4.0
ENVIRONMENTAL CONSEQUENCES

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Section 4 evaluates the environmental and socioeconomic consequences of the alternatives under consideration. This section contains revisions, clarifications, and updates from what was presented in the 2010 FEIS. These changes include the following:

- The Indirect and Cumulative Effects Analysis has been revised, updated, and clarified to reflect the most recent development trends, updated land use plans, and currently proposed access configurations.
- The detailed evaluation sheets (referred to as Factor Sheets) format and content have been updated to be consistent with the current factor sheets* being used on WisDOT environmental documents.
- The impacts have been updated to reflect design refinements+ that have been made since the Record Of Decision (ROD).
- The wetland delineation has been updated and the impacts presented in this section have been updated to reflect the new delineation.
- The Unique Area Impact Evaluation information (which includes Section 4(f) resources) has been updated and revised to reflect changes since the FEIS. Since this information required extensive clarification and updating, the information has been removed from this section and included in Section 5.

*Factor Sheets are a more condensed method for documenting the results of the NEPA process. They are generally used by WisDOT and FHWA in Environmental Assessments and Environmental Reports. The sheets were used in this EIS as part of a WisDOT pilot effort to streamline the environmental documentation process. Since the FEIS used the Factor Sheet format, it has been retained in this Limited Scope SDEIS (LS SDEIS), except for Section 5, which was significantly revised.

+ Design refinements are minor changes to roadway alignments, access configurations, slope limits, etc. that normally occur during the design process as more information is obtained and more design has been performed. The refinements do not change the fundamental concept of the project nor do they fundamentally change the impact conclusions presented within the

Maroon text signifies updates addressing changed conditions or analysis, clarifications, or additional information
Items that are considered revisions that target specifically identified issues in the January 19, 2012 Notice of Intent to prepare an LS EIS are shown in blue text.
For tables and figures, the title of the Table or Figure has been shown in maroon or blue to indicate whether it has been revised since the 2010 FEIS.

4.1 INTRODUCTION

This section describes the beneficial and adverse social, economic, and environmental consequences of the No-Build, Build Alternatives, and Corridor Preservation Alternatives. The section is broken into different parts. Sections 4.2 and 4.3 address commitments of resources and the relationship between uses of the environment and long-term productivity. Section 4.4 addresses indirect and cumulative effects: Sections 4.5 and 4.6 provide a summary of the impacts in matrix form, and Section 4.6 contains factor sheets that provide more detail on individual impacts.

A. Indirect and Cumulative Effects

The indirect and cumulative effects discussion in Section 4.4 provides a summary of the indirect effects of the Preferred Build Alternative. Indirect effects are effects caused by the alternative but are later in time or removed in distance from the actual construction of the alternative. Section 4.4 also provides a summary of the cumulative effects of the Preferred Build Alternative. Cumulative effects are the incremental impacts of the alternative on resources, when combined with other past, present, and reasonably foreseeable future actions, regardless of who creates the impact. Appendix C provides a more detailed evaluation of the indirect and cumulative effects.

B. Environmental Cost Matrix

The matrices in Tables 4.5-1, 4.5-2, and 4.5-3 provide an overview of the environmental impacts and costs from the 2004 DEIS, 2010 FEIS, and this LS SDEIS. The matrices include estimates of construction and real estate costs in the year of expenditure, land acquisition estimates, farmland area affected, residential properties affected, and natural environment issues such as wetlands, uplands, endangered species, archaeological/historical resources, and air and noise quality.

The method used to attribute right of way impacts to either the WIS 23 roadway or the trail is shown graphically in Figure 4.1-1. For the analysis, the impacts allocated to the Old Plank Road Trail include some of the slopes associated with the 4-lane roadway expansion. This allocation method places the trail within the right of way being designated for the road. Without the trail, about 35 percent of land allocated to the trail would still be needed for the 4-lane expansion. Without the WIS 23 expansion, an additional 35 percent of land allocated for the trail would be needed for the trail.

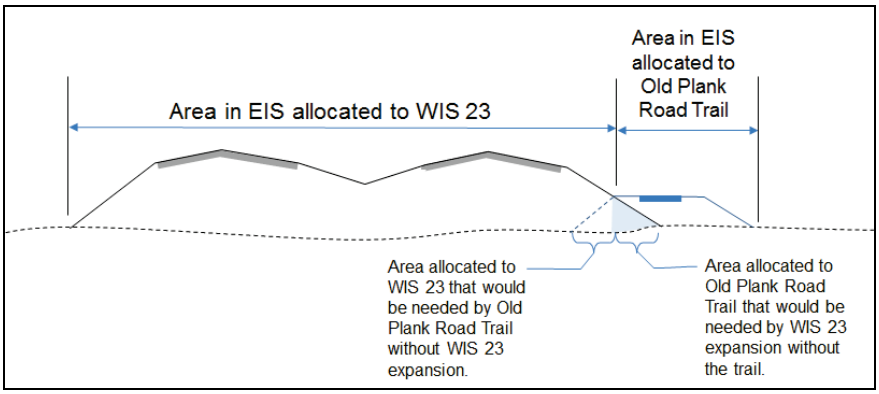


Figure 4.1-1 Area Allocated to WIS 23 Expansion and Old Plank Trail

C. Environmental Evaluation Matrix

The matrix contained in Section 4.6 provides an overview of the effects of the No-Build, Build, and Preferred Build Alternatives as well as the Corridor Preservation Alternatives. The effect of each specific factor is defined as adverse, benefit, none, or not applicable for each corridor alternative. The environmental effect is summarized for each factor, and if further investigation is necessary, a detailed evaluation of the factor is discussed further in Section 4.6.

D. Detailed Factor Sheets

Following the Environmental Evaluation Matrix, detailed evaluation of the specific environmental factors is presented using individual factor sheets. As mentioned, Factor Sheets are a more condensed method for documenting the results of the NEPA process. They are generally used by WisDOT and FHWA in Environmental Assessments and Environmental Reports. The sheets were used in this EIS as part of a WisDOT pilot effort to streamline the environmental documentation process. Since the 2010FEIS used the Factor Sheet format, it has been retained in this Limited Scope SDEIS, except for Section 5, which was significantly revised.

The Wisconsin Department of Natural Resources (WDNR), the Wisconsin State Historical Society, the US Army Corps of Engineers (USACE), the United States Fish & Wildlife Service (USFWS), and the United States Environmental Protection Agency (USEPA) have commented on this proposed project throughout the scoping process. This coordination is reflected in the individual Factor Sheet discussions. Coordination with these agencies will continue and they will have the opportunity to comment within the LS SEIS process.

4.2 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES

A. Build Alternatives

The No-Build Alternative includes irretrievable money, time, and personal hardship related to the high rate of personal injury and property damage crashes that are anticipated along the existing route. The increases in cost, time, and frustration levels associated with decreasing levels of service for vehicle movement and operational energy expenditure are tied to the inefficient facility. The impairment of recreational, service, emergency, and business travel within the project area also creates irretrievable commitments of resources.

The Build Alternatives require irreversible commitments of resources such as land acquisition of residential and commercial properties, wetland and farmland destruction, and access acquisition. Land converted from private use to public use displaces local tax revenues. Economic resources committed to the project include irretrievable federal and state funding for construction and maintenance.

In addition, irretrievable resources such as fuel, labor, and highway materials are required to construct the Build Alternatives. Labor and materials are expected to remain in adequate supply. Construction energy expended to build the improved facility is considered irretrievable; however, the savings in operational energy requirements on the more efficient facility should compensate for the construction energy usage.

The commitment of these resources is based on the concept that the traveling public and local residents will benefit from the improved quality of WIS 23. Benefits, which are anticipated to outweigh the commitments of resources, will include improved safety, greater facility capacity, and travel time savings.

B. Corridor Preservation

The No Corridor Preservation Alternatives do not irretrievably commit resources, money, or time for right of way of future transportation improvements. The No Corridor Preservation alternative could preclude future transportation options by not preserving opportunities that are presently available. This preclusion could result in less than optimal future transportation solutions.

The Corridor Preservation Alternatives do preserve and therefore commit land for future transportation right of way. This preserves future transportation opportunities. This commitment, however, is neither irreversible nor irretrievable. Future circumstances could remove these preservation measures, and protected land could have all restrictions removed.

4.3 RELATIONSHIP BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Any Build and No-Build Alternative, as well as the Corridor Preservation or the No Corridor Preservation Alternative, involves short-term and long-term trade-offs. Short-term consequences for Build Alternatives include the more immediate impacts of the project. Long-term consequences relate to direct or indirect effects on future generations. Short-term consequences for Corridor Preservation Alternatives include the reduction in property rights for areas needed for future transportation improvements.

Short-term consequences for Build Alternatives include some increased localized noise, air, and water pollution and some traffic delays during construction. These impacts are important to those experiencing them; however, the impacts do not have a lasting effect on the quality of the environment. Other short-term consequences involve additional fuel use by motorists and construction equipment during construction. Public funds will also be committed to build the facility.

The proposed improvement project does not have a precedent-setting nature for future projects. The alternatives being studied offer common congestion relief and safety improvements that follow accepted standards. Factors such as highway improvement projects, sewer line extensions, the area's economic vitality, available land, land costs, housing supply, development regulations, and community planning may enable development. Construction of the Preferred Build Alternative is not expected to solely stimulate substantial long-term indirect impacts, but it could slightly accelerate the pace of indirect development. Potential indirect impacts related to development are described in Section 4.4 and Appendix C of this LS SDEIS. The purpose of the improvement project is to address existing and future traffic needs and to preserve highway mobility and safety to avert future highway improvements. Development will continue in this area for the same reason that it has been occurring for the last decade and because of the factors listed above. The counties in the study area have grown in population since European settlement and continue to grow in towns, villages, and cities with few exceptions. This growth is planned in adopted comprehensive plans consistent with State Statutes. This growth is also consistent with population projections from Wisconsin's Demographic Services Center. Local governments and Sheboygan and Fond du Lac counties are zoning properties consistently with adopted plans to accommodate development resulting from growth trends.

The Build Alternatives will not preclude future transportation options. The proposed project is expected to provide acceptable capacity and safety for the foreseeable future. If additional capacity were required beyond what is provided by this project, other modal alternatives or additional highway alternatives could still be pursued.

The Corridor Preservation Alternatives also will not preclude future transportation options. When future transportation options are needed, a range of alternatives will be evaluated at that time within the NEPA process. The Corridor Preservation Alternatives; however, will preserve opportunities that could be lost without a preservation action.

Long-term environmental impacts resulting from Build Alternatives include the creation of new environmental effects such as new structures, wetland losses, loss of uplands, and additional right of way distances for wildlife crossings.

Long-term benefits realized from the Build Alternatives include improved convenience, safety, and energy use for those living in the project area and for those traveling through the area.

The No-Build Alternative avoids all the short-term and localized construction impacts. Safety and mobility would continue to deteriorate under the No-Build Alternative as capacity needs are not met. As traffic volumes increase in the future, the congestion and crash potential on the existing route will increase, thus reducing the long-term productivity of the area.

4.4 INDIRECT AND CUMULATIVE EFFECTS (ICE)

Section 4.4 evaluates indirect and cumulative effects of the alternatives under consideration. The Indirect and Cumulative Effects (ICE) Analysis has been revised, updated, and clarified as part of this LS SDEIS. The ICE analysis presented in the 2010 FEIS was prepared in the spring of 2008. The updated analysis was completed in the winter of 2012 and accounted for recent economic and development trends. The analysis used the most recent WisDOT guidance for conducting an indirect and cumulative effects analysis and accounted for recent legal opinions. The analysis included a workshop on January 17, 2012, with a panel made up local and regional land use and transportation planners, economic development professionals, and agricultural, natural, and cultural resource experts.

The Council on Environmental Quality (CEQ) states that "indirect" effects 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 or 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," (CFR 1508.8). A "cumulative" effect is "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," (CFR 1508.7).

A. Indirect Effects Analysis

The project team followed the six-step analysis method described in WisDOT's Guidance for Conducting an Indirect Effects Analysis (November 2007). These steps include the following:

1. Scope, Select Tools/Activities, and Determine the Study Area
2. Inventory the Study Area for Notable Features
3. Identify Impact Causing Activities of the Proposed Project Alternatives
4. Identify the Potentially Significant Indirect Effects
5. Analyze Indirect Effects, Describe their Significance for Project Alternatives, and Evaluate Assumptions
6. Assess Consequences and Identify Mitigation Strategies.

The following paragraphs summarize the findings of these six steps. The complete indirect effects analysis in the ICE document is organized around these steps and can be found in Appendix C.

1. Scope, Select Tools/Activities, and Determine Study Area

In selecting tools, the study team referenced Appendix B in WisDOT's Guidance for Conducting an Indirect Effects Analysis. The study team used all of the various methods referred to in this document, trend analysis, expert panels, and the Delphi method[1] were most appropriate because these methods leveraged the use of up-to-date, readily available and broadly recognized data sources and the most knowledgeable local and resource experts. Local land use staff and community officials have the

[1] The Delphi method is a structured communication technique that relies on a panel of experts. Typically a panel of experts answers questionnaires. After the questionnaires are completed, a facilitator provides an anonymous summary of the findings and reasons for them. In a meeting, or otherwise, experts are encouraged to revise their earlier answers in light of the replies of other members of their panel.

greatest insight into local development trends and have the greatest awareness of potential development proposals.

a. Scope

To understand the scope of probable indirect impacts of highway expansion and corridor preservation measures, the project team compiled all available land use plans, zoning ordinances, and zoning maps for each municipality within the ICE study area (the study area boundaries are depicted on Figure 4.4-1). Based upon an analysis of these documents, the project team identified the areas where impacts are likely to occur. The following criteria were used to identify such locations:

- Existing land use and development patterns.
- Population projections.
- Areas planned for development through local land use plans.
- Currently established land use controls.
- Locations of future WIS 23 interchanges and other access changes.
- Locations of significant natural resource features.

b. Select Tools and Activities

In selecting tools, the study team referenced Appendix B in WisDOT's Guidance for Conducting an Indirect Effects Analysis. As mentioned, of the various methods referred to in this document, trend analysis, expert panels, and the Delphi method[2] were most appropriate because these methods leveraged the use of existing information and knowledge.

Following this initial analysis, the project team contacted the Planning Directors for Sheboygan County and Fond du Lac County. Based upon their expertise and familiarity with local land use patterns, the planners answered questions regarding where potential changes in residential, commercial, industrial, and institutional development might occur as a result of highway expansion. Both planners were also asked to identify how the expansion might affect farmland, wetlands, and other environmental resources in the highway's surrounding communities over the long term. The project team also contacted local officials in the corridor area. Planners from the town of Empire, city of Fond du Lac, and city of Plymouth were interviewed about their municipality's future land use plans along WIS 23.

Following interviews with county and local planners, the project team solicited opinions on potential impacts of project alternatives from local experts using the Delphi method. Experts were selected based on their professional areas of expertise and their local knowledge of the project ICE study area. The expert panel members included local and regional land use and transportation planners, other local officials, economic development professionals, and agricultural, natural, and cultural resource experts. An inventory report was provided to panel members to provide an overview of the project and proposed alternatives as well as existing conditions and policies of state and local government. Panel members were asked to review the inventory report, respond to an online survey, and complete a mapping exercise identifying potential indirect and cumulative effects for each of the WIS 23 alternatives. Panelists were also asked to attend a facilitated panel discussion where panelists shared their survey and map responses. The discussion format enabled the identification of points of consensus and disagreement on possible impacts. Representatives from the following agencies and communities participated in the panel:

- Town of Plymouth
- Town of Greenbush
- Town of Forest
- Town of Marshfield
- Town of Taycheedah
- Village of St. Cloud
- Village of Mt Calvary
- Village of Glenbeulah
- City of Plymouth
- City of Fond du Lac

[2] ibid

- Sheboygan County Planning Department
- Fond du Lac County Planning Department
- Fond du Lac Metropolitan Planning Organization
- East Central Wisconsin Regional Planning Commission
- Bay-Lake Wisconsin Regional Planning Commission
- WisDNR Wildlife Management, Eastern Fond du Lac and Sheboygan Counties
- Ice Age Trail (National Park Service)
- Wisconsin Department of Agriculture, Trade, and Consumer Protection
- University of Wisconsin-Extension, Sheboygan County
- University of Wisconsin-Extension, Fond du Lac County
- Wade House Historic Site-Wisconsin Historical Society
- Glacial Lakes Conservancy
- Niagara Escarpment Resource Network

Information gathered from the initial project team analysis, county and local planner interviews, and expert panel process was used to identify potential indirect and cumulative effects of WIS 23 expansion. These effects are summarized in this section and incorporated in Appendix C.

c. Determine ICE Study Area

Land use planners on the study team interacted with staff planners from Fond du Lac County, Sheboygan County, and East Central Wisconsin Planning Commission to determine the likely range of influence from the WIS 23 corridor. Beyond the study area, the influence of WIS 23 diminishes as other arterial corridors provide access. The ICE study area is depicted on Figure 4.4-1 and extends roughly 3.5 miles north of the corridor and roughly 4.5 miles south of the corridor. The ICE study area is defined by commutershed and civil boundaries. It includes the following jurisdictions: city of Fond du Lac, village of Mt. Calvary, village of St. Cloud, town of Empire, town of Forest, town of Taycheedah, and town of Marshfield in Fond du Lac County and the city of Plymouth, village of Glenbeulah, town of Greenbush, and town of Plymouth in Sheboygan County.

