act combines the continuation and improvement of current programs with new initiatives to meet the challenges of improving safety as traffic continues to increase at record levels, protecting and enhancing communities and the natural environment as we provide transportation, and advancing America's economic growth and competitiveness domestically and internationally through efficient and flexible transportation. The National Intermodal Transportation System shall: Consist of all forms of transportation in a unified, interconnected manner, including the transportation systems of the future, to reduce energy consumption and air pollution while promoting economic development and supporting the Nation's preeminent position in international commerce. Include a National Highway System which consists of the National System of Interstate and Defense Highways and those principal arterial roads which are essential for interstate and regional commerce and travel, national defense, intermodal transfer facilities, and international commerce and border crossings [illegible] t improvements in public	No direct relation to cumulative or indirect impacts; however presents mitigation strategy. In accordance with all applicable Federal law and regulations, participation in wetlands mitigation efforts related to projects funded under this title, which may include participation in wetlands mitigation banks; contributions to statewide and regional efforts to conserve, restore, enhance and create wetlands; and development of statewide and regional wetlands conservation and mitigation plans, including any such banks, efforts, and plans authorized pursuant to the Water Resources Development Act of 1990 (including crediting provisions). Contributions to such mitigation efforts may take place concurrent with or in advance of project construction. Contributions toward these efforts may occur in advance of project construction only if such efforts are consistent with all applicable requirements of Federal law and regulations and State transportation planning processes. The Secretary of the Interior must approve any conversion of property acquired or developed with assistance under this act to other than public, outdoor recreation use.

			Indirect and Cumulative Impacts
		transportation necessary to achieve national goals for improved air quality, energy conservation, international competitiveness, and mobility for elderly persons, persons with disabilities, and economically disadvantaged persons in urban and rural areas of the country. Provide improved access to ports and airports, the Nation's link to world commerce. Give special emphasis to the contributions of the transportation sector to increased productivity growth. Social benefits must be considered with particular attention to the external benefits of reduced air pollution, reduced traffic congestion and other aspects of the quality of life in the United States. Must be operated and maintained with insistent attention to the concepts of innovation, competition, energy efficiency, productivity, growth, and accountability. Practices that resulted in the lengthy and overly costly construction of the Interstate and Defense Highway System must be streamlined. Be adapted to ``intelligent vehicles", ``magnetic levitation systems", and other new technologies wherever feasible and economical, with benefit cost estimates given special emphasis concerning safety considerations and techniques for cost allocation. Calls out Wetlands Mitigation Banks: Sec. 1006-1007	
Transportation Act (Section 4(f)): 49 U.S.C. 303 23 CFR 771.135	DOT	The Section 4(f) legislation provides protection for publicly owned parks, recreation areas, historic sites (regardless of ownership), wildlife and/or waterfowl refuges from conversion to a transportation use. The Federal Highway Administration (FHWA) may not approve the use of land from a significant publicly owned park, recreation area, or wildlife and waterfowl refuge, or any significant historic site unless a determination is made that: There is no feasible and prudent alternative to the use of land from the property; and	Requires consideration of the environmental impact of highways on parks, historic sites, recreation, and wildlife areas. Indirect impacts are described as “constructive use and proximity impacts.” (2) Constructive use occurs when the transportation project does not incorporate land from a section 4(f) resource, but the project's proximity impacts are so severe that the protected activities, features, or attributes that

			Indirect and Cumulative Impacts
		The action includes all possible planning to minimize harm to the property resulting from such use (23 CFR 771.135).	qualify a resource for protection under section 4(f) are substantially impaired. Substantial impairment occurs only when the protected activities, features, or attributes of the resource are substantially diminished. (Sec. 771.135(p)(iii)) A series of constructive uses are described in the regulation (noise, aesthetics, restricted access, vibration, and ecology). No specific mention of cumulative impacts, but an EA or EIS should consider a project's effects to a 4(f) property combined with the effects of other planned projects.
Surface Transportation and Uniform Relocation Assistance Act of 1987: 23 U.S.C. 144(o)	DOT	Established a historic bridge program to encourage the inventory, retention, rehabilitation, adaptive reuse, and future study of historic bridges.	No specific mention of indirect or cumulative impacts or the development of mitigation measures.
Wildflowers: 23 U.S.C. 319	DOT	Requires the planting of native wildflowers as part of highway landscaping projects.	No specific mention of indirect or cumulative impacts or the development of mitigation measures.
Highway Beautification Act: 23 U.S.C. 131	DOT	Provides control of outdoor advertising and junkyards to help preserve natural beauty.	No specific mention of indirect or cumulative impacts or the development of mitigation measures.
Air, Land, and Water Laws and Regulations			
Clean Air Act (as amended), Transportation Conformity Rule: 23 U.S.C. 109(j) 42 U.S.C. 7521 (a) Sanctions: 42 U.S.C. 7509, Sec. 179	EPA	The primary objective of the Clean Air Act is to establish Federal standards for various pollutants from both stationary and mobile sources and to provide for the regulation of polluting emissions via State Implementation Plans. In addition, the amendments are designed to prevent significant deterioration in certain areas where air quality exceeds national standards, and to provide for improved air quality in areas that do not meet Federal standards ("nonattainment"	No specific mention of indirect or cumulative impacts. Provides for EPA's review and comment on the environmental impact of Federal projects , focusing on the adequacy of the EIS and the impact evaluation "from the standpoint of public health or welfare or environmental quality."

			Indirect and Cumulative Impacts
(b) sec. 110 (m) (P.L. 101-549) 40 CFR 93		areas). Section 309 of the CAA authorizes EPA to review and comments on both the adequacy of the analysis and the environmental impacts of the proposed action itself in accordance with NEPA, and to make those reviews public. If the proposing agency (the "lead" agency) does not make sufficient revisions and the project remains environmentally unsatisfactory, EPA may refer the matter to the President's Council on Environmental Quality for mediation.	
Wilderness Act: 16 U.S.C. 1131-1136 36 CFR 293: Wilderness--primitive areas 43 CFR 19; Wilderness Preservation, 43 CFR 8560: Management of Designated Wilderness Areas 50 CFR 35: Wilderness preservation and management	DOI and USDA	DOI and USDA to review every roadless area of 5,000 or more acres and every roadless island (regardless of size) and determine its suitability and establish restrictions on activities that can be undertaken on a designated area.	No specific mention of indirect or cumulative impacts or the development of mitigation measures.
Wild and Scenic Rivers Act: 16 U.S.C. 1271-1287 36 CFR 297: Wild and Scenic Rivers	DOI and USDA	Establishment of a National Wild and Scenic Rivers System for the protection of rivers with important scenic, recreational, fish and wildlife, and other values. Rivers are classified as wild, scenic or recreational. The Act designates specific rivers for inclusion and prescribes the methods and standards by which additional rivers may be added. The Act contains procedures and limitations for control of lands in Federally administered components of the System and for disposition of	No specific mention of indirect or cumulative impacts or the development of mitigation measures. The Act stipulates that no U.S. department or agency may assist by loan, grant, license or otherwise in the construction of a water resources project that would have a direct and adverse effect on the values for which a river is designated as an actual or potential System component. This does not

			Indirect and Cumulative Impacts
		lands and minerals under Federal ownership. Hunting and fishing are permitted in components of the System under applicable Federal and State laws.	preclude licensing or assistance to developments below or above an actual or potential wild, scenic or recreational river area or on a stream tributary which will not invade the area or diminish the scenic, recreational and fish and wildlife values of the area. § 1278. Based on geographic location, the proposed action could result in an indirect or cumulative impact on the protected resource.
Land and Water Conservation Fund Act (Section 6(f)): 16 U.S.C. 460 -4 TO -11	DOI	This Act regulates admission and special recreation user fees at certain recreational areas and establishes a fund to subsidize State and Federal acquisition of lands and waters for recreational and conservation purposes. The Secretary of the Interior must approve any conversion of property acquired or developed with assistance under this act to other than public, outdoor recreation use.	No specific mention of indirect or cumulative impacts or the development of mitigation measures.
National Forest Management Act of 1976: 16 U.S.C. §§ 472a, 521b, 1600, 1611–1614 (1994 & Supp. III 1997) (amending Forest and Rangeland Renewable Resources Planning Act of 1974, Pub. L. No. 93-378, 88 Stat. 476))	USDA – Forest Service	This Act reorganized, expanded and otherwise amended the Forest and Rangeland Renewable Resources Planning Act of 1974, which called for the management of renewable resources on national forest lands. The National Forest Management Act (NFMA) requires the Secretary of Agriculture to assess forest lands, develop a management program based on multiple-use, sustained-yield principles, and implement a resource management plan for each unit of the national forest system. It is the primary statute governing the administration of national forests. NFMA places obligations upon the Forest Service to manage Federal lands in a sustainable manner and imposes procedural requirements to ensure public participation in the management process.	No specific mention of indirect or cumulative impacts or the development of mitigation measures. The final rule will allow the steps in the planning framework to be coordinated with the scoping requirements under the Forest Service NEPA procedures when appropriate. This will reduce duplication in the preparation of environmental documents associated with management of the National Forest System.

			Indirect and Cumulative Impacts
Executive Order 11990: Protection of Wetlands 23 CFR 777 DOT Order 5660.1A	All Agencies	Directs agencies in furtherance of the National Environmental Policy Act of 1969, in order to avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative.	EO directs agencies to improve and coordinate Federal plans, functions, programs and resources to the end that the Nation may attain the widest range of beneficial uses of the environment without degradation and risk to health or safety, each agency, to the extent permitted by law, shall avoid undertaking or providing assistance for new construction located in wetlands unless the head of the agency finds (1) that there is no practicable alternative to such construction, and (2) that the proposed action includes all practicable measures to minimize harm to wetlands which may result from such use. In making this finding the head of the agency may take into account economic, environmental and other pertinent factors. Each agency shall also provide opportunity for early public review of any plans or proposals for new construction in wetlands, in accordance with Section 2(b) of Executive Order No. 11514, including the development of procedures to accomplish this objective for Federal actions whose impact is not significant enough to require the preparation of an environmental impact statement under Section 102(2)(C) of NEPA.
Emergency Wetlands Resources Act of 1986: 16 U.S.C. 3921; 3931	DOI	Promote wetlands conservation for the public benefit and to help fulfill international obligations in various migratory bird treaties and conventions. Authorizes the purchase of wetlands from Land and Water Conservation Fund monies, and requires the Secretary of the Interior to establish a National Wetlands Priority Conservation Plan, requires the States to include wetlands in their Comprehensive Outdoor Recreation Plans, and transfers funds from import duties on arms and ammunition to the Migratory Bird Conservation Fund.	No specific mention of indirect or cumulative impacts or the development of mitigation measures.

			Indirect and Cumulative Impacts
National Trails System Act: 16 U.S.C. 1241-1249 36 CFR 251 43 CFR 8350	DOI USDA	Creates a national system of trails of recreation and preservation of outdoor areas. The system consists of national recreation trails, national scenic trails, national historic trails and connecting or side trails. National Recreation Trails may be established by the Secretaries of Interior or Agriculture on land wholly or partly within their jurisdiction, with the consent of the involved State(s), and other land managing agencies, if any. National Scenic and National Historic Trails may only be designated by an Act of Congress.	No specific mention of indirect or cumulative impacts or the development of mitigation measures. Based on geographic location, the proposed action could result in an indirect or cumulative impact on the protected resource.
Rivers and Harbors Act of 1899: 33 U.S.C. 401 23 CFR 650, Subparts D & H 33 CFR 114-115	USACE, State, FWS, USCG, EPA	The Act prohibits the construction of any bridge, dam, dike, or causeway over or in navigable waterways of the U.S. without Congressional approval. Administration of section 9 has been delegated to the Coast Guard. Structures authorized by State legislatures may be built if the affected navigable waters are completely within one State, provided the plan is first approved by the Chief of Engineers and the Secretary of the Army. The Act also prohibits the building of wharfs, piers, jetties, and other structures without approval. The Fish and Wildlife Coordination Act provides authority for the U.S. Fish and Wildlife Service to review and comment on the effects of Corps of Engineers activities on fish and wildlife.	No specific mention of indirect or cumulative impacts or the development of mitigation measures.
Federal Water Pollution Control Act (1972), as amended by the Clean Water Act (1977 & 1987): 33 U.S.C. 1251-1376 23 CFR 650 Subpart B, 771	USACE, EPA, State	The Clean Water Act consists of two major parts, one being the provisions which authorize Federal financial assistance for municipal sewage treatment plant construction and the second is the regulatory requirements that apply to industrial and municipal dischargers and overall water quality management. The second provision, overall water quality management, includes the non-point source discharge elimination system (NPDES) program Section 401 and 402, ocean discharges Section 403, the total maximum daily load program (TMDL) Section 303 and 304, and control of dredge or	Portions of the CWA reference indirect and cumulative impacts and the development of mitigation measures. The following sections may address some indirect or cumulative impacts - 401 Water Quality Standards (State run) 402 NPDES – runoff from construction sites greater than 5 acres Section 303(d) requires States, territories, and authorized tribes are required to develop lists of impaired waters. These impaired waters do not meet water quality standards that

			Indirect and Cumulative Impacts
33 CFR 209, 320-323, 325, 328, 329 40 CFR 121-125, 129-131, 133, 135-136, 230-231 DOT Order 5660.1A		fill material into waters of the U.S. (wetlands) Section 404.	states, territories, and authorized tribes have set for them, even after point sources of pollution have installed the minimum required levels of pollution control technology. The law requires that these jurisdictions establish priority rankings for waters on the lists and develop TMDLs for these waters. Sect. 404(b)(1) Guidelines require analysis of/mitigation for secondary (indirect) and cumulative impacts
Executive Order 11988: Floodplain Management, as amended by Executive Order 12148 23 CFR 650, Subpart A 23 CFR 771 DOT Order 5650.2	All Agencies	Directs agencies, in furtherance of the National Environmental Policy, the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973, in order to avoid to the extent possible the long and short term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative.	Each agency shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities for providing Federally undertaken, financed, or assisted construction and improvements. Based on geographic location, the proposed action could result in an indirect or cumulative impact on the protected resource.
National Flood Insurance Act: (P.L. 90-448) Flood Disaster Protection Act: (P.L. 93-234): 42 U.S.C. 4001-4128 23 CFR 650, Subpart A 23 CFR 771 44 CFR 59-62, 64-68, 70-71, 75-77	FEMA	The National Flood Insurance Act provides restrictions on new development in designated floodways, a requirement that new structures in the 100-year flood zone be elevated to or above the 100-year flood level (known as base flood elevation, or BFE), and a requirement that subdivisions are designed to minimize exposure to flood hazards. For high-hazard coastal zones ("velocity" zones, or "v" zones), additional standards are imposed, including the requirement that buildings be elevated on pilings, that all new development be landward of mean high water, that the BFE include potential wave heights, and that new development not damage dunes or dune vegetation.	No specific mention of indirect or cumulative impacts; provides restrictions on development within flood zones

			Indirect and Cumulative Impacts
DOT Order 5650.2		The Flood Disaster Protection Act calls for the Identification and Mapping of Special Hazard Areas (Flood Maps).	
Marine Protection Research and Sanctuaries Act: 33 U.S.C. 1401-1445 33 CFR 320, 330 40 CFR 220-225, 227-228, 230-231	NOAA, EPA	The Act authorizes the Secretary of Commerce, with significant public input, to designate and manage national marine sanctuaries based on specific standards. It provides for supervision by the Secretary over any permitted private or Federal action that is likely to destroy or injure a sanctuary resource, and requires periodic evaluation of implementation of management plans and goals for each sanctuary. The Act also specifies prohibited activities, penalties and enforcement. The Act provides authority for comprehensive and coordinated conservation and management of these marine areas in a manner which complements existing regulatory authorities; facilitate public and private uses of these marine area resources to the extent compatible with resource protection; develop and implement coordinated protection and management plans with appropriate Federal agencies, State and local governments, Native American tribes and organizations, international organizations and other public and private interests; create models of and incentives for conservation and management of these areas. The Act prohibits transporting any material from the U.S. for the purpose of dumping it into ocean waters, or dumping any material into ocean waters, except as authorized by permit. The Act sets controls on materials and sites for dumping, and requires fees and compliance with agreements for alternative waste management and disposal.	No specific mention of indirect or cumulative impacts or the development of mitigation measures. Based on geographic location, the proposed action could result in an indirect or cumulative impact on the protected resource.

