

Wisconsin Department of Transportation

Guidance for Conducting a Cumulative Effects Analysis

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This guidance document replaces “Land Use in Environmental Documents: Indirect and Cumulative Effects Analysis for Project-Induced Land Development (1996).”

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CHAPTER 1: INTRODUCTION/BACKGROUND

This guidance document is for practitioners in the development of a cumulative effects analysis as required under NEPA/WEPA. For guidance on indirect effects analysis, please see WisDOT's "Guidance for Conducting an Indirect Effects Analysis."

HOW ARE CUMULATIVE EFFECTS DEFINED?

The [National Environmental Policy Act \(NEPA\)](#), and the [Wisconsin Environmental Policy Act \(WEPA\)](#) (which is consistent with NEPA) requires that the direct impacts, indirect effects and cumulative effects of proposed actions be assessed and disclosed.¹

NEPA Definition

The NEPA definition of a cumulative effect/impact² comes from the Council on Environmental Quality (CEQ), which defines a cumulative impact as:

...The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. (40 CFR §1508.7.)

From this definition, cumulative effects to natural, cultural, historic resources and/or human communities are not just the result of the transportation project itself, but also other collective actions and projects that occur in a study area over time. For example, other actions may include other local or state transportation projects, sewer service extensions or expansion projects, residential, commercial and industrial development plans and large-scale development such as a large subdivision or warehouse/distribution center.

Understanding cumulative effects from the standpoint of time and space

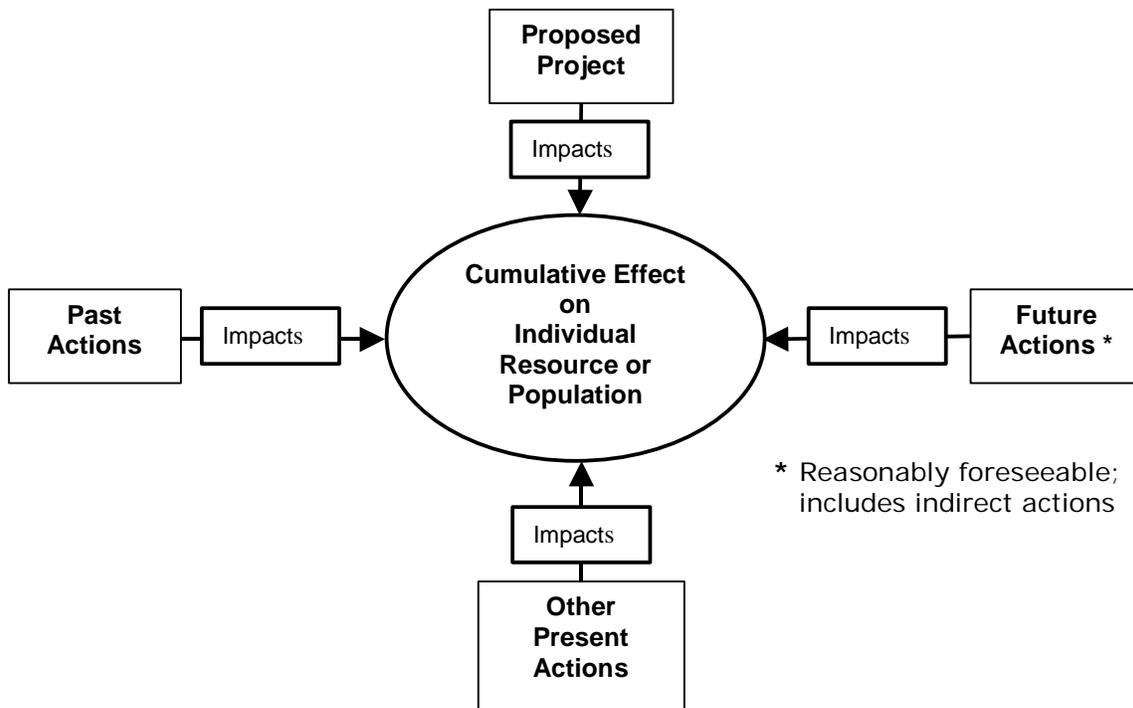
Cumulative effects are defined in both timeframe - such as past, present, and reasonably foreseeable actions - and spatial/geographic terms i.e. how are the effects distributed or allocated on the physical landscape. The following figure graphically depicts how past, present and reasonably future actions (including the proposed project) can create cumulative effects to a natural, cultural or historic resource or population. This diagram is helpful to refer to when attempting to visualize or describe cumulative effects.

Effects can be either beneficial, detrimental or both. For example, development along a corridor may be economically beneficial by providing new goods and services and helping to contribute to the tax base of a local community. This same development may also create negative impacts to natural resources and other populations. It is important

¹ In addition, H[Wisconsin Administrative Rule NR 150](#)H defines cumulative effects as "repeated actions of the same type, or related actions or other activities occurring locally that can be reasonably anticipated and that would compound impacts."

² The terms "effects" and "impacts" have the same meaning, although the term "cumulative effects" is strongly recommended for use in environmental documents.

to document both the perceived and established positive and negative effects, and to provide suggestions on where mitigation may be appropriate through avoidance and/or minimization efforts.



Source: "Questions & Answers Regarding the Consideration of Indirect & Cumulative Impacts in the NEPA Process." FHWA. January 2003.

Cumulative effects are also sometimes viewed as how a particular resource or population is impacted or has become degraded due to policies or actions that are occurring in combination to create the cumulative effect. If a resource's degradation can be measured over time, this is helpful information to document. For example, mitigation actions or recovery plans identified by agencies or communities may be able to reverse a declining trend.