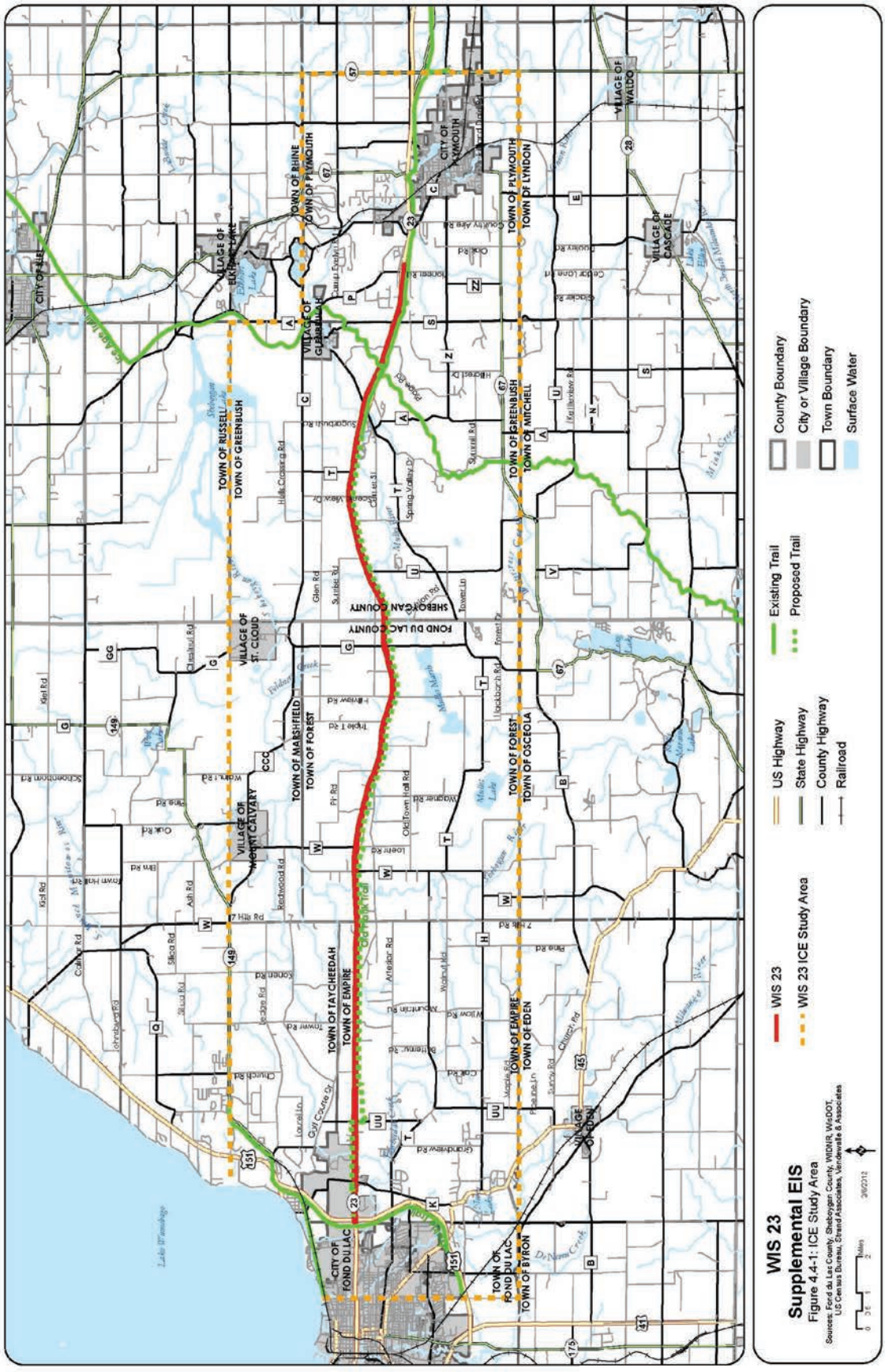

WIS 23
Supplemental EIS
Figure 4.4-1: ICE Study Area
Sources: Ford du Lac County, Sheboygan County, WIDNR, WisDOT, US Census Bureau, Strand Associates, Vandewalle & Associates
2/6/2012
WIS 23
WIS 23 ICE Study Area
US Highway
State Highway
County Highway
Railroad
Existing Trail
Proposed Trail
County Boundary
City or Village Boundary
Town Boundary
Surface Water
CITY OF FOND DU LAC
TOWN OF FOND DU LAC
TOWN OF BYRON
VILLAGE OF OAKFIELD
TOWN OF EMPIRE
TOWN OF EDEN
TOWN OF TAYCHEEDAH
TOWN OF FOREST
TOWN OF OSCEOLA
VILLAGE OF MOUNT CALVARY
TOWN OF MARSHFIELD
VILLAGE OF ST. CLOUD
TOWN OF GREENBUSH
TOWN OF MITCHELL
TOWN OF RUSSELL
VILLAGE OF GLENBEULAH
VILLAGE OF ELKHART LAKE
CITY OF SHEBOYGAN
TOWN OF RHINE
TOWN OF PLYMOUTH
CITY OF PLYMOUTH
TOWN OF LYNDON
VILLAGE OF CASCADE
VILLAGE OF WALDO
FOND DU LAC COUNTY
SHEBOYGAN COUNTY

Figure 4.4-1

2. Study Area Inventory and Notable Trends

a. Population Trends

Table 4.4-1 shows the official Wisconsin Department of Administration's 2030 population projections for each of the municipalities included in this ICE study area. The expected population growth rate for the entire area over the next 20 years (without highway expansion) is comparable to the statewide growth rate and the growth rate for Sheboygan County and is slightly higher than the overall Fond du Lac County growth rate. The most substantial (absolute) growth is projected to occur in the city of Fond du Lac with other substantial growth also occurring in the city of Plymouth and town of Greenbush, and, to a lesser extent, the towns of Taycheedah, Empire, and Plymouth, which are adjacent to the cities of Fond du Lac and Plymouth, respectively.

Table 4.4-1 Population Projections for the ICE Study Area, 2010-2030

	2010	2030	Change	% Change
City of Fond du Lac	43,021	50,312	7,291	16.9%
City of Plymouth	8,445	10,696	2,251	26.7%
Town of Taycheedah	4,205	4,773	568	13.5%
Town of Plymouth	3,195	3,857	662	20.7%
Town of Empire	2,797	3,265	468	16.7%
Town of Greenbush	1,534	3,355	1,821	118.7%
Town of Fond du Lac	3,015	2,697	-318	-10.5%
Town of Forest	1,080	1,211	131	12.1%
Town of Marshfield	1,138	1,133	-5	-0.4%
Village of Mt. Calvary	762	1,237	475	62.3%
Village of St. Cloud	477	523	46	9.6%
Village of Glenbeulah	463	499	36	7.8%
Total Study Area Population	70,132	83,558	13,426	19.1%
State of Wisconsin	5,772,370	6,541,180	768,810	13.3%

Sources: U.S. Census Bureau, 2010; Wisconsin Department of Administration, 2008

b. Land Use Plans

A number of communities in the ICE study area had comprehensive plans or land use plans that depicted areas for future growth and preservation. Plans current as of January 2012 were used in this analysis.

The city of Fond du Lac's future land use plan shows residential and commercial development on the east side of the city occurring over the next 20 years (to the year 2030). New development planned east of the city and along the WIS 23 corridor consists mostly of moderate density development served by municipal sewer and water. Residential development is planned to extend from the current developments on the east side of Fond du Lac to County UU on the north and south sides of WIS 23. Commercial and institutional development is also planned for all four quadrants of the US 151/WIS 23 interchange. There is an existing golf course on the west side of County UU, north of WIS 23, that provides an amenity for future residential development in this area.

The town of Taycheedah's Plan shows the majority of town lands remaining in agricultural use with growth concentrated along the Lake Winnebago shoreline, north of the city of Fond du Lac.

The town of Empire's future land use plans do not show any development along the WIS 23 corridor except at the intersection of County Highway UU and WIS 23, which is planned for smaller-scale commercial and industrial development. The remainder of the corridor is planned for long-term agricultural use.

The city of Plymouth's future land use plans indicate development south of WIS 23. Plymouth's plans show a frontage road and commercial development immediately south of WIS 23, with new

residential development south of the commercial development. Currently, the city of Plymouth is not planning land use changes for the area north of WIS 23.

The town of Marshfield's land use plan indicates additional residential development around the village of Mount Calvary on the west, north, and east sides and institutional development on the south side.

The town of Greenbush's plan indicates a desire to preserve the majority of town lands for agricultural use, with some commercial and/or residential development planned for the County A/WIS 23 interchange area and additional residential development located in the village of Glenbeulah where it can be served by municipal sewer and water.

The village of Glenbeulah's plan indicates additional future residential development in the north and northeast portions of the village, with some additional commercial development located toward the center of the village just off County A.

Other plans for the ICE study area include the Sheboygan County Farmland Preservation Plan, the Fond du Lac County Farmland Preservation Plan, the Long-Range Transportation and Land Use Plan for the Fond du Lac Metropolitan Planning Organization (MPO), the Fond du Lac Land and Water Resource Management Plan, and the city of Fond du Lac 2040 Water System Development Plan. The land use recommendations for these documents are generally consistent with the local land use plans discussed above.

Several other federal and/or state highway projects that may impact traffic volumes within the WIS 23 corridor are being studied, are under construction, or have been recently completed. The WisDOT Connections 2030 Long-Range Multi-modal Transportation Plan includes a summary of several state trunk highway projects and project studies intended to improve traffic safety and efficiency. It includes the WIS 23 project. Other recommendations include ongoing upgrades to improve US 41 to comply with interstate standards (especially between the Fond du Lac and Appleton east of the WIS 23 project area), the future designation of US 41 as a federal interstate highway, and improvements to US 151 south and west of the project area. These projects may have indirect and cumulative effects on land use and development throughout the region, including the WIS 23 ICE study area.

c. Notable Features

The area has several notable features that are described in Section 3 of this SEIS. The following paragraphs summarize some of these features.

(1) Agriculture

Fond du Lac and Sheboygan counties have 279,922 acres and 157,607 acres of cropland, respectively. According to the USDA 2007 Census of Agriculture and UW Extension, agriculture accounts for $2.3 billion in sales in Fond du Lac County. The 2006 Agricultural Impact Statement (AIS) for the project published by the Department of Agriculture, Trade, and Consumer Protection states that an estimated 17 percent of all economic activity in the county is agriculturally related. Rated on a number of farmland preservation indicators, Fond du Lac County, though classified as an urban county, continues to have a very strong agricultural industry. It ranked 8th among Wisconsin counties in 2003 in production of corn for grain, 6th in production of corn for silage, 10th in soybean production, and 1st in winter wheat. Dairy is the largest sector within county agriculture. For Sheboygan County, the USDA 2007 Census of Agriculture and UW Extension estimates that agriculture accounts for $3.3 billion in sales. The 2006 AIS for the project states that Sheboygan County is more urbanized than Fond du Lac County, but it still remains a very important agricultural county. The report estimated that 21 percent of all economic activity in Sheboygan County is agriculturally related. Sheboygan County ranked 16th among Wisconsin counties in production of corn for silage, 16th in soybeans, 14th in oats, and 4th in winter wheat. Dairy is the largest sector within county agriculture, with a large portion being postprocessing such as cheese products.

(2) Wetlands

According to WDNR aerial photography (1978-79), Fond du Lac County has 69,128 acres of wetlands that account for 14.9 percent of the land cover in the county. Sheboygan County (1987 aerial photography) has 40,447 acres of wetlands that account for 12.3 percent of the county.

There are several notable wetland complexes near the WIS 23 corridor. Mullet Marsh (339 acres) is located about 1 mile south of WIS 23. The Sheboygan Marsh area (over 14,000 acres of land and surface water publically owned) is located about 2 miles north of WIS 23 in the project area.

(3) Water Quality

Four watershed areas are found within the ICE study area: the eastern Lake Winnebago Watershed, the Onion River Watershed, the Sheboygan River Watershed, and the Mullet River Watershed (which flow into the Sheboygan River.) There are four stream/river crossings along the corridor: the Sheboygan River, a tributary to the Sheboygan River, the Mullet River, and Taycheedah Creek.

Taycheedah Creek and the Onion River do not cross WIS 23 in the ICE study area. Mullet River crosses WIS 23 near the town of Greenbush and is classified as a Warm Water Sport Fish Community stream. The Mullet River is unique in that it flows from the warm water headwaters into a cold water segment. Between Glenbeulah and Plymouth, spring inflows lower stream temperatures and the river supports cold water sport fish.

Most of the ICE study area is located within the Sheboygan River basin, which has been identified by the USEPA as a Great Lakes Area of Concern (AOC). AOCs are geographic areas that are severely degraded, often because of water contamination from chemicals such as PCBs and heavy metals or excessive nutrient contributions. Much of the Sheboygan River is on the WDNR's impaired waters list, though not the section within the WIS 23 corridor. Land uses and practices within the Sheboygan River basin that have contributed to adverse environmental conditions include agricultural and urban runoff, municipal and industrial discharges, wetland removal, and shoreline modification.

(4) Uplands

Much of the woodlands and upland habitat in the ICE study area is located within the Kettle Moraine State Forest–Northern Unit. The forest has been identified as an area of scenic and scientific value and is protected as a unit of the Ice Age National Scientific Reserve. Numerous areas with geographic features of scientific value are located within the ICE study area but are not yet within or protected as part of the Ice Age National Scientific Reserve, including the interlobate moraine. These areas contain woodlands, wetlands, streams, grasslands, kettles, kames, and lakes.

A portion of the Niagara Escarpment is also located in the ICE study area. Because of the distinctive geology of this natural feature, a number of unique plant and animal species rely on the integrity of the escarpment. As indicated in a *Niagara Escarpment Inventory of Findings* report,[3] the escarpment's ecosystems have been threatened by development. The escarpment ridge is located just east of Fond du Lac in an area that has been planned for long-term development; therefore, development pressure in the long term may negatively impact the Niagara Escarpment

Sheboygan Marsh County Park and Sheboygan Marsh State Wildlife Area are located 2 miles north of the WIS 23 corridor. The area historically known as Sheboygan Marsh includes over 14,000 acres of land and surface water. It contains the largest restored wetland in the Wisconsin watersheds of lakes Michigan and Superior. The Sheboygan Marsh Wildlife Area portion of the marsh includes over 8,166 acres of public lands, of which Sheboygan County owns 7,414 acres and Wisconsin owns 752 acres. The remainder of the marsh is privately owned.

Mullet Creek Wildlife Area is located 1 mile south of the WIS 23 corridor and is a 2,217-acre property located in east central Fond du Lac County. The Mullet Lake State Natural Area is located about .05 mile southwest of Mullet Creek Wildlife Area. The lake and swamp complex is the headwaters of the Mullet River in the priority watershed of the Sheboygan River.

[3] The Niagara Escarpment Inventory of Findings 1999-2001 and Considerations for Management, Final Report, May 1, 2002, Natural Heritage Inventory Program, Bureau of Endangered Resources, Wisconsin Department of Natural Resources

(5) Threatened and Endangered Species

Within the WIS 23 corridor area, there are 21 plant and animal species listed as either threatened, endangered, or special concern within the approximately 19 miles between Fond du Lac and Sheboygan counties. Eight state threatened species and two state endangered species are considered potentially affected based on WDNR project coordination. The state endangered species include rainbow shell mussel and Midwest Pleistocene vertigo upland snail. State threatened species include the snow trillium, slippershell mussel, ellipse mussel, red-shouldered hawk, cerulean warbler, Acadian flycatcher, hooded warbler, and Blanding's turtle. More information is contained in Section 3 of this LS SDEIS.

The project team worked with WDNR and USFWS to obtain rare species data for the ICE study area, which is larger than the corridor study area. WIS 23 crosses through Empire and Forest townships in Fond du Lac County and Greenbush and Plymouth townships in Sheboygan County.

Table 4.4-2 shows the number of rare species occurrences by township, in the broader ICE study area. This information is provided to summarize the general density of threatened and endangered species in both Fond du Lac and Sheboygan Counties in comparison to the project alignment and occurrences within the four townships that the project traverses.

The Sheboygan County towns of Greenbush and Plymouth contain more threatened and endangered species than towns adjacent to WIS 23 in Fond du Lac County. This is partially based on the presence of the Kettle Moraine Forest in Sheboygan County. Fond du Lac County has 36 reported threatened and endangered species occurrences and Sheboygan County has reported 40 occurrences. Cumulatively both counties have 54 rare species.

Table 4.4-2 Rare Species Occurrences in Towns and Counties within ICE Study Area

Town	Town	Range	Rare Plants	Rare Terrestrial Animals (including birds)	Aquatic Animals	Total Rare Species per Town (or County)	Total Rare Habitats
Empire (FDL County)	15N	18E	1	--	--	1	-
Forest (FDL County)	15N	19E	--	2	--	2	2
Greenbush (Sheboygan Co.)	15N	20E	2	6	3	11	2
Plymouth (Sheboygan Co.)	15N	21E	4	3	2	9	3
Total Occurrence Summary for all WIS 23 Towns	**4**	**4**	**6**	**10**	**5**	**21**	**7**
Occurrences Summary for Fond du Lac County	T13N to T17N	R14E to R19E	9	19	8	36	30
Occurrences Summary for Sheboygan County	T13N to T16N	R20E to R22E	18	14	8	40	33
Occurrence Summary for both WIS 23 Project Counties (Fond du Lac and Sheboygan)	**4**	**9**	**22**	**10**	**22**	**54**	**39**

Threatened and Endangered Species Data obtained from WDNR on-line Natural Heritage Inventory (NHI 11/14/12) and from WDNR correspondence March 2013. Note: Only threatened and endangered species are included in table. State Special Concern Species were not included in tallies.

(6) Historic and Archaeological Resources

Within the broader ICE study area, there are numerous historic resources. Wisconsin's Architecture and Historic Inventory (AHI) is a search engine that provides historical and architectural information for about 120,000 properties within Wisconsin. Listing on the AHI is not an indication of whether the property is eligible for the National Register of Historic Places (NRHP). This resource indicates there are 4,119 listings for Fond du Lac County and 2,664 listings for Sheboygan County.

Directly within the WIS 23 corridor, there are 17 potential historic sites and another 2 sites associated with the connection roads and interchange. Effects to all these resources were avoided except for those discussed below. Among historic resources potentially directly affected by WIS 23 alternatives are two historic and one archaeological resources eligible for or on the NRHP. The St. Mary's Springs Academy is on the east end of Fond du Lac and has two contributing buildings that are built in the Georgian Revival style and Richardsonian Romanesque Revival style. It is associated with the Sisters of St. Agnes of the Roman Catholic Church. Impacts to this property were avoided. The Old Wade House is now a state park near the Kettle Moraine State Forest and is run by the State Historical Society. It is a living history portrayal of a restored stagecoach inn built around 1850. Within the park are three structures that are on the National Register of Historic Places (NRHP). Impacts to the properties on the NRHP were avoided. The Sippel archaeological site is a small Yankee homestead/farm in the town of Greenbush. It was occupied between 1848 and 1875. The owners and inhabitants played instrumental roles in the early development of the Greenbush community, serving as farmers and merchants.

(7) Air Quality

The proposed WIS 23 project is located in the Lake Michigan Intrastate Air Quality Control Region. These air quality regions monitor National Ambient Air Quality Standards established by the USEPA under the authority of the Clean Air Act. Primary standards are designed to protect human health with an adequate margin of safety. Secondary standards are designed to protect public welfare from any known or anticipated adverse effect. Table 4.4-3 lists the standards for the different air pollutants and whether they are a primary or secondary standard.

Table 4.4-3 National Ambient Air Quality Standards

Pollutant	Type	Standard	Averaging Time a	Regulatory Citation
SO_2	Primary	0.14 ppm (365 µg/m^3)	24-hour	40 CFR 50.4(b)
SO_2	Primary	0.030 ppm (80 µg/m^3)	annual	40 CFR 50.4(a)
SO_2	Secondary	0.5 ppm (1,300 µg/m^3)	3-hour	40 CFR 50.5(a)
PM_{10}	Primary and Secondary	150 µg/m^3	24-hour	40 CFR 50.6(a)
$PM_{2.5}$	Primary and Secondary	35 µg/m^3	24-hour	40 CFR 50.7(a)
$PM_{2.5}$	Primary and Secondary	15 µg/m^3	annual	40 CFR 50.7(a)
CO	Primary	35 ppm (40 mg/m^3)	1-hour	40 CFR 50.8(a)(2)
CO	Primary	9 ppm (10 mg/m^3)	8-hour	40 CFR 50.8(a)(1)
O_3	Primary and Secondary	0.12 ppm (235 µg/m^3)	1-hour b	40 CFR 50.9(a)
O_3	Primary and Secondary	0.075 ppm (150 µg/m^3)	8-hour	40 CFR 50.10(a)
NO_2	Primary and Secondary	0.053 ppm (100 µg/m^3)	annual	40 CFR 50.11(a) and (b)
Pb	Primary and Secondary	0.15 µg/m^3	Rolling 3 months	40 CFR 50.1

a. Each standard has its own criteria for how many times it may be exceeded, in some cases using a three-year average.
b As of June 15, 2005, the 1-hour ozone standard no longer applies to areas designated with respect to the 8-hour ozone standard (which includes most of the United States, except for portions of 10 states).