			Indirect and Cumulative Impacts
Safe Drinking Water Act: 42 U.S.C.§ 300f et seq., 6939b 15 U.S.C. § 1261 et seq. 40 CFR 141-143	EPA	The Act, establishes a Federal program to monitor and increase the safety of the nation's drinking water supply. The SDWA authorizes the U.S. Environmental Protection Agency (EPA) to set and implement health-based standards to protect against both naturally occurring and man-made contaminants in drinking water. The EPA is also responsible for assessing and protecting drinking water sources; protecting wells and collection systems; making sure water is treated by qualified operators; ensuring the integrity of distribution systems; and making information available to the public on the quality of their drinking water.	Does not specifically address indirect or cumulative impacts; rather, it specifies that adverse effects would be addressed through consultation and/or a permit process.
Water Bank Act: 16 U.S.C. 1301-1311 7 CFR 752	USDA	This Act promotes the preservation of wetlands by authorizing the Secretary of Agriculture to enter into land-restriction agreements with owners and operators in return for annual Federal payments. The Secretary has authority to enter into ten-year renewable agreements with landowners and operators in important migratory waterfowl nesting and breeding areas for the conservation of water on farm, ranch and other wetlands identified in a conservation plan. This plan must be developed in cooperation with the local soil and water conservation district under regulations the Secretary may enact.	No specific mention of indirect or cumulative impacts or the development of mitigation measures.
Coastal Zone Management Act of 1972: 16 U.S.C. 145 et seq. 15 CFR 923, 926, 930 23 CFR 771	NOAA	The Act establishes an extensive Federal grant program within the Department of Commerce to encourage coastal States to develop and implement coastal zone management programs. The coastal zone programs must include a coastal nonpoint pollution control program. Federal activities that affect State coastal zones must be consistent to the maximum extent practicable with enforceable policies of approved State programs. The Act also establishes a national estuarine research reserve system.	No specific mention of indirect or cumulative impacts or the development of mitigation measures.

			Indirect and Cumulative Impacts
		Congress declared that it is the national policy to protect, develop and enhance coastal zone resources, and to encourage and assist the states with development and implementation of management programs for coastal areas. These programs should provide for: protection of natural resources; management of coastal development to minimize the loss of life and property caused by improper development and destruction of natural protective features; management of coastal development to improve, safeguard and restore the quality of coastal waters, protect natural resources and protect existing uses of waters; assistance in redevelopment and preservation of urban waterfronts and historic and cultural coastal features; coordination of procedures to ensure expedited governmental decision making; consultation and coordination with affected Federal agencies; opportunities for public and local government participation; assistance to support planning, conservation and management for living marine resources, including siting of pollution control and aquaculture facilities within the coastal zone; study and development of plans for addressing the adverse effects upon the coastal zone of land subsidence and sea level rise. It is also the national policy to: encourage the preparation of special area management plans; encourage widespread participation, cooperation and coordination.	
Coastal Barrier Resources Act and Great Lakes Coastal Barrier Act of 1988: 16 U.S.C. 3501-3510 42 U.S.C. 4028	DOI	The Act protects undeveloped coastal barriers and related areas by prohibiting direct or indirect Federal funding of various projects in these areas that might support development. Limited exceptions are allowed, such as funding for fish and wildlife research. The purpose of the Act is to minimize the loss of human life	No specific mention of indirect or cumulative impacts or the development of mitigation measures.

			Indirect and Cumulative Impacts
13 CFR 116 Subparts D, E 44 CFR 71, 205 Subpart N		wasteful expenditure of Federal funds, and damage to fish, wildlife and other natural resources of the coastal barriers by: restricting future Federal financial assistance for development of these areas; establishing a Coastal Barrier Resources System; considering ways in which long-term conservation of these resources may be achieved.	
Farmland Protection Policy Act of 1981: 7 U.S.C. 4201-4209 7 CFR 658	NRCS	Minimize impacts on farmland and maximize compatibility with State and local farmland programs and policies.	Projects are subject to FPPA requirements if they may irreversibly convert farmland to nonagricultural use and are completed by a Federal agency or with assistance from a Federal agency.
Wildlife Laws and Regulations			
Bald Eagle Protection Act of 1940: 16 U.S.C. 668-668d, 54 Stat. 250	DOI	This law provides for the protection of the bald eagle (the national emblem) and the golden eagle by prohibiting, except under certain specified conditions, the taking, possession and commerce of such birds. The 1972 amendments increased penalties for violating provisions of the Act or regulations issued pursuant thereto and strengthened other enforcement measures. Rewards are provided for information leading to arrest and conviction for violation of the Act.	No specific mention of indirect or cumulative impacts or the development of mitigation measures.
Endangered Species Act of 1973: 16 U.S.C. 1531-1543 7 CFR 355 50 CFR 17, 23, 81, 222, 225-227, 402, 424, 450-453	FWS, NOAA	The Act provides broad protection for species of fish, wildlife and plants that are listed as threatened or endangered in the U.S. or elsewhere. Provisions are made for listing species, as well as for recovery plans and the designation of critical habitat for listed species. The Act outlines procedures, described in the next paragraph, for Federal agencies to follow when taking actions that may affect listed species. The Act also provides exemptions and exceptions for scientific research, enhancement of species, and incidental takes. The Endangered Species Act also is the enabling legislation for the	The ESA regulations define cumulative effects as "those effects of future State or private activities, not involving Federal activities that are reasonably certain to occur within the action area of the Federal action subject to consultation." The ESA regulations define indirect effects as "those effects that are caused by or will result from the proposed action and are later in time, but are still reasonably certain to occur."

			Indirect and Cumulative Impacts
		Convention on International Trade in Endangered Species of Wild Fauna and Flora, commonly known as CITES. All other Federal agencies, in consultation with and with the assistance of the Secretary, also must use their authorities in furtherance of the purposes of the Act by carrying out programs for the conservation of listed species. All Federal agencies, in consultation with and with the assistance of the Secretary, must insure that any action authorized, funded or carried out by the agency (agency action) is not likely to jeopardize the continued existence of an endangered or threatened species, or result in destruction or adverse modification of a critical habitat of a species.	The Services make the determination of jeopardy or destruction/adverse modification of critical habitat. If the Services determine that there is jeopardy or destruction/adverse modification, the Services will use the expertise of the Federal agency and any applicant to identify Reasonable and Prudent Alternatives. Section 10(a)(1)(B) of the Act authorizes permits for incidental take. The applicant prepares a conservation plan ensuring that the taking will not appreciably reduce the likelihood of survival and recovery of the species in the wild, and that the applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking."
Fish and Wildlife Conservation Act ("Nongame Act"); 16 U.S.C. 2901-2911; 94 Stat. 1322	FWS, State	The Act authorizes financial and technical assistance to the States for the development, revision, and implementation of conservation plans and programs for nongame fish and wildlife. The original Act authorized $5 million for each of Fiscal Years 1982 through 1985, for grants for development and implementation of comprehensive State nongame fish and wildlife plans and for administration of the Act. It also required the U.S. Fish and Wildlife Service to study potential mechanisms for funding these activities and report to Congress by March 1984.	No specific mention of indirect or cumulative impacts or the development of mitigation measures.
Fish and Wildlife Coordination Act: 16 U.S.C. 661-666(C)	FWS, USDA, NOAA	The Act provides that whenever the waters or channel of a body of water are modified by a department or agency of the U.S., the department or agency first shall consult with the U.S. Fish and Wildlife Service and with the head of the agency exercising administration over the wildlife resources of the State where construction will occur, with a view to the conservation of wildlife resources. The Act provides that land, water and interests may be acquired by Federal construction agencies for wildlife conservation and development. In	Calls for consultation with the FWS and State agencies whenever the waters or channel of a body of water are modified by a department or agency of the U.S.

			Indirect and Cumulative Impacts
		addition, real property under jurisdiction or control of a Federal agency and no longer required by that agency can be utilized for wildlife conservation by the State agency exercising administration over wildlife resources upon that property.	
Migratory Bird Treaty Act: 16 U.S.C. 760c-760g 50 CFR 10 50 CFR 20 50 CFR 21	DOI	The Migratory Bird Treaty Act implements various treaties and conventions between the U.S. and Canada, Japan, Mexico and the former Soviet Union for the protection of migratory birds. Under the Act, taking, killing or possessing migratory birds is unlawful.	No specific mention of indirect or cumulative impacts or the development of mitigation measures.
Magnuson-Stevens Fishery Conservation and Management Act: 16 U.S.C. 1801-1802	NOAA	Act governs the conservation and management of ocean fishing. It establishes exclusive U.S. management authority over all fishing within the exclusive economic zone, all anadromous fish throughout their migratory range except when in a foreign nation's waters and all fish on the Continental Shelf. The Act also establishes eight Regional Fishery Management Councils responsible for the preparation of fishery management plans to achieve the optimum yield from U.S. fisheries in their regions. The purposes of the Act are to: take immediate action to conserve and manage the fishery resource off the U.S. coasts and U.S. anadromous species and Continental Shelf fishery resources; support the implementation and enforcement of international fishery agreements for the conservation and management of highly migratory species; promote domestic commercial and recreational fishing under sound conservation and management principles; provide for preparation and implementation of fishery management plans to achieve and maintain the optimum yield of each fishery on a continuing	No specific mention of indirect or cumulative impacts or the development of mitigation measures. Based on geographic location, the proposed action could result in an indirect or cumulative impact on the protected resource (essential fish habitat).

			Indirect and Cumulative Impacts
		basis; establish Regional Fishery Management Councils to protect fishery resources through preparation, monitoring, and revision of plans that allow for participation of States, fishing industry, consumer and environmental organizations; encourage the development of underutilized U.S. fisheries; promote the protection of essential fish habitat.	
Sikes Act: 16 U.S.C. 670a-670o, 74 Stat. 1052	DOD, DOI, State	This Act provides for cooperation by the Departments of the Interior and Defense with State agencies in planning, development and maintenance of fish and wildlife resources on military reservations throughout the United States. Public Law 93-452, signed October 18, 1974, (88 Stat. 1369) authorized conservation and rehabilitation programs on AEC (now DOE), NASA, Forest Service and BLM lands. These programs are carried out in cooperation with the States by the Secretary of the Interior, and on Forest Service lands by the Secretary of Agriculture. It provided for the inclusion of endangered plants in conservation programs developed for BLM, Forest Service, NASA and DOE lands.	No specific mention of indirect or cumulative impacts or the development of mitigation measures.
Executive Order 13112: Invasive Species This order revokes EO 11987	All Agencies	This order seeks to prevent the introduction of alien plant and animal species that cause economic or environmental harm. Federal Agencies whose actions may introduce such species are required to identify and prevent such actions; monitor the status of invasive species and respond immediately to increases; provide for the introduction of native species and restoration of invaded ecosystems; and conduct research on invasive species and environmentally sound strategies to control them. The Order further establishes the Invasive Species Council whose members have significant responsibilities concerning invasive species, and an Advisory Committee to provide information and guidance for the Council.	No specific mention of indirect or cumulative impacts or the development of mitigation measures; however, EO requires monitoring and response and restoration activities, which may be considered as mitigation measures.

			Indirect and Cumulative Impacts
		Invasive Species Management Plan prescribing specific actions for invasive species control.	
Cultural Laws and Regulations			
National Historic Preservation Act: 16 U.S.C. 470 et seq. 36 CFR 800 (Section 106 Regulations)	ACHP	The National Historic Preservation Act (NHPA) created the Advisory Council on Historic Preservation (ACHP), an independent Federal agency, to advise the President and Congress on matters involving historic preservation. Under Section 106, Federal agencies are required to take into account the effects of their undertakings on properties eligible or listed in the National Register of Historic Places, and to afford the ACHP a reasonable opportunity to comment on actions that may affect such properties. The regulations define how Federal agencies meet Section 106 statutory responsibilities. The section 106 process seeks to accommodate historic preservation concerns with the needs of Federal undertakings through consultation among the agency official and other parties with an interest in the effects of the undertaking on historic properties, commencing at the early stages of project planning.	The agency must take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register. *Criteria of 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 the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative. (Section 800.5(a)(1)) If an adverse effect is found, the agency official shall consult further to resolve the adverse effect pursuant to Sec. 800.6. *Resolution of adverse effects.* The agency official shall consult with the SHPO/THPO and other consulting parties, including Indian tribes and Native Hawaiian organizations, to develop and evaluate alternatives or modifications to the undertaking that could avoid, minimize, or mitigate adverse effects on historic properties. (Section 800.6(a))

			Indirect and Cumulative Impacts
			If the agency official, the SHPO/THPO, and the Council agree on how the adverse effects will be resolved, they shall execute a memorandum of agreement.
Archaeological and Historic Preservation Act: 16 U.S.C. 469-469C	National Park Service	Provides for the preservation of historical and archeological data (including relics and specimens).	No specific mention of indirect or cumulative impacts or the development of mitigation measures.
Archaeological Resources Protection Act: 16 U.S.C. 470aa-mm	National Park Service	The purpose of this Act is to secure, for the present and future benefit of the American people, the protection of archaeological resources and sites which are on public lands and Indian lands, and to foster increased cooperation and exchange of information between governmental authorities, the professional archaeological community, and private individuals having collections of archaeological resources and data which were obtained before October 31, 1979.	No specific mention of indirect or cumulative impacts or the development of mitigation measures.
Antiquities Act of 1906: 16 U.S.C. 431-433	President	Established penalties for damage or destruction of historic or prehistoric ruins and monuments. Authorized the President of the United States to declare historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest that are situated upon the lands owned or controlled by the Government of the United States to be national monuments.	No specific mention of indirect or cumulative impacts or the development of mitigation measures.
American Indian Religious Freedom Act: 42 U.S.C. 1996	Indian Tribes	Establishes the protection and preservation for American Indians of their inherent right of freedom to believe, express, and exercise the traditional religions of the American Indian, Eskimo, Aleut, and Native Hawaiians, including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites.	No specific mention of indirect or cumulative impacts or the development of mitigation measures. Based on geographic location, the proposed action could result in an indirect or cumulative impact on the protected resource.

			Indirect and Cumulative Impacts
Native American Grave Protection and Repatriation Act: 25 U.S.C. 3001 et seq.	Indian Tribes	Establishes protection of human remains and cultural material of importance to Native American and Hawaiian groups.	No specific mention of indirect or cumulative impacts or the development of mitigation measures.
Health and Safety Laws and Regulations			
Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act of 1976: 42 U.S.C. 6961 et seq. 40 CFR 256-300	EPA	Regulates the treatment, transportation, storage, and disposal of solid and hazardous wastes.	No specific mention of indirect or cumulative impacts or the development of mitigation measures.

Appendix B:
Case Law

Summary of Indirect and Cumulative Impacts Cases

For the case law review, a search was conducted within LexisNexis[5], an electronic database of State and Federal case law and court documents, for cases relevant to indirect and cumulative impacts of transportation projects. This search was supplemented by reviews of relevant legal texts, specifically, Daniel Mandelker's NEPA Law and Litigation, and Roger Findley and Daniel Farber's Cases and Material on Environmental Law, as well as the NEPAnet Case Law Review, an environmental case law source compiled by the National Association of Environmental Professionals. Finally, Work Group members were asked to contribute any known legal decisions that had not been covered by the other case law sources.

The attached table includes cases where the courts considered issues related to NEPA analysis of indirect and cumulative effects for transportation projects. The table is organized chronologically and includes the case titles and citations, identifies the Federal litigants, and summarizes the issues and holdings of each case.

[5] The query used the following key words: National Environmental Policy Act; transportation; airport; runway; highway; interstate; bridge; rail; transit; indirect impacts; and cumulative impacts.