When making numerical estimates of cumulative effects, it can often become very cumbersome, if not impossible, to assign which portion of the cumulative effect is primarily the result of a particular action or activity such as a proposed transportation project. Because of these difficulties, it is most important to meet the spirit of NEPA by qualitatively identifying the effects and resources themselves i.e. that a transportation project may impact, in combination with other policies or non-transportation related development actions. Resource agencies, such as the Wisconsin Department of Natural Resources (WDNR), may be able to provide measurements of these effects. However, NEPA does not require a quantitative analysis (such as modeling) for identifying cumulative effects (see also, "scope of cumulative effects analysis" in this chapter).

WHEN IS A CUMULATIVE EFFECTS ANALYSIS REQUIRED?

CEQ regulations require all federal agencies to consider the cumulative effects of all proposed agency actions. A cumulative effects analysis is required whenever an Environmental Assessment or Environmental Impact Statement is prepared AND the following two related criteria apply:

(1) The proposed action under review must have a direct and/or indirect effect on a specific natural, historic, cultural resource or population for the proposal or alternative to exert a *cumulative* influence.

(2) If no direct and/or indirect effect to a specific resource is suspected, there is no need to consider cumulative effects to that resource.

If a proposed project will have no significant impact on the environment, the use of a categorical exclusion (CE) is appropriate. In reaching this conclusion, the cumulative effects on the resource must be considered. However, when a CE is selected as the appropriate level of environmental documentation, no more than a cursory examination of cumulative effects is usually warranted.³

What level of detail is appropriate when conducting a cumulative effects analysis for an EA compared to an EIS?

It really depends because each project is unique and has its own complexities and issues. Generally, the level of detail should be comparable to the complexity of the project. A cumulative effects analysis in an EA does not necessarily need to be as “extensive” or at the level or scale of an EIS. For example, a basic narrative may be prepared in the EA that comprehensively covers the issues while sufficiently describing the cumulative effects in question. Enough data should also be used to support the analysis. The amount of data included does not need to be in excess of what is required to make conclusions. Whatever the case, the 11-step process can be shaped to meet the project analysis needs.

WHAT SHOULD A CUMULATIVE EFFECTS ANALYSIS IDENTIFY?

In general, the following items must be identified in every cumulative effects analysis:

1. The area in which the effects of the proposed project will be felt;
2. The impacts that are expected in that area from the proposed project;
3. Other past, present, and reasonably foreseeable actions that have or are expected to have impacts in the area;
4. The impacts or expected effects from these other actions; and
5. The overall impact that can be expected if the individual impacts are allowed to accumulate.

THE SCOPE OF CUMULATIVE EFFECTS ANALYSIS

A complete cumulative effects analysis cannot be conducted until the direct impacts and the indirect effects (if there are present) have first been identified in the environmental review process. A draft environmental impact statement document should contain a brief discussion on the direct impacts and indirect effects that will be examined and the basic process for the analysis. If cumulative effects are conceptually anticipated or perceived

³ If a CE project includes economic development as part of the project purpose, indirect effects are anticipated. Therefore, indirect effects analysis would be warranted as well as cumulative effects analysis.

for a project alternative(s), these issues should also be discussed in the draft EIS. It is also recommended that if a preferred alternative will be selected, that the extensive cumulative effects analysis should focus on the preferred alternative and the no-build option in a comparative view. By focusing the effort, the analysis of cumulative impacts will be more efficient rather than applying an extensive cumulative effects analysis to all alternatives.⁴ More information can be found in Chapter 2 of this guide on the analysis process.

For Environmental Assessments, the analysis should follow the steps outlined in Chapter 2 of this guide and make adjustments to the level of the analysis according to the complexity of the project.

The cumulative effects analysis utilizes a qualitative approach to conduct the analysis, rather than a quantitative framework such as the use of modeling. No such cumulative effects model exists. However, resource specific and other data, (even information

garnered from a model), is very important to use in the analysis and support the findings. For example, the use of data is especially valuable when Section 404 resources or biological resources are involved, because such data can be critical to identifying avoidance and mitigation measures and preparing permit applications.

Cumulative Effects and the Coordination Plan Included under SAFETEA-LU.

The cumulative effects analysis should be addressed as an element in every coordination plan.

For FHWA's guidance on SAFETEA-LU, go to: www.fhwa.dot.gov/hep/section6002/

Cumulative Effects and the Coordination Plan Included under SAFETEA-LU

It is important to repeatedly stress the value of public and agency participation beginning at the early scoping stage and continuing throughout the environmental process. SAFETEA-LU requires that lead agencies (i.e. WisDOT) establish a plan for coordinating public and agency participation and comment during the environmental review process. This helps ensure that cooperating and participating agencies as well as the public are involved and providing input at key points in the process. Utilizing the coordination plan as a tool to obtain input from citizens and agencies on cumulative effects can be very useful.

OTHER RULES AND REGULATIONS TO CONSIDER

In addition to NEPA and WEPA, other regulations call for the consideration of cumulative impacts. You, the practitioner, will need to assess potential cumulative impacts on archaeological and historical resources protected by the National Historic Preservation Act (NHPA) (36 CFR 800 or Section 106 Review). *This cumulative effects analysis guide does not address all components of the adverse effects analysis required by Section 106.*

The regulations implementing Section 106 of the NHPA also acknowledge that a project's adverse effects include any that are reasonably foreseeable, even if they may occur later in time, are farther removed in distance, or are cumulative. The consideration of indirect and cumulative impacts is required when applying the criteria of adverse

⁴ Certainly, not all projects are the same and the analysis process should be discussed early on in project methodology and scoping meetings with the agencies and public. For example, a Tiered EIS process may need to examine multiple alternatives over a phased period of time.

effect on historic properties ([36 CFR §800.5\(a\)\(1\)](#)) and delineating the area of potential effects (APE) ([36 CFR § 800.16\(d\)](#)) as part of the Section 106 process.