Fond du Lac County is presently in attainment of all National Ambient Air Quality Standards (NAAQS). Sheboygan County was designated nonattainment for the 2008 Ozone Standard on April 30, 2012 (Federal Register / Vol. 77, No. 98 / Monday, May 21, 2012) Sheboygan County is also designated nonattainment for the 1997 Ozone standard, but that standard will be revoked effective July 20, 2013.

(8) Trails

There are three trails within the project corridor. The Old Plank Road Trail is a 17-mile paved trail that accommodates bicyclists, runners, and walkers. The Trail parallels WIS 23 from Sheboygan west to the Kettle Moraine State Forest. The Ice Age Trail is about a 1,000-mile footpath winding through Wisconsin that follows the moraine of the Wisconsin Glacier. It travels through the Northern Unit of the Kettle Moraine State Forest and crosses WIS 23 near Julie Court. The State Equestrian Trail also travels through the Northern Unit of the Kettle Moraine Forest and crosses WIS 23 at the same location.

(9) Environmental Justice (EJ) Populations

Environmental justice populations are described in Appendix C and depicted on Maps 2-5 of the Appendix. Minority and low-income populations are located at the ends of the ICE study in the cities of Plymouth and Fond du Lac. Several census tracks in the ICE study area also have a greater proportion of elderly individuals (age 65+) when compared to county averages. These concentrations are likely to remain because they are closer to urban areas and the associated services, housing, and employment opportunities associated with urban areas.

3. Impact-Causing Activities of the Project Alternatives.

The No-Build Alternative does not provide access management features, does not provide travel time improvements, and does not include trail enhancements. The No-Build Alternative will have no impacts since it serves as the baseline condition.

The Preferred Build Alternative would expand WIS 23 to 4 lanes and construct interchanges and J-turns at high use intersections. It also extends the Old Plank Road Trail to Fond du Lac and installs a grade-separated crossing for the Ice Age Trail and State Equestrian Trail. The net benefits include improved travel time, increased safety, and better trail facilities along and across WIS 23. The possible disadvantages include the purchase of about 424 acres of new right of way consisting of cropland, uplands, and wetlands. Disadvantages also include the relocation of 33 residences, 10 businesses, and 19 farms.

The benefits of the Preferred Build Alternative could also enable effects that are indirectly associated with the project. Improved travel times could, over time, cause people to make locational choices that increase the pace of development along the corridor. Access management features could affect the location of new development, particularly commercial development. The indirect effects of changes to development pace and location would create impacts to the natural environment.

The improved travel times, mobility, and safety would also increase daily travel volumes in the corridor. Figure 4.4-2 illustrates the difference in 2035 traffic volumes the corridor would experience between the No-Build and Preferred Build Alternatives.[4]

[4] Forecast volumes were updated in July 2012 by WisDOT's Traffic Forecasting Section in Madison using both a newly developed travel demand model (TDM) for the Northeast Region and other postprocessing measures that use traffic counts. See Section 1.3 of this LS SDEIS.

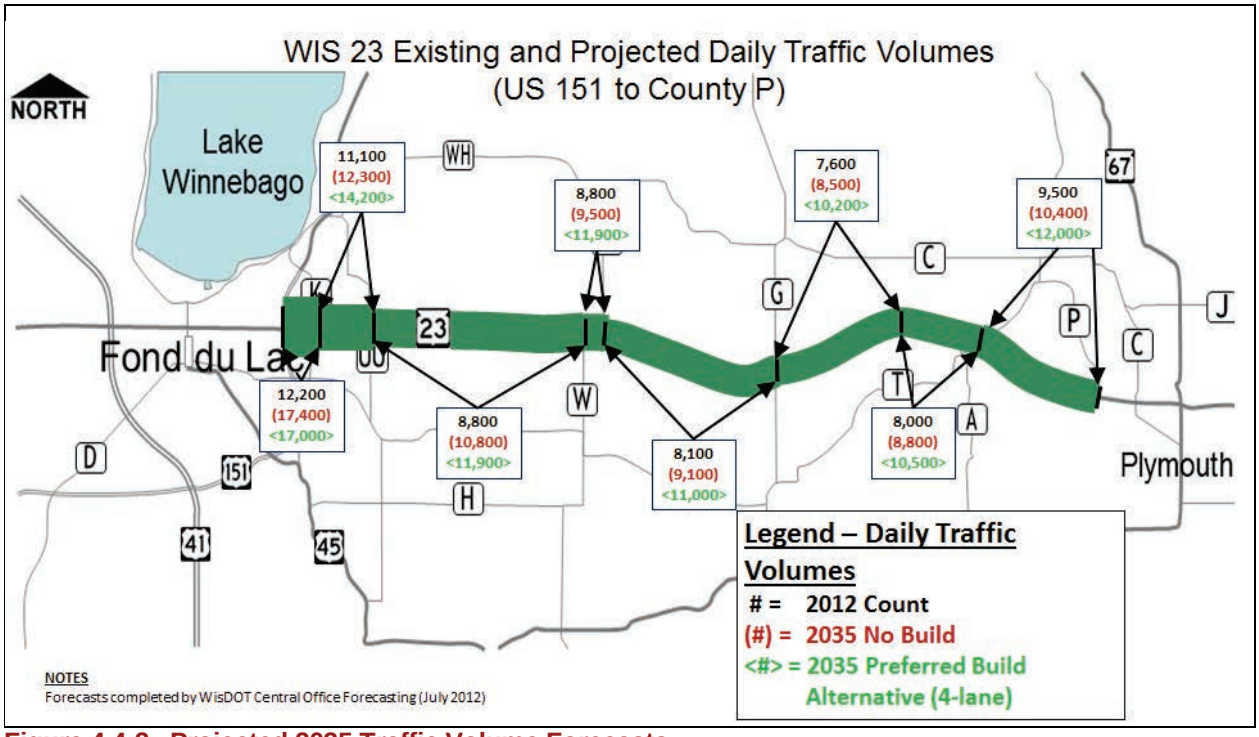


Figure 4.4-2 Projected 2035 Traffic Volume Forecasts

4. Identify Potentially Significant Indirect Effects

Potential indirect effects include loss of farmland and uplands from a possible increased rate of development in the corridor. Tables 4.4-4 and 4.4-5 summarize some of the impact-causing activities associated with the No-Build and Preferred Build Alternatives and the corresponding indirect effect. The tables also summarize influencing factors that support and discourage those changes. Figures 4.4-3-5 at the end of this section illustrates these changes.

Table 4.4-4 Summary of Indirect Effects of No-Build Alternative

Location and Potential Impact-Causing Activity	Potential Indirect Effect	Influencing Factors	
		Supports Change	Discourages Change
No improvements would be provided other than routine maintenance.	Reduced safety and increasing congestion may reduce development in corridor, particularly in middle area more distant from Fond du Lac and Plymouth.	There are no improvements associated with the No-Build Alternative.	Most town land planned and/or zoned for agricultural preservation. Farmland preservation plans in place. No sewer or water available in towns.

Table 4.4-5 Summary of Indirect Effects of Preferred Build Alternative (including Corridor Preservation Alternative)

Location and Potential Impact-Causing Activity	Potential Indirect Effect	Influencing Factors	
		Supports Change	Discourages Change
Expansion of WIS 23 from 2 to 4 lanes from US 151 to County P	Potential slight increases in the pace of growth in existing and planned interchange locations along the corridor. Potential slight acceleration of the loss of farmland and natural resources as a result of development.	Development is planned for cities and villages. Sewer and water available in cities and villages. Some town areas are planned and/or zoned for development.	Most town land planned and/or zoned for agricultural preservation. Farmland preservation plans in place. No sewer or water available in towns.
Wisconsin American Drive/ WIS 23 Roundabout	May facilitate accelerated development in the area.	Local land use plan recommends urban development in areas near improvement.	Current access north of WIS 23 is limited.
Jug-handle interchange at County K	Potential slight increases in the pace and amount of commercial and residential development on eastern fringe of Fond du Lac. Potential acceleration of farmland loss and impacts to other natural resources including the Niagara Escarpment from conversion to development.	Area has been planned for future urban growth by the city of Fond du Lac. Planned development of new municipal water infrastructure to serve this area. Municipal sewer and water available. Higher land values may lead to increased farmland sales for development.	Presence of Niagara Escarpment nearby might warrant careful consideration of the impacts of development. Changes in local land development or natural resource protection policies. Land acquisition by public or land conservation organizations. High agricultural commodity prices incentivize continued farming.
WIS 23 access removal at the following intersections: Mary Hill Park Drive Hilltop Drive Log Tavern Road Triple T Road Banner Road Hickory Road Division Road Julie Lane Ridge Road Sandstone Lane Twinkle Lane	Potential decreases in the pace and amount of development occuring adjacent to these intersections. Fewer impacts to farmland and other natural resources.	Municipal sewer and water not yet available at most intersections. Minimal areas planned for development in rural areas.	Areas near cities and villages planned for future urban growth.

Table 4.4-5 Summary of Indirect Effects of Preferred Build Alternative (including Corridor Preservation Alternative)

Location and Potential Impact-Causing Activity	Potential Indirect Effect	Influencing Factors	
		Supports Change	Discourages Change
WIS 23 access reductions at the following intersections: • Whispering Springs Drive (RIRO) • Taft Road (RIRO) • Tower Road (RIRO, northbound dedicated left-turn lane, and eastbound J-turn) • Poplar Road (RIRO) • 7 Hills Road (RIRO, dedicated left-turn lanes, and J-turns) • County W (RIRO, dedicated left-turn lanes, J-turns) • Hillview Road (RIRO and northbound dedicated left-turn lane) • Chickadee Drive (RIRO) • County U (RIRO and westbound J-turn) • County T (RIRO and eastbound J-turn) • Plank Road (RIRO and eastbound J-turn) • Sugarbush Road (RIRO and dedicated left-turn lanes) • County A (RIRO, dedicated left-turn lanes, and westbound J-turn) • Plank Road (intersection relocation and RIRO) • County S (RIRO and J-turns) Note: RIRO = Right-In/Right-Out	Potential slight decreases in the pace and amount of development occuring adjacent to these intersections. Fewer impacts to farmland and other natural resources.	No municipal sewer and water available. Intersections planned by town for long-term agriculture.	Areas near cities and villages planned for future urban growth.
Interchange at County UU	Potential slight increases in the pace and amount of development around interchange. Potential acceleration of farmland and natural resource loss from conversion to development. Potential impacts to the Niagara Escarpment.	Area immediately surrounding interchange has been planned for development by the town. Area planned for long-term city growth and municipal sewer and water. Close to Fond du Lac market area.	Presence of Niagara Escarpment nearby might warrant careful consideration of the impacts of development.
Interchange at County G	Potential slight increases in the pace and amount of development in the village of St. Cloud. Potential slight acceleration of farmland and natural resource loss from conversion to development.	Village has municipal sewer and water to serve development. Some development already located in the area around the County G/WIS 23 intersection. Already zoned for development.	Municipal sewer and water not yet available at interchange.
Extension of the Old Plank Road Trail from west of Greenbush to Fond du Lac; new underpass in the town of Greenbush	Potential increase in usership and increased safety. Potential economic benefits to communities with trail access.	Increased connectivity to regional trail network.	None.

Table 4.4-5 Summary of Indirect Effects of Preferred Build Alternative (including Corridor Preservation Alternative)

Location and Potential Impact-Causing Activity	Potential Indirect Effect	Influencing Factors	
		Supports Change	Discourages Change
Corridor Preservation Alternative – Grade Separations Tower Road 7 Hills Road Scenic View Drive Sugarbush Road	Potential reduction in the amount of development at these intersections. Fewer impacts to farmland and other natural resources.	No municipal sewer and water available. Most intersections planned by Town for long-term agriculture.	Sugarbush Road intersection planned for development.
Corridor Preservation Alternative – Interchanges County W County A	Potential increases in the pace and amount of development around future interchange areas. Potential acceleration of farmland and natural resource loss from conversion to development.	County A/T area planned for development.	County W intersection planned by Town for long-term agriculture.

5. Analyze Indirect Effects, Describe Their Significance for the Project Alternatives and Evaluate Assumptions.

The study team collected and compiled an inventory of local and regional trend data including population and housing trends and projections; demographics, including environmental justice populations; income, labor force, industries, and commuting patterns; agricultural resources; natural resources; land use and development patterns; archaeological and historical resources; and local, county, regional, and state plans and regulations. These notable features were selected based on guidance from WisDOT's Guidance for Conducting an Indirect Effects Analysis as well as a determination by the study team that they were relevant to the analysis. This information has been compiled and is included in Appendix C. Information from the inventory was considered in the preparation of this indirect effects analysis.

a. No-Build Alternative

(1) Development

(a) General Development Pattern

Expert panelists and the ICE study team agreed that under the No-Build Alternative, future land development within the WIS 23 study area will most likely occur in the locations planned for in adopted comprehensive plans (see Figures 4.4-3 to 4.4-6a). Panelists further indicated that the amount of land identified in comprehensive plans is adequate to accommodate future development, particularly in light of the current economic climate which has substantially slowed land development in recent years. Adopted comprehensive plans indicate that future development will primarily occur in undeveloped lands at the periphery of cities and villages. While the majority of outlying town lands are planned to remain as agriculture, open space, or natural areas, the following areas are planned for future development in the vicinity of WIS 23:

- Residential and mixed use development at the south end of the town of Taycheedah, east of County UU.
- Highway commercial development at the intersection of County UU and WIS 23 in the town of Empire.
- Unspecified future development in the town of Forest on the north side of WIS 23, west of Triple T Road.
- Residential and commercial development in Greenbush at the intersection of County A and WIS 23, east of the Wade House historic site.
- Two areas of rural residential development in the town of Greenbush south of WIS 23 on either side of the Kettle Moraine State Forest.

- Commercial development along the WIS 23 frontage in the town of Plymouth, west of WIS 57 and east of the city of Plymouth.

Areas where panelists identified potential development that may occur under the No-Build Alternative beyond that designated in adopted comprehensive plans are depicted on Map 10 of Appendix C and Figure 4.4-3. As is required under state statutes, local zoning supports development and preservation as indicated in adopted comprehensive plans. While certain areas have been planned and zoned for development in the study area, access to urban services and the real estate market will ultimately drive the pace, location, and intensity of future development.

(b) Residential Development

Expert panelists and the ICE study team generally agreed that the location of future residential development will generally occur in locations planned by study area communities. As indicated in adopted comprehensive plans (see Figures 4.4-3 to 4.4-6a), new residential development in the study area is planned primarily in city and village growth areas, such as the east side of the city of Fond du Lac, the east and west sides of the city of Plymouth, and the north side of the village of Glenbeulah. Small areas of residential development are planned in the town of Greenbush and Empire, but otherwise very little new rural development is planned in study area towns, which is supported by farmland preservation zoning limiting minimum lot sizes to between 10 to 35 acres.

Expert panelists identified areas where residential development may occur under the No-Build Alternative on Map 10 in Appendix C and Figure 4.4-3. These areas include lands in the town of Taycheedah to the east and northeast of Fond du Lac, along county highways on all sides of Mt. Cavalry, surrounding Wolf Lake in Marshfield, on the north and south side of St. Cloud, on the north side of Glenbeulah, east of the city of Plymouth near County S and County Z, and scattered residential development throughout the study area.

Expert panelists indicated, and the ICE study team agrees, that scattered, nonfarm residential construction has occurred over the past couple of decades, which has reduced the amount of woodlands, natural areas, and farmland in the study area. Panelists suggested that low land prices and inadequate land use controls may have encouraged this trend. Recently adopted farmland preservation plans and zoning regulations, in combination with the slow economy, will likely continue to reduce this trend. However, areas not protected by conservation or farmland preservation zoning may be at risk for long range future residential development if and when economic conditions improve.

(c) Commercial Development

Expert panelists and the ICE study team generally agreed that the location of future commercial development will generally occur in locations planned by study area communities. The city of Plymouth plans for substantial commercial growth outside of the study area on its east side to the south of WIS 23 and adjacent to WIS 57. The city of Fond du Lac plans for future mixed-use development at the northeast quadrant of the WIS 23/US 151 interchange. The town of Forest anticipates a small area of commercial at the juncture of County G/County T, and the town of Plymouth anticipates commercial development along WIS 23 corridor to the northeast of the city of Plymouth.

Expert panelists and the ICE study team agreed that the timing of future commercial development will likely be tied to a broader economic recovery. Expert panelists and the ICE study team further agreed that increased traffic congestion and growing safety issues along the WIS 23 corridor may have a detrimental impact on future economic growth under the No-Build Alternative, including the timing of future commercial development.

Some panelists identified a few areas of potential future small scale highway-oriented commercial development that are *not* planned by local communities (these are depicted on Map 10 of Appendix C and Figure 4.4-3). These are located primarily at county highway intersections with WIS 23, as well as a large area of possible future commercial

development on the southeast side of Fond du Lac where future residential development is now planned by the city.

(d) Industrial Development

Very little industrial development is planned to occur in the study area. The city of Plymouth has identified industrial growth areas on the south side of the city in the study area and additional areas outside the study area. Expert panelists and the ICE study team generally agreed that industrial development will likely occur in these locations under the No-Build Alternative; however, as with commercial development, the timing of future industrial development will likely be tied to a broader economic recovery. Expert panelists and the ICE study team further agreed that increased traffic congestion and growing safety issues along the WIS 23 corridor may have a detrimental impact on future industrial development under the No-Build Alternative.

(e) Institutional Development

Expert panelists indicated the Agnesian HealthCare recently announced that it will be opening a new hospital at the WIS 23/WIS 49 intersection in Ripon, approximately 25 miles west of the study area. This facility will provide healthcare services to a portion of the population in the study area. In addition the ICE study team notes that additional new small scale institutional development to serve local needs under the No-Build Alternative is anticipated to occur as needed, generally based on the pace of new residential development.

(f) Redevelopment

As indicated previously, the present economic climate has substantially slowed land development and redevelopment in recent years. The ICE study team feels limited redevelopment is expected to occur in the study area under the No-Build Alternative; however, the timing of such redevelopment will likely be tied to a broader economic recovery.

(g) Community Character

Expert panelists and the ICE study team generally agreed that the No-Build Alternative is not expected to significantly alter the existing character of study area communities, as development trends are likely to generally continue. These trends are likely to continue if ICE study area communities follow their adopted long range comprehensive plans which account for and are designed to accommodate modest continued growth trends. Small scale highway-oriented commercial development may have a slight impact on rural character as local zoning ordinances do not contain provisions that protect community character.

(2) Agricultural Land

The majority of study area towns plan for the continuation of farming in existing agricultural areas. Farmland preservation plans prepared by Fond du Lac and Sheboygan counties aid in the preservation of productive farmland and protect farm operations from conflict with incompatible uses. However, the degree to which these plans are followed will vary depending on evolving growth policies and other land use regulations. The rate at which farmland is converted to nonagricultural uses will largely be a factor of economic conditions and each community's desire to preserve agriculture.

Expert panelists and the ICE study team generally agreed that only minimal farmland would likely be lost in the near term under the No-Build Alternative beyond that associated with planned development in city and village growth areas. However, panelists indicated that in the longer term, agricultural land in the towns adjacent to urban areas (i.e., Taycheedah, Plymouth, and Empire) may experience development pressure, particularly as the economy rebounds.

It is the ICE study team's opinion that because the decision to sell farmland for scattered rural residential development is often more related to personal circumstances and require only on-site well and septic systems, the timing and location of such development are very difficult to predict.