Cumulative and Indirect Impacts			
			Holding
City of Davis v. Coleman, 521 F.2d 661, 675-77 (9th Cir. 1975)	DOT – FHWA	Federal and State highway authorities proposed to build a freeway interchange near Davis, California without filing an EIS or the California equivalent, EIR. Instead, they issued a Negative Declaration, claiming that there would be no significant environmental impacts. Environmentalists argued that, aside from failing to prepare an EIS, the highway authorities had also erred by refusing to consider the growth-inducing impacts of the interchange.	The court ruled in favor of the plaintiffs and criticized the Negative Declaration for leaving a large number of questions unanswered: it did not discuss "probable impact on growth, land use or the planning process." In addition, there was no estimate of the increased demand for city services, which would be occasioned by increased population, and no discussion of the possible impacts on community cohesion and the tax base. All these matters should have been considered. Agency has duty to discuss growth and development that would be caused by a highway interchange project.
Rankin v. Coleman, 394 F. Supp. 647, modified 401 F. Supp. 664 (E.D. N.C. 1975)	DOT – FHWA	Plaintiffs sought to enjoin the DOT from further construction of a highway improvement project proposed for Bogue Island, one of the barrier islands on North Carolina's Outer Banks, which at the time of the challenge was largely undeveloped. The USACE proposed the construction of a 44 foot wide, asphalt paved, four or five lane highway that would span the length of the island, replacing the existing 20 foot wide secondary road through the middle of this "admittedly ecologically delicate environment." Although the EIS prepared for the project noted that "a modern highway can enhance the economic progress of resort and recreational areas...and existing and planned development ...will benefit from the project," it contained "no discussion at all regarding the secondary effects of increased development of the island, such as increased demand for fresh water, increased amounts of sewage and increased demand for other community services." In addition to not identifying and analyzing these indirect effects on the limited resources and fragile ecology and environment of the island, the EIS failed to determine and evaluate the effect that increased development would have on the island's natural dune and vegetation system as a barrier against increasing erosion.	The court found in favor of the plaintiffs and held that the EIS "completely overlooked...numerous social, economic and environmental" direct and indirect effects of the highway. The court granted the injunction and remanded for completion of an adequate EIS. Although the court noted that the island could sustain "carefully planned and limited development," it found that significant alteration of Bogue's dunes and vegetation could lead to "rapid erosion by the normal action of ocean and wind and to virtual obliteration by storms."

Cumulative and Indirect Impacts			
			Holding
Kleppe v. Sierra Club, 427 U.S. 390 (1976)	DOI	Plaintiffs agued that the DOI did not appropriately analyze the cumulative impacts of the proposed action and other coal-related actions in the region.	The court ruled in favor of the DOI. The court stated that NEPA may require a comprehensive impact statement in certain situations where several proposed actions are pending at the same time; for example, when several proposals for coal-related actions that will have cumulative or synergistic environmental impact on a region are pending concurrently before an agency, their environmental consequences must be considered together because only through comprehensive consideration of pending proposals can the agency evaluate different courses of action. "Cumulative environmental impacts are, indeed, what require a comprehensive impact statement. But determination of the extent and effect of these factors, and particularly identification of the geographic area within which they may occur, is a task assigned to the special competency of the appropriate agencies…Even if environmental interrelationships could be shown conclusively to extend across basins and drainage areas, practical considerations of feasibility might well necessitate restricting the scope of comprehensive statements."
Coalition for Canyon Preservation v. Bowers, 632 F.2d 774 (9th Cir. 1980)	DOT - FHWA	This case involved a proposal to widen a 10.8 mile section of a narrow, two-lane Federal highway that connected four small, rural towns in northern Montana and served as the primary access road into Glacier National Park. The new segment would create an 88 foot wide, four-lane highway, including 10 foot parking lanes with new curbing and other improvements in the sections passing through the towns, resulting in the relocation of several business. The EIS admitted that "the possibility exist[ed]" that the wider four-lane highway could result in "development along the highway…increas[ing] at a faster pace than in the past." However, "nothing further was said about increased development" in the EIS.	The court found in favor of the plaintiffs and held that the EIS's failure to assess this foreseeable development violated NEPA: The aerial maps of the area show that the [four] towns…are centered about the main road; tourism is their main source of income and roadside businesses are common. It is likely that this project will have major effects on the character of these towns. This case requires analysis of these secondary effects.

Cumulative and Indirect Impacts			
			Holding
Florida Wildlife Fed'n v. Goldschmidt, 506 F. Supp. 350 (S.D. Fla. 1981)	DOT – FHWA	Plaintiff's filed for preliminary injunction to halt construction of a segment of Interstate 75 on the basis that the FHWA failed to analyze growth inducing impacts of the proposed project.	The court ruled in favor of the FHWA and found that the proposed highway did not have growth inducing effects, because market demand, not the highway was inducing development in the area. The highway would affect the type, not the amount, of growth, and land use regulation could control environmental effects of new development.
Gloucester County Concerned Citizens v. Goldschmidt, 533 F. Supp. 1222 (D. N.J. 1982)	DOT – FHWA	Plaintiffs challenged an FEIS for a proposed highway project "based upon the purported absence of consideration of 'secondary impacts' of the...project," specifically: 1) how the highway would fit into the State's existing highway network; 2) what effect it would have on existing and planned mass transit lines; and 3) the impact upon development and population growth. Plaintiffs also complained that: Although the FEIS acknowledges that the highway will act as a catalyst to development in the surrounding area, it does not go on to study the secondary effects of the road such as increased development, with its concomitant increase in population and demand for State, county and municipal services, such as schools, police and fire protection and sewage facilities.	The court ruled in favor of the FHWA and found that there was adequate reference, accompanied by several maps, of the relationship between the proposed highway and its specific place within the State's highway network, and that it would not detract from usage of existing rapid transit lines. Further planning of rapid transit lines was unlikely without the presence of the new facility. Population figures in the FEIS demonstrated that the area had grown and would continue to grow with or without the proposed project, because there were existing roads that serviced the area. Accordingly, the court held that the plaintiffs had failed to demonstrate that any of the secondary impacts would be "significant," and that the failure of the FEIS to speculate on future events, "which, based on the information available at the time of the FEIS, appear improbable, does not articulate a serious deficiency in the FEIS."
Sierra Club v. Sigler, 695 F.2d 957 (5th Cir. 1983)	USACE	The Army Corps of Engineers issued permits authorizing private construction of a multi-purpose, deep water port and crude oil distribution system near Galveston, Texas. Among other challenges, the plaintiffs argued that the FEIS violated NEPA because it failed to examine the adverse environmental impacts that would result from the project's secondary effects.	The court found in favor of the plaintiffs and held that because the project's benefits were analyzed as "selling points" in the FEIS, there could be no "hard look" required by NEPA without identifying and analyzing the adverse impacts resulting from the project's indirect effects. The court noted that the FEIS cited many benefits that would flow from the terminal's construction; however the court did not call for an objective cost-benefit analysis in the FEIS.

Cumulative and Indirect Impacts			
			Holding
Sierra Club v. Marsh, 729 F.2d 868 (1st Cir. 1985) (Sierra Club III)	USACE	Plaintiffs challenged to a proposed port and causeway on a rural island in Maine. The court set forth a three part test to determine whether a particular set of impacts is definite enough to be evaluated, or too speculative to warrant consideration: (1) With what confidence can one say that the impacts are likely to occur? (2) Can one describe them "now" with sufficient specificity to make their consideration useful? (3) If the decision maker does not take them into account "now," will the decision maker be able to take account of them before the agency is so firmly committed to the project that further environmental knowledge, as a practice matter, will prove irrelevant to the government's decision?	The court ruled in favor of the plaintiffs and held that the failure to prepare an EIS evaluating these impacts violated NEPA because the indirect effects of industrial development expected to result from construction of the port and causeway had been identified and specifically described in the planning documents, which projected with considerable confidence that such development would occur. Analysis of these effects could not be conducted at a later date because once construction of the port and causeway neared completion, it would be too late to account for the indirect development, which would be a foregone conclusion.
Fritiofson v. Alexander, 772 F.2d 1225 (5th Cir. 1985)	USACE	Plaintiffs challenged the USACE's decision not to prepare an EIS before issuing a permit authorizing a housing developer to construct a canal system. The Plaintiffs asserted that the USACE did not conduct an adequate analysis of cumulative impacts.	The court rules in favor of the plaintiffs. The court stated that "the CEQ regulations [indicate] that a meaningful cumulative-effects study must identify: (1) the area in which effects of the proposed project will be felt; (2) the impacts that are expected in that area from the proposed project; (3) other actions--past, proposed, and reasonably foreseeable--that have had or are expected to have impacts in the same area; (4) the impacts or expected impacts from these other actions; and (5) the overall impact that can be expected if the individual impacts are allowed to accumulate. The court found that there is no study in the record, prepared by the USACE, or its consultants, that approximates this kind of analysis and the discussion in the EA is vague and conclusory. Additionally, the court stated that p*roposed* actions with potential cumulative impacts may mandate the preparation of a regional or comprehensive impact statement, but *contemplated* actions with potential cumulative impacts cannot.

Cumulative and Indirect Impacts			
			Holding
Coalition on Sensible Transp., Inc. v. Dole, 826 F.2d 60 (D.C. Cir. 1987)	DOT	Petitioners argued that the DOT failed to analyze the cumulative impact of the project together with those of various related interchange and Spur improvements.	The court ruled in favor of the DOT and stated that the EA and FONSI were sufficient to alert interested members of the public to any arguable cumulative impacts involving these other projects. The court found that it makes sense to consider the "incremental impact" of a project for possible cumulative effects by incorporating the effects of other projects into the background "data base" of the project at issue, rather than by restating the results of the prior studies. Further analysis in the present EA or FONSI would be redundant and in no material way serve the purposes of NEPA.
CARE Now, Inc. v. Federal Aviation Admin., 844 F.2d 1569 (11th Cir. 1988)	DOT – FAA	The citizens group sought review of the FAA's order approving a runway extension at an airport. The citizens group argued that the FONSI failed to address several available alternatives, failed to consider the cumulative impacts of the extended runway in the context of other improvements, and unfairly relied on speculative mitigation measures.	The court ruled in favor of the FAA and held that the FAA's limited analysis of cumulative effects was warranted given the limited effect, direct or indirect, of the proposal. Speculation as to the use of the airport by larger types of aircraft and heavier loads could never be a cumulative effect because the proposal itself forbids that effect. Furthermore, an increase in capacity is inevitable at the airport given the projected growth of the surrounding metropolitan area and the strain on the area's other airport. This increased growth at the airport in question is not attributable to an extended runway. The effect caused by the runway extension will be a higher percentage of safe landings, not a higher number of planes landing.
Mullin v. Skinner, 756 F. Supp. 904 (E.D. N.C. 1990)	DOT-FHWA	Property owners challenged the proposed construction of a high-rise bridge and asserted that the EA and FONSI were inadequate because they failed to consider indirect impacts of the proposed action. Plaintiffs pointed to extensive evidence, including expert testimony that the bridge would cause high-density development that could result in a variety of indirect impacts on environment.	The court ruled in favor of the plaintiffs and held that State and Federal authorities involved in proposed construction of the high-rise bridge had to prepare a full environmental impact statement even though they had concluded in both the EA and FONSI that the project would not significantly "affect" the quality of human environment.
National Wildlife Federation v. FERC, 912 F.2d 1471 (D.C.	FERC	Plaintiffs argued that the FERC violated NEPA when it granted a city license for construction and operation of a dam with	The court ruled in favor of the FERC and found that FERC's failure to consider the second phase of a project, under which

Cumulative and Indirect Impacts			
			Holding
Cir. 1990)		small hydroelectric powerhouse.	the dam would be greatly expanded, in approving first phase of project did not violate NEPA. The court stated that the "EIS need not delve into the possible effects of a hypothetical project, but need only focus on the impact of the particular proposal at issue and other pending or recently approved proposals that might be connected to or act cumulatively with the proposal at issue. In this case, the [FERC] did not ignore any relevant proposals involving [the location of the dam]." In addition the proposal for phase II was withdrawn and any claim that it would be reintroduced was merely speculative and hypothetical.
North Buckhead Civic Association v. Skinner, 903 F. 2d 1533 (11th Cir 1990)	DOT – FHWA	The EIS evaluated combined environmental effects of the multi-lane highway and transit median where their routes were congruent, and in addition, the EIS incorporated by reference studies of rail line extensions that examined the environmental consequences of a proposed station outside of the right-of-way.	The court ruled in favor of the FHWA and found that the EIS adequately considered cumulative impacts of the proposed multi-lane highway and median designed to handle heavy rail mass transit.
Sierra Club v. Marsh, 976 F.2d 763 (1st Cir. 1992) (Sierra Club IV)	USACE	After remand and further appellate review of Sierra Club III, 729 F.2d 868, the Sierra Club again challenged the FEIS for the project. The FEIS in Sierra Club IV restricted its indirect effect analysis to four light-dry industries. The plaintiffs complained that the agency's evaluation of the project's indirect impacts was inadequate because it failed to evaluate heavy industries. The administrative record revealed that the water and sewage treatment facilities on the island were inadequate to sustain heavy industry. Furthermore, the cost of upgrading the water facilities alone to sustain heavy industry was prohibitive. Local officials and property owners directed their marketing toward light-dry, not heavy industry.	The court ruled in favor of the USACE and held that: "NEPA requires an EIS to evaluate only those secondary impacts that are reasonably foreseeable. The court concluded that it was permissible for the agencies not to analyze other water dependent industries, such as auto processing, petroleum and cement, because the likelihood of these industries developing on [the] Island is too speculative to be reasonably foreseeable." Because the EIS's identification of the four light-dry industries reasonably discussed the type of industrial development likely to occur, the court upheld the agency's evaluation of the project's indirect effects.
Seattle Cmty. Council Fed'n	DOT – FAA	Petitioners argued that the FAA failed to consider the	The court ruled in favor of the FAA and found that the FA was

Cumulative and Indirect Impacts			
			Holding
v. Federal Aviation Admin., 961 F.2d 829 (9th Cir. 1992)		cumulative and indirect effects of increased air traffic when proposing to change the airport flight patterns.	adequate and that an impact statement on change in airport flight patterns did not have to consider increase in traffic as indirect effect as this was not the purpose of the change. Although the Plan is not intended to increase the volume of air traffic at the airport directly, the fact that it will increase the efficiency of the air traffic system and reduce delays will necessarily allow the volume to increase. However, the increase in volume is not a "growth inducing effect [or] other effect related to induced changes in the pattern of land use, population density or growth rate." 40 CFR § 1508.8(b). Rather, the Plan deals with the existing air traffic. The proposed procedures are designed, among other things, to expand the FAA's use of existing airspace to more efficiently meet the existing air traffic demand at the airport.
Grapevine v. United States Dep't of Transp., 17 F.3d 1502 (D.C. Cir. 1994), cert. denied, 115 S. Ct. 635 (1994).	DOT – FAA	The Dallas-Fort Worth Airport sought funds from the FAA to build two new airport runways, two new terminal buildings, and other facilities in order to accommodate increased airport demand. Plaintiff's argued that FAA failed to consider the cumulative impacts of related actions.	The court ruled in favor of the FAA and found that even though FAA deemed several elements of the plan as independent or speculative, the FAA had considered the cumulative impact of most of the elements; those elements not considered by FAA, however, could not be included in the approved airport layout plan.
Conservation Law Found. v. Federal Highway Admin., 24 F.3d 1465 (1st Cir. 1994)	DOT – FHWA	Final EIS referred to reports and data contained in the draft EIS to analyze cumulative impacts of government actions.	The court held in favor of the FHWA and found that the information contained in the draft EIS could be considered part of the cumulative impact analysis for a route corridor with respect to construction of controlled access highway across the area.
Laguna Greenbelt, Inc. v. United States Dep't of Transp., 42 F.3d 517 (9th Cir. 1994)	DOT – FHWA	The record showed that 98.5 percent of all land in the project area of benefit was accounted for already in either existing or committed land uses not contingent upon the toll road.	The court ruled in favor of the FHWA and found that the discussion of growth-inducing impacts in the EIS for the proposed toll road was reasonably thorough even though conclusions about the amount and pattern of growth were based on planning documents that assumed the toll road would be built. [illegible] a conclusory statement that growth will

Cumulative and Indirect Impacts			
			Holding
			increase with or without the project, or that development is inevitable, is insufficient; the agency must provide an adequate discussion of growth-inducing impacts.
Clairton Sportsmen's Club v. Pennsylvania Turnpike Comm'n, 882 F. Supp. 455 (W.D. Pa. 1995)	DOT – FHWA	Plaintiffs argued that the EIS did not consider cumulative impacts of another highway project to link the northern terminus of a highway project to the city.	The court ruled in favor of the FHWA and found that the EIS was not required to consider the cumulative impacts of the other project, because the project was not "reasonably foreseeable" within the meaning of NEPA. That is, there was no evidence that the project had been federally approved; there was no funding pending before any agency for the project; and there was no evidence of active preparation to make a decision on alternatives to the project. The agency could not be faulted for not considering cumulative impacts, as they did not know what form the transportation link would take.
Airport Neighbors Alliance, Inc. v. United States, 90 F.3d 426 (10th Cir. 1996)	DOT – FAA	The City of Albuquerque had a master plan for the city's airport which set forth a construction schedule in three phases over 20 years. The plan included upgrading one runway to accommodate commercial jet traffic, reconstructing another runway, expanding the terminal facility, constructing a second parking structure, building a new cargo services building, expanding surface access roads, and relocating rental car facilities. The appellants challenged an EA covering only the runway upgrade as being inadequate under NEPA because it failed to consider the cumulative impacts of the other components of the plan. The DOT responded that the runway upgrade was independent from the plan and that the other components of the plan were merely elements that might be complemented over a twenty-year period.	The court ruled in favor of the FAA and found that the record suggested that the city would upgrade the runway even if the other components of the master plan were not implemented. The court concluded that the components of the plan were not so interdependent that it would be unwise or irrational to complete the runway upgrade without them. According to the court, requiring a cumulative EIS to analyze possible future actions in a twenty-year master plan would result in a misallocation of resources, and would undercut NEPA's objective of useful environmental analysis regarding major Federal actions.