This guide will help analysts to assess potential cumulative effects on jurisdictional waters of the U.S., including special aquatic sites, protected by Section 404 of the federal Clean Water Act, which are under the jurisdiction of the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency (EPA). For more information, see [Section 404 of the Clean Water Act](#) and the [404\(b\)\(1\) Guidelines](#).

This guidance is not intended for cumulative impact analyses for Biological Assessments prepared to comply with Section 7 of the federal Endangered Species Act (ESA); under Section 7, only non-federal actions are included in the cumulative effects analysis.

CHAPTER 2: THE CEQ “ELEVEN-STEP” PROCESS

This chapter outlines eleven steps for conducting a cumulative effects analysis as developed by the Council on Environmental Quality (CEQ). These steps are a framework (rather than a formula) for identifying and assessing cumulative effects of a transportation project.

The eleven steps fall into one of three groups in the analysis: 1.) Scoping; 2.) Describing the affected environment; and 3.) Determining the environmental consequences. Each project has a unique set of issues; and as a result, the steps in the analysis can be iterative which may require you to revisit a step at different points in the process. For example, as the environmental review process progresses, resource agencies or the public may identify new issues or there may be new information about an existing issue, requiring you to address the issue or concern.

SCOPING FOR THE CUMULATIVE EFFECTS ANALYSIS

- 1) Identify the significant issues associated with the proposed action and define the assessment;
- 2) Establish geographic scope for the analysis;
- 3) Establish timeframe for analysis (into future);
- 4) Identify other actions affecting the natural, historic, cultural resources, ecosystems and human communities of concern;

DESCRIBING THE AFFECTED ENVIRONMENT

- 5) Characterize resources identified in scoping in terms of their response to change and capacity to withstand stress;
- 6) Characterize the stresses affecting these resources and their relation to regulatory thresholds;
- 7) Define a baseline condition for the resources.

DETERMINING THE ENVIRONMENTAL CONSEQUENCES

- 8) Identify the important cause and effect relationships between human activities including the proposed project and resources;
- 9) Determine the magnitude and significance of cumulative effects to those resources identified in the analysis;
- 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.

SCOPING FOR THE CUMULATIVE EFFECTS ANALYSIS

Project scoping should identify the public and agency concerns; clearly define the environmental issues and alternatives to be examined in the environmental document including the elimination of non-significant issues; identify related issues that originate from separate legislation, regulation, or Executive Order and identify state and local agency requirements that must be addressed. An effective scoping process can help to reduce unnecessary paperwork and time delays in preparing and processing the EIS by

clearly identifying all relevant procedural requirements.⁵ Overall project scoping is intended to ensure that:

- Problems/concerns/issues are identified early and properly studied;
- Issues having little to no relationship to the project and document are minimized or eliminated;
- The environmental document is well-documented and balanced; and
- Delays, which could occur by an inadequate draft environmental document, are avoided.

Project scoping is somewhat administrative in the sense that it focuses on how to optimize the environmental review process and make it more efficient.

Scoping for the cumulative effects analysis is different than project scoping as it specifically relates to the issues, resources and effects specific to the cumulative effects study area. Steps 1-4 described below provide a more detailed explanation of scoping for the cumulative effects analysis.

STEP 1: IDENTIFY THE SIGNIFICANT ISSUES ASSOCIATED WITH THE PROPOSED ACTION AND DEFINE THE ASSESSMENT.

According to [FHWA guidance](#), the resources subject to a cumulative effects assessment should be determined on a case-by-case basis early in the NEPA process, generally as part of early coordination or scoping.

It is important to keep in mind that only the project's identified direct impacts and indirect effects will need to be further analyzed in a cumulative effects analysis. Those resources that are not affected directly and/or indirectly by the project cannot contribute to a cumulative effect.

Conducting cumulative effects analyses.

If a project is not anticipated to cause direct impacts and/or indirect effects to a resource, then the project will not contribute to a cumulative effect on that resource either.

The first step in scoping for cumulative effects analysis is to identify the significant issues associated with the proposed action. Again, the context of these issues relates to past, present and reasonably foreseeable future actions (including the proposed project) that create cumulative effects to an individual resource.

This step is often done concurrently with Step 2 that considers resources within the spatial context of where they are located and their geographic extent. The analysis should focus on: 1) those resources significantly impacted by the project; and 2) resources currently in decline or at risk even if project impacts are relatively small.

STEP 2: ESTABLISH GEOGRAPHIC SCOPE FOR THE ANALYSIS.

Cumulative effects are defined in both timeframe - such as past, present, and reasonably foreseeable future actions - and spatial/geographic terms as related to the health or status of the resource. By defining a study area, you will identify the geographic boundaries to be included in the cumulative effects analysis. Resource agencies and interested citizens can provide assistance on understanding the geographic extent for

⁵ 40 CFR Part 1500, Guidance Regarding NEPA Regulations. This memorandum was published in the Federal Register and appears at 48 Fed. Reg. 34263 (1983).

each resource or population (e.g., watershed boundaries, extent/influence of neighborhood that consists of a special human population, extent of historic/cultural resource, etc.).

The boundaries or geographic scope should always take into account the context of the transportation project itself. This is important because there needs to be a spatial

Remember to consider the study area(s) for both the direct impacts and indirect effects in the development of the cumulative effects study area.

limit/boundary for analysis. For example, the cumulative effects of a river or watershed can extend for many miles into other counties or even other states.

Judging where to “draw the line” will often depend on the scale of the project itself. Does the project area involve a 50-mile corridor, or is it much smaller such as a new interchange that may only involve two miles of freeway?