(3) Wetlands

Wetland areas of regional significance are located in the study area. These include the Sheboygan River Marsh area, which has been identified by WDNR as a Land Legacy Place, Sheboygan Marsh County Park and State Wildlife Area, Kiel Marsh State Wildlife Area, Mullet Creek Wildlife Area, Mullet Lake State Natural Area, and Calvary Marsh. As indicated in the *Land Legacy Report*, protecting the open space around and between wetlands would buffer them from conflicting land uses and would link them together in an ecologically valuable corridor. Efforts in this general regard have been undertaken in Sheboygan County; land conservancies have acquired 1,100 acres that are protected by conservation easements. WDNR and land conservancies will likely continue to work to protect natural areas through land acquisition and conservation easements.

Expert panelists indicated, and the ICE study team agrees, that the amount of wetland areas lost to future development would be minimal under the No-Build Alternative because of the minimal amount of new development. In terms of wetland quality, panelists suggested, and the ICE study team agrees, that the quality of wetlands in or adjacent to planned development areas may be minimally impacted by stormwater runoff from impervious surfaces associated with new development. Panelists noted that such impacts will likely accelerate over the long term and as the economy rebounds, particularly surrounding the city of Plymouth where substantial development is planned. In addition, wetlands are strongly protected under federal and state law. Ultimately, the level of impact will vary based on development type, local regulations, mitigation activities, and future conservation efforts.

(4) Water Quality

As indicated earlier, the study area is located almost entirely within the Sheboygan River basin, which has been identified by the USEPA as a AOC. AOCs are geographic areas that are severely degraded, often resulting from water contamination from chemicals such as PCBs and heavy metals or excessive nutrient contributions. The main land uses and practices within the Sheboygan River basin that have contributed to adverse environmental conditions include agricultural and urban runoff, municipal and industrial discharges, wetland removal, and shoreline modification. In addition, as stated in the Niagara Escarpment Inventory of Findings Report, the Escarpment area is sensitive to groundwater contamination.

Panelists indicated that under the No-Build Alternative, impacts to surface water levels and groundwater recharge areas are not anticipated beyond that associated with planned development in city and village growth areas and current trends in rural residential land development. Panelists did note, however, that stormwater runoff associated with new development, combined with higher traffic volumes and substantially more pollutants along the WIS 23 corridor, could result in increases in water pollutants. The level of impact will vary based on development type, local regulations, and mitigation activities. Overall, panelists concur and the ICE study team agrees that these impacts to surface water and groundwater are anticipated to be minimal under the No-Build Alternative.

(5) Upland Habitat

(a) Woodlands and Ecologic Resources

Much of the woodlands in the study area are located within the Kettle Moraine State Forest–Northern Unit. The forest has been identified as an area of scenic and scientific value and is protected as a unit of the Ice Age National Scientific Reserve. Numerous areas with geographic features of scientific value are located within the study area but are not yet within or protected as part of the Ice Age National Scientific Reserve, including the interlobate moraine. These areas contain woodlands, wetlands, streams, grasslands, kettles, kames, and lakes.

A portion of the Niagara Escarpment is also located in the study area. Because of the distinctive geology of this natural feature, a number of unique plant and animal species rely on the integrity of the escarpment. As indicated in the Niagara Escarpment Inventory of Findings report, the escarpment's ecosystems have been threatened by development, not only in Wisconsin, but in the upper peninsula of Michigan, New York, and Canada. The escarpment ridge is located just east of the city of Fond du Lac in an area that has been planned for long term development (see Map 7a of Appendix C); therefore, a high degree of

development pressure in the long term may impact woodlands and ecological resources in the vicinity of the Niagara Escarpment.

Expert panel members and the ICE study team generally agreed that there will be minimal impact to woodlands under the No-Build Alternative because of new development. Such development, particularly rural residential, could occur in woodlands or alter woodland and wildlife habitat areas. The ICE study team suggests the impact will mainly be because of additional rural residential development in areas planned and zoned for such. Impacts include habitat fragmentation and reduction of the natural aesthetic caused by residences and woodland clearing on the face or top of the Escarpment.

However, panel members noted that it is a goal of WDNR and Niagara Escarpment Network to acquire and preserve additional lands of scientific value. Expert panel members and the ICE study team generally agreed there may be negligible impacts woodlands that are within the planned expansion areas of the Kettle Moraine State Forest and the Niagara Escarpment under the No-Build Alternative if these acquisition and preservation efforts are successful.

(b) Glacial Features

There are numerous glacial features throughout the study area. One panel member noted that these features are not currently protected through local regulation. Expert panel members and the ICE study team generally agreed there will likely be minimal impacts to glacial features under the No-Build Alternative because there will be a limited amount of new development in areas where prominent glacial features are present.

(6) Threatened and Endangered Species

As mentioned, within the 19-mile WIS 23 corridor area there are 21 plant and animal species listed as either threatened, endangered, or special concern. The majority are located in the towns of Forest and Greenbush. Expert panelists indicated, and the ICE study team agrees, that the No-Build Alternative is not expected to substantially impact these populations of endangered species because of absence of land-disturbing development activity indirectly related to the No-Build Alternative.

(7) Historic and Archaeological Resources

Expert panelist expected access to the St. Mary's Springs Academy, as a functioning school, could become more problematic under the No-Build alternative because of the difficulty of accessing WIS 23 at the at-grade intersection. Impacts to the school, as a historic resource, would not occur as a direct effect of the WIS 23 highway. Existing access to the Old Wade House State Park via WIS 23 currently poses traffic safety issues. It was anticipated by the expert panel that the Old Wade House State Park, as a functioning park, could be negatively impacted by growing traffic congestion and safety issues under the No-Build Alternative because of the difficulty accessing the site. Because the historic structures on the NRHP within the park are distant from the roadway, there would be no direct effect to the historic resources in the park.

The No-Build Alternative would not require the area occupied by the Sippel Archaeological site, therefore, there would be no direct impact to the site. Known archaeological resources are protected from disturbance by state and federal regulations. Expert panel members did not identify specific archaeological resources and suggested that impacts to such resources would likely be minimal, if any, under the No-Build Alternative. Undocumented archaeological resources are always at risk of being disturbed by development activity, however, the historically low development trends in the ICE study area are expected to continue under the No-Build Alternative, likely having a low impact on these resources.

(8) Air Quality

Motor vehicles contribute several pollutants listed in the National Ambient Air Quality Standards. These include the following:

(a) Nitrogen oxides react with ammonia, moisture, and other compounds to form nitric acid vapor and related particles. These compounds can affect lung tissue.

(b) Volatile Organic Compounds (VOC) combine with oxides of nitrogen, react and create ozone. While beneficial in the upper atmosphere, ozone irritates the respiratory system at ground level. According to a 2005 USEPA report, about 26 percent of VOCs come from on-road motor vehicles.

(c) Carbon monoxide reduces the blood's ability to deliver oxygen to the body. Motor vehicle travel is the major contributor of carbon monoxide in the United States.

Other pollutants are also discussed in Section 4.6 of this LS SDEIS. With the No-Build Alternative, average daily traffic volumes on WIS 23 will increase from 8 to 23 percent by the year 2035. Corresponding to the increased WIS 23 traffic volumes will be increased side road volumes that both feed WIS 23 and lead to destinations from WIS 23. Motor vehicle technology and cleaner fuels have been leading to a reduction in motor vehicle exhaust pollution. However, increased vehicle volumes may result in additional emissions.

As mentioned, Sheboygan County is not in attainment for the 8-hour standard for ground-level ozone as part of the NAAQS. Such emissions could effect Sheboygan County's nonattainment status. The conformity analysis indicates the Sheboygan Area Transportation Plan is consistent with the approved motor vehicle emissions budgets for Air Quality.

(9) Trails

The Old Plank Road Trail is a 17-mile multiuse trail that parallels WIS 23 from Sheboygan to Greenbush, linking with the Ice Age Trail in the Kettle Moraine State Forest–Northern Unit. Other trails in the study area include Ice Age Trail, the State Equestrian Trail, and a snowmobile trail—each of which directly cross WIS 23 between Plank Road and County S.

Expert panelists and the ICE study team agreed that impacts associated with the No-Build Alternative include continuation of the existing at-grade Ice Age Trail/State Equestrian Trail crossing on WIS 23, where high speed traffic is present, which many panelist indicated they had personally experienced difficulty crossing at this location. Also, the proposed extension of the Old Plank Road Trail west to Fond du Lac would either be delayed or would not occur which panelists representing local governments indicated was something their constituents desired.

(10) Environmental Justice Populations

Environmental justice populations are described in Chapter 2 and depicted on Maps 2 to 5 of Appendix C. Minority and low-income populations are located at the ends of the ICE study are in the cities of Plymouth and Fond du Lac. Several census tracks in the ICE study area also have a greater proportion of elderly individuals (i.e., age 65+) when compared to county averages.

The study team determined that minority and low income populations will not be disproportionately adversely impacted by the No-Build Alternative because generally employment and social services are available in Fond du Lac and Plymouth where such population concentrations occur and therefore travel on WIS 23 is generally not required. Conversely, elderly populations will be more adversely affected by increased congestion and decreased safety because they are concentrated in the central portion of the ICE study area and need to travel to the urban areas at the ends of the ICE study area for services.

b. Preferred 4-Lane Build on Alignment Alternative

(1) Development

(a) General Development Pattern

As with the No-Build Alternative, expert panelists and the ICE study team agreed that future land development within the study area will generally follow adopted comprehensive plans. In the written questionnaire, there was some disagreement among panelists about the location, pace, and intensity of development that may occur under the Build Alternative as depicted on Maps 15 and 16 of Appendix C and Figure 4.4-4. However, after discussing these impacts at the panel workshop meeting, expert panelists generally concurred with one another. Specifically, they identified development impacts that may occur within the jurisdiction they represent and deferred to other panelists for impacts in their communities.

It is the opinion of the expert panel and the ICE study team that the general locations of development at the western and eastern ends of the corridor will not be impacted under the Build Alternative because development in the cities of Fond du Lac and Plymouth respond to the provision of urban utilities and services. However, the pace of future development in these cities may be slightly accelerated as a result of reduced access along WIS 23 between the two cities pushing development to the ends of the corridor, where the preservation of access, reduced congestion, and improved ease of travel will attract development. The location, amount, and pace of future development in the rural central portion of the corridor (in the towns of Taycheedah, Forest, Greenbush, and Plymouth) may

be further altered. Specifically, development will likely concentrate at future interchanges including County UU, County W (north), and County G and be reduced where new access restrictions occur including Tower Road and 7 Hills Road. In the vicinity of Greenbush hamlet, future interchange improvements at County T/A will likely be offset by access reductions at Sugarbush Road.

The ICE study teams feels that the pace and amount of growth related to the indirect effects of the Build Alternative will likely only be slightly higher than those associated with the No-Build Alternative because of a combination of factors: regional growth trends have been and are likely to continue to be modest, the Preferred Build Alternative is not a new highway facility but rather a modification of a long-existing highway, and the Preferred Build Alternative generally reduces the number of access points which has the strong tendency to focus additional development near remaining access points.

(b) Residential Development

Expert panelists and the ICE study team generally agreed that residential development impacts will vary in the study area. For example, residential development may concentrate at higher densities in more urbanized areas and in other areas with highway access. Slightly shortened travel time for commuters and traveler comforter related to capacity and safety improvements may lead to slight increases in the amount of residential development in rural areas compared to the No-Build Alternative. Smaller communities within the study area may experience modest increases in the pace and amount of residential growth as a result of improved access to major employment centers beyond the study area. Areas identified by panelists for possible residential development beyond areas identified in comprehensive plans are shown on Maps 15 through 17 of Appendix C and Figure 4.4-4.

Other impacts associated with the Preferred Build Alternative include the direct access of rural residential lots to WIS 23 and response times of emergency vehicles. Expert panelists noted that a number of residential driveways presently have direct access to WIS 23. The Preferred Build Alternative will require alternate access and the potential relocation of driveway access to rural roads and county highways. Panelists also indicated that response times for emergency vehicles may be affected under the Preferred Build Alternative, particularly in the town of Greenbush. Higher response times could slightly reduce the amount of residential development in the study area. The WisDOT project manager indicated that access for emergency services would be coordinated in the design phase if the Preferred Build Alternative is implemented.

(c) Commercial Development

Expert panel members and the ICE study team generally agreed that commercial development will continue to be focused in planned commercial areas under the Preferred Build Alternative, but unplanned highway-oriented commercial development may also occur at proposed interchange locations as a result of increased capacity and a focusing of access at proposed interchanges, combined with a general reduction of access between interchanges. However, panelists noted and the ICE study team agrees that large increases in commercial development in rural areas, as well as large scale projects, are unlikely to occur until utilities and urban services are available in those areas. The ICE study teams notes that there are no plans for such provision of services at the time of writing.

In addition to the location of future commercial development, panelists indicated the Preferred Build Alternative may have the impacts in the study area listed below. This may be because of slight increases in traffic volume and commercial development under the Preferred Build Alternative.

1) Higher-value commercial development may result.
2) New economic development initiatives, such as marketing campaigns, creation of tax incremental financing districts, and new business parks and shopping centers may emerge.
3) Employment related development may be channeled closer to WIS 23 and at higher concentrations.
4) Communities with easier access to WIS 23 may experience greater economic growth than communities not directly on the corridor.
5) Businesses may be encouraged to locate in the vicinity of WIS 23 corridor to take advantage of enhanced access and visibility.

6) Connection of Sheboygan and Fond du Lac via a 4-lane highway may cause new economic development opportunities to emerge throughout the study area.

(d) Industrial Development

Industrial development is primarily planned in the city of Plymouth on the south, southeast, and northwest sides of the city. Expansion to existing quarrying operations may also occur in the town of Plymouth as suggested by the town's comprehensive plan.

Expert panelists and the ICE study team generally agreed that the location of future industrial development will generally occur as planned under the Preferred Build Alternative, but at a somewhat accelerated pace and potentially at a somewhat greater intensity (e.g. more impervious surface area per acre) as a result of increased capacity and a focusing of access as proposed interchanges, combined with a general reduction of access in between interchanges. Panelists indicated that future industrial development may also be focused at interchange locations to take advantage of increased visibility. Panelists also suggested that new economic development initiatives may emerge, such as marketing campaigns, new tax incremental financing districts, and new industrial parks—such as in the city of Plymouth where industrial development is planned to occur.

(e) Institutional Development

As suggested in the No-Build Alternative, additional new locally serving institutional development in the study area is anticipated to occur as needed generally based on the pace of new residential development. However, compared to the No-Build Alternative, institutional development may potentially occur at a somewhat faster rate under the Preferred Build Alternative when the economy recovers because of slight increases in the amount and pace of new residential development. Panelists also indicated that the intensity (e.g. more impervious surface area per acre) of new institutional development will likely be somewhat greater under the Preferred Build Alternative as a result of increased capacity and a focusing of access as proposed interchanges, combined with a general reduction of access in between interchanges.

(f) Redevelopment

As indicated previously, the present economic climate has substantially slowed land development and redevelopment in recent years. Expert panelists and the ICE study team generally agree that limited redevelopment is expected to occur in the study area under the Preferred Build Alternative in the current economic climate; however, when the economy rebounds, redevelopment may occur at a slightly faster pace and at a slightly greater intensity/density under the Preferred Build Alternative as a result of increased capacity, reduced travel time, and reduced congestion. Redevelopment will most likely occur in urbanized areas, such as the cities of Fond du Lac and Plymouth.

(g) Community Character

Expert panelists and the ICE study team generally agreed that the Preferred Build Alternative is not expected to significantly alter the existing character of study area communities, as development trends are likely to be only slightly increased compared to the No-Build Alternative. These trends are likely to continue if ICE study area communities follow their adopted long range comprehensive plans which account for and are designed to accommodate modest continued growth trends. However, some panelists indicated the rural character of the towns may be affected by accelerated growth of nearby cities and villages. Others suggested that easier access provided by WIS 23 may increase demand for "country-living" under the Preferred Build Alternative, and the increased development could negatively affect rural character in such areas. Finally, near future rural interchanges new small scale highway-oriented commercial development may also have a slight impact on rural character, as local zoning ordinances do not contain provisions which protect community character.

Panelists and the ICE study team generally agreed that community character will ultimately be dependent upon local government regulation and the quality of development and siting decision. Panelists also indicated that the Preferred Build Alternative will not increase the number of billboards in the study area because of lack of demand for off-site advertising. The ICE study team notes that adopting regulations that prevent billboards would be a more certain way of avoiding this adverse impact on community character.

(2) Agricultural Land

The majority of towns in the study area plan for the continuation of farming, except in small areas planned for development. County farmland preservation plans in combination with exclusive agricultural zoning further protect land that is planned to remain in agricultural uses and enables continuation of farming.

Expert panelists and the ICE study team agreed that the Preferred Build Alternative will likely slightly accelerate the conversion of farmland in areas planned for future development and an overall increase in urbanization may increase development pressure in rural areas. In addition, some towns may allow development on low quality farmland.

The panel concurred that two counteracting trends would influence development at interchange locations. First, the development values of the land will likely increase providing an incentive for landowners to sell to developers. Second, town representatives and the WisDATCP representative on the panel also noted that agricultural commodity prices are very high which is providing an incentive to continue to farm. Areas of farmland not planned for development around interchange locations will likely experience development pressure and may result in the additional loss of farmland at these locations. As mentioned earlier, land development has been slow in recent years because of the slow economy; therefore, the degree to which land development is accelerated as a result of the highway expansion may be negligible until the economy makes a full recovery.

In addition, expert panelists noted a concern that closure of existing access to farm fields may result in the fragmentation of existing farms on opposite sides of the highway corridor. Fragmentation could lead to greater distances traveled by farm vehicles and may result in less productive and economically viable farm operations. However, the WisDOT project manager indicated that farm field access will be maintained and unrestricted direct median crossovers will be included as part of the Preferred Build Alternative design which will be available for use by farm machinery, police and maintenance vehicles, and others.

(3) Wetlands

As noted under the No-Build Alternative, several wetland areas of regional significance are located in the study area, the protection of which is a priority for WDNR and local land conservancies. Expert panelists indicated that the loss of wetlands may occur under the Preferred Build Alternative. However, wetlands are protected from development by state and federal regulations; therefore the ICE study team feels that substantial loss of wetlands is not anticipated under the Preferred Build Alternative. Where wetland areas are proposed to be filled for development, mitigation and/or replacement is required.

Expert panelists indicated, and the ICE study team agrees, that the amount of wetland areas lost to future development would be slightly increased under the Preferred Build Alternative compared to the No-Build Alternative because of slight increases in the amount of new development. Panelists also noted that impacts resulting from increased pace and amount of development will likely accelerate over the long term as the economy rebounds, particularly surrounding the city of Plymouth where substantial areas are proposed for development near wetland areas. Panelists also suggested that the quality of wetlands in or adjacent to planned development areas may be minimally impacted by stormwater runoff from impervious surfaces associated with new development. In addition, wetlands are strongly protected under federal and state law. Ultimately, the level of impact will vary based on development type, local regulations, mitigation activities, and future conservation efforts.