Cumulative and Indirect Impacts			
			Holding
Carmel-by-the –Sea v. U.S. DOT, 123 F.3d 1142, 1160 (9th Cir. 1977)	DOT – FHWA	EIS for proposed highway construction project was inadequate with regard to cumulative impacts, given its failure to list specifically other relevant projects in the region, which precluded analysis of cumulative impacts of those projects and the proposed highway project.	The court found in favor of the plaintiffs and held that an EIS must "catalogue adequately the relevant past projects in the area." It must also include a "useful analysis of the cumulative impacts of past, present, and future projects." This means the EIS must analyze the combined effects of the actions in sufficient detail to be "useful to the decisionmaker in deciding whether, or how, to alter the program to lessen cumulative impacts." The court found that responsible government agencies bore the burden of properly describing other area projects and detailing cumulative impacts of these projects in the final EIS for the proposed highway project.
Morongo Band of Mission Indians v. Federal Aviation Admin., 161 F.3d 569, 579-580 (9th Cir. 1998)	DOT – FAA	The Morongo Band argued that the FAA improperly failed to consider growth-inducing effects of the proposed airport enhancement project.	The court ruled in favor of the FAA and found that even though the EA did not discuss the growth-inducing effects that may have been foreseeable, the project was implemented to deal with existing problems. The court held that the fact that the project might also facilitate further growth is insufficient to require an analysis of growth-inducing impacts.
Piedmont Environmental Council v. DOT, 159 F. Supp.2d 260 (W.D. Va. 2001)	DOT – FHWA	Plaintiffs brought an action NEPA challenging the proposed construction of a bypass on the basis that the FEIS failed to analyze the growth-inducing impacts of the bypass.	The court ruled in favor of the FHWA and found that the FHWA took a hard look at the growth-inducing impacts issue and that the decision to include only limited discussion of the issue in the FEIS was not arbitrary or capricious. The court relied on the fact that the FHWA had conducted a Socio-Economic and Land Use Analysis of the various alternatives being considered for the Corridor. The study looked at many factors, including future land use in the area and the effects that the alternatives would have on that land use.
Custer County Action Ass'n v. Garvey, 256 F.3d 1024 (10th Cir. 2001)	DOT – FAA	Petitioners claim the EIS failed to adequately address noise impacts; the cumulative impacts of all U.S. military, foreign military and non-military overflights; impacts to existing and proposed wilderness areas and national parks; the nationwide impacts of low-level military aircraft operations; and the	The court ruled in favor of the FAA and stated that while the cumulative impact analysis was not a model of clarity or thoroughness, the EIS adequately addressed the cumulative impact of all U.S. military, foreign military, and non-military overflights.

Cumulative and Indirect Impacts			
			Holding
		socioeconomic impacts of overflights.	
Texas Committee on Natural resources v. Van Winkle, 197 F. Supp.2d 586 (N.D. Tex. 2002)	USACE	Plaintiffs groups challenged the adequacy of the EIS prepared by the USACE for a proposed flood control project on a river running through a major city. Plaintiffs asserted that the USACE violated NEPA by failing to analyze other foreseeable future projects that are connected to the proposed project.	The court ruled in favor of the USACE and found that, the proposed project and the other projects, although obviously related by geographic features, their association with the river, and the overall goal of improving the area, are not "connected actions." The courts stated that there is no evidence in the record that the building of the proposed project will automatically trigger any of the other projects. Although all of the projects were approved by the voters in a bond election, such approval does not automatically indicate that they will all be constructed. In addition, there is no evidence, beyond Plaintiffs' speculative belief, that the proposed project cannot proceed unless the other projects are built before or at the same time as the proposed project. Finally, there is no evidence in the record that the proposed project, whose purpose is to provide flood protection to certain areas, is an interdependent part of any of the other projects. Consequently, because the success or failure of the proposed project does not depend on any of the other projects, the Court concluded that the USACE's failure to analyze the other projects in the EIS was not arbitrary and capricious.
Route 9 Opposition Legal fund v. Mineta, 213 F. Supp.2d 637 (W.D. W.Va. 2002)	DOT – FHWA	Plaintiffs argued that the FHWA did not adequately consider indirect and cumulative impacts for the proposed improvement to Route 9.	The court ruled in favor of the FHWA and found that the FEIS adequately examined the indirect and cumulative impacts. The Administrative Record demonstrated that the FEIS incorporated a Regional Secondary and Cumulative Impact Analysis and contained a project-specific secondary and cumulative impact study. Additionally, an assessment of secondary and cumulative land use growth caused by the proposed Route 9 project in the reasonable foreseeable future was conducted through a review of the local zoning and development ordinances, which limited commercial and

Cumulative and Indirect Impacts			
			Holding
			residential development in areas zoned for agricultural use, similar to the land along the route of the Preferred Alternative. The court also found that it was not reasonably foreseeable that the adjacent State would build a multi-lane highway, and therefore there were no cumulative or secondary impacts to study.
Grand Canyon Trust v. Federal Aviation Administration, 290 F. 3d 339 (D.C. Cir 2002)	DOT – FAA	FAA addressed only the incremental increase in noise that would occur as a result of its approval of a replacement airport near the Zion National Park, and not the cumulative impact on the park. There was no way to determine whether the FAA's estimated 2 percent increase, in addition to other noise impacts on the park, will significantly affect the quality of the human environment. The FAA analysis does not aggregate the noise impacts on the park.	The court ruled in favor of the plaintiffs and disapproved the EA because it did not analyze the cumulative impact on the park from other actions. The court held that a cumulative impacts analysis must identify the area in which the effects of the proposed project will be felt; the impacts that are expected in that area from the proposed projects; other actions – past, present, and proposed, and reasonably foreseeable – that have or are expected to have impacts in the same area; the impacts or expected impacts from these other actions; and the overall impact that can be expected if the individual impacts are allowed to accumulate.
Idaho Sporting Congress v. Rittenhouse, 305 F.3d 957 (9th Cir. 2002)	USFS	Plaintiffs assert that the USFS failed to adequately analyze the cumulative impacts of the proposed timber sales.	The court ruled in favor of the plaintiffs. The court found that while ordinarily, an agency has the discretion to determine the physical scope used for measuring environmental impacts, the choice of analysis scale must represent a reasoned decision and cannot be arbitrary. In this case the USFS arbitrarily limited the analysis to "home range" in the face of its own findings that there would be significant depletion of habitat at the larger "landscape scale." The court found that the EIS does not explain why the home range scale was chosen despite hard scientific information in the possession of the USFS indicating that use of landscape scale analysis is mandatory. The court therefore held that the USFS acted arbitrarily in employing the home range for cumulative effects analysis in the EIS.

Cumulative and Indirect Impacts			
			Holding
Utahns for Better Transportation v. U.S. Department of Transportation, 305 F.3d. 1152 (10th Cir. 2002)	DOT – FHWA	The Appellants allege that FHWA violated NEPA when the FEIS failed to consider the cumulative impact of a future expansion of a parkway from four lanes to six.	The court found in favor of the FHWA and stated that EIS for proposed four-lane highway project is not required to consider cumulative impacts of future expansion of the highway to six lanes, because the proposed plan and the addition of two lanes are not so interdependent that it would be irrational to complete one without the other.
Davis v. Mineta, 302 F.3d 1104 (10th Cir. 2002)	DOT – FWHA	The DOT prepared an EA and FONSI for the proposed five-lane highway project, which would bisect two parks, require the demolition or moving of numerous historic structures and affect others, may quadruple noise levels in one of the parks, increase traffic to 34,000 cars per day, and require the construction of a new bridge over the Jordan River.	The court ruled in favor of the plaintiffs and found the EA to be inadequate due to the lack of discussion or comparison of the local effects in the area directly impacted by the proposed project of induced growth caused by the extension of the highway as compared to a no-build alternative or the use of other alternatives. The DOT's refusal to study the possibility that the relatively unspoiled nature of the local area might be due, at least in part, to the lack of a major roadway through it is arbitrary and capricious. The court also found that the EA does not provide an adequate discussion of the cumulative impacts of the project on the human environment and that these cumulative impacts may be significant.
Senville v. Peters, -- F.Supp.2d--, 2004 WL 1682965 (D.Vt. 2004)	DOT – FHWA	Plaintiffs contend that the EIS for the proposed Chittenden County Circumferential Highway (CCCH) does not adequately address cumulative impacts of the proposed project.	The court ruled in favor of plaintiffs. It found that EIS entirely failed to address cumulative impacts and that its discussion of secondary or indirect impacts was cursory and therefore insufficient. The EIS had identified several planned highway improvements in the region, and noted a high level of development in the immediate proximity of the projects, but it contained no discussion of the potential cumulative impacts on environmental resources, such as agricultural lands, water quality and air quality. The EIS also noted that it was difficult to identify the location and extent of indirect impacts. It stated that development was anticipated only along roadways with direct access to the CCCH, and that the project would have indirect secondary impacts on agricultural lands, but it had no analysis to support those assumptions and no discussion

Cumulative and Indirect Impacts			
			Holding
			of any possible mitigation measures.
Citizens Advocate Team, et al. v. USDOT, et al., No. 02 C 5962, (N. D. Il. 2004)	DOT – FHWA	Plaintiffs alleged that the Final EIS for a proposed bridge project failed to provide a detailed assessment of growth-inducing impacts.	The court found in favor of the FHWA and ruled that although the final EIS contains only a limited discussion of the projected traffic and population increases associated with the proposed bridge, the ROD was not arbitrary and capricious in light of the minor role that these growth-inducing impacts were determined to have on the surrounding area.
Hunt v. North Carolina DOT, 299 F. Supp.2d 529 (E.D.N.C. 2004)	DOT – FHWA	Plaintiffs challenged the final EIS on the basis that the FHWA analysis of secondary impacts for proposes bridge project was inadequate.	The court found in favor of the FHWA and ruled that the final EIS adequately analyzed secondary impacts because it considered the effects of a full build out of the island, installation of a sewer system, population growth, increased day visitors, and stormwater and sewer issues related to runoff from the bridge.
DOT v. Public Citizen, 124 S. Ct. 2204 (2004)	DOT – FMCSA	The court considered whether the FMCSA must develop an EIS to analyze the effect of safety regulations that implement the President's NAFTA decision to allow Mexican trucks to enter the U.S. Public Citizen argued that the EA must take the increased cross-border operations' environmental effects into account as an effect of the proposed regulations because Congress required DOT to issue truck safety registration and inspection regulations before the President's decision to lift the Mexican truck moratorium could take effect, making the trucks' entry is a "reasonably foreseeable" indirect effect of the issuance of the regulations.	The court ruled in favor of the FMCSA and found that Public Citizen's argument overlooks FMCSA's inability to countermand the President's lifting of the moratorium or otherwise categorically to exclude Mexican trucks from operating in the U.S. In this case, DOT regulatory authority is so limited that it cannot be the legal "cause" of the effects of the President's action (rejecting "but for" causation for a "rule of reason" based on the scope of decision). This analysis is not changed by the CEQ regulation requiring an agency to evaluate the "cumulative impact" of its action, because that rule does not require FMCSA to treat the lifting of the moratorium itself or the consequences from that lifting as an effect of its rules promulgation.

Appendix C:
Guidance Documents

FEDERAL

Council on Environmental Quality. (January 1997). ***Considering Cumulative Effects Under the National Environmental Policy Act.***

The CEQ handbook "Considering Cumulative Effects Under the National Environmental Policy Act" provides a framework for advancing environmental impact analysis by addressing cumulative effects in either an environmental assessment (EA) or an Environmental Impact Statement (EIS). The handbook presents practical methods for addressing coincident effects (adverse or beneficial) on specific resources, ecosystems, and human communities of all related activities, not just the proposed project or alternatives that initiate the assessment process. It is recognized as a tool for practitioners in examining and documenting the effects on social, economic, and environmental resources. It outlines the general principles, presents useful steps, and provides an overview of a number of methods for conducting cumulative effects analysis. While, it is not formal guidance, exhaustive, or definitive, it will assist in developing study-specific approaches to cumulative impacts analysis.

Available at ceq.eh.doe.gov/nepa/ccenepa/ccenepa.htm.

Federal Aviation Administration. (2001). ***Guidelines for Compliance with the National Environmental Policy Act and Related Environmental Review Statutes for the Licensing of Commercial Launches and Launch Sites*****. Washington, DC.**

These guidelines provide additional guidance to FAA commercial space launch site license applicants and others involved in commercial space launch site actions on the format and content of FAA environmental assessments and impact statements, but are not intended to replace or overrule FAA Order 1050.1D, NEPA or other environmental laws. Cumulative impacts are addressed as one facet of the NEPA process, but are not given special attention. Guidance on how to assess cumulative impacts is not provided.

Available at http://ast.faa.gov/lrra/environmental/EPA5DKS.pdf.

Federal Aviation Administration. (1999). FAA Order 1050.1 D CHG 4***, Policies and Procedures for Considering Environmental Impacts, June 14, 1999, Chapter 3, Environmental Actions*****. Washington DC**.

Chapter 3 of FAA Order 1050.1 DCHG 4 lays out FAA policies on many environmental actions. The document addresses categorical exclusions, extraordinary circumstances, advisory actions, and environmental assessment. Cumulative impacts are also touched upon, specifically with regard to how cumulative impacts are defined, when they must be assessed, and various requirements of how they must be assessed.

Available at http://www.aee.faa.gov/e3/1050pt1d/chap3.pdf.

Federal Highway Administration. (January 2003). ***Questions and Answers Regarding the Consideration of Indirect and Cumulative Impacts in the NEPA Process*****. (Interim Guidance).**

Prepared by FHWA, this "Questions and Answers" section of the *Environmental Guidebook* addresses indirect and cumulative impact considerations in the context of the NEPA process. The topics covered include the definitions of and differences between direct, secondary, indirect, and cumulative impacts; what to do when data needed for determining "reasonably foreseeable" actions are unavailable; FHWA's specific policy and requirements regarding indirect and cumulative impact analysis in the NEPA process; and specific strategies for addressing indirect and cumulative impacts. These questions and answers also cover legal topics, such as FHWA's legal authority to mitigate environmental impacts identified in the NEPA process, and include a short review of the case law that addresses the definition of "reasonably foreseeable" actions.