Federal and State Agency representatives (e.g. U.S. Fish and Wildlife Services, Wisconsin Department of Natural Resources [DNR]) and citizens must be consulted for their input during the scoping process.⁶ SAFETEA-LU requires that WisDOT and FHWA establish a coordination plan for EIS projects for coordinating public and agency participation and comment during the environmental review process. However, regional environmental coordinators and BEES staff should also help to identify the appropriate study boundaries for the cumulative effects analysis based on their knowledge of the resources and regulatory law.

Coordination plans are developed early in the environmental review process after project initiation and as part of the scoping process.

In order to determine the geographic boundaries, it will be important to establish the existence of causal (cause-and-effect) relationships or connections between the collective activities/actions and the impacts that could occur to the specific resource. The relationships should be logical, not arbitrary and have sufficient support to be defended.

Example Approaches for Establishing a Study Area

There is no set approach to defining a study area for a cumulative effects analysis. That being said, you must remember to take in consideration the study areas for direct impacts and indirect effects of the proposed project when determining the study area for cumulative effects analysis. Remember that these areas have essentially established the need to conduct the cumulative effects analysis.

Below are some other approaches:

- Community effects/land use issues. Discuss the project with local planners and/or other local experts who are aware of development trends and land use plans in the area. Identify neighborhood or community boundaries or potential environmental justice populations using census tract or other data. Community plans and other plans may also help shape the study area boundaries.
- Watershed approach. Identify the watershed and/or sub-basins in which the project is proposed. Consult with WisDOT specialists and other resource agency professionals such as DNR, to identify issues and trends affecting wetlands, floodplains/shoreland areas and groundwater.

⁶ Reference: FHWA's SAFETEA-LU Guidance. www.fhwa.dot.gov/hep/section6002/index.htm

- Archaeological resources. Identify prehistoric and/or historic archaeological sites in the project vicinity. Determine the geographic context for the type of archaeological resources being affected. Consult with cultural resource professionals and review the project's historic property survey report.
- Historic architectural resources. Identify historic districts and neighborhoods with affected buildings or structures. Project-specific historical resource analyses typically define the geographic context needed to understand the historic significance of a structure (e.g., period of significance and neighborhood, community, or resource type). Consult with historic resource professionals and review the project's historic property survey report.
- Threatened and endangered species. Determine the local population of individual species and a general study area by considering the range, sub-range, or population distribution for the species, as well as information provided in the biological assessment for the proposed project. Consult with experts (e.g., DNR Bureau of Endangered Resources) and others specializing in particular species for assistance in defining the study area.⁷

Your approach to establish a study area may include a combination of these issues. However you determine the study area the important point is to be sure to document the process used to delineate the study area and resources utilized including discussions with experts where applicable.

STEP 3: ESTABLISH TIMEFRAME FOR ANALYSIS (INTO FUTURE).

A project's cumulative effects can occur at the time of project's construction and/or at some time in the future. These future effects must be "reasonably foreseeable" which means that approved projects (transportation and other projects) and future plans should be considered. More speculative actions, such as projects and plans that may or may not occur, should be generally disregarded.

Using a 20-year future (from construction forward into the future) based upon current trends is considered a reasonable time frame to conduct the analysis. Forecasting impacts beyond 20 years is more speculative and provides decision-makers limited value. Occasionally, a 10-year future timeframe for analysis may also work depending upon the level of information of information that is available and the relative amount of impact that is involved and the project timeline for construction.

You may also want to consider regional and national trend information as well, especially if the proposed project spans over a larger geographic area (e.g. a 30-mile corridor plan). However, be careful not to stray into issue areas or variables that are too difficult to predict with any degree of certainty such as the price of gasoline or the effects of the global economy.

STEP 4: IDENTIFY OTHER ACTIONS AFFECTING THE RESOURCES, ECOSYSTEMS AND HUMAN COMMUNITIES OF CONCERN.

"Other actions" include those past, present and reasonably foreseeable actions or activities. These actions may include such items as large-scale developments (big-box

⁷ These example approaches are from previous WisDOT guidance and from California's Dept. of Transportation (CALTRANS) guidance. See Chapter 4 "Resources and Additional Guidance."

retail or a new production plant) that may create infrastructure needs for both transportation and utilities.

Other factors to consider: water and sewer service projects that could stimulate development within the study area, local policies and plans such as commercial, residential and industrial development plans, zoning actions such as rezoning an area for more intensive uses and the establishment of Tax Incremental Financing (TIF) districts to encourage development activity. This is by no means an all-inclusive list of development activity and land use trends. Development trends and issues vary depending upon the unique characteristics of the local community. However, these examples should give you some idea of the categories of actions and activities that you will need to include in your analysis.

Scoping meetings with local planners, community officials and citizens can be very helpful in identifying past, present and future activities/actions in the study area. In order to gain input, these meetings can be face-to-face or involve more formal techniques such as expert panels, citizen advisory groups or public forums.

What is reasonable timeframe in the past to examine as having a “past” effect on a resource?

This is unique for every project. Highway improvements that occurred within the last 10 years within the study area should be included in “past” actions. However, you do not have to document every change in land use, but large shifts (new business park, etc.) should be noted. Be sure to seek local input for this part of the analysis.

Agency input (i.e. WI Dept. of Agriculture, Trade and Consumer Protection, WDNR, State Historical Society, U.S. Fish and Wildlife, U.S. Department of Interior, etc.) at the scoping stage is required and can be very helpful to inform the process by describing sensitive resources in the study

area that are subject to cumulative effects. At a minimum, WisDOT staff should always make a request for written comments from agencies to provide their input on how a resource(s) is expected to be impacted based upon the review of the actions were identified by local officials.

Environmental Justice (EJ) issues are also of paramount concern to identify at this stage – it is important that the BEES Environmental Justice Analyst be consulted early in the scoping process to help determine special, human communities of concern.