(4) Water Quality

As indicated under the No-Build Alternative, the study area is located almost entirely within the Sheboygan River Basin, which has been identified by the USEPA as a Great Lakes Area of Concern (AOC). System improvements under the Preferred Build Alternative will increase the impervious surface area in the study area and the number of vehicles using the corridor. These factors may contribute to increases in the peak rate and volume of stormwater runoff and pollutants, including chloride, salt, and other deicing chemicals. In addition, as stated in the Niagara Escarpment Inventory of Findings Report, the Escarpment area is sensitive to groundwater contamination.

Expert panelists indicated, and the ICE study team agrees, that increased stormwater runoff and land development under the Preferred Build Alternative may reduce the area available for groundwater recharge which may alter surface water levels and further reduce water quality

through increased sedimentation and increased temperature, particularly after periods of heavy rain and/or snow melt. However, panelists indicated, and the ICE study team agrees, the degree of these impacts would likely be slightly higher compared to the No-Build Alternative. One member of the expert panel indicated that the marshes in the study area receive much of the runoff in this corridor. There will be an increased impact to the marshes in the study area under the Preferred Build Alternative because of increased impervious surface area and new development.

(5) Upland Habitat

i. Woodland and Ecologic Resources

The majority of large tracts of woodlands in the study area are located in the Kettle Moraine State Forest – Northern Unit. As described earlier, the Forest is a unit of the Ice Age National Scientific Reserve. Numerous other areas containing geographic features of scientific value, including the interlobate moraine, are located within the study area but are not yet within or protected by an Ice Age National Scientific Reserve.

As described earlier, the Niagara Escarpment is located in the study area. Hydrologic disruption and outright destruction of some of Escarpment features because of road construction is identified as a current threat in the Niagara Escarpment Inventory of Findings report. The report also indicates that residential development is one of the most pressing threats to the Niagara Escarpment as past residential development and associated infrastructure has also fragmented sensitive habitats and may destroy rare plant and animal species.

Expert panel members and the ICE study team generally agreed that there will be slightly increased impacts to woodlands under the Preferred Build Alternative compared to the No-Build Alternative as a result of slightly increased pace and amount of development. Such development, particularly rural residential, could occur in woodlands or alter woodland and wildlife habitat areas. Panelists also indicated that invasive species, such as phragmites, spread rapidly along highway corridors, which is another possible impact of the Preferred Build Alternative. Expert panelists indicated that the Preferred Build Alternative could further impact the Escarpment, unique glacial features, and other resources areas of ecological significance. The ICE study team suggests the impact will mainly result from rural residential development in areas planned and zoned for such. Impacts include habitat fragmentation and related impacts on threatened and endangered species, and reduction of the natural aesthetic caused by residences and woodland clearing on the face or top of the Escarpment.

However, panel members noted that it is a goal of WDNR and Niagara Escarpment Network to acquire and preserve additional lands of scientific value. Expert panel members and the ICE study team generally agreed there may be minimal impacts to woodlands that are within the planned expansion areas of the Kettle Moraine State Forest and the Niagara Escarpment under the Preferred Build Alternative if these acquisition and preservation efforts are successful.

ii. Glacial Features

There are numerous glacial features throughout the study area. One panel member noted that these features are not currently protected through local regulation. Expert panel members and the ICE study team generally agreed there will likely be slightly increased impacts to prominent glacial features under the Preferred Build Alternative because of lack of protection (e.g., overlay zoning) and slightly increased amounts of new development compared to the No-Build Alternative. These impacts would be reduced if the WDNR implements its plans to acquire 7,000 acres of new land around the Kettle Moraine State Forest.

(6) Threatened and Endangered Species

There are 21 rare species within the project corridor study area (see Section 3). In the broader ICE study area, there are 36 occurrences of rare species in Fond du Lac County and 40 occurrences of rare species in Sheboygan County. Interaction with the WDNR indicates one state endangered and nine threatened species could potentially be directly affected by WIS 23 improvements. The state endangered species is rainbow shell mussel. State threatened species include the yellow gentian, snow trillium, slippershell mussel, ellipse mussel, red-shouldered hawk, cerulean warbler, Acadian flycatcher, hooded warbler, and Blanding's turtle.

Panelists indicated, and the ICE study team agrees, that reduction and degradation of habitat as a result of slightly increased pace and amount of development under the Preferred Build

Alternative could further threaten or potentially cause the displacement or loss of these threatened species, both along the corridor and in the broader county context. More discussion on adverse effects to threatened and endangered species is presented in the cumulative effects section.

(7) Historic and Archaeological Resources

Recent revisions to the historic boundary of the St. Mary's Springs Academy site have led to a No Adverse Effect for the property from improvements proposed under the Preferred Build Alternative. The County K jug-handle associated with the Preferred Build Alternative will make access in to and out of the site easier. There should be no direct impact to St. Mary's Springs Academy historic boundary as a result of the Preferred Build Alternative. Expert panelists indicated that the Old Wade House State Park would be positively impacted by the Preferred Build Alternative with the recently constructed visitor center and carriage house museum which interface with an expansion to WIS 23 and associated improvements. Further, panelists indicated that the site would benefit from improved visibility and access for both cars and bicycles. The historic properties on the NRHP within the park are distant from WIS 23, so there would be no direct impact on these resources.

It is difficult to determine the Preferred Build Alternative's indirect effect on historic structures outside of the WIS 23 corridor. There are no laws preventing private entities from altering these structures, and it is not clear that a slightly increased pace of development would affect the razing or restoration of existing structures.

Staff on the expert panel did not identify specific archaeological resources that may be impacted under the Preferred Build Alternative other than the Sippel site (which is a direct impact, see Section 4.6 B6). As indicated under the No-Build Alternative, archaeological resources are protected from disturbance by state and federal regulations. Expert panel members did not identify any specific archaeological resources that may be impacted under the Preferred Build Alternative; however, potential loss of undiscovered archaeological sites was noted as a potential impact of the Preferred Build Alternative. The ICE study team suggests new development indirectly related to the Preferred Build Alternative would require ground-disturbing activities. These activities could adversely impact unknown archaeological sites, and since archaeological reconnaissance is not required for private development, these sites would not be avoided. Since the amount of new development under the Preferred Build Alternative is likely to be slightly greater compared to the No-Build, the likelihood of adversely impacting unknown archaeological sites would be slightly higher. The development footprint associated with building development sites is smaller than that of a major roadway corridor, so development impacts to archaeological resources, when compared to the roadway's direct impacts, are likely to be much smaller.

(8) Air Quality

As mentioned under the No-Build Alternative on page 4-19, motor vehicles contribute several pollutants listed in the National Ambient Air Quality Standards that affect human health. These pollutants include nitrogen oxides and volatile organic compounds that lead to ozone, carbon monoxide, and minor amounts of particulate matter. Other pollutants are also discussed in Section 4.6 of this LS SDEIS.

The Preferred Build Alternative will have higher traffic volumes and higher travel speeds. Additionally, the projected 2035 daily traffic volumes are 10 to 25 percent higher than what would normally occur with the No-Build alternative. The projected 2020 daily summer traffic on the Sheboygan County portion of WIS 23 represents about 2.52 percent of the total vehicle miles traveled (VMT) in Sheboygan County for a summer day. With the Preferred Build Alternative, WIS 23 has 0.13 percent more VMT contribution to the total county VMT[5]. The emissions associated with these higher traffic volumes combined with other human activities such as manufacturing, off-road vehicles, and other sources emit VOCs and NOx that contribute to ground-level ozone levels in Sheboygan County. WDNR and USEPA have in place a set of regulations that are designed to decrease emissions from motor vehicles,

[5] Based on total VMT obtained from Sheboygan Area MPO conformity analysis in the 2013-2016 TIP

areas sources and industrial sources over time. Programs and regulations are in place at the federal and state level to control vehicle emission including regulations in the early 2000s and 2007 further controlling emissions from vehicles and fuels. These are projected to reduce vehicle pollutant emissions over the next 25 years.

As mentioned, Sheboygan County is not in attainment for the 8-hour standard for ground-level ozone as part of the NAAQS. The conformity analysis indicates the Sheboygan Area Transportation Plan is consistent with the SIP for Air Quality even with the expansion of WIS 23 to 4 lanes. Therefore while the Preferred Build Alternative could have more VOC and NOx emissions than the No-Build Alternative, the conformity analysis which was approved in February 27, 2013 indicates the Sheboygan Area Transportation Plan is consistent with the emission budgets set forth to bring the county back into attainment.

(9) Trails

The Ice Age Trail, the State Equestrian Trail, and a snowmobile trail currently cross WIS 23 between Plank Road and County S. As part of the expansion project, an underpass will be constructed to provide a safer crossing across WIS 23 and to ensure these important recreational corridors are not interrupted. The WisDOT project manager noted that proposed park and rides in the Preferred Build Alternative could also include trail heads.

Expert panelists indicated, and the ICE study team agrees, that the extension of the Old Plank Road Trail from Plymouth to Fond du Lac will be a positive impact of the Preferred Build Alternative. As proposed under the Preferred Build Alternative, the Old Plank Road Trail will connect with the 7-mile Prairie Trail in Fond du Lac which is part of a larger system of trails to link the Peebles Trail and the Wild Goose Trail in Dodge County. Panelists also indicated the Preferred Build Alternative will result in safer and more efficient access to trails which will provide economic benefits for communities with trail access. While the trail network is anticipated to be improved in the study area, expert panel members and the ICE study team do not anticipate new land development associated with the expanded trail network.

The Niagara Escarpment Network is in the process of developing a Niagara Escarpment Greenway Plan which will include a future north-south hiking trail along the escarpment that will cross the WIS 23 corridor. Extension of the Old Plank Road Trail under the Preferred Build Alternative would connect with this and other future trails, improving the regional trail network.

(10) Environmental Justice Populations

Minority and low income populations are located at the ends of the ICE study are in the cities of Plymouth and Fond du Lac. Several census tracks throughout the ICE study area also have a greater proportion of elderly individuals (i.e., age 65+) when compared to county averages.

The ICE study team determined that environmental justice populations will not be disproportionately adversely impacted by the Preferred Build Alternative. The most substantial changes to access in the Preferred Build Alternative occur in the town of Greenbush near the villages of Glenbeulah and Elkhart Lake. However, there are no concentrations of environmental justice populations in this area. A variety of less substantial access restrictions are proposed along other points in the corridor which may make access somewhat less convenient and trips slightly longer for the concentrations of elderly population in the central part of the ICE study area in the towns of Marshfield and Forest and the villages of Mount Calvary and St. Cloud. However, such access restrictions are likely to be offset by reduced highway congestion and safer conditions under the Preferred Build Alternative.

6. Assess Consequences and Identify Mitigation Activities.

The indirect effects analysis indicates the predominant consequence of indirect effects from the Preferred Build Alternative is the potentially increased pace of development that could occur outside the urban centers as a result of improved safety and increased mobility on WIS 23. Since most of the sensitive resources in the ICE study area are located in nonurban areas, the consequence of the indirect effect of rural development includes adverse impacts on agricultural land, water quality, and upland habitat, which are not protected to the same extent as wetlands.

NEPA does not specifically require substantive mitigation for project impacts; direct, indirect, or cumulative. The CEQ regulations require that the environmental impacts statement include consideration and discussion of possible mitigation for project impacts (40 CFR §§ 1502.14((f), 1502.16(e-h), 1505.2(c), 1508.25(b)(3)).[6]

Questions 19a. and 19b. of the *CEQ 40 Questions and Answers* provide additional guidance on mitigation to be addressed and documented in a NEPA document.

> "*The mitigation measures discussed in an EIS must cover the range of impacts of the proposal. The measures must include such things as design alternatives that would decrease pollution emissions, construction impacts, esthetic intrusion, as well as relocation assistance, possible land use controls that could be enacted, and other possible efforts."*
>
> *"All relevant, reasonable mitigation measures that could improve the project are to be identified, even if they are outside the jurisdiction of the lead agency or the cooperating agencies, and thus would not be committed to as part of the RODs of these agencies. This will serve to alert agencies or officials who can implement these extra measures, and will encourage them to do so. To ensure that environmental effects of a proposed action are fairly assessed, the probability of the mitigation measures being implemented must also be discussed. Thus the EIS and the Record of Decision should indicate the likelihood that such measures will be adopted or enforced by the responsible agencies."*

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

> *"Measures necessary to mitigate adverse impacts will be incorporated into the action and 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."*
>
> *It is important that we understand how mitigation is defined in the NEPA process. Replacement or compensation is the last of a sequence of considerations that constitute the overall mitigation expectation of the CEQ regulations (40 CFR § 1508.20). Mitigation includes avoidance and minimization of project impacts first. This hierarchy is often referred to as "sequencing" and means that impact avoidance and minimization measures should be considered early and as an integral component of the alternatives development and analysis process. Replacement or compensation for impacts are intended primarily to deal with residual impacts that cannot be avoided or minimized.*

The following paragraphs summarize project sequencing as it pertains to all impacts, direct, indirect, and cumulative.

a. Avoidance Measures

(1) Corridor Selection

In the development, evaluation, and screening of alternative corridors, WisDOT considered both the direct environmental impacts of the corridor alternatives as well as the indirect and cumulative effects. The consideration of direct, indirect, and cumulative effects led to the selection of the on-alignment corridor, Alternative 1, as the Preferred Alternative. The selection of Alternative 1 had the following effects:

(a) It reduced the quantity of direct impacts to farmland, wetlands, and uplands

[6] http://www.environment.fhwa.dot.gov/projdev/qaimpact.asp accessed on June 2013

(b) It reduced the number of severed farm parcels and the amount of farmland required. Farm severances make agriculture less sustainable and can lead to a reduction in farming activities and the conversion of severed parcels to other land uses (an indirect effect). Alternative 1 had the least amount of farm severances and cropland required.

(c) It reduced the amount of roadway lane mileage associated with WIS 23 improvements. Selection of an off-alignment corridor would have increased lane mileage because new bypass lanes would be constructed in addition to the existing WIS 23 lanes. Alternative 1 would have about a third less pavement than some off-alignment alternatives. Additional lane mileage has direct environmental effects, such as degraded water quality, induced traffic, the corresponding air quality impacts, and severance of natural communities. Selection of Alternative 1 avoided the impacts that would have occurred with additional lane mileage of the off-alignment alternatives.

(d) It avoided potential residential and commercial development from occurring along an off-alignment corridor (an indirect effect). This included avoiding the corresponding environmental impacts that would have been associated with this development.

In addition to the selection of Alternative 1 as the Preferred Build Alternative, WisDOT also selected the No Corridor Preservation Option for the US 151/WIS 23 connection. By not preserving lands for a future system interchange, WisDOT avoided potential indirect effects to properties adjacent to the options. The avoided indirect effects included decreased marketability of parcels and potentially reduced investment and reinvestment in affected properties.

(2) Preferred Alternative Features

WisDOT seeks to incorporate design components and features into the Preferred Alternative that minimize the adverse effects of the potential project. Many of these components address direct effects, but they also have regional influence. The WIS 23 Preferred Project incorporates a 16-mile extension of the Old Plank Road Trail. This extension enhances the ability of WIS 23 to serve nonmotorized modes of transportation and offsets potential negative project effects to nonmotorized modes.

b. Minimization Measures

WisDOT implements access management on roadways and access points along state highways. The implementation of access management can affect the development potential of properties served by that project (an indirect effect). In implementing access management, WisDOT seeks not to restrict or impede existing land uses but seeks to prevent traffic from potential future development from negatively impacting highway operations. By implementing access restrictions, new development, particularly commercial development, is less likely to occur near the access restriction. Similarly, by permitting access, development is able to occur in planned locations and at higher densities. The WIS 23 Preferred Alternative incorporates access management, which is detailed in Table 2.7-1 of this LS SDEIS for the project. Of the current 42 full-access intersections, the Preferred Alternative incorporates 6 cul-de-sacs, 14 right-in/right-out access restrictions, 10 J-turn access restrictions, and 3 interchanges/jug-handle. While providing sufficient local access, these access restrictions will have the effect of directing development away from rural intersections with less access toward intersections with more access.

c. Mitigation Measures

Mitigation for direct effects includes wetland mitigation, the provision of a grade separated crossing for the Ice Age Trail/State Equestrian Trail, the replacement of forest land to the Northern Unit of the Kettle Moraine State Forest, as well as data recovery for the Sippel Archaeological site. Other than access management, no direct mitigation measures are proposed that specifically target indirect effects.

d. Avoidance, Minimization, and Mitigation Measures Outside of WisDOT's and FHWA's Jurisdiction.

Although neither WisDOT nor FHWA has jurisdiction over local land use policy and, or decisions, the project team has identified several avoidance, minimization, and mitigation measures that may further reduce indirect and cumulative impacts if implemented by other entities. They are identified here for consideration by the appropriate outside entities. Policy choices by local governments regarding planning and existing and future land use regulations can play a large

role in either facilitating or minimizing potential indirect effects of the WIS 23 project. Local jurisdictions through land use policies and decisions have a greater influence on other actions that contribute to indirect effects. Land use tools available to local jurisdictions commonly used to avoid and reduce impacts to resources include the following:

(a) Comprehensive Planning. Wisconsin law requires communities that wish to regulate land adopt a comprehensive plan to guide local land use decisions. These decisions—for example, the location, type, quantity and character of development, protection of agricultural lands and natural resources, local utilities and community facilities, and economic development initiatives—are closely related to impacts analyzed in this report. Comprehensive plans may be amended from time to time and are required to undergo a complete update every ten years.

(b) Zoning. A zoning ordinance and map can be used to determine appropriate locations and other regulations for specific land uses. For example, zoning land for exclusive agricultural use can help ensure that it will not be developed for nonagricultural uses until zoning policies have changed or a rezoning has occurred. Overlay zoning above and beyond state and federal regulations for natural resource features, such as isolated wetlands, uplands woodlands, shorelands, steep slopes, drainageways, habitat areas, and historic sites, may also be adopted by local jurisdictions. According to state law, zoning ordinances and maps are required to be consistent with the local comprehensive plan.

(c) Land Division. Land division ordinances must also be consistent with the local comprehensive plan under state law. These ordinances determine the manner in which land may be divided, design standards, types of public improvements needed to serve development, access control at time of land division, and, in conjunction with the zoning ordinance, the development density.

(d) Extraterritorial Jurisdiction. Wisconsin Statutes specifically allow cities and villages to prepare plans for and to regulate land divisions within their extraterritorial jurisdictions in unincorporated (township) areas. Such extraterritorial powers can help reduce development in agricultural areas and can help ensure that that when development does occur, it can be developed in a manner consistent with local zoning and the comprehensive plan.

(e) Official Mapping. Official mapping is a plan implementation tool authorized under Wisconsin Statutes for adoption as an ordinance by cities, villages, and towns. These maps may be used to show alignments of future roads, expanded right of way for existing roads, and other planned public facilities, such as parks and trails. When land development is proposed in an area with a planned facility as depicted on the official map, the municipality may obtain or reserve land for that future facility through public dedication, public purchase, or reservation for future purchase.

(f) Conservation Easements. Purchase of agricultural or conservation easements to prohibit development are voluntary and allow the landowner to be compensated for limiting the development potential of the land. Conservation easements are permanent and are carried over to subsequent landowners when the property is sold.

(g) Urban Service Area. In Wisconsin, urban service area boundaries around municipalities may be legally extended (e.g., public sewer and water). Urban service areas are useful in managing the location and timing of urban and suburban growth.

(h) Tax Increment Financing (TIF). Communities may utilize TIF to fund public improvements that would otherwise not occur without the use of TIF. Local governments may adopt TIF districts to direct development and redevelopment to specific locations in a community. Typically, these are compact areas served by public utilities.