Available at http://environment.fhwa.dot.gov/guidebook/Gimpact.htm.

Federal Highway Administration. (2002). Web pages, "Impact Methodologies." Washington, DC.

FHWA's "Impact Methodologies" web pages provide information on the general relationships between transportation and land use policies and various impact areas: namely physical environmental impacts, operating environmental impacts, fiscal impacts, and economic impacts. The web pages provide forecasting methodologies for impacts to areas such as wetlands and sensitive habitats, water quality, historical/archeological resources, energy resources, as well as impacts that effect emissions and noise levels. Specific models and/or other ways to assess impacts for each area are presented.

Available at http://www.fhwa.dot.gov/planning/toolbox/framework.htm.

Federal Highway Administration. (2002). Web page, "Summary: Economic Impacts of Federal-Aid Highway Investment." Washington, DC.

This web page summarizes the productivity impacts and the employment impacts of highway investment. It highlights the benefits that highway investment brings to industries and the workforce through production cost savings, contributions to the yearly productivity growth rate, high net social rates of return, and job creation. The web page notes, for example, that the Federal-aid Highway Program has contributed, on average, one-quarter of the yearly productivity growth in the United States from 1950 to 1989, and supports approximately 42,100 total full-time equivalent jobs.

Available at http://www.fhwa.dot.gov/policy/empl.htm.

Federal Highway Administration. (1996). ***Community Impact Assessment: A Quick Reference for Transportation*****. (FHWA-PD-96-036; HEP 30/8-96(10M)P). Washington, DC.**

"Community Impacts Assessment: A Quick Reference for Transportation" was written as a primer for transportation professionals and analysts who assess the impacts of proposed transportation projects on communities. It outlines the community impact assessment process, highlights critical areas that must be examined, and identifies the basic tools and information sources in parallel with the FHWA NEPA project development process. This guide promotes the idea that community impact assessment should include all items of importance to people, such as mobility, safety, employment effects, relocation, isolation, and other community issues.

Available at http://environment.fhwa.dot.gov/projdev/tdmcia.htm

Federal Highway Administration. (April 1992). ***Position Paper: Secondary and Cumulative Impact Assessment in the Highway Project Development Process.***

This position paper represents the first and only formal guidance issued by FHWA until the release of the interim guidance in January 2003. It provides a basic orientation to secondary and cumulative impacts and suggests a decisionmaking framework comprised of eight general concepts to help incorporate secondary and cumulative impacts into the highway project development process. Some of the suggestions address when to begin considering secondary and cumulative effects, the scope of the impact analysis, and what to do when an area has limited resources and information. The paper does not prescribe any particular approach, technique, or method of assessment; rather it provides general analytical outlines and "rules-of-thumb."

Available at http://environment.fhwa.dot.gov/guidebook/content/Secondary_Cumulative_Impact_Assessmt.htm.

National Aeronautics and Space Administration. (2001). ***NASA Procedures and Guidelines 8580.1: NASA Procedures and Guidelines for Implementing the National Environmental Policy Act and Executive Order 12114, Chapter 7.***

The NASA Procedures and Guidelines establish standard procedures for implementing NEPA and NASA's overall environmental planning process. It establishes responsibilities, procedures, and guidelines for carrying out the requirements of NEPA, its implementing regulations, and Executive Order (EO)

12114, Environmental Effects Abroad of Major Federal Actions, and is applicable to NASA Headquarters and NASA Centers, including Component Facilities. This document takes into account CEQ guidance on cumulative impacts, but does not establish new requirements for cumulative impact analyses, nor is it legally binding. Rather, it provides perspectives on and suggests a framework for a rigorous approach to identifying and analyzing cumulative impacts. It also discusses various analytical tools that are available and the approaches used by several Federal agencies.

Available at http://nodis3.gsfc.nasa.gov/library/displayDir.cfm?Internal_ID=N_PG_8580_0001_&page_name=main.

U.S. Environmental Protection Agency. (2000). ***Our Built and Natural Environments: A Technical Review of the Interactions between Land Use, Transportation, and Environmental Quality*****. (EPA/231/R-01/002). Washington, DC.**

In this document, EPA summarizes technical research on the relationship between the built and natural environments, as well as current understanding of the role of development patterns, urban design, and transportation in improving environmental quality. "Our Built and Natural Environments" is designed as a technical reference for analysts in State and local governments, academics, and people studying the implications of development on the natural environment. Chapter 4, Effects of Different Development Types on the Environment, covers many of the indirect environmental effects that may accompany development, and contends that growth can be accommodated in ways that minimize negative direct and indirect impacts on human and natural environments and in some cases even improve environmental quality. Strategies that EPA identifies as minimizing negative environmental impacts include compact development, reduced impervious surfaces and improved water detention, safeguarding of environmentally sensitive areas, mixed land uses, transit accessibility, and support for pedestrian and bicycle activity.

Available at http://www.smartgrowth.org/library/built.html.

U.S. Environmental Protection Agency. (2000). ***Projecting Land-Use Change: A Summary of Models for Assessing the Effects of Community Growth and Change on Land-Use Patterns*****. (EPA/600/R-00/098). Washington, DC.**

This guide provides a selective summary of 22 leading land use change models currently in use or under development. It is intended to help readers determine the models' applicability, data and resource requirements, strengths and limitations, and costs. The guide stresses that the consideration of the direct and indirect, synergistic, and cumulative impacts any project will bring to the community is needed. The document provides examples of some of the land use questions that should be considered in order to cover indirect and cumulative impacts, such as whether existing roads will need to be widened or new roads

built, whether additional housing will need to be constructed, and whether the project will encourage other new businesses.

Available at http://www.epa.gov/ecocommunity/tools/reportfinal3.pdf.

U.S. Environmental Protection Agency. (May 1999). ***Consideration Of Cumulative Impacts In EPA Review of NEPA Documents*****. (EPA 315-R-99-002). Washington, DC.**

This guidance, while not expressly intended for use by Federal agencies in carrying out cumulative impact analysis, includes information pertaining to the EPA's review of cumulative impact analysis in EISs. It is intended to help EPA reviewers of NEPA documents provide accurate, realistic, and consistent comments on the assessment of cumulative impacts focused on specific issues that are critical in EPA's review of NEPA documents under Section 309 of the Clean Air Act. The guidance contains relevant background information, definitions, and basic concepts; a section on EPA's review of cumulative effects in a NEPA analysis (e.g., how EPA should review cumulative impacts, whether cumulative impacts can be the basis for adverse ratings, if EPA should suggest mitigation measures), and a section on major areas that should be reviewed in order to adequately analyze cumulative impacts. This guidance also provides suggestions on how to prepare comments to address cumulative impacts in NEPA documents. The guidance is meant to be used in conjunction with the Council on Environmental Quality's handbook "Considering Cumulative Effects Under the National Environmental Policy Act."

Available at www.epa.gov/Compliance/resources/policies/nepa/index.html.

U.S. Fish and Wildlife Service. (March 1998). ***Section 7 Consultation Handbook-Chapter 4—Formal Consultation*****.**

This chapter of the Endangered Species Act Section 7 Consultation Handbook describes the formal consultation process to determine whether a proposed action is likely to threaten the existence of a listed species or jeopardize its critical habitat. The "effects of the action" section of the chapter addresses indirect and cumulative effects and provides examples of some, such as predators following ORV tracks into nesting sites, and the way a new highway would benefit two different mining operations. This section of the chapter also cites case law and provides definitions relevant to indirect and cumulative impacts.

Available at http://endangered.fws.gov/consultations/s7hndbk/ch4.pdf.

STATE AND LOCAL

California Deportment of Transportation. (April 2004). *Environmental Handbook, Volume I, Chapter 14: Biological Resources*.

This chapter discusses the framework within which biological resources are considered during project planning, development and implementation. The laws, regulation and policy that apply to biological resources are discussed within the context of project delivery timelines. In addition to Federal laws and regulations, the chapter provides links to, and information about State and local laws and various guidance. The chapter also briefly breaks out information on cumulative impact analysis from NEPA, CEQ, and the ESA.

Available at http://www.dot.ca.gov/ser/vol1/sec3/natural/Ch14Bio/ch14bio.htm.

California Department of Transportation.. (2003.) Environmental Handbook, Volume 4: Community Impact Assessment.

This chapter of the Environmental Handbook outlines the basic analytic techniques that Caltrans environmental planners should use to assess potential community impacts, and also offers examples of avoidance, minimization, and mitigation strategies for such impacts. The chapter presents Federal and State guidance on land use and growth inducement discussions, as well as consistency with local and regional plans, farmland impacts, and social impacts.

Charlotte County-Punta Gorda Metropolitan Planning Organization. (June 2001). *Secondary and Cumulative Impact Assessment in the Planning Process*.

In March 2001, several task groups were organized in Florida to address specific issues and problems relating to environmental streamlining. One of these groups—the Secondary and Cumulative Impact Task (SACIT) Group—was asked to address the definition of secondary and cumulative impacts. In June 2001, the Charlotte County-Punta Gorda Metropolitan Planning Organization issued this technical report, which summarizes the work of the SACIT Group. The report includes a brief description of the 11 steps identified by the Council on Environmental Quality in cumulative effects analysis and groups them into three categories. In addition, the report describes the results of a survey that the participants in the group completed. Questions on the survey included whether secondary and cumulative impact review should be a two-pronged approach; what transportation projects evoked consideration and mitigation of secondary and cumulative impacts, what issues are considered significant secondary and cumulative impacts of transportation projects; what is the geographic scope of analysis for each of the identified secondary and cumulative impacts identified; what is the difference between secondary and cumulative impact; and who is responsible for mitigating secondary and cumulative impacts. The report also has a list of the strengths and weaknesses of various land use impact evaluation tools and

what issues each tool can be used to address, such as creating a baseline forecast or performing an impact assessment.

Available at http://www.ulam.org/%5CSACI-Lisa.PDF.

Colorado Department of Transportation. *Identifying True Cumulative Effects*. (February 2004). Washington, DC. (presentation).

The message of this presentation is that a regional focus to cumulative effects analysis can improve the analysis process. A regional focus is intended to provide a more complete and accurate picture of cumulative effects, move cumulative effects analysis to the front of the process, be more applicable than corridor specific analysis, and encourage partnership between agencies. The presentation describes the four phases of a regionally focused cumulative effects analysis (i.e., use expert panels to create qualitative regional cumulative effects analysis, develop tools to move from qualitative to quantitative regional cumulative effects analysis, use quantitative tools to predict future cumulative effects and critical resources, and coordination between agencies), and provides examples that illustrate the phases. The presentation ends with an overview of the benefits that may come from greater regional focus in cumulative effects analysis.

Available at http://www.environment.transportation.org/environmental_issues/secondary_indirect_cumulative_impacts/workshop/Norton_files/frame.htm.

Colorado Department of Transportation. (December 2003). *Sustaining Nature and Community in the Pikes Peak Region: A Sourcebook for Analyzing Regional Cumulative Effects*.

This report provides a general discussion of cumulative effects and sustainability, and an overview of issues specific to Colorado's Pikes Peak region. Section one of the report introduces biodiversity and quality of life as components of sustainability and describes the preparation of this document. Section one also provides a summary of the evolution of the Pikes Peak landscape over the last 100 years. Section two of the report is the Sourcebook. This is a compendium of useful information about six key indicators of sustainability in the Pikes Peak region. Together, the two sections are intended for use by local governments, transportation planners, businesses, individuals, and community groups.

Florida Department of Transportation, Central Environmental Management Office, URS Corporation, & Powell, Fragala, and Associates. (April 2004). *Sociocultural Effects Evaluations: Interim Guidelines for the ETDM Process*.

The FDOT Central Environmental Management Office has developed these Interim Guidelines to provide an approach for conducting Sociocultural Effects (SCE)

Evaluations until the Efficient Transportation Decision Making Manual and supporting handbooks are complete. Section 1.0 of this report describes the process for evaluating SCE during this interim period. Section 2.0 describes the data entities, classifications, and attributes that support SCE Evaluations, as well as how the data should be used in SCE Evaluation. Section 3.0 provides guidance from the Interim Environmental Screening Tool (EST) User Guide for navigating around the Sociocultural Effects module of the EST to enter community characteristics into the database and record the Sociocultural Effects of projects. The report also describes the six SCE issues that should be addressed in an SCE evaluation (i.e., social, economic, land use, mobility, aesthetics, and relocation issues), and the SCE Evaluation tasks that must be performed during the Efficient Transportation Decision Making process.

Available at.
http://www.dot.state.fl.us/emo/pubs/Final%20-%20Sociocultural%20Effects%20Evaluation.pdf

Georgia Department Of Transportation. (2000). *Plan Development Process – 2000: Manual of Guidance 4050, TOPPS 4050*. Last Updated March 2004.

This document explains the procedures and steps necessary for the Georgia Department of Transportation (GDOT) to administer Federal-Aid projects. NEPA is briefly addressed as a process that must be followed for projects involving Federal funds. A broad overview of the three types of environmental documents that may be prepared, the public involvement process, and the analysis of social, economic, and environmental data is given, but indirect and cumulative impacts are not specifically covered.

Available at
http://www.dot.state.ga.us/DOT/preconstruction/SpecialSubjects/PDP/PDF/pdp.pdf.

Idaho Transportation Department. (September 2003). *DRAFT: Environmental Process Manual: Section 2200: Secondary and Cumulative Impacts.*

Produced by the Idaho Transportation Department, this section of the manual covers the production of several sections of an environmental document, including indirect and secondary impacts, cumulative impacts, irreversible and irretrievable commitment of resources, and the relationship between local short-term uses of the environment and long-term productivity. This includes a description of the NEPA requirements for considering cumulative and indirect impacts, a list of related acronyms and abbreviations, a brief glossary, and descriptions of applicable statutes and regulations. In addition, this section of the manual has excerpts of applicable technical and policy guidance from FHWA, CEQ, and the Oregon Department of Transportation. There also is an explanation of guidance given on a specific project by the FHWA Western Resource Center and the Idaho FHWA Division Office. A list

of frequently asked questions also is included, with answers to issues such as why air quality and land use are not considered the purposes of secondary and cumulative impact analyses. Finally, the manual includes several useful exhibits. The first is a series of comment excerpts between the Idaho FHWA Division Office and the Idaho Transportation Department regarding secondary and cumulative impacts. The second exhibit is an EPA memo—Consideration of Cumulative Impacts in EPA Review of NEPA Documents. The third exhibit is questions and answers regarding the consideration of indirect and cumulative impacts in the NEPA process.

Available at http://www.itd.idaho.gov/manuals/Environmental/HTML%20Files/2200.htm#_Toc40240628

Indiana Department of Transportation. (August 2003). *Procedural Manual for Preparing Environmental Studies*.

The "Environmental Considerations: Direct, Indirect, and Cumulative Impacts" section of this manual is a very brief description of the CEQ definitions of direct, indirect, and cumulative impacts. The section refers the reader to the CEQ regulations for more information on indirect and cumulative impacts, and does not contain any State-specific information or guidance.

Available at http://www.ai.org/dot/pubs/manuals/envirStudies/. See Environmental Considerations: Direct, Indirect, and Cumulative Impacts.

Maryland State Highway Administration. *Maryland's Approach to Secondary and Cumulative Effects Analyses*. (February 2004). Washington, DC. (presentation).

This presentation covers Maryland's approach to secondary and cumulative effects analysis (SCEA). SCEA process was co-developed by Maryland State Highway Administration and FHWA Division staff with input from Federal and State resource agencies after reviewing CEQ guidance and similar analyses conducted for major projects in other States. The Maryland SCEA process involves several components, including scope of analysis, geographical/temporal boundaries, methodology to be used (e.g., land use overlays, matrices, interviews with local planners, expert land use panels), analyses, conclusions, and mitigation. The presentation stresses that SCEA analyses should be part of the overall project planning process, and that SCEA should be conducted concurrently with other detailed technical studies after detailed alternates are developed.