DESCRIBE THE AFFECTED ENVIRONMENT

Following the scoping process, you will need to describe the affected environment including the resources that may be impacted as well as the stresses affecting these resources. It is important to follow the spatial boundaries (study area) and timeframe previously delineated in the scoping process. However, the process can be iterative. If new information about the resources and stresses are discovered in the following steps, adjustments to both the size/extent of the study area and the timeframe in which cumulative effects will take place may be needed and communicated to the resource agencies, local community and other stakeholders who were involved in the scoping process.

STEP 5: CHARACTERIZE RESOURCES, POPULATIONS ETC. IDENTIFIED IN SCOPING IN TERMS OF THEIR RESPONSE TO CHANGE AND CAPACITY TO WITHSTAND STRESS.

Characterizing resources as part of a cumulative effects analysis is similar to describing the affected environment as part of a typical EIS or EA. However, an important distinction is that the cumulative effects analysis expands or extends the spatial and time considerations into a much longer planning period that also takes into account the potential for resource and system interactions (as resources are impacted by different developments).

This step also serves to establish each of the resources “baseline” condition and sets the context for the more detailed analysis of the magnitude of these cumulative effects discussed in Step 9. According to CEQ guidance⁸, in order to address cumulative effects adequately, the description of the affected environment should contain four types of information:

- Data on the status of important natural, cultural, social, or economic resources and systems;
- Data that characterize important environmental or social stress factors;
- A description of pertinent regulations, administrative standards, and development plans; and
- Data on environmental and socioeconomic trends.

First, evaluate the existing resources in the study area likely to be impacted. These existing resources may include: geology, vegetative cover, fish and wildlife, habitat, water quality and quantity, recreational uses, cultural resources, and the composition of the human community (community impacts) within the study area. In addition, review social and economic data (including past and present land uses) closely associated with the status of the resources, ecosystems, and human communities/populations of concern.

What if data involving baseline conditions of existing resources and populations does not exist?

Talk with agencies and stakeholders as early as possible. This will help all participants to reach a mutual understanding of the availability and acceptability of pertinent information. Be sure to document missing data that would be important to the analysis. Further guidance from CEQ regarding what to say about the incomplete or unavailable information, and when to obtain additional information, can be found at [40 CFR 1502.22](#).

Local, regional and state resource data is available through the many sources such as WDNR, Metropolitan Planning Organizations, Regional Planning Commissions, and local government agencies (planning, land conservation departments). Asking for this information early on in the process will help you to conduct a timely analysis as well as discover missing pieces.

A wealth of population data including census data and population estimates and projections are available through the [Wisconsin Department of Administration website](#). More specialized population data studies are also conducted at the UW-Madison’s [Applied Population Laboratory](#).

⁸ Considering Cumulative Effects Under the National Environmental Policy Act (NEPA), Council on Environmental Quality. Chapter 3: “Describing the Affected Environment.” January 1997. [Hhttp://ceq.eh.doe.gov/nepa/ccenepa/ccenepa.htm](http://ceq.eh.doe.gov/nepa/ccenepa/ccenepa.htm)

The description of the affected environment should focus on how the existing conditions of key resources, ecosystems, and human communities have been altered by human activities. This historical context should include important human stressors and pertinent environmental regulations and standards. Where possible, trends in the condition of resources, ecosystems, and human communities should also be included in the document.

The description of the affected environment should be used as an environmental baseline to evaluate environmental consequences and to help identify actions that contribute to cumulative effects. For more examples/categories of cumulative effects often considered on projects, please see the CEQ guidance identified in Footnote #2.

STEP 6: CHARACTERIZE THE STRESSES AFFECTING THESE RESOURCES, ETC. AND IDENTIFY THEIR RELATION TO REGULATORY THRESHOLDS.

The next step in describing the affected environment is to collect data on stress factors to each identified, potentially affected resource, ecosystem, and human population within the study area. A simple matrix can be used to list the resources in one column along with possible stresses in an adjacent column. In addition, activities that may benefit the resource (e.g., mitigation project) should be included to determine the overall net, adverse or beneficial effect on the environment. Note that a comparison matrix can be used to summarize and compare the cumulative effects for each of the project's alternatives.

According to CEQ, two types of information should be used to describe stress factors contributing to cumulative effects. First, identify the types, distribution, and intensity of key social and economic activities within the region. Data on these "driving variables" can identify key cumulative effects. For example, population growth is strongly associated with habitat loss. A proposal that would contribute to population growth in a specific area (e.g., a highway bypass project traversing through a rural area) should be viewed as a likely variable for habitat loss in addition to other environmental effects.

Secondly, the analysis should examine indicators of stress on specific resources, ecosystems, and human population. Changes affecting certain resources can serve as an early warning of impending environmental or social degradation. Indicators of environmental stress can be either exposure-oriented (e.g., contamination levels) or effects-oriented (e.g., loss or degradation of a fishery). High sediment loads and the loss of stable stream banks are both common indicators of cumulative effects from urbanization.

STEP 7: DEFINE A BASELINE CONDITION FOR THE RESOURCES, ETC.

Step 7 simply represents the summary of the "affected resources" as it defines the baseline condition for each resource that has been identified as part of the analysis. The information and characterization of the resources developed through Steps 5 and Step 6 will be used to develop a baseline condition of each resource being analyzed in the cumulative effects analysis. This step is conducted in order to ensure that both the current conditions and historical context of the resources, ecosystems, and human communities are identified. This will be used as the basis when evaluating the environmental consequences of cumulative effects.