(i) Stormwater Best Management Practices (BMP). Traditional stormwater management practices attempt to carry water away from a developed site as quickly as possible after a storm or are designed to hold water on-site in constructed ponds. Alternatively, BMPs aim to control runoff by managing precipitation as close to where it hits the ground as possible, thereby facilitating infiltration of precipitation into groundwater and evaporation of water back into the atmosphere. This approach decreases peak stormwater quantities and improves the overall quality of the stormwater that does enter streams and lakes. The severity of water quality impacts is dependent on the magnitude and duration of upstream hydrologic events

including sediment inputs, flooding, and land use change. However, these impacts may be minimized through local and county stormwater ordinances and BMP.

e. Monitoring and Evaluation of Indirect Effects

Section 6 of this LS SDEIS contains the commitments to mitigation and monitoring regarding effects of the Preferred Alternative. It includes continued coordination with WDNR regarding threatened and endangered species, commitments regarding archaeological and historic sites, wetland monitoring, as well as measures to offset impacts to Section 4(f) properties. WisDOT and FHWA will work within their jurisdictional limitations to minimize adverse indirect effects. These efforts will be primarily associated with the roadway project corridor and are primarily limited to the duration of the construction project. Local communities and state agencies with jurisdiction in the study area will have the ability to monitor and evaluate impacts on land and resources on a long-term basis. Communities have the ability to approve or not approve development proposals and can influence the pace of development for years after WIS 23 improvements are completed. Other agencies with federal authority, such as the US EPA and US Army Corps of Engineers, also have the authority to monitor impacts to natural resources such as floodplains, wetlands, and water quality.

Figures 4.4-3 to 4.4-6a show the locational effects of possibly increased pace of development from the indirect effects analysis. Substantive comments from members of the expert panel are noted in comment bubbles in these figures.

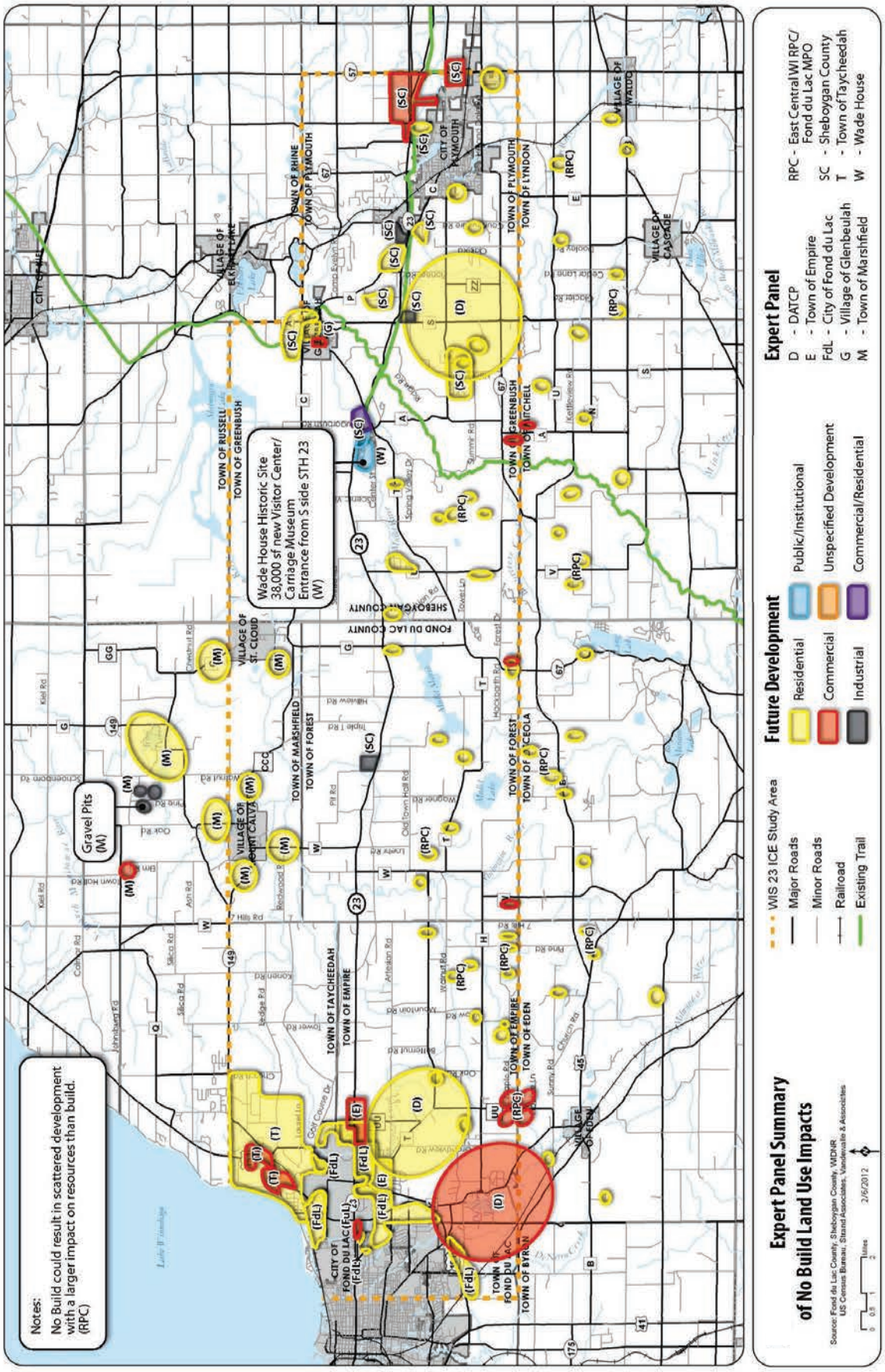

Notes:
No Build could result in scattered development with a larger impact on resources than build. (RPC)
Wade House Historic Site
38,000 sf new Visitor Center/ Carriage Museum
Entrance from S side STH 23 (W)
Gravel Pits (M)
Expert Panel Summary of No Build Land Use Impacts
Source: Fond du Lac County, Sheboygan County, WDNR, US Census Bureau, Strand Associates, Vandewalle & Associates
2/6/2012
Future Development
WIS 23 ICE Study Area
Major Roads
Minor Roads
Railroad
Existing Trail
Residential
Commercial
Industrial
Public/Institutional
Unspecified Development
Commercial/Residential
Expert Panel
D - DATCP
E - Town of Empire
FdL - City of Fond du Lac
G - Village of Glenbeulah
M - Town of Marshfield
RPC - East Central WI RPC/ Fond du Lac MPO
SC - Sheboygan County
T - Town of Taycheedah
W - Wade House
TOWN OF RUSSELL
TOWN OF GREENBUSH
VILLAGE OF ELKHART LAKE
TOWN OF RHINE
TOWN OF PLYMOUTH
CITY OF PLYMOUTH
TOWN OF LYNDON
VILLAGE OF CASCADE
VILLAGE OF WALDO
TOWN OF MITCHELL
VILLAGE OF ST. CLOUD
SHEBOYGAN COUNTY
FOND DU LAC COUNTY
TOWN OF MARSHFIELD
TOWN OF FOREST
VILLAGE OF FOND DU LAC
TOWN OF TAYCHEEDAH
TOWN OF EMPIRE
TOWN OF EDEN
CITY OF FOND DU LAC
TOWN OF FOND DU LAC
TOWN OF BYRON
VILLAGE OF EDEN

Figure 4.4-3

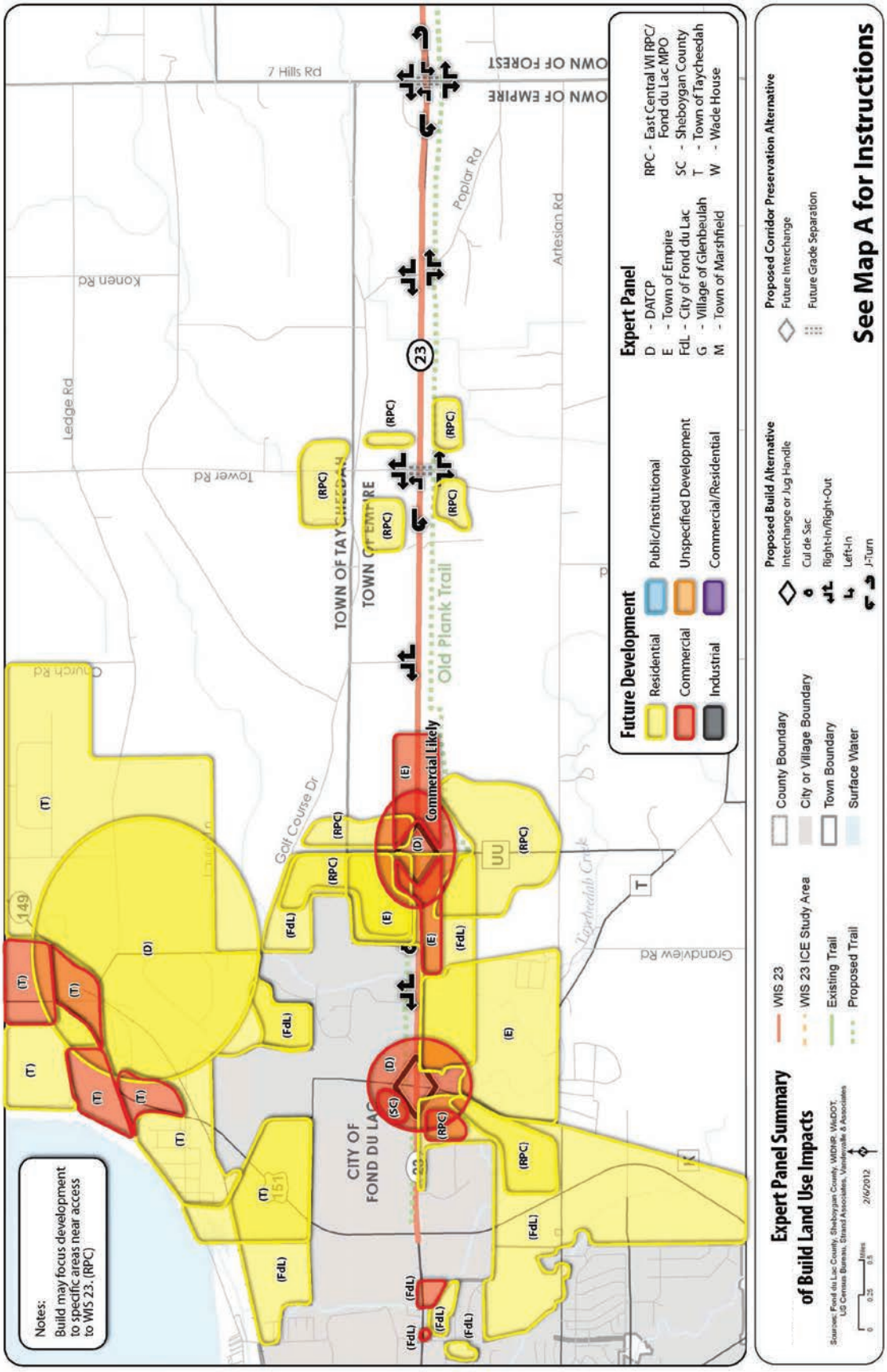

Notes:
Build may focus development to specific areas near access to WIS 23. (RPC)
Future Development
Residential
Commercial
Industrial
Public/Institutional
Unspecified Development
Commercial/Residential
Expert Panel
D - DATCP
E - Town of Empire
FdL - City of Fond du Lac
G - Village of Glenbeulah
M - Town of Marshfield
RPC - East Central WI RPC/ Fond du Lac MPO
SC - Sheboygan County
T - Town of Taycheedah
W - Wade House
Proposed Build Alternative
Interchange or Jug Handle
Cul de Sac
Right-In/Right-Out
Left-In
J-Turn
Proposed Corridor Preservation Alternative
Future Interchange
Future Grade Separation
See Map A for Instructions
Expert Panel Summary of Build Land Use Impacts
WIS 23
WIS 23 ICE Study Area
Existing Trail
Proposed Trail
County Boundary
City or Village Boundary
Town Boundary
Surface Water
Old Plank Trail
Commercial Likely
CITY OF FOND DU LAC
TOWN OF TAYCHEEDAH
TOWN OF EMPIRE
TOWN OF FOREST
7 Hills Rd
Ledge Rd
Tower Rd
Koenen Rd
Church Rd
Golf Course Dr
Poplar Rd
Artesian Rd
Grandview Rd
Taycheedah Creek
149
151
23
41

Figure 4.4-4a

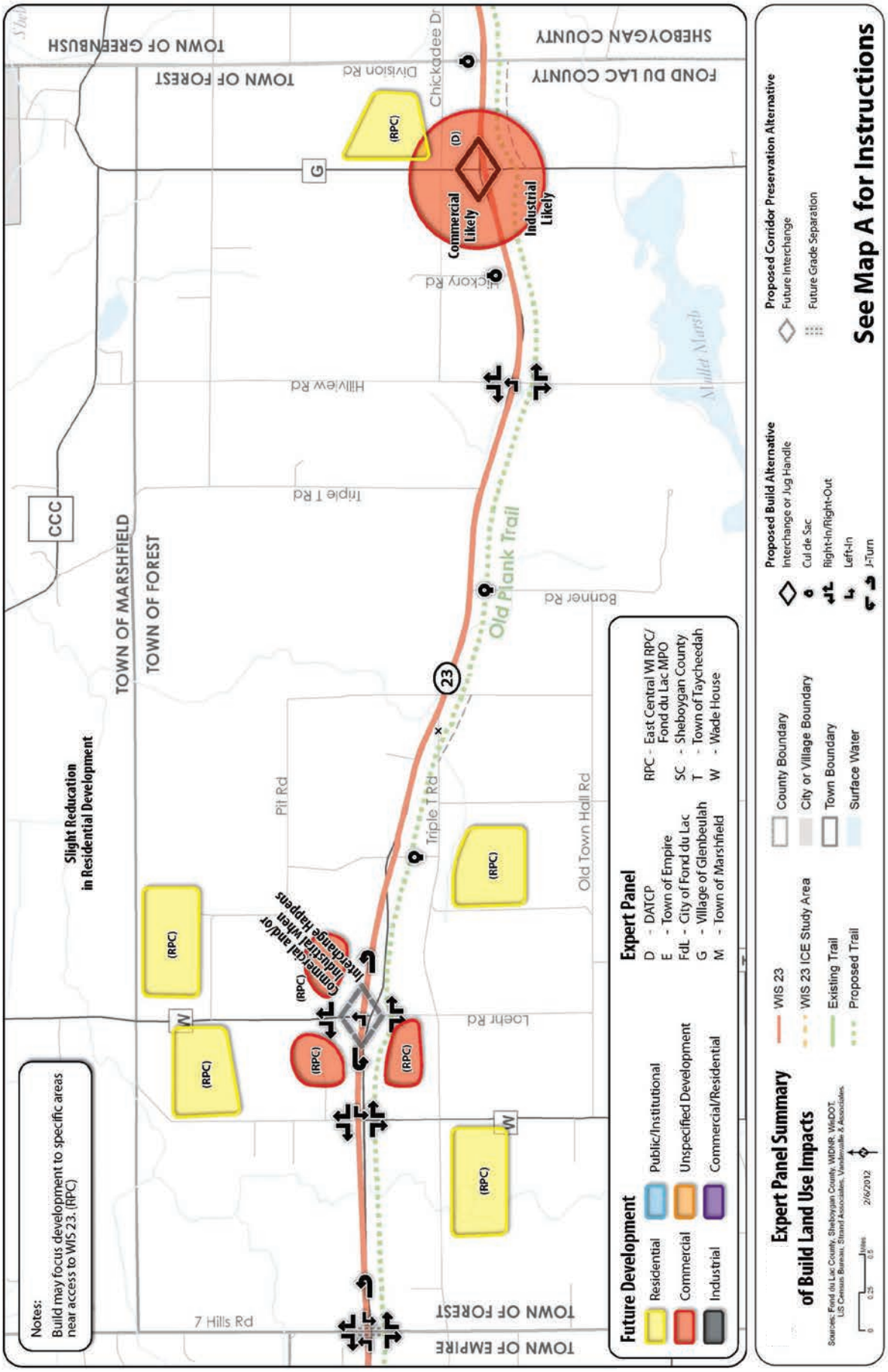

Expert Panel Summary of Build Land Use Impacts
See Map A for Instructions
Proposed Build Alternative
Interchange or Jug Handle
Cul de Sac
Right-In/Right-Out
Left-In
J-Turn
Proposed Corridor Preservation Alternative
Future Interchange
Future Grade Separation
WIS 23
WIS 23 ICE Study Area
Existing Trail
Proposed Trail
County Boundary
City or Village Boundary
Town Boundary
Surface Water
Future Development
Residential
Commercial
Industrial
Public/Institutional
Unspecified Development
Commercial/Residential
Expert Panel
D - DATCP
E - Town of Empire
FdL - City of Fond du Lac
G - Village of Glenbeulah
M - Town of Marshfield
RPC - East Central WI RPC/ Fond du Lac MPO
SC - Sheboygan County
T - Town of Taycheedah
W - Wade House
Notes:
Build may focus development to specific areas near access to WIS 23. (RPC)
Slight Reduction in Residential Development
Commercial and/or Industrial When Interchange Happens
TOWN OF MARSHFIELD
TOWN OF FOREST
TOWN OF GREENBUSH
TOWN OF FOREST
TOWN OF EMPIRE
FOND DU LAC COUNTY
SHEBOYGAN COUNTY
Commercial Likely
Industrial Likely
Old Plank Trail
Triple T Rd
Pit Rd
Old Town Hall Rd
Loehr Rd
Banner Rd
Hillview Rd
Hickory Rd
Division Rd
Chickadee Dr
7 Hills Rd
Mullet Marsh
CCC
G
M
23
(RPC)
(D)