Available at http://www.environment.transportation.org/environmental_issues/secondary_indirect_cumulative_impacts/workshop/Pedersen_files/frame.htm.

Maryland State Highway Administration. (June 2000). ***Maryland State's Highway Administration's Secondary and Cumulative Effects Analysis Guidelines for Environmental Impact Statements and Environmental Assessments.***

Maryland State Highway Administration developed these guidelines to provide a consistent framework for secondary and cumulative effects analysis (SCEA). The guidelines provide general procedures for conducting an SCEA. The guidelines also include definitions of secondary (indirect) and cumulative effects and indicate that SCEAs must be incorporated into the overall project planning scoping process and initiated prior to the preliminary alternatives meeting. In addition, the guidelines describe the steps for performing scoping and the initial activities relating to a conducting an SCEA, including how to identify impacted resources and establish geographical boundaries for the analysis, and discuss various analysis methodologies and how summaries of the SCEA should be written. The guidelines conclude with a brief discussion of how to mitigate the effects of secondary and cumulative impacts.

Available at http://www.sha.state.md.us/ImprovingOurCommunity/oppe/scea/other/6-28-00Guidelines.pdf or contact Gay Olsen, golsen@sha.state.md.us or 410-545-8504.

North Carolina Department of Transportation and North Carolina Department of Environmental and Natural Resources (NCDOT/NCDENR). (2004). Indirect and Cumulative Impact Assessment Guidance: Integrated NEPA/SEPA/401 Eight-Step ICI Assessment Process. Prepared by The Louis Berger Group, Inc.

This memorandum describes the manner in which the NCDOT/NCDENR Indirect and Cumulative Impact (ICI) Assessment Procedures can incorporate water quality considerations. According to the memo, the primary concern for transportation project indirect and cumulative impacts from a water quality perspective is non-point source pollution from urban activities (i.e., urban runoff). Consequently, procedures to address non-point source pollution in the context of transportation project ICI assessment are the primary focus of the memo. By incorporating such procedures into the ICI assessment guidance, the assessment can provide the basis for addressing cumulative impacts as required by the Department of Environment and Natural Resources, Division of Water Quality to implement Section 401 of the Clean Water Act.

Available at http://www.ncdot.org/planning/pe/naturalunit/NEPA401Guidance.doc.

North Carolina Department of Transportation. (November 2001). ***Guidance for Assessing Indirect and Cumulative Impacts of Transportation Projects in North Carolina, Volume I: Guidance Policy Report,*** **and** ***Volume II Practitioner's Handbook.***

Divided into two volumes, this guidance is designed to help with the evaluation of the indirect and cumulative effects of transportation projects. The purpose of the

guidance is to provide practitioners with a tool to help in the identification, analysis, and assessment of indirect and cumulative effects of transportation projects as part of the NEPA/SEPA process. The guidance also is designed to help agencies understand the assessment of indirect and cumulative effects and to provide a "standard" for reviewing NEPA/SEPA assessment documents. To meet these goals, the guidance includes background information on the assessment of indirect and cumulative project impacts, including descriptions of related terminology, relevant statutes, regulations, guidelines, and case law. The guidance also provides direction on project scoping issues, direction on identification and evaluation of project-induced growth effects, and descriptions of various methodologies for assessing indirect and cumulative effects. Finally, the guidance describes a framework for incorporating indirect and cumulative effects into NEPA/SEPA documents and planning and other activities. Volume I comprises the technical memoranda prepared for the agencies' review in developing the guidance. Volume II describes the "how-to" methods of indirect/cumulative impact assessment.

Available online at http://www.ncdot.org/planning/pe/naturalunit/ICI_Guidance_Volume1.pdf and http://www.ncdot.org/planning/pe/naturalunit/ICI_Guidance_Volume2.pdf or contact Gail Grimes at ggrimes@dot.state.nc.us or 919-733-7844 ext. 323.

Oregon Department of Transportation. (April 2001). ***Final Report, SPR 327—A Guidebook for Evaluating the Indirect and Cumulative Growth Impacts of Highway Improvements*****. Prepared by ECONorthwest and Portland State University.**

Designed for staff at the Oregon Department of Transportation (ODOT), this guidebook provides guidance for completing environmental analysis and documentation on the indirect land use impacts of highway improvements. Information in the guidebook is based on the results of a study that ODOT conducted to better understand the "cause and effect" relationships among highway capacity, travel demand, and development patterns. The guidebook is not a directive, but a compilation of recommendations for taking a systematic look and consistent approach to predicting, estimating, and describing the indirect land use impacts of highway improvements. The body of the guidebook includes a framework and steps for evaluating the indirect impacts of highway improvements on land use as well as a sample analysis and report. The appendices of the report provide background information on the study on which the guidebook is based.

Available at http://www.odot.state.or.us/tddresearch/reports/pdf/guidebook.pdf or contact Alan R. Kirk at Alan.R.Kirk@odot.state.or.usat or 503-986-4130.

Washington State Department of Transportation. (March 2004). ***Environmental Procedures Manual-Revision 2004-1, Section 480: Secondary and Cumulative Impacts.***

The *Environmental Procedures Manual* is a compilation of environmental procedures and processes that is anticipated to be used as a guidance resource by the Washington State Department of Transportation (WSDOT). Section 480 focuses on indirect or secondary impacts, cumulative impacts, irreversible and irretrievable commitment of resources, and the relationship between local short-term uses of the environment and long-term productivity.

Section 480 is available at http://www.wsdot.wa.gov/fasc/EngineeringPublications/Manuals/EPM/480.pdf.

The entire document is available at http://www.wsdot.wa.gov/fasc/EngineeringPublications/Manuals/EPM/March2004Revision.pdf.

Wisconsin Department of Transportation. ***Land Use in Environmental Documents—Indirect and Cumulative Effects Analysis for Project-Induced Land Development, Technical Reference Guidance Document.***

Targeted at District staff and consultants responsible for assessing a project's potential to indirectly change land development patterns, this technical guidance provides a framework for conducting indirect and cumulative effects analysis; background and reference information on land use planning, regulation, and the relationship between transportation and land use; and detailed information on specific analysis techniques. The framework described in the document can be used to assess a project's potential to change land development patterns as part of the system of land development present in the project study area. The systems approach helps users envision the project's effects as they interact with other factors that affect land use patterns and development. The guidance is divided into seven chapters, each describing a step in the framework.

Available at http://environment.transportation.org/environmental_issues/secondary_indirect_cumulative_impacts/techguidwholedoc.pdf or contact Susan Fox at susan.fox@dot.state.wi.us or 608-267-4473.

OTHER

American Association of State Highway and Transportation Officials. (February 2004). *2004 AASHTO Secondary and Cumulative Impacts Workshop: Who, What, Where, and Most Importantly, How?* Washington DC. (presentation).

This presentation highlights some of the best practices in secondary and cumulative impact analysis and explains how secondary and cumulative impacts analysis relates to the US 12 Memorandum of Agreement. The presentation uses examples of projects in Wisconsin to show methodologies for secondary and cumulative impacts analysis. The conclusions of the presentation are that it helps to involve resource agencies early, seek buy-in from resource agencies, that there is a need for a transparent process and procedure because there is no "black box solution", and to use local expertise.

Available at www.environment.transportation.org/environmental_issues/secondary_indirect_cumulative_impacts/workshop/Fox_files/frame.htm.

Bright, Elise M. (January 1982). Secondary Impacts of Airports: An Assessment of Planning Procedures. *Transportation Quarterly*, 36(1).

The development of a public airport with Federal funds is a process that involves agencies at all government levels as well as private organizations and individuals. This article evaluates the effectiveness of the airport development process in dealing with secondary impacts. It discusses airport system plans developed at the Federal, State, and regional/metropolitan levels, and suggests changes to how these plans are developed, coordinated, and implemented for improved handling of secondary impacts. The article also addresses the failure of the Environmental Assessment Process to result in beneficial changes to airport planning or design, and makes suggestions to remedy this. Defining boundaries of airport-impacted areas, government's role, enforcement measures, and innovative planning and implementation are also covered.

Buffington, Jesse L., Herndon, Cary W., and Weiss, Michael E. (1978.) Non-User Impacts of Different Highway Designs as Measured by Land Use and Land Value Changes. *Texas Transportation Institute* Research Report 225-2.

This report reviews the types of highway impacts, highway impact assessment elements, techniques for measuring land use and land value impacts, and the literature indicating the magnitude of land use and land value changes from various types of highway improvement. Land use and land value changes are divided into three categories in this report: land use and land value measurement models; land use and traffic models; and land use and urban development models. The report concludes that the literature contains no procedure for highway analysts to use impact data from

previous studies in predicting impacts from proposed projects, and so suggests two methods for doing so. The report also advises how to choose which of the two methods, Comparable Data Prediction Procedure (CDPP) or Inferred Data Prediction Procedure (IDPP), is more appropriate in different circumstances.

Cooper, T.A and Canter L.W. (1997). Documentation of Cumulative Impacts in Environmental Impact Statements. *Environmental Impact Assessment Review* 17.

This study involved the systematic review of 33 EISs from USDA, FHWA, and the Army Corps of Engineers in order to identify deficiencies in the documentation of cumulative impacts (CIs). Results show that although documentation practices have improved since 1990, inadequacies still exist. To remedy the problems identified in the study, the authors suggest the following: CIs should be reported in a separate part of the "Environmental Consequences" section, and they should be addressed for each pertinent resource; a summary of CIs should be included; any CIs considered not significant should be mentioned, plus the reason(s) for their non-significance; spatial and temporal boundaries addressed within the CI Assessment (CIA) process should be defined for pertinent environmental resources; and utilized guidance and methodologies should be described.

Douglas, Ian and Lawson, Nigel. (2003). Airport construction: materials use and geomorphic change. *Journal of Air Transport Management* 9.

This article details the direct and indirect environmental impacts associated with airport construction. The authors draw attention to the fact that although most of the well known impacts affect areas physically close to the airport, many other effects should be considered. Increasingly, airports act as a magnet for related commercial and industrial development, and so airport construction together with increased development may seriously compromise ecosystems indirectly through runoff, airborne emissions, and land disturbances. Impacts associated with mining, quarrying, aviation fuel production, and disposal of harmful materials used on aircraft, which may take place very far from the airport, are also addressed.

European Commission/Hyder. (May 1999). *Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions*.

Commissioned by the European Commission: Directorate-General XI (Environment, Nuclear Safety and Civil Protection), these guidelines consider the assessment of indirect and cumulative impacts as well as impact interactions within the Environmental Impact Assessment (EIA) process. It presents the results of research and consultations conducted by Hyder, in the form of guidelines, which advise practitioners on how to approach indirect and cumulative impacts during the various stages of an EIA, how to adapt the approach to a specific project, and suggests methods and tools for identifying and assessing indirect and cumulative impacts, as well as impact interactions.

Available at
http://www.regione.calabria.it/psu/web/..%5CInformation%20Package%5CEIA%203.pdf.

Florida Atlantic University/Florida International University Joint Center for Environmental and Urban Problems. (1998). ***Secondary and Cumulative Environmental Impacts of Transportation Projects*****. FL-ER-70-98.**

This study upon which this paper was written was undertaken by Florida Atlantic University/Florida International University Joint Center for Environmental and Urban Problems for the Florida Department of Transportation to analyze the methods currently used to assess secondary and cumulative impact and to recommend a more comprehensive system of evaluations. To develop the study, researchers conducted extensive literature reviews, interviews with decision-makers, and a review of existing methodologies. As a result, the paper presents a method for evaluating secondary and cumulative impacts during transportation planning and project development. The paper also discusses the optimal phase in transportation projects in which to identify and document impacts and recommendations for making consistent evaluations of impacts. In addition, the paper includes recommendations that the definition of "secondary impact" be altered, and that an impartial oversight body be created to foster mediation among various agencies.

Executive summary available at
http://www.dot.state.fl.us/researchcenter/Completed_Proj/Summary_EMO/FDOT_788.pdf. Contact Win Lindeman at win.lindeman@dot.state.fl.us or 850-410-5886 for a copy of the report.

Horton, Michael. (February 2004). ***The Endangered Species Act, Indirect and Cumulative Effects, and Highway Development.*** **Washington, DC. (presentation)**

This presentation by Michael Horton is based on the requirement that Federal agencies ensure that that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of listed endangered species or their critical habitats (section 7(a)(2)). It covers consultation procedures, such as Interagency Cooperation Regulations 50 CFR 402.02, as well as the treatment of indirect and cumulative effects under the endangered species act (ESA), saying that indirect effects must be analyzed regardless of whether the action agency has control or discretion over them; however, this does not mean that the action agency must mitigate for them. It also provides references for relevant court rulings on indirect effects under the ESA.

Available at
http://www.environment.transportation.org/environmental_issues/secondary_indirect_cumulative_impacts/workshop/Horton_files/frame.htm.

Lenzen, Manfred, Murray, Shauna A., Korte, Britta and Dey, Christopher J. (2003.) Environmental impacts assessment including indirect effects – a case study using input-output analysis. *Environmental Impact Assessment Review* (23).

This article describes the benefits of, and a methodology for, conducting input-output analysis as part of an EIS. The authors describe possible 1st, 2nd, and 3rd order environmental impacts that could occur in a wide range of projects, but that may be overlooked in environmental impact analysis (EIA), or could be too complicated to be accounted for. Input-output analysis is offered as a way to quantify these complex indirect impacts that may occur far from the actual project site spatially or temporally. The article focuses on the construction of an airport in Sydney, Australia as a case study, and demonstrates input-output analysis conducted for this project. The authors conclude that input-output analysis can significantly improve the completeness of a conventional EIS for a range of quantifiable indicators, improve the ability to rank alternative options, and provide an overview of indirect impacts to be used for streamlining the EIA audit.

Moyer, Jennifer. (February 2004). *Indirect and Cumulative Effects Assessment.* Washington, DC. (presentation).

This presentation acknowledges that although there are definitions of indirect and cumulative effects provided in CEQ and Army Corps of Engineers regulations, these definitions do not provide instruction as to what should be done to evaluate indirect and cumulative impacts (ICIs). The presentation focuses on the aquatic environment, and the level of effort needed to evaluate ICIs to the aquatic environment. Scope and scale of the assessment, the importance of understanding trends and context of the analysis, and mitigation and monitoring are stressed. Overall, the presentation makes recommendations to focus on the aquatic environment, utilize existing information, think holistically, and use ICI assessment as a tool for developing an effective mitigation plan.

Available at http://www.environment.transportation.org/environmental_issues/secondary_indirect_cumulative_impacts/workshop/Moyer_files/frame.htm.

National Cooperative Highway Research Program. (2002). *NCHRP Report 466—Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects.* Prepared by the Louis Berger Group.

The objectives of this project focused on the update of *NCHRP Report 403, Guidance for Estimating the Indirect Effects of Proposed Transportation Projects* and to provide training materials related to the use of Report 403. The Desk Reference contains a synthesis of regulations, case law, published literature, EIS content, and practitioner experience in indirect effects analysis and documentation. It discusses a

framework for identifying and analyzing indirect impacts of transportation projects. Appropriate tools and techniques are also referenced. The Desk Reference is supported by a course curriculum that provides instruction on applying the techniques of Report 403.

The Desk Reference is available (in PDF format) at gulliver.trb.org/publications/nchrp/nchrp_rpt_466.pdf or can be ordered online at the Transportation Research Board (TRB) bookstore at www.nationalacademies.org/trb/bookstore/.

National Cooperative Highway Research Program. (April 2002). *The Use of Expert Panels in Analyzing Transportation and Land Use Alternatives*. Prepared by Parsons Brinckerhoff Quade and Douglas, Inc.

This report provides guidance on when and how to conduct expert panels for transportation planning and analysis applications. The guidance draws primarily upon six case studies of recent expert panel processes that functioned similar to the Delphi Method (i.e., a highly structured technique in which selected experts provide their assessment of likely future outcomes by responding to several rounds of questions). An expert panel can be used as a primary analysis method or in conjunction with other tools, and is a cost-effective technique that can be applied in a variety of settings to produce reliable results. The three sections of the report provide a foundation for the guidance on carrying out successful expert panels that follows. First, the report defines what an expert panel is and is not, which is followed by a discussion of the variety of applications for which they are most suited. Finally, report touches briefly on the nature of empirical study, validation, and forecasting.