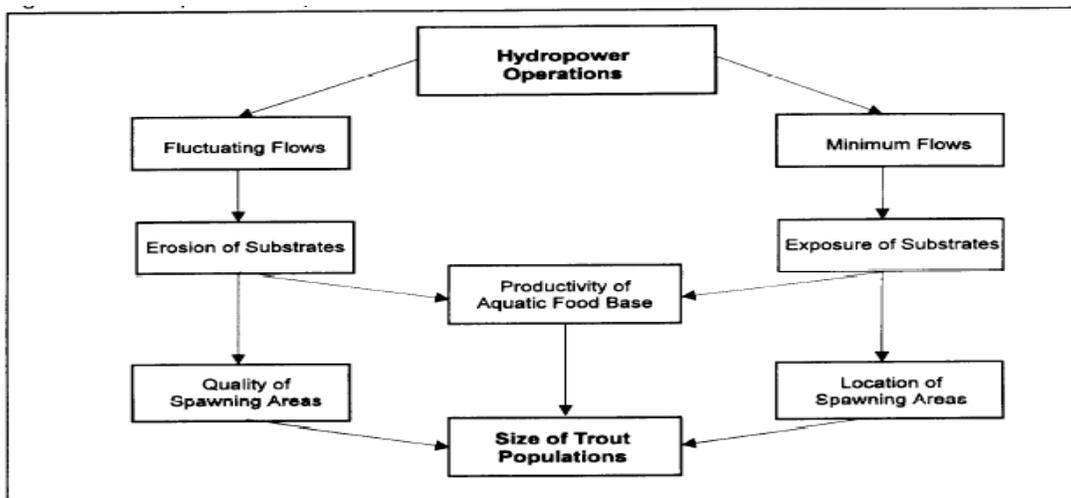
DETERMINE THE ENVIRONMENTAL CONSEQUENCES

Now that you have determined that the baseline conditions and have collected the necessary information as inputs for the analysis, the environmental consequences resulting from cumulative effects can now be both identified and described. This is really the “nitty-gritty” of the cumulative analysis and the stage in which conclusions regarding the significance and magnitude of the effects are drawn. In addition, mitigation responses are also identified and proposed at this stage to help avoid, minimize, and possibly compensate for actions creating cumulative effects.

STEP 8: IDENTIFY THE IMPORTANT CAUSE AND EFFECT RELATIONSHIPS BETWEEN HUMAN ACTIVITIES AND RESOURCES.

The goal of this step is to describe the 1.) affected environment, and the actions that affect resources and 2.) to develop a description of the cause and effect relationships. This includes the impacts from the project as well other actions/activities affecting the same resource(s).

CEQ suggests utilizing networks and system diagrams (see the below diagram for an example “cause/effect” relationship) as the preferred method of conceptualizing cause and effect relationships. Diagrams are useful in identifying and describing the pathways of the cause/effect relationships that are often complex and difficult to document in written text.



Source: Considering Cumulative Effects Under the National Environmental Policy Act (NEPA), CEQ, January 1997. Website: <http://ceq.eh.doe.gov/nepa/ccenepa/ccenepa.htm>

It is suggested that diagrams be simplified wherever possible to focus primarily on the important or relevant relationships that can be supported by information. Remember, the primary audience of an environmental document is decision makers. While it is important to document the logical, cause/effect relationships in a comprehensive manner, the results should be summarized in the analysis in a concise manner and in a form that can be used for public disclosure of impacts and to support decision-making.

STEP 9: DETERMINE THE MAGNITUDE AND SIGNIFICANCE OF CUMULATIVE EFFECTS.

The goal of this step is to characterize the magnitude and significance of the environmental consequences of the proposed action in the context of the cumulative

effects of other past, present, and future actions. This step should document the following for each resource:

- The status or condition of the resource due to changes created by past, present and reasonably foreseeable actions;
- The contribution of the proposed project to the overall cumulative impact to the resource, in support of a significance determination;
- Avoidance and Minimization - Any project design changes that were made, or additional opportunities that could be taken, to avoid and minimize potential impacts in light of cumulative impact concerns (this will be addressed again in Step #10).

The CEQ Guidance [Chapter 4 of CEQ's Considering Cumulative Effects](#) discusses methodologies used to make significance or magnitude conclusions. However, in general, the context and intensity of the combined cumulative impacts (including impacts from the proposed project) can be used to draw conclusions about the severity of the effects.

STEP 10: MODIFY OR ADD ALTERNATIVES TO MITIGATE SIGNIFICANT CUMULATIVE EFFECTS.

Mitigation should be considered for any impact disclosed in the environmental document including: direct, indirect, or cumulative effects. For cumulative effects in particular, mitigation generally occurs through avoidance and or minimization efforts as part of the project itself. For more information, see CEQ's discussion of mitigation in [NEPA's Forty Most Asked Questions, nos. 19a and 19b](#).⁹

Determining the feasible mitigation measures and responsibility for a cumulative impact can prove very difficult. Because cumulative effects result from the combined actions of numerous agencies and private entities, making the determination of who is responsible or culpable can be a complex task. However, from a more positive point of view, mitigation involving cumulative effects can create opportunities for several agencies or groups to work together to help resolve the issue. For example, potential cumulative impacts to air quality may be addressed through a multi-jurisdictional or regional planning approach such as an air quality plan.

IMPORTANT:

The project's indirect effects analysis and cumulative analysis are distinct and separate analyses. A cumulative effects analysis should always be clearly distinguishable from the indirect effects analysis.

It may also be useful to list the agencies that have regulatory authority over the resource and recommending actions to those agencies that have influence or responsibility over the care of the resource. Disclosure of this type of information can be subsequently used to develop a plan of action to address the mitigation of impacts.

STEP 11: MONITOR THE CUMULATIVE EFFECTS OF THE SELECTED ALTERNATIVE AND ADAPT MANAGEMENT.