Figure 4.4-4b

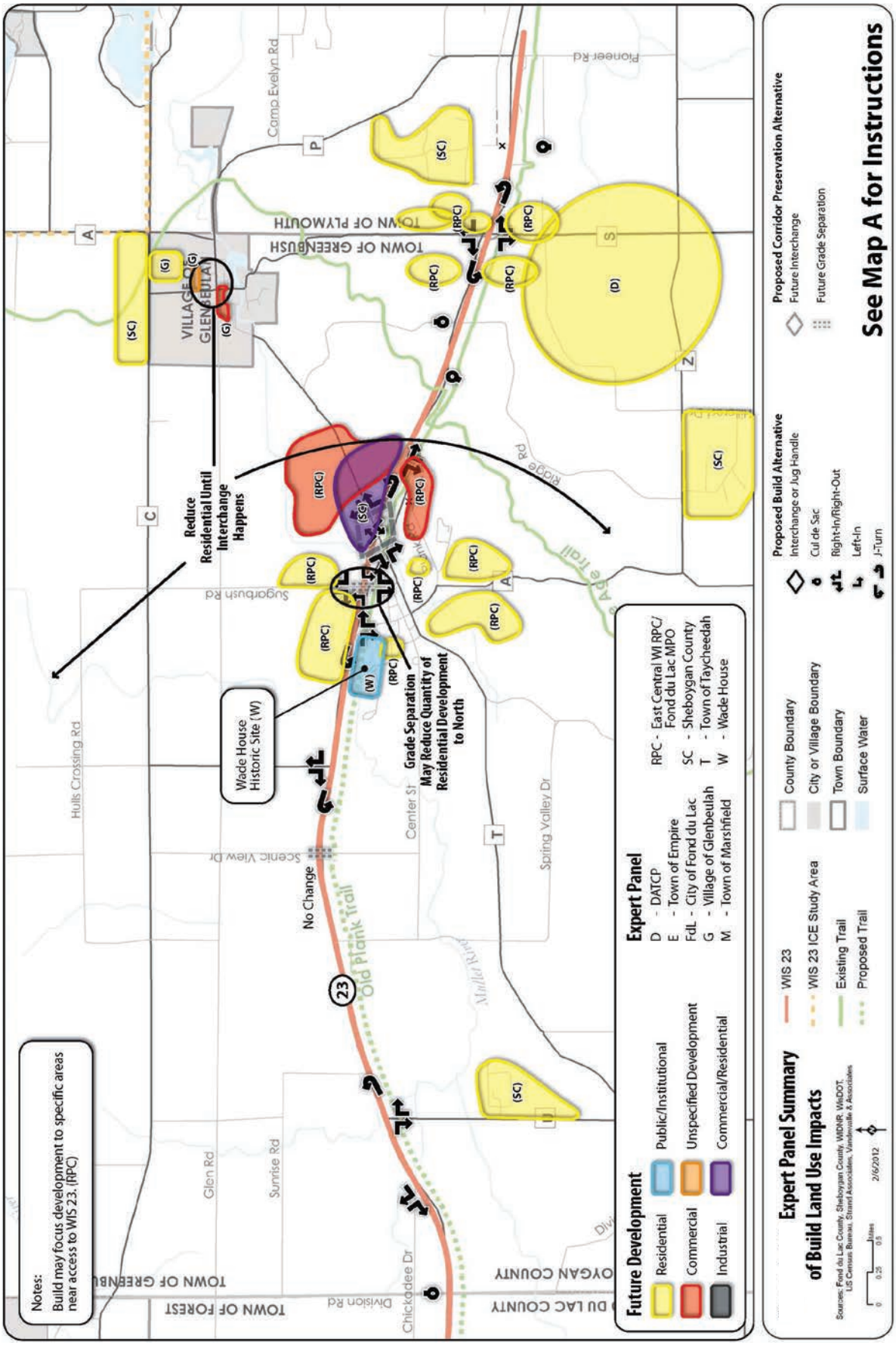

Notes:
Build may focus development to specific areas near access to WIS 23. (RPC)
Reduce Residential Until Interchange Happens
Wade House Historic Site (W)
Grade Separation May Reduce Quantity of Residential Development to North
No Change
Future Development
Residential
Commercial
Industrial
Public/Institutional
Unspecified Development
Commercial/Residential
Expert Panel
D - DATCP
E - Town of Empire
FdL - City of Fond du Lac
G - Village of Glenbeulah
M - Town of Marshfield
RPC - East Central WI RPC/ Fond du Lac MPO
SC - Sheboygan County
T - Town of Taycheedah
W - Wade House
WIS 23
WIS 23 ICE Study Area
Existing Trail
Proposed Trail
County Boundary
City or Village Boundary
Town Boundary
Surface Water
Proposed Build Alternative
Interchange or Jug Handle
Cul de Sac
Right-In/Right-Out
Left-In
J-Turn
Proposed Corridor Preservation Alternative
Future Interchange
Future Grade Separation
See Map A for Instructions
Expert Panel Summary of Build Land Use Impacts
2/6/2012
TOWN OF PLYMOUTH
TOWN OF GREENBUSH
TOWN OF FOREST
DU LAC COUNTY
OGAN COUNTY
VILLAGE OF GLENBEULAH
Camp Evelyn Rd
Pioneer Rd
Ridge Rd
Sugarbush Rd
Hulls Crossing Rd
Scenic View Dr
Center St
Spring Valley Dr
Old Plank Trail
Glen Rd
Sunrise Rd
Division Rd
Chickadee Dr

Figure 4.4-4c

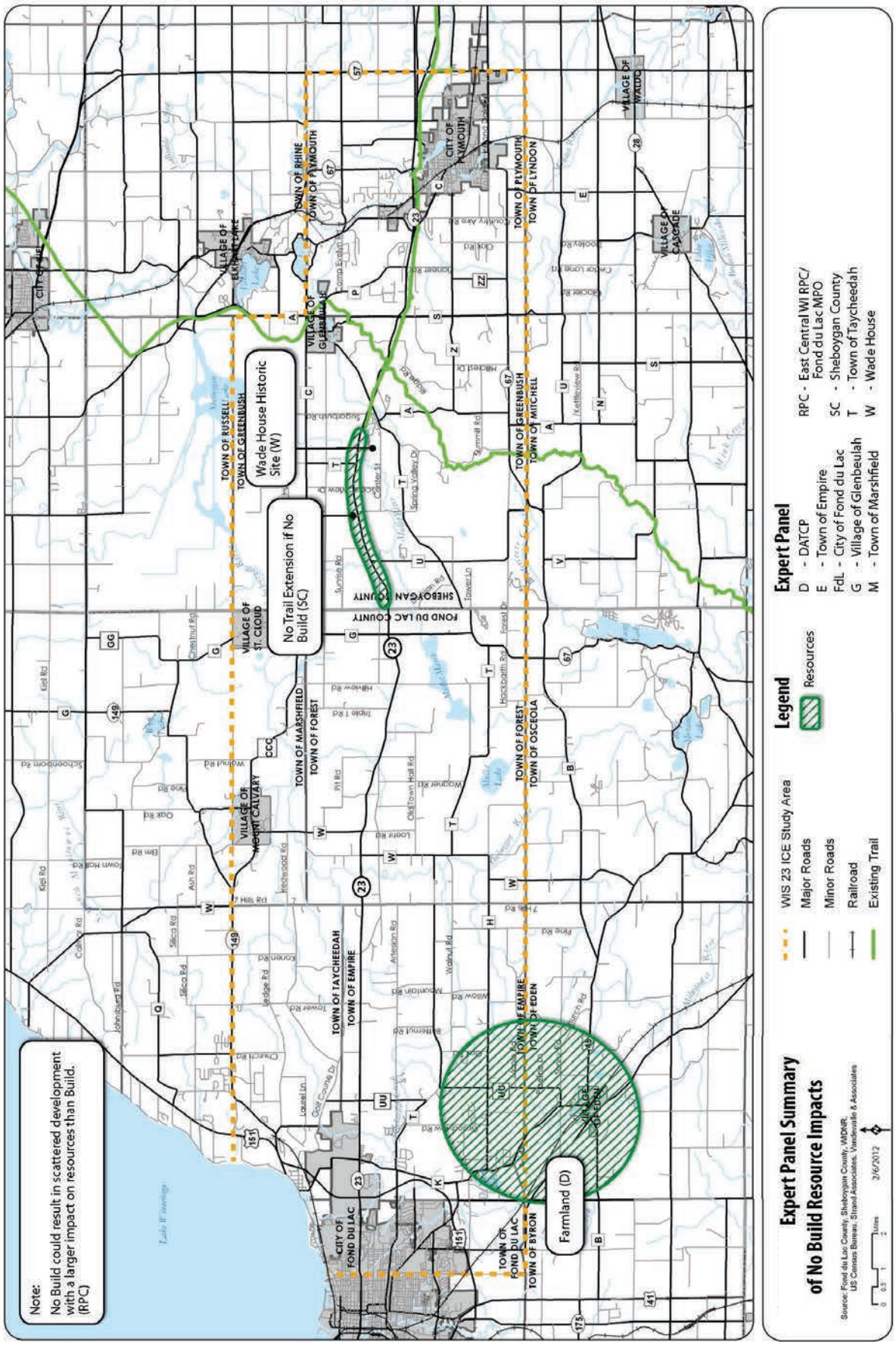

Expert Panel Summary
of No Build Resource Impacts
Source: Fond du Lac County, Sheboygan County, WIDNR, US Census Bureau, Strand Associates, Vandewalle & Associates
2/6/2012
Miles
Legend
WIS 23 ICE Study Area
Major Roads
Minor Roads
Railroad
Existing Trail
Resources
Expert Panel
D - DATCP
E - Town of Empire
FdL - City of Fond du Lac
G - Village of Glenbeulah
M - Town of Marshfield
RPC - East Central WI RPC/ Fond du Lac MPO
SC - Sheboygan County
T - Town of Taycheedah
W - Wade House
Note:
No Build could result in scattered development with a larger impact on resources than Build. (RPC)
Wade House Historic Site (W)
No Trail Extension if No Build (SC)
Farmland (D)
TOWN OF RUSSELL
TOWN OF GREENBUSH
TOWN OF RHINE
TOWN OF PLYMOUTH
TOWN OF LYNDON
TOWN OF MITCHELL
TOWN OF MARSHFIELD
TOWN OF FOREST
TOWN OF OSCEOLA
TOWN OF TAYCHEEDAH
TOWN OF EMPIRE
TOWN OF EDEN
TOWN OF FOND DU LAC
TOWN OF BYRON
VILLAGE OF ELKHART LAKE
VILLAGE OF GLENBEULAH
VILLAGE OF ST. CLOUD
VILLAGE OF MOUNT CALVARY
VILLAGE OF WALDO
VILLAGE OF CASCADE
CITY OF PLYMOUTH
CITY OF FOND DU LAC
SHEBOYGAN COUNTY
FOND DU LAC COUNTY

Figure 4.4-5

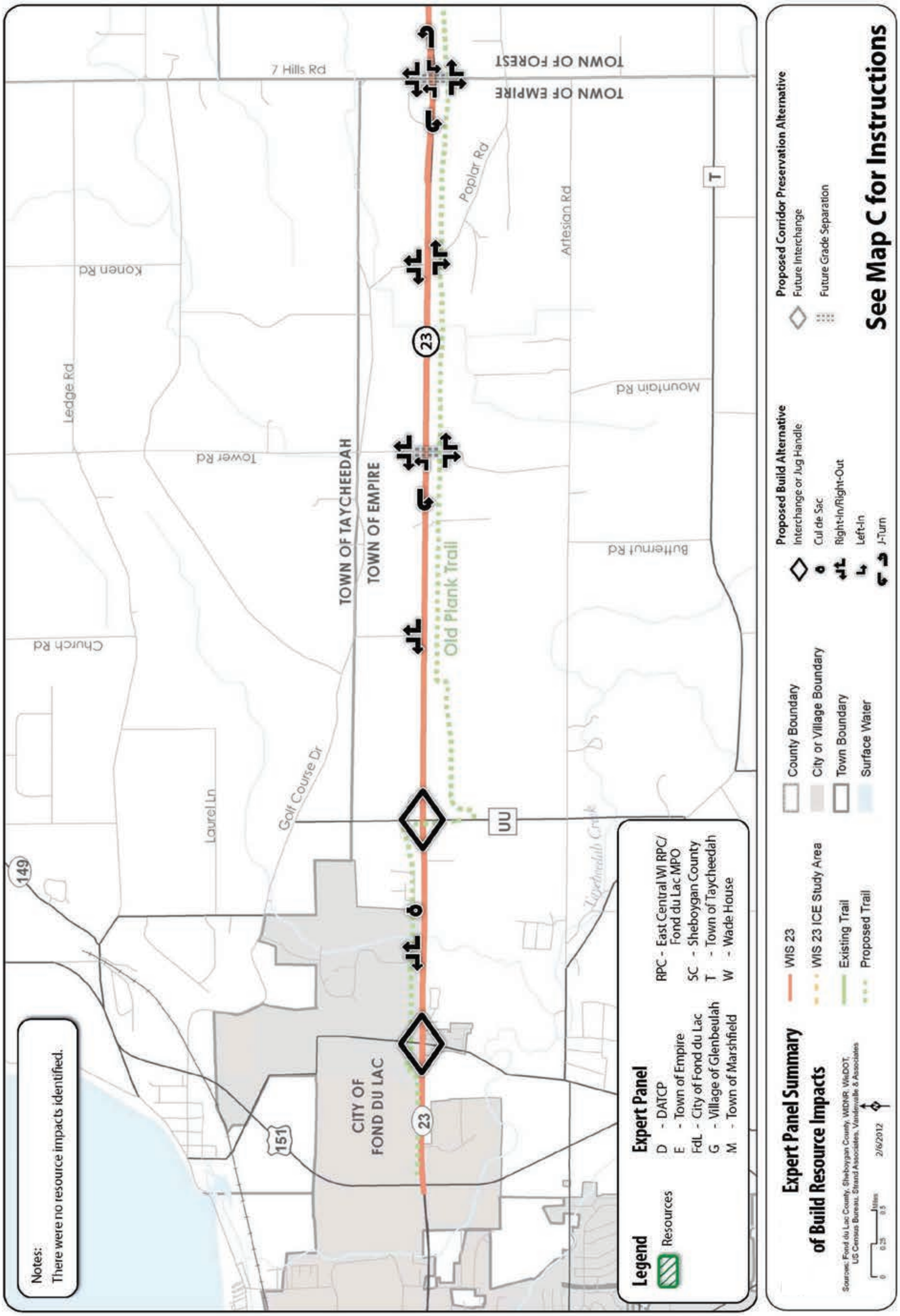

Notes:
There were no resource impacts identified.
Legend
Resources
Expert Panel
D - DATCP
E - Town of Empire
FdL - City of Fond du Lac
G - Village of Glenbeulah
M - Town of Marshfield
RPC - East Central WI RPC/ Fond du Lac MPO
SC - Sheboygan County
T - Town of Taycheedah
W - Wade House
Expert Panel Summary of Build Resource Impacts
WIS 23
WIS 23 ICE Study Area
Existing Trail
Proposed Trail
County Boundary
City or Village Boundary
Town Boundary
Surface Water
Proposed Build Alternative
Interchange or Jug Handle
Cul de Sac
Right-In/Right-Out
Left-In
J-Turn
Proposed Corridor Preservation Alternative
Future Interchange
Future Grade Separation
See Map C for Instructions
2/6/2012
CITY OF FOND DU LAC
TOWN OF TAYCHEEDAH
TOWN OF EMPIRE
TOWN OF FOREST
Old Plank Trail
Golf Course Dr
Laurel Ln
Church Rd
Tower Rd
Ledge Rd
Konen Rd
7 Hills Rd
Poplar Rd
Artesian Rd
Mountain Rd
Butternut Rd
Taycheedah Creek
23
149
151
UU
T

Figure 4.4-6a

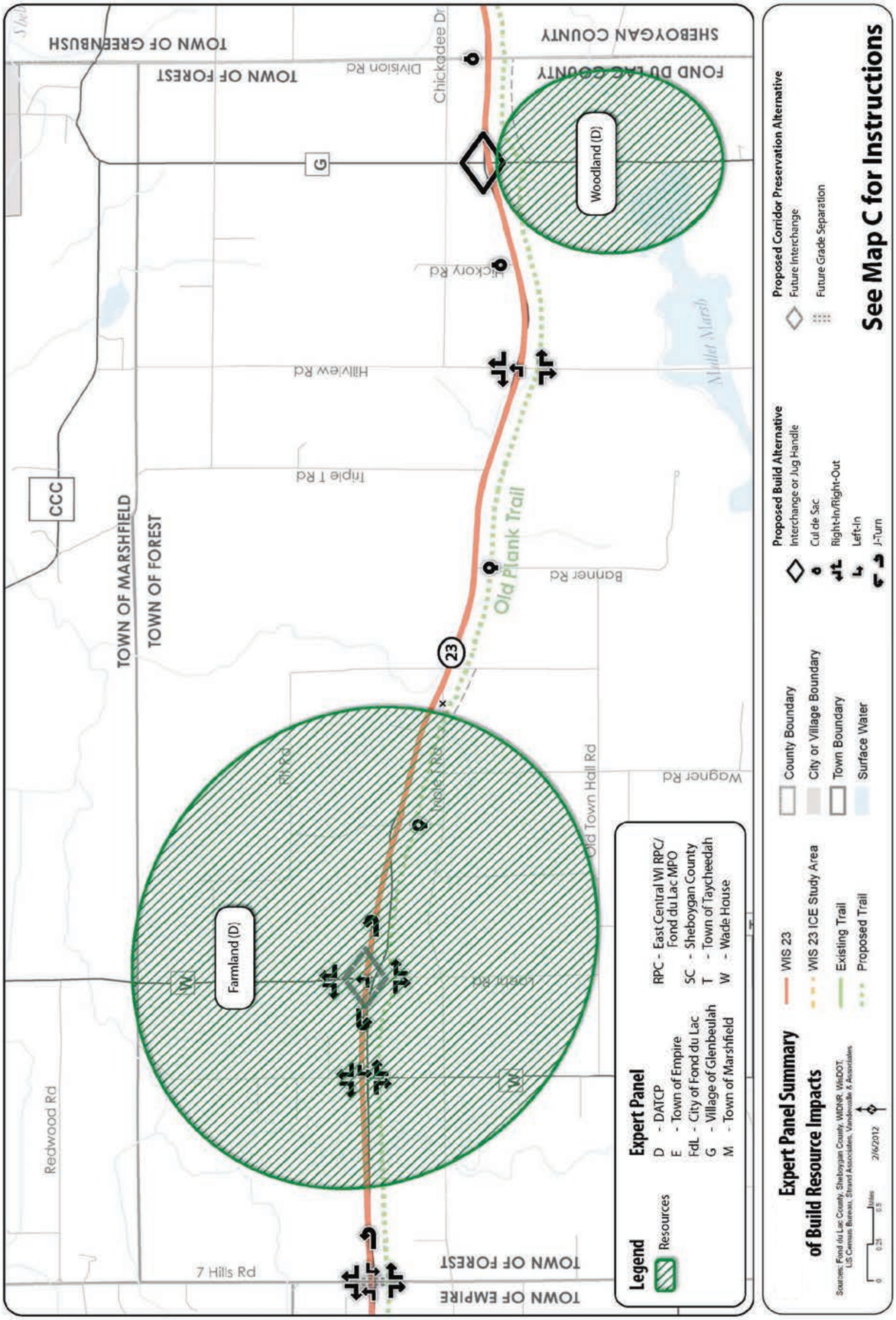

TOWN OF GREENBUSH
SHEBOYGAN COUNTY
TOWN OF FOREST
FOND DU LAC COUNTY
TOWN OF MARSHFIELD
TOWN OF EMPIRE
Division Rd
Chickadee Dr
Hickory Rd
Hillview Rd
Triple T Rd
Banner Rd
Wagner Rd
Old Town Hall Rd
Redwood Rd
7 Hills Rd
Old Plank Trail
CCC
G
W
23
Woodland (D)
Farmland (D)
Legend
Resources
Expert Panel
D - DATCP
E - Town of Empire
FdL - City of Fond du Lac
G - Village of Glenbeulah
M - Town of Marshfield
RPC - East Central WI RPC/ Fond du Lac MPO
SC - Sheboygan County
T - Town of Taycheedah
W - Wade House
Expert Panel Summary of Build Resource Impacts
WIS 23
WIS 23 ICE Study Area
Existing Trail
Proposed Trail
County Boundary
City or Village Boundary
Town Boundary
Surface Water
Proposed Build Alternative
Interchange or Jug Handle
Cul de Sac
Right-In/Right-Out
Left-In
J-Turn
Proposed Corridor Preservation Alternative
Future Interchange
Future Grade Separation
See Map C for Instructions
2/6/2012