Available at http://nepa.fhwa.dot.gov/ReNEPA/ReNepa.nsf/All+Documents/CCECF4D789DB510E85256CE6006142A0/$FILE/use_of_expert_panels.pdf.

National Cooperative Highway Research Program. (2001). *NCHRP Report 456—Guidebook for Assessing the Social and Economic Effects of Transportation Projects*. Prepared by David J. Forkenbrock, Public Policy Center, University of Iowa, and Glen E. Weisbrod, Economic Development Research Group, Boston, MA.

Presented in guidebook format, this report identifies current best methods, tools, and techniques for assessing the social and economic effects of transportation projects on their surrounding communities. The guidebook defines 11 general types of social and economic effects, such as changes in travel time, vehicle operating costs, transportation choices, and accessibility, and provides insights into and evaluations of the methods, tools, and techniques available to assess them. The guidebook also includes appendices describing the use of geographic information systems and travel demand modeling to assess the effects of transportation projects. The information contained in the guidebook is based on an extensive literature review and

comprehensive survey of State departments of transportation and metropolitan planning organizations. The guidebook will help planners comply with applicable laws, executive orders, and regulations and employ best practices for good participatory planning.

Available at http://gulliver.trb.org/publications/nchrp/nchrp_rpt_456-a.pdf or from the Transportation Research Board (TRB) bookstore at http://www.nationalacademies.org/trb/bookstore/.

National Cooperative Highway Research Program. (1999). *NCHRP Report 423A—Land Use Impacts of Transportation: A Guidebook*. Prepared by Parsons Brinckerhoff Quade and Douglas, Inc., and Transportation Management and Design.

This guidebook aims to improve the practice of land use forecasts, and to identify tools and procedures for realistically evaluating the land use impacts of transportation investments and policies. The guidebook is broken down into four chapters. Chapter 1 reviews what is known about the relationship between land use and transportation. Chapter 2 evaluates the analytical tools that are currently available for these tasks. Chapter 3 outlines a behavioral framework for understanding the process of urban growth and development. Chapter 4 describes processes for doing base case forecasts and land use impact assessments using familiar tools but drawing upon the behavioral framework.

Available at http://nepa.fhwa.dot.gov/ReNEPA/ReNepa.nsf/0/ccecf4d789db510e85256ce6006142a0/$FILE/land_use_guidebook.pdf or from the Transportation Research Board bookstore at http://www.nationalacademies.org/trb/bookstore.

National Cooperative Highway Research Program. (1998). *NCHRP Report 403—Guidance for Estimating the Indirect Effects of Proposed Transportation Projects*. Prepared by the Louis Berger Group.

This document presents the findings of research performed under NCHRP Project 25-10, "Estimating the Indirect Effects of Proposed Transportation Projects." The research focused on various perspectives of definition, identification, and assessment of indirect effects on proposed transportation projects. The research included a review of environmental policy and NEPA implementation resources of transportation and environmental resource agencies, other related documentation, relevant case law, published literature, and environmental impact statements. Interviews with transportation and resource agency personal involved in the preparation and review of EISs were also included. The guidance establishes an analysis framework for identification and assessment of indirect effects for transportation projects.

O'Brian, Arnold L. and Pennell, Stephen. (2000.) Assessing cumulative impacts on hydrologically sensitive areas under conditions of suburban development. ***Hydrological Science and Technology*** **18(1-4**).

This paper addresses the sensitivity of certain areas to changes in the amount and nature of hydropological inputs. These changes can take place when land is developed and roofs, driveways, storm drains, and roads alter the amount and pattern of water entering the ground water or aquifer. The paper notes that techniques for assessing the impacts of such changes on hydrologically sensitive area are not widely used despite the fact that they could identify potentially serious impacts. The authors describe a case study in which the SWMS_2D numerical model, a program that is able to account for impacts to groundwater and aquifers, was a useful tool in cumulative impacts assessment. The model allows the user to test how an aquifer will fare under many different scenarios, and although the results are not necessarily accurate quantitative predictors of the aquifer's reactive to different inputs, it reveals significant trends and valuable qualitative information about impacts to the aquifer.

Still, Katherine and Seskin, Sam (editors). (2003). ***Methods for Evaluating Secondary and Cumulative Land Use Impacts.*** **Vol. 1, No. 1.**

This is the first edition of a newsletter intended to serve as a forum to share new ideas and questions on the topic of secondary and cumulative land use impacts. The two-page newsletter contains brief descriptions of several transportation projects, and provides links for more information. Links to guidance documents and other resources are also provided. Methodologies and challenges related to secondary and cumulative impacts are not addressed in this issue.

Available at
http://nepa.fhwa.dot.gov/ReNEPA/ReNepa.nsf/All+Documents/E5FA4540E7FA4F6E85256CD900464984/$FILE/impacts%20v1%20n1.doc.

Transit Cooperative Research Program. (2002). ***Estimating the Benefits and Costs of Public Transit Projects: A Guidebook for Practitioners*****.**

This guidebook provides a valuable resource for people responsible for analyzing the benefits and costs of public transportation services and presenting the results of these analyses to decisionmakers, the media, and the public. The guidebook is divided into five sections. Section I explains how to use the guidebook and provides an overview of benefit-cost evaluation concepts and their application to transit projects. Section II addresses the basic benefits and costs of transit projects, including impacts on travel, secondary impacts on the environment and safety, and the direct costs and revenues of transit projects. Section III discusses other benefits and costs of transit projects, including impacts on land use and land development, economic impacts, and the distribution of impacts. Section IV provides an example with sample analyses. Section V consists of four appendices that provide a bibliography, integrated models

for conducting comprehensive benefit-cost analysis, sample calculations, and conversion factors for calculating constant dollars. An electronic version of the guidebook is included on a CD-ROM, which accompanies the printed guidebook.

Available at http://gulliver.trb.org/publications/tcrp/tcrp78/index

Appendix D:
Training Courses

Courses Related to Indirect and Cumulative Impacts

Identified courses that focus on indirect or cumulative impacts, or include substantive modules on indirect and cumulative impacts are listed below. General NEPA courses that only include mention of indirect or cumulative impacts are not included. Courses highlighted in **bold** focus solely on either indirect or cumulative impacts, while others include other topics.

Following this listing, a description of each course is provided, identifying topics covered, availability of course materials, course duration, eligibility, target audience, logistics, and contact information. This information was developed based on available information on each course and is subject to change.

Duke University

- **Accounting for Cumulative Effects in the NEPA Process**
- Preparing and Documenting Environmental Impact Analyses
- Implementation of NEPA

Environmental Impact Training

- Advanced Topics in EIA
- Strategic Environmental Assessment: Principles and Practices Related to Programmatic EAs and EISs
- **Cumulative Effects Assessment**

Environmental Planning Strategies

- **Conducting Quality Cumulative Impact Analyses under the National Environmental Policy Act (NEPA)**

Environmental Training & Consulting International

- Essentials for the NEPA Practitioner
- **Assessing Cumulative Impacts**

National Cooperative Highway Research Program

- **Estimating the Indirect Effects of Proposed Transportation Projects**

The Shipley Group

- **Cumulative Impact Analysis and Documentation Process**

U.S. Department of Transportation, Federal Highway Administration, National Highway Institute

- NEPA and Transportation Decision Making
- **Indirect and Cumulative Impact Workshop**

U.S. Department of Agriculture Forest Service

- **NEPA/NFMA Forest Plan Implementation Training Course**

U.S. Army Corps of Engineers Professional Development Support Center

- Regulatory IIA
- Regulatory IIB

U.S. Department of Energy, Management, Budget & Evaluation

- **NEPA: Assessing Cumulative Impacts**

U.S. Fish and Wildlife Service

- **Cumulative Effects Assessment**

U.S. Environmental Protection Agency and Federal Highway Administration

- **Methods for Evaluating Secondary and Cumulative Land Use Impacts**

Accounting for Cumulative Effects in the NEPA Process
Duke Environmental Leadership Program

The course is entirely focused on cumulative impacts.

Areas Covered
- Cumulative effects concepts and principles
- Scoping techniques
- Baseline conditions
- Information sources and methods for effects identification and prediction

Course Materials
- Course not currently offered; when offered, course materials will only be available through registration for the course.

Duration
- 2.5 days

Eligibility
- Open to all

Target Audience
- Not specifically mentioned

Logistics
- Location: Durham, NC
  * Custom onsite classes also available for parties of 10 or more *
- Offerings: Annually
- Cost: $695 ($775 after deadline)

Contact Information
- Ray Clark, lead instructor for NEPA certificate program, (202) 544-8200, rayclark@clarkgroupllc.com
- Deb Hall, contact at DEL office, (919) 613-8700, dwhall@duke.edu

Preparing and Documenting Environmental Impact Analyses
Duke Environmental Leadership Program
http://www.nicholas.duke.edu/del/shortcourses/courses/envimpact.html

Approximately 2.5 of 24.5 hours of the course related to indirect and cumulative impacts.

Areas Covered
- How to prepare, document, coordinate and review information required by NEPA

Course Materials
- Course materials only available through registration for the course.

Duration
- 3.5 days

Eligibility
- Open to all

Target Audience
- Novice NEPA writers or reviewers
- Entry and junior level Federal agency professionals
- Contractors

Logistics
- Location: Durham, NC
  * Custom onsite classes also available for parties of 10 or more *
- Offerings: Annually
- Cost: $990 ($1090 after deadline)

Contact Information
- Ray Clark, lead instructor for NEPA certificate program, (202) 544-8200; rayclark@clarkgroupllc.com
- Deb Hall, contact at DEL office, (919) 613-8700, dwhall@duke.edu

Implementation of NEPA
Duke Environmental Leadership Program
http://www.nicholas.duke.edu/del/shortcourses/courses/NEPAimplementation.html

Approximately 3 of 31.5 hours of the course related to indirect and cumulative impacts.

Areas Covered
- Brief history of land-use regulation in the United States
- Detailed reviews of legislative history and intent of NEPA, overview of Council on Environmental Quality (CEQ) regulations
- Integrating NEPA into agency decision-making
- Role of the public, scoping, public involvement programs
- Limitations of actions a Federal agency may take during the NEPA process
- Alternative approaches to holding large public meetings
- Comparison of agencies implementing regulations
- Methods for conducting environmental impact analyses
- Alternatives to a proposed action
- Determining "significances"
- Socio-economic impact assessment
- Ecological risk assessment
- Environmental justice, tribal issues
- Mitigating environmental impacts
- Records of decision, case study
- NEPA case law
- Current issues in NEPA
- Emerging technology
- Litigation risks and consequences and how to avoid them

Course Materials
- Not available without registering for the course

Duration
- 4.5 days

Eligibility
- Open to all

Target Audience
- Mid-level and senior project managers who are involved with streamlining the environmental permitting process for Federal facilities and Federal regulatory activities and preparing and reviewing environmental assessments, environmental impact statements, and other NEPA analyses

Logistics

- Location: Durham, NC
  * Custom onsite classes also available for parties of 10 or more *
- Offerings: Annually
- Cost: $1050 ($1150 after deadline)

Contact Information

- Ray Clark, lead instructor for NEPA certificate program, (202) 544-8200, rayclark@clarkgroupllc.com
- Deb Hall, contact at DEL office, (919) 613-8700, dwhall@duke.edu

Advanced Topics in EIA
Environmental Impact Training
http://www.eiatraining.com/On-Site_Courses/on-site_courses.html

Approximately 2 of 22.5 hours of the course address indirect and cumulative impacts.

Areas Covered
- Environmental Impact Assessment (EIA) project planning
- Strategic Environmental Assessment, i.e., Programmatic EIS in the U.S.
- Identifying alternatives
- Scoping
- Techniques for forecasting impacts
- Cumulative impact assessment
- Use of GIS in EIA
- Risk assessment in EIA
- Expert systems in EIA
- Use of the Internet in EIA
- Decision support systems
- Mitigation banking and incremental cost analysis for mitigation planning
- Environmental Justice
- Economic valuation of environmental impacts
- Environmental monitoring and auditing

Course Materials
- Not available without registering for the course, and not all courses offered by Environmental Impact Training have specific training materials associated with them.

Duration
- 3 days

Eligibility
- Open to all

Target Audience
- Courses are generally requested by government agencies, industry, and consulting firms.

Logistics
- Onsite training only, call for information

Contact Information
- Larry Cantor, (830) 596-8804, info@eiatraining.com

Strategic Environmental Assessment: Principles and Practices Related to Programmatic EAs and EISs

Environmental Impact Training

http://www.eiatraining.com/On-Site_Courses/on-site_courses.html

Approximately 3 of 18 course agenda items address indirect and cumulative impacts.

Areas Covered

- Environmental Impact Assessment (EIA) of policies, plans, and programs
- International, regional, and sectoral Strategic Environmental Assessments (SEAs)
- Policy-level impact studies
- Steps in planning a SEA, including scoping
- SEA and sustainable development
- Addressing cumulative effects within SEA
- Environmental indicators and methods for use in SEAs
- Mitigation measures/programs in SEA
- Overcoming institutional and technical barriers related to Programmatic EAs and EISs

Course Materials

- Not available without registering for the course, and not all courses offered by Environmental Impact Training have specific training materials associated with them.

Duration

- 3 days

Eligibility

- Open to all

Target Audience

- Courses are generally requested by government agencies, industry, and consulting firms.

Logistics

- Onsite training only, call for information

Contact Information

- Larry Cantor, (830) 596-8804, info@eiatraining.com

Cumulative Effects Assessment
Environmental Impact Training
http://www.eiatraining.com/On-Site_Courses/on-site_courses.html

Course is entirely focused on cumulative impacts.

Areas Covered
- Effects considerations in an EIA
- Principles and procedures
- Determining spatial and temporal boundaries for cumulative effects
- Defining baseline conditions
- Delineation of reasonably foreseeable future actions
- Methods for identifying cumulative effects
- Incorporation of Cumulative Effects Assessment considerations during scoping
- Mitigation and monitoring of cumulative effects

Course Materials
- Not available without registering for the course, and not all courses offered by Environmental Impact Training have specific training materials associated with them.

Duration
- 3 days

Eligibility
- Open to all

Target Audience
- Courses are generally requested by government agencies, industry, and consulting firms.

Logistics
- Onsite training only, call for information

Contact Information
- Larry Cantor, (830) 596-8804, info@eiatraining.com

Conducting Quality Cumulative Impact Analyses under the National Environmental Policy Act (NEPA)
Environmental Planning Strategies, Inc.

Course is entirely focused on cumulative impacts.

Areas Covered
- Conducting effective and practical NEPA cumulative impact analyses
- Selecting the proper scope of analysis
- Developing an appropriate baseline
- Incorporating correct past, present, and reasonably foreseeable future actions
- The framework of NEPA, the CEQ regulations, CEQ guidance, EPA guidance, and legal precedent

Course Materials
- Not available without registering for the course.

Duration
- 2-3 days

Eligibility
- Open to all

Target Audience
- Courses are generally requested by Federal and State agencies; the workshop is highly tailored to the sponsoring agency.

Logistics
- Call for information

Contact Information
- Judith Lee, (563), 332-6870, Jleeeps@mchsi.com

Essentials for the NEPA Practitioner
Environmental Training & Consulting International
http://www.envirotrain.com/nepatoolbox.html

Approximately 2 of 14 course agenda items related to indirect and cumulative impacts.

Areas Covered
- NEPA overview
- How the NEPA process works
- Initial scoping
- Identifying significant issues
- Developing appropriate alternatives
- Creating effective public involvement strategies
- The relationship of NEPA to other environmental requirements (e.g., cultural resources management and Endangered Species Act)

Course Materials
- Not available without registering for the course

Duration
- 2 days

Eligibility
- Open to all

Target Audience
- Line, project, and environmental managers responsible for NEPA compliance
- Staff writers and editors who prepare EAs/EISs
- Resource and technical specialists who contribute to NEPA analyses
- Interdisciplinary team leaders and members
- Environmental contractors and consultants

Logistics
- Onsite training only, call for information

Contact Information
- Leslie Wildeson, (720) 859-0380, info@envirotrain.com

Assessing Cumulative Impacts
Environmental Training & Consulting International
http://www.envirotrain.com/nepatoolbox.html

Course is entirely focused on cumulative impacts.