This step points to the fact that the process of evaluating cumulative effects does not end when the environmental document is finalized and the project is built. Although you may personally not be involved in the ongoing monitoring of the cumulative effects associated with the selected alternative; changing land use patterns and trends may

⁹ Also, refer to the WisDOT's indirect effects analysis guidance for more information on mitigation for indirect effects.

dictate that WisDOT study the area again for further proposed modifications to transportation facilities or through other approaches.

Monitoring cumulative effects is usually not the sole responsibility of WisDOT but should be considered especially for those direct project impacts that may have a negative cumulative effect.

It is also very important to note that “adapting management” is a multi-agency or shared responsibility. Again, cumulative effects are the result of changes due to various actions involving policies and plans from many different agencies, not just WisDOT. Given this future possibility, the information on cumulative effects that you have gathered as part of the environmental impact study will represent important baseline documentation from which to perform a new study not only by WisDOT, but other agencies as well. So, document well!

CHAPTER 3: REQUIRED DOCUMENTATION

The documentation of the cumulative effects analysis should be clearly written and concise, while providing the require disclosure of the findings. The written documentation should essentially follow the basic step-by-step framework as presented in this guidance: Scoping [Steps #1-4], Describing the Environment [Steps #5-7] and Determining the Environmental Consequences [Steps #8-11]. If more discussion is needed in your project on a particular issue, step, or concern, then make adjustments as needed.

The cumulative effects analysis should be documented in a specific *section*. It should not be written within another chapter or the indirect effects analysis section. It should include the list of data and the assumptions and process (e.g. the 11-step method) that was followed in conducting the analysis and leading to the findings and conclusions that were drawn. Documenting the assumptions can be very important and useful information if agencies/public raise concerns; the project or persons involved changes in the future; or if a project faces a legal challenge.

The following items should also be included in the cumulative effects documentation:

A Description of the Analytical Method(s) or Approaches Used

Briefly state how the cumulative effects analysis was conducted using this 11 step methodology for the various affected resources. For example, “an inventory of wetland resources (step 5) including anticipated development (step 6) within the study area was developed utilizing GIS overlay analysis (steps 7-8).” Briefly explain the approach and include any data used to make conclusions for purposes of clarification. Provide references or footnotes as needed.

Explanation of Any Assumptions Used to Conduct the Analysis

Explain any limitations that were faced in conducting the analysis. It is important to document how conclusions were reached in situations for which there was scarce information, or limitations or obstacles associated with collecting the data (e.g., data were not available or cost prohibitive to develop).

It may not be known what the preferred alternative at the draft EIS stage. A general discussion of the study area, and description of the range of direct and/or indirect effects of each of the various alternatives that could contribute to cumulative effects should be included. You will not be at a point in the project know the extent of the cause and effect

An example of typical discussion in a draft EIS:

“Sedge meadows (see page xx) are located within the project study area. Based on project analysis of direct impacts, Alternative A would impact the known area of sedge meadows. Alternative B would not impact sedge meadows. Alternative C would have an unknown impact on the area of sedge meadows. Alternative A, in combination with other actions, could contribute to a potentially adverse cumulative impact to the sedge meadows. Alternative B and the No Build Alternative would not contribute to a potential cumulative impact to this resource. Alternative C may or may not have a cumulative impact. A complete analysis of the potential cumulative effects of sedge meadows from the preferred alternative and no build alternative will be provided in the final EIS.”

relationship to a particular resource.¹⁰

The detailed cumulative effects analysis should occur utilizing the preferred alternative after it has been selected in comparison with the no-build option as part of the final, environmental document. Conclusive statements regarding cumulative effects should not be made in the draft EIS document because they are more appropriately addressed in the final, environmental document. However, a general discussion of the potential for cumulative effects for each alternative in the draft, environmental document is viewed as a preliminary analysis and is acceptable.

Document Data Sources

Be sure to document the assumptions and methods used to identify projects included in the analysis, the agencies and experts consulted, and any other additional research. Maintaining a record of methods, assumptions, and analyses is important - especially when data are scarce. It is also important if project personnel changes over time, the environmental documentation process is delayed or the project needs to be updated in a future effort such as a Supplemental EIS to be clear about what data was available, used in the analysis and the sources.

Where should the cumulative effects analysis be placed in the environmental document?

For EIS documents, the cumulative effects analysis should be *summarized* as a separate section or chapter in the document, after the discussion of direct impacts and indirect impacts. The complete analysis for the cumulative effects analysis should then be located in an appendix.

For EA documents, the analysis should be included as an attachment to the basic worksheets as a separate section. The analysis should be referred to in the text where appropriate questions call for the discussion.

¹⁰ In general, the draft stage (without selecting a preferred alternative) is too undetermined to make more than a speculative assessment of cumulative effects of specific resources.

CHAPTER 4: RESOURCES AND ADDITIONAL GUIDANCE

WisDOT ASSISTANCE

You are not alone in your efforts. If the Study Team needs further assistance on cumulative effects analysis, (i.e. you are uncertain about the level of analysis that the project will need; interpreting results of project screening; etc.), there are WisDOT staff who can help you. The best approach is to work at sorting out the issues using a team approach and not to make generalized assumptions. Contact DTSD-BEES *Environmental Policy & Community Impacts Section* staff (see names below) and your regional environmental coordinator.

Kassandra Walbrun
608-261-8618
kassandra.walbrun@dot.state.wi.us

Pat Trainer
608-264-7330
patricia.trainer@dot.state.wi.us

ADDITIONAL GUIDANCE

There are an increasing amount of available resources that could be helpful to you when developing analysis for both indirect effects and cumulative effects. Be prudent in applying guidance as it may contain non-Wisconsin related legal premises and/or contain outdated information (i.e. SAFETEA-LU, missing relevant court cases).

FEDERAL GUIDANCE (SORTED BY RELEVANCE)¹¹

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

The handbook is a tool for practitioners and provides an overview of a number of methods for conducting cumulative effects analysis. While not formal guidance, it has been previously used as a reference in court cases. <http://ceq.eh.doe.gov/nepa/ccenepa/ccenepa.htm>

Guidance on the Consideration of Past Actions in Cumulative Effects Analysis, June 2005.

This CEQ authored memo provides clarified guidance on considering “past” actions in a cumulative effects analysis. http://ceq.eh.doe.gov/nepa/regs/Guidance_on_CE.pdf

Questions and Answers Regarding the Consideration of Indirect and Cumulative Impacts in the NEPA Process. FHWA. January 2003.

This document contains some of the most clear federal guidance on both indirect and cumulative effects analysis: www.environment.fhwa.dot.gov/projdev/qaimpact.asp

“Draft Baseline Report.” Indirect and Cumulative Impacts Workgroup from Executive Order #13274, March 15, 2005.

¹¹ These resources were also utilized in developing this guidance document.

The report describes existing legal requirements, practices, challenges, opportunities to improve the analysis of indirect and cumulative impacts and interagency agreement on these issues. www.dot.gov/execorder/13274/workgroups/icireport.htm

Position Paper: Secondary and Cumulative Impact Assessment In the Highway Project Development Process. 1992. FHWA.

The paper (albeit dated) provides a basic orientation to the subject and suggests a decision-making framework of 8 general concepts for incorporating secondary (indirect) and cumulative impact considerations into the highway project development process. www.fhwa.dot.gov/environment/guidebook/index.htm.

“Consideration Of Cumulative Impacts In EPA Review of NEPA Documents.” May 1999. U.S. Environmental Protection Agency, Office of Federal Activities (2252A).

The guidance is intended to assist EPA reviewers of NEPA documents on cumulative impacts and how to provide accurate, realistic, and consistent comments focused on specific issues that are critical in EPA's review under Section 309 of the Clean Air Act. www.epa.gov/Compliance/resources/policies/nepa/index.html

STATE GUIDANCE (SORTED ALPHABETICALLY)

California: “Guidance for Preparers of Cumulative Impact Analysis” www.dot.ca.gov/ser/cumulative_guidance/approach.htm

Maryland: “Secondary and Cumulative Effects Analysis Guidelines for Environmental Impact Statements and Environmental Assessments.” www.sha.state.md.us/oppe/scea/index.htm

North Carolina: “Guidance for Assessing Indirect and Cumulative Impacts of Transportation Projects in North Carolina.” November 2001. www.ncdot.org/doh/PRECONSTRUCT/pe/neu/NEUProcedures/ICI.html

Oregon: “A Guidebook for Evaluating the Indirect and Cumulative Growth Impacts of Highway Improvements.” April 2001. www.odot.state.or.us/tddresearch

OTHER SELECTED REFERENCES (SORTED BY RELEVANCE)

FHWA's SAFETEA-LU Website including a Toolkit: [FHWA | Environmental Review Toolkit | Streamlining and Stewardship | SAFETEA-LU](#)

FHWA's Final Guidance on SAFETEA-LU Section 6002 Environmental Review Provisions. November 15, 2006. (For guidance on public participation and the coordination plan see questions #47-57.) www.fhwa.dot.gov/hep/section6002/

“Projecting Land-Use Change: A Summary of Models for Assessing the Effects of Community Growth and Change on Land-Use Patterns.” U.S. EPA, 2000. www.epa.gov/ecocommunity/tools.htm

“The Use of Expert Panels in Analyzing Transportation and Land Use Alternatives.” Transportation Research Board, National Research Council. FHWA National Cooperative Highway Research Program. [http://nepa.fhwa.dot.gov/ReNEPA/ReNepa.nsf/All+Documents/CCECF4D789DB510E85256CE6006142A0/\\$FILE/use_of_expert_panels.pdf](http://nepa.fhwa.dot.gov/ReNEPA/ReNepa.nsf/All+Documents/CCECF4D789DB510E85256CE6006142A0/$FILE/use_of_expert_panels.pdf)

“Land Use Impacts of Transportation: A Guidebook.” NCHRP Report 423A. Prepared for FHWA National Cooperative Highway Research Program, 1999.
www.nationalacademies.org/trb/bookstore

“Guidebook for Assessing the Social and Economic Effects of Transportation Projects.” NCHRP Report 456. Prepared for FHWA National Cooperative Highway Research Program, 2001. www4.trb.org/trb/crp.nsf/All+Projects/NCHRP+25-19

“Issues in NEPA Litigation.” William M. Cohen, Adjunct Professor and Consultant, Washington College of Law, American University, Washington, DC.
www.naep.org/NEPAWG/NEPA_Issues_1.html

“Our Built and Natural Environments: A Technical Review of the Interactions between Land Use, Transportation, and Environmental Quality.” U.S. EPA, 2000.
www.smartgrowth.org/library/built.html

Toolbox for Regional Policy Analysis Website. Federal Highway Administration and Federal Transit Administration. www.fhwa.dot.gov/planning/toolbox/index.htm

TRAINING RESOURCES (SORTED ALPHABETICALLY)

Duke University - 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. Website: <http://www.env.duke.edu/>

Environmental Impact Training - Cumulative Effects Assessment.

This 3-day course focuses on the principles and practices for incorporating cumulative effects considerations in the environmental impact assessment (EIA) process. Information: <http://www.eiatraining.com/index.htm>

Wisconsin Department of Transportation Training: “Introduction to Indirect Effects Analysis and Cumulative Effects of Projects.”

Sponsored by BEES-DTSD through *WisDOT University*, this workshop provides an overview of both indirect and cumulative effects analyses methodologies and is provided free of charge to a requesting regional office. A more extensive intermediate course is also available. Contact your training coordinator and BEES for further information.