Areas Covered
- Tools for identifying cumulative effects and using the methods of analysis contained in the Council on Environmental Quality cumulative effects guidance

Course Materials
- Not available without registering for the course

Duration
- 2 days

Eligibility
- Open to all

Target Audience
- Technical specialists who do NEPA analyses
- Anyone who prepares EAs/EISs or manages or supports those who do

Logistics
- Onsite training only, call for information

Contact Information
- Leslie Wildeson, (720) 859-0380, info@envirotrain.com

Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects

National Cooperative Highway Research Program

www.4.trb.org/trb/crp.nsf

Course materials are a set of slides supporting NCHRP Report 466.
Course is entirely focused on indirect impacts.

Areas Covered

- Statutory and regulatory context for indirect effects
- Case law on indirect effects evaluation
- Initial scoping for indirect effects analysis
- Identifying the study area and goals
- Inventorying notable features
- Identifying impact-causing activities of the proposed action and alternatives
- Identifying potentially significant indirect effects for analysis
- Analyzing indirect effects, including qualitative and quantitative forecasting tools
- Evaluating analysis results
- Developing appropriate mitigation and enhancement strategies

Course Materials

- Course materials are available free on the web at: http://www4.trb.org/trb/crp.nsf/All+Projects/NCHRP+25-10(2)

Duration

- Unspecified; contains ten course modules

Eligibility

- Available to all

Target Audience

- Technical specialists who do NEPA analyses
- Anyone who prepares EAs/EISs or manages or supports those who do

Logistics

- Available on-line

Contact Information

- Larry Pesesky, (973) 678-1960 x487, lpesesky@louisberger.com

Cumulative Impact Analysis and Documentation Process
The Shipley Group
http://www.shipleygroup.com/pages/workshops.html

Course is entirely focused on cumulative impacts.

Areas Covered
- Defining compliance minimums and cumulative impacts
- Review of Council on Environmental Quality (CEQ) guidance on cumulative impacts
- Choosing methodologies for cumulative impact analysis
- Documenting cumulative impact analysis in an EA or an EIS

Course Materials
- Course materials not usually offered without registering for the course. Instructor will make materials available to EO 13274 Work Group members for review.

Duration
- 2 days

Eligibility
- Open to all

Target Audience
- NEPA coordinators
- Technical specialists
- Interdisciplinary teams
- Decision makers
- Reviewers of NEPA documents

Logistics
- Location:
  - Various locations in the Western U.S.

  * Onsite training available *
- Offerings: twice/year
- Cost: $595

Contact Information
- Syd Allen, Vice President, (888) 270-2157

NEPA and Transportation Decision Making

U.S. Department of Transportation, Federal Highway Administration, National Highway Institute

http://www.nhi.fhwa.dot.gov/coursedesc.asp?coursenum=117

The course describes indirect and cumulative impacts.

Areas Covered

- Council on Environmental Quality's and FHWA's regulations and guidance for implementing NEPA and Section 4(f) of the Department of Transportation Act
- Initiatives for interagency coordination and streamlining the project development process including those provisions contained in TEA-21
- Public involvement
- Title VI/ Environmental Justice
- FHWA's policy for mitigation and enhancement
- The role of transportation in achieving sustainable development

Course Materials

- Course workbook is available
- Course materials are available online at http://www.environment.fhwa.dot.gov/tutorials/index.htm as part of a NEPA and transportation project development tutorial

Duration

- 3 days

Eligibility

- Open to all

Target Audience

- FHWA employees; State DOT employees Federal and State environmental resource agency employees
- Local government and MPO employees who participate in the transportation decision making process

Logistics

- Location: Varies depending upon request.
- Offerings: Annually, varies depending upon request
- Cost: Varies depending on class size and participants

Contact Information

- Aung Gye, Course Coordinator, (202) 366-2167

Indirect and Cumulative Impact Workshop
Federal Highway Administration, Office of Project Development and Environmental Review and the Resource Center Environmental Service Team

The workshop is entirely focused on indirect and cumulative impacts related to the transportation project development process

Areas Covered:
- Introduction to the the NEPA transportation project development process
- Essential terminology
- NEPA and other regulatory requirements
- Analysis of indirect and cumulative impacts for transportation projects
- Overview of methodologies
- Process and documentation
- Overview of Case law

Materials
- Powerpoint presentation

Duration
- 1 to 2 days

Eligibility
- Open to all (at the discretion of requesting agency)

Target Audience
- FHWA employees and State DOT employees (primary)
- Federal and State environmental resource agency employees ((at the discretion of requesting agency

Logistics
- State DOTs request through FHWA Division Office
- Others agencies by request
- No charge

Contact Information
- **Lamar Smith, 202-366-8994**
- **Don Cote, 415-744-2650**

NEPA/NFMA Forest Plan Implementation Training Course

U.S. Department of Agriculture Forest Service

http://www.fs.fed.us/emc/nepa/includes/ftcp1.html

Approximately 2 of 18 course agenda items related to indirect and cumulative impacts.

Areas Covered

- Introduction to the National Forest Management Act (NFMA) and NEPA
- Forest Service-specific public involvement concepts
- Building a project record for environmental analysis
- The development of a proposed action statement, purpose and need statement, and a clear statement of the scope of the decision framework
- Introduction to project records
- Definitions and concepts relating to environmental effects
- Scoping and the roles of the responsible official and the ID team
- NEPA documentation requirements
- Content requirements for an Environmental Assessment (EA), Environmental Impact Statement (EIS), and associated decision documents
- NEPA significance criteria
- Alternatives
- Environmental effects analysis
- Monitoring requirements under NFMA and NEPA
- Response to comments
- Decisions and notifications

Course Materials

- Course materials are not available without registering for the course; however, a detailed course outline is available online at the link provided above.

Duration

- 4 days

Eligibility

- Open to non-Forest Service personnel at the discretion of each regional office. Region 5 regularly welcomes people from outside the Forest Service.

Target Audience

- USDA Forest Service line officers responsible for decisions
- People who participate on and are consultants to interdisciplinary (ID) teams that conduct environmental analyses
- Employees from other Federal and State agencies

* A general understanding of the NEPA process and natural resource management experience is recommended, but not required. *

Logistics

- Location: The course was developed by the Forest Service's Washington office, but is offered by regional offices.
- Offerings: Frequently January – March of each year at regional offices
- Cost: Variable

Contact Information

- Joe Carbone, Ecosystem Management Coordination Staff, (202) 205-0884, jcarbone@fs.fed.us

Regulatory IIA

U.S. Army Corps of Engineers Professional Development Support Center
http://pdsc.usace.army.mil/CourseListDetails1.asp?Cntrl_Num=322

Approximately 1 of 8 course agenda items addresses indirect and cumulative impacts.

Areas Covered
- Scope of analysis
- Cumulative impacts
- Administrative appeals
- Historic properties
- Tribal issues
- Endangered species
- Essential fish habitat
- Ocean/inland testing

Course Materials
- A student workbook may be purchased for $65; however, USACE is not allowed, by government regulation, to accept money from contractors, so someone from FHWA or a local USACE district would have to purchase the materials through the U.S. Treasury.

Duration
- 5 days

Eligibility
- Member, USACE who have attended the Regulatory I training course

Target Audience
- Supervisors
- Project managers
- Enforcement officers
- Journeyman level regulators with a minimum of 2 years experience in grade level GS-07 and higher.

Logistics
- Location:
  - Various cities in USACE regions
- Offerings: Approximately twice/year
- Cost: $1080

Contact Information
- Jeanine Wright, (256) 895-7455

Regulatory IIB

U.S. Army Corps of Engineers Professional Development Support Center

http://pdsc.usace.army.mil/CourseListDetails1.asp?Cntrl_Num=323

Approximately 1 of 14 course agenda items addresses indirect and cumulative impacts.

Areas Covered

The decisions that must be made through a permit evaluation including:

- Business perspective
- Excavation rule
- Jurisdictional determination
- Exemptions
- Solid waste
- General permits
- Wetland delineator program
- Wetlands management
- Mitigation
- Cumulative impacts assessments
- Alternatives analysis
- 404(b)(1) guidelines
- Public interest review
- 404(q)

Course Materials

- A student workbook may be purchased for $65; however, USACE is not allowed, by government regulation, to accept money from contractors, so someone from FHWA or a local USACE district would have to purchase the materials through the U.S. Treasury.

Duration

- 5 days

Eligibility

- Member, USACE who have attended the Regulatory I training course

Target Audience

- Supervisors
- Project managers
- Enforcement officers
- Journeyman level regulators with a minimum of 2 years experience in grade level GS-07 and higher.

Logistics

- Location: Various cities in USACE regions
- Offerings: Approximately 3 times/year
- Cost: $1180

Contact Information

- Jeanine Wright, (256) 895-7455

NEPA: Assessing Cumulative Impacts

U.S. Department of Energy, Management, Budget & Evaluation

https://mis.doe.gov/ess/training_catalog_detail.cfm?course_num=000045&skey=none

Course is fully dedicated to cumulative impacts.

Areas Covered

- Recognizing cumulative impacts
- Learning to systematically use the methods of cumulative effects analysis for EISs and EAs

Course Materials

- Currently unknown

Duration

- 2 days

Eligibility

- N/A

Target Audience

- N/A

Logistics

- Location: Not currently scheduled
- Offerings: Not currently scheduled
- Cost: Not currently scheduled

Contact Information

- Danny Corella, Training Coordinator, (202) 287-1682

Cumulative Effects Assessment

U.S. Fish and Wildlife Service, National Conservation Training Center

The course is entirely focused on cumulative impacts.

Areas Covered

- Principles and procedures for cumulative effects assessment
- Delineation of spatial and temporal boundaries;
- Defining baseline conditions;
- Determination of reasonably foreseeable actions;
- Methods for identifying cumulative effects;
- Application of predictive methods;
- Mitigation and monitoring of cumulative effects

Course Materials

- Not available

Duration

- 4 days / 28 hours

Eligibility

- Open to all
- No tuition for FWS personnel. Tuition is $680 for non-FWS participations. The Park Service and Bureau of Land Management each get two tuition waivers and a 20 percent reduction in tuition.

Target Audience

- Personnel involved in the evaluation of cumulative effects and integration of these effects into the environmental impact assessment process.

Logistics

- Contact National Conservation Training Center, 304-876-7202

Contact Information

- Dave Lemarie, NCTC Environmental Conservation Branch, 304-876-7490, or Mary Kimble, NCTC Environmental Conservation Branch, 304-876-7449

Methods for Evaluating Secondary and Cumulative Land Use Impacts
U.S. Environmental Protection Agency and Federal Highway Administration

The course focuses on indirect impacts.

Areas Covered
- Land use impacts of transportation projects
- Methodologies for assessing land use impacts
- Use of expert panels

Course Materials
- Course materials are available free on the web at: http://nepa.fhwa.dot.gov/ReNepa/ReNepa.nsf/home?openform&Group=Cumulative%20and%20Indirect%20Impacts

Duration
- 1 day

Eligibility
- Available to all

Target Audience
- Transportation and environmental resource agency staff

Logistics
- Workshop was offered three times in 2003 (in Albany, NY; Hartford, CT; and Boston, MA)
- Workshop materials are currently available on-line

Contact Information
- Katherine Still, still@pbworld.com

Appendix E:
List of EISs Reviewed

Executive Order 13274 – Interagency Transportation Infrastructure Streamlining Task Force
Review of EISs for Purpose and Need and Indirect and Cumulative Impacts

The following list of EIS documents were reviewed for both Purpose and Need and for Indirect and Cumulative Impacts. The selection of EISs for review was based on the recommendations of Agency staff (FAA, FHWA, and FTA), and for EPA OFA, the selection was based on the issues addressed in the EIS, e.g. Section 404 permits or projects that crossed National Forests. Additionally, EISs that were litigated and were included in the case law summary were also identified as a priority for review.

		Date
EPA – OFA	Final EIS – Colorado Forest Highway 80, Guanella Pass Road, Colorado	Aug. 2002
	Final EIS - U.S. 287/26 Improvements Project, Moran Junction to 12 miles west of Dubois through Bridger-Teton and Shoshone National Forests, Wyoming	Oct 2003
	Draft EIS - Reference Post 13 Interchange and City Road Project, Washington County, UT	Sept 2002
	Draft Supplemental EIS – U.S. 189, Utah Valley to Herber Valley Widening and Realignment, Utah and Wasatch Counties, Utah	Sept 2002
	Draft EIS and 4(f) Evaluation – Improvements to I15 from 31st Street to 2700 North, Weber County, Utah	Oct 2003
	Final EIS and Section 4(f) Statement – Wyoming Forest Highway 4, U.S. 212 Beartooth Highway, Park County, Wyoming	Sept 2003
	Final EIS - MO-19, MO-107, and U.S. 54 Improvements and Extensions, U.S. 61 near Bowling Green and New London, Pike, Monroe, Ralls, and Audrain Counties, Missouri	June 2002
	Final EIS – Louisiana I Improvements Golden Meadow to Prot Fourchon	Oct 2002
	Final EIS - U.S. 67 (FAP 310) Between Jacksonville and Macomb; Morgan, Cass, Schuyler, and McDonough Counties, Illinois	May 2002
	Final EIS and Final Section 4(F) Statement; South and East Beltways, Lincoln, Nebraska, Project No. DPU-3300(1)	June 2002
	Final EIS - WV 65 Corridor G to Naugatuck, Mingo County, West Virginia - Federal Project No. STP-0065 (008) EQ, State Project No. U230-65-7.74 02	May 2002
	Final EIS - State Route 120 Oakdale Expressway Project, City of Oakdale, California	Sept 2002
	Draft SEIS – Jamestown Bridge Replacement Project, Rhode Island	Feb 2003
	Draft EIS – Interstate 15 Corridor, Montana City to Lincoln Road, Montana	Feb 2003
	Final EIS – East Harrison County Connector, I-10 to U.S. 90, Harrison County, Mississippi	Jan 2003
	Draft EIS – Fairfield to Dupuyer Corridor Study in Teton and Pondera Counties (between Yellowstone National Park and Glacier National Park), Montana	Aug 2002

		Date
FTA	Draft SEIS - MTA New York City Transit Second Avenue Subway, New York	March 2003
	Final EIS - New Britain-Hartford Busway New Britain, Newington, West Hartford, and Hartford, CT	Dec 2001
	Draft EIS - Central Link Light Rail Transit Project between North Seattle and the City of Sea Tac, Washington	Dec 1998
	Final EIS – LA Eastside Corridor, Los Angels County, California	Jan 2002
	Draft EIS – Permanent WTC Port Authority Trans-Hudson (PATH) Terminal	May 2004
	Draft EIS – Weber County to Salt Lake City Commuter Rail Project, Utah	April 2004
	Draft EIS – MTA Long Island Railroad East Side Access, New York	May 2000
	Draft EIS – Fulton Street Transit Center, New York	May 2004
FAA	Final EIS - Establishment of air cargo hub, Toledo Express Airport, Toledo, Ohio	May 1990
	Final SEIS – Indianapolis international airport	March 2001
	Final EIS for the proposed runway 5L/23R, proposed new overnight express air cargo sorting and distribution facility, and associated developments at Piedmont Triad International Airport (PTIA), North Carolina	Nov 2001
	Draft EIS - Cincinnati/Northern Kentucky International Airport, Construction of new and expansion of existing runway and support facilities, Ohio	July 2000
	Final EIS - Disposal and Reuse of Homestead Air Force Base, Florida	Feb 1994
	Final EIS - Master Plan Development and FAR Part 150 Noise Compatibility Update, Charlotte Douglas International Airport, Charlotte, NC	Nov 1999
FHWA	Final EIS and Section 4(f) Evaluation - I-69 Evansville to Indianapolis, Indiana Tier 1	Dec 2003