Figure 4.4-6b

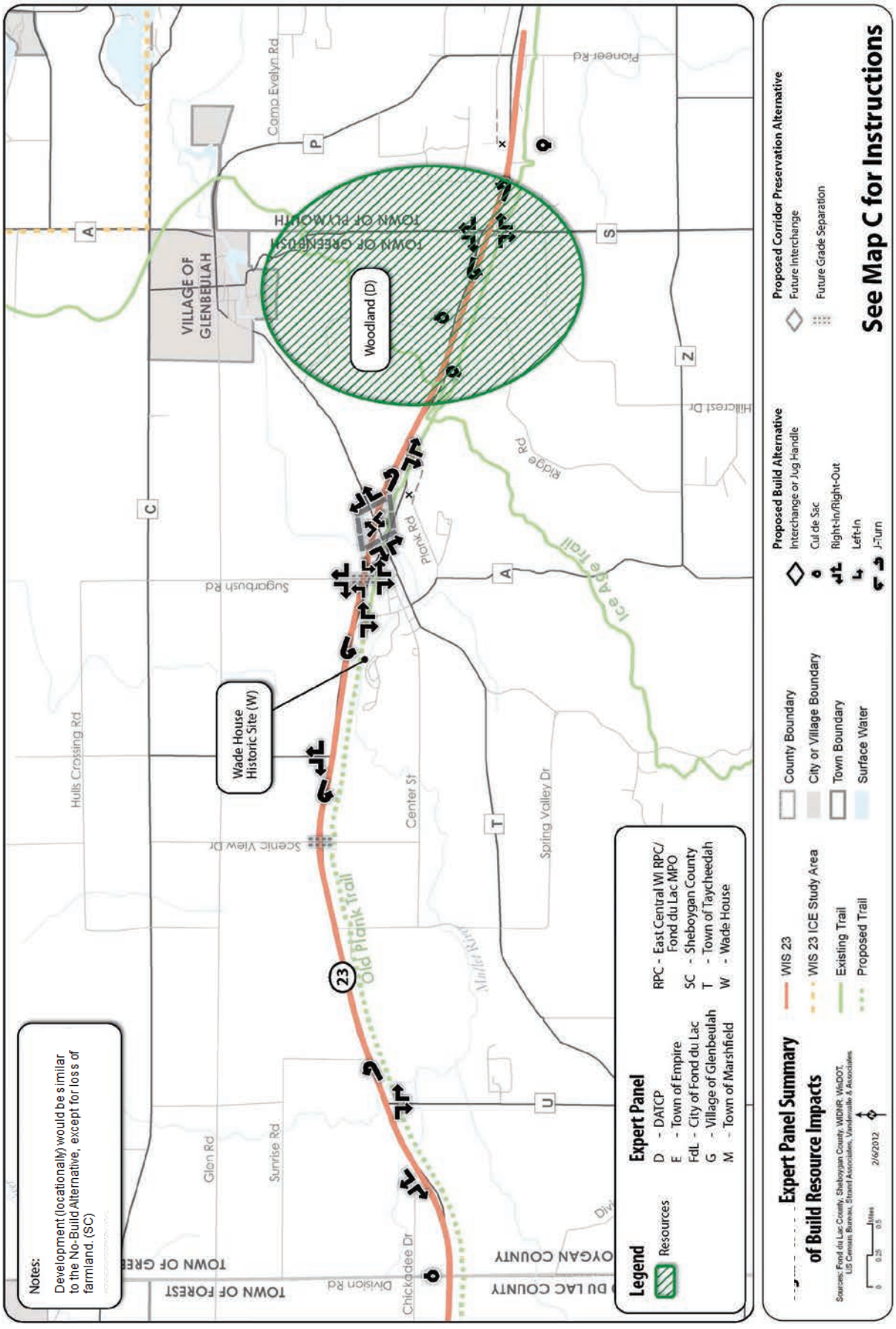

Expert Panel Summary
of Build Resource Impacts
See Map C for Instructions
Proposed Build Alternative
Interchange or Jug Handle
Cul de Sac
Right-In/Right-Out
Left-In
J-Turn
Proposed Corridor Preservation Alternative
Future Interchange
Future Grade Separation
WIS 23
WIS 23 ICE Study Area
Existing Trail
Proposed Trail
County Boundary
City or Village Boundary
Town Boundary
Surface Water
Legend
Resources
Expert Panel
D - DATCP
E - Town of Empire
FdL - City of Fond du Lac
G - Village of Glenbeulah
M - Town of Marshfield
RPC - East Central WI RPC/ Fond du Lac MPO
SC - Sheboygan County
T - Town of Taycheedah
W - Wade House
Notes:
Development (locationally) would be similar to the No-Build Alternative, except for loss of farmland. (SC)
Woodland (D)
Wade House Historic Site (W)
VILLAGE OF GLENBEULAH
TOWN OF PLYMOUTH
TOWN OF GREENBUSH
TOWN OF FOREST
DU LAC COUNTY
OGAN COUNTY
Old Plank Trail
Ice Age Trail
Camp Evelyn Rd
Pioneer Rd
Sugarbush Rd
Hulls Crossing Rd
Scenic View Dr
Center St
Spring Valley Dr
Hillcrest Dr
Ridge Rd
Plank Rd
Glen Rd
Sunrise Rd
Division Rd
Chickadee Dr
Miller River
Sources: Fond du Lac County, Sheboygan County, WDNR, WisDOT, US Census Bureau, Strand Associates, Vandewalle & Associates
2/6/2012

Figure 4.4-6c

B. Cumulative Effects Analysis

Cumulative effects are defined as "impact[s] on the environment which results from the incremental impact of the action when added to other past, present, and reasonably forseeable 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." Figure 4.4-7 illustrates how project effects combine with other actions unrelated to the highway project to produce a cumulative effect.

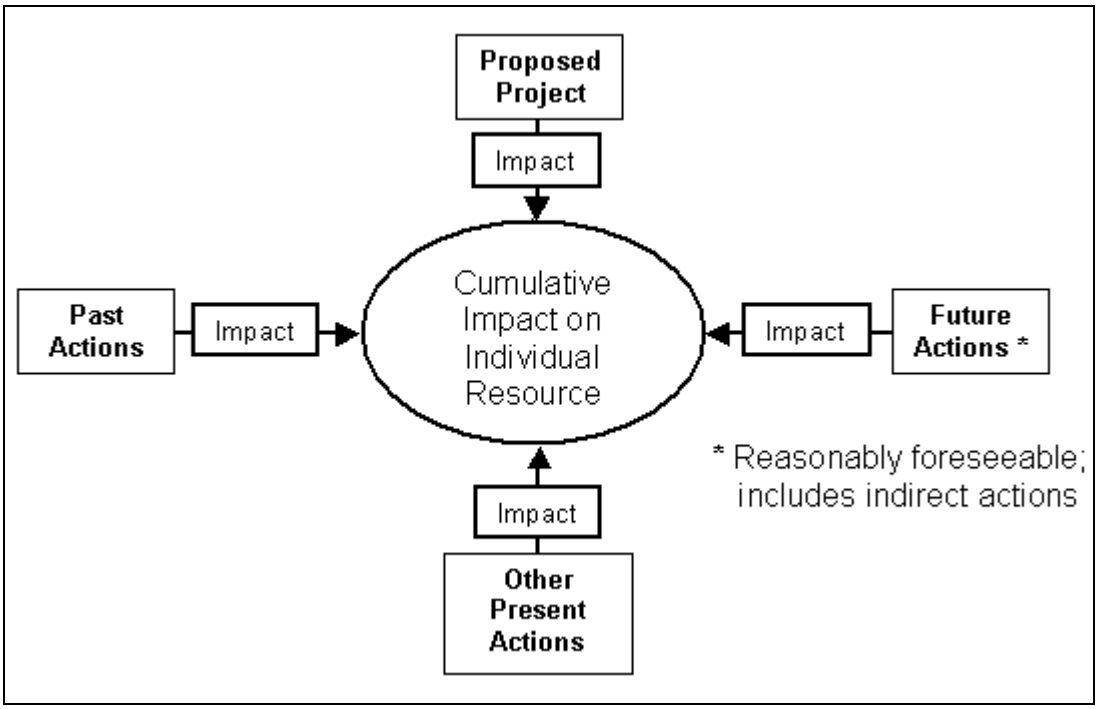


Figure 4.4-7 Cumulative Impacts (FHWA Environmental Review Toolkit)

The project team performed a qualitative assessment of the potential cumulative effects of the Preferred Build Alternative along with the Preferred Corridor Preservation Alternatives. The analysis considered these project effects when combined with activities that have occurred upon a resource in the ICE study area in the recent past, those that are presently underway, and those that may be reasonably foreseen in the future. The cumulative effect analysis was updated from the one presented in the 2010 FEIS in that more recently available information was included, updated direct impacts were referenced, the 2012 opinions of the expert panel were incorporated, and trends were referenced to suggest the significance of the impact.

Methodology

The Council on Environmental Quality's "Eleven-Step" Process (referenced in the WisDOT's "Guidance for Conducting an Indirect Effects Analysis") was used to conduct the WIS 23 cumulative impacts analysis.

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 time frame 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.

These steps and the analysis associated with each are presented below.

1. Issues Associated with the Proposed Build Action and Corridor Preservation Alternatives

The study team collected and compiled an inventory of local and regional trend data including population and housing trends and projections; income, labor force, industries, and commuting patterns; agricultural resources; natural resources; land use and development patterns; archaeological and historical resources; and local, county, regional, and state plans and regulations. These notable features were selected based on guidance from WisDOT's Guidance for Conducting an Cumulative Effects Analysis (2007) as well as a determination by the study team that they were relevant to the analysis. This information has been compiled and is included in Appendix C. Information from the inventory was considered in the preparation of the cumulative effects analysis. This analysis will address the following resources, which have been identified as being directly and/or indirectly impacted.

a. Development Patterns
b. Agricultural Land
c. Wetlands
d. Water Quality
e. Upland Habitat
f. Threatened and Endangered Species
g. Historic and Archeological Resources
h. Air Quality
i. Trails
j. Environmental Justice Populations

2. Geographic Scope

The ICE study area for this cumulative effects analysis encompasses the same area used for the indirect effects analysis (see Figure 4.4-1). Land use planners on the study team interacted with staff planners from Fond du Lac County, Sheboygan County, and East Central Wisconsin Planning Commission to determine the likely range of influence from the WIS 23 corridor. Beyond the ICE study area, the influence of WIS 23 diminishes as other arterial corridors provide access to adjacent lands. In some instances in the cumulative effects discussion, countywide impact trends are used for both Fond du Lac and Sheboygan counties. Countywide information was referenced because of its availability (as opposed to town-based information) and because it provided useful information on regional trends as well as the magnitude of effects.

3. Time Frame for Analysis

The time frame for this cumulative effects analysis is 20 years from the preparation of this analysis. This time frame corresponds with many of the local community plans that are used to help identify reasonably foreseeable actions in the ICE study area. However, it can be reasonably assumed that the effects identified in this analysis would continue to be valid after 20 years if local policies and regulations remained generally the same.

4. Other Actions Affecting the Resources, Ecosystems, and Human Communities of Concern

a. Past Actions: The WIS 23 corridor has experienced little change in land use patterns in the past two decades. The only major roadway project was the recently completed US 151 bypass of Fond du Lac located at the west end of the corridor (Final EIS completed in 1996). The majority of the ICE study area remains in agricultural use. Over the years, unsewered residential development has occurred in the towns mostly along the WIS 23 corridor. Most concentrated development has occurred within and around cities and villages located in the ICE study area including primarily the cities of Fond du Lac and Plymouth and, to a much lesser extent, the villages of Mount Calvary, Glenbeulah, and St. Cloud. Some industrial

development has occurred in the cities of Fond du Lac and Plymouth and some commercial development is sparsely scattered at intersections along the WIS 23 corridor.

The activities of other entities have affected the ICE study area. Local land use policies and decisions have led to the conversion of farmland and woodlands for scattered residential and nonresidential development over the past decades. Table 4.4-6 compares farm data from the 2007 and 2002 Census of Agriculture.

Table 4.4-6 Census of Agriculture Data

	2002 Fond du Lac County	2007 Fond du Lac County	2002 Sheboygan County	2007 Sheboygan County
Number of Farms	1634	1643	1116	1059
Land in Farms (acres)	344,286	335,745	195,248	191,719
Average Farm Size (acres)	211	204	175	181
Total Cropland (acres)	292,255	279,922	166,592	157,607

Incremental development in the ICE study area has also impacted natural resources, particularly the Niagara Escarpment, which is located in the ICE study area (the escarpment brow extends north/south along the eastern periphery of the city of Fond du Lac),[7] and the Kettle Moraine State Forest,[8] which intersects with WIS 23 in the town of Greenbush.

In 2008 the Blue Sky Green Field Wind Energy Center was constructed in Fond du Lac County, Wisconsin. The 10,600-acre wind farm is located in the towns of Calumet and Marshfield in northeast Fond du Lac County and is the largest operating wind farm in Wisconsin.

b. Present and Future Actions: Major roadway projects recently completed in the study area include the US 151 Fond du Lac bypass on the south side of the city (constructed in 2005-2008). As of December 2012, the following WisDOT studies were being conducted or were near completion in the vicinity of the project ICE study area:

(1) The WIS 23 Corridor Preservation Study
This study considered alternatives to preserve and map for future conversion a 10-mile section of the WIS 23 corridor between County P and WIS 32 to a freeway to provide greater safety and mobility. This study determined where land acquisitions for frontage roads, overpasses, and interchanges were necessary for such freeway conversion. No construction is planned as a part of this study. Implementation of the improvements will occur as determined by future operational needs.

[7] The Niagara Escarpment is the steep face of a 650-mile bedrock ridge that runs from Rochester, New York, across portions of southeastern Canada, and then southward north and west of Lake Michigan to southeastern Wisconsin. In Wisconsin, the escarpment extends for over 230 miles from Door Peninsula to northern Waukesha and Milwaukee counties. In the ICE study area, the Escarpment runs north to south through the center of Fond du Lac County and is a prominent feature near the southeastern shore of Lake Winnebago.

[8] Kettle Moraine State Forest-Northern Unit is a 27,725-acre forest stretching across Sheboygan, Fond du Lac, and Washington counties. Made up of geological formations caused by retreating glaciers, the forest is managed for forestry and outdoor recreation. Textbook examples of glacial landforms are scattered throughout the forest, such as drumlins, kames, eskers, and kettles. Botanically, the forest is quite diversified with nearly 60 species of trees present, together with numerous shrubs, wild flowers, ferns, and other plant life. This state park is comprised mostly of forests and lakes and provides habitat for a diversity of species, including whitetail deer, hawks, turkeys, raccoons, squirrels, and possums. The Kettle Moraine State Forest-Northern Unit is part of the Ice Age National Scientific Reserve established in 1964 to project glacial landforms and landscapes in Wisconsin. The Wade House State Historic Site, situated in Greenbush at the entrance of the Kettle Moraine State Forest, once served as an inn and stopping point for stage coaches traveling on the Fond du Lac-Sheboygan Plank Road.

(2) The US 151 Fond du Lac Bypass Corridor Preservation Study

This study is addressing long-term transportation needs of two segments of the US 151 Fond du Lac bypass between WIS 175 and County WH. The first segment is a 5.2-mile 4-lane divided expressway between WIS 175 and WIS 23. The preservation study will map the right of way needs for the location of future overpasses and interchanges. WisDOT's long-term vision of this segment is an ultimate freeway conversion with increased mobility and traveler safety. The second segment is a 2.9-mile 2-lane highway between WIS 23 and County WH. Right of way was previously acquired along this segment to accommodate a future 4-lane segment. The preservation study for this segment includes a long-term safety and operations evaluation. It is likely three projects will be implemented from this study before the year 2020. These projects include the County V interchange with US 151, the County T overpass over US 151, and improvements to the DuCharme Parkway/US 151 intersection.

(3) US 41 Conversion Study

In the previous federal surface transportation law known as Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), the US 41 corridor is recommended for Interstate conversion and is identified as a high priority corridor based on its importance for providing regional, national and international freight and vehicle movements. WisDOT, in consultation with FHWA, is studying potential impacts of converting US 41 from a noninterstate freeway on the NHS to an Interstate Highway between the Zoo Interchange on Interstate 94 (I-94/I-894) in Milwaukee and the US 41/I 43 interchange in Green Bay. The overall study corridor extends through Kenosha, Racine, Milwaukee, Waukesha, Washington, Dodge, Fond du Lac, Winnebago, Outagamie, and Brown counties. A portion of the corridor is aligned with US 45 from the Zoo Interchange to the US 45/41 split in Washington County. New I-41 signage would extend from the US 41/I-94 interchange south of the Wisconsin/Illinois state line, then continue north concurrently with I-94 to the Mitchell Interchange, then northwesterly concurrent with I-894 to the Zoo Interchange. From the Zoo Interchange, the new signing would extend north along US 45 and US 41 through Fond du Lac, the Fox Valley, and Green Bay and end at the I-43 interchange. Because the route from the south terminus to the Zoo Interchange along I-94 and I-894 is already an Interstate highway, that area is not part of the conversion of US 41. However, it is part of the study area since it would be signed consistent with the numbering for the converted section of US 41.

(4) Other Actions in the Area

To counter undesired rural development trends, local regulations have changed. These changes have affected farmland preservation planning, zoning, and acquisition of conservation easements to protect natural areas from future development. Other past activities, such as agricultural practices, urbanization, and stream channelization, have negatively impacted the quality of waterways in the ICE study area. Modern agricultural practices, wetland mitigation banking, and environmental cleanup of impaired waters, such as the Sheboygan River, have helped to improve conditions in the ICE study area.

As indicated in the ICE Analysis (Appendix C), agencies have planned for future land conservation through acquisition in the ICE study area and beyond, in particular expansion of the Kettle Moraine State Forest. At the same time, expert panelists suggested that commodity prices are currently high and are expected to continue to increase, which raises the value of agricultural land. This, in turn, may negatively affect agencies' ability to acquire additional land for conservation purposes. This increase in commodity prices may also drive some farmers to convert wooded areas to tillable land causing additional negative impacts on natural resources through runoff and habitat loss. These trends are not influenced by the WIS 23 project.

The pace and amount of residential and nonresidential development that may occur as a result of the No-Build and Build Alternatives are tied to market demand resulting from a combination of demographic factors and economic conditions. The country is emerging from an economic recession, which has slowed market demand in recent years. This is illustrated by residential building permit issued in Fond du Lac and Sheboygan counties (see Table 4.4-7).

Table 4.4-7
Annual New Privately Owned Residential Building Permits, Estimates with Imputation (from US census)

County	2006	2007	2008	2009	2010	2011
Sheboygan	318	237	135	89	67	56
Fond du Lac	334	255	172	128	125	101

The number of residential building permits in Sheboygan and Fond du Lac counties is considerably lower in 2011 than in 2006. Based on its demographic, land use, and economic development expertise, and as confirmed by the ICE expert panel, the study teams believes the market demand for new development is likely to return to prerecession trends as the economy rebounds.

5. Characterization of the Resources, Ecosystems, and Human Communities Identified During Scoping in Terms of Their Response to Change and Capacity to Withstand Stress

Much of the characterization of resources in the ICE study area has already been described in Section 3 of this LS SDEIS and in the indirect effects analysis (page 4-9). The following paragraphs summarize these resources and ecosystems while providing some supplemental information.

a. Agricultural Land

Agriculture is a major industry in Fond du Lac and Sheboygan counties, providing 8,692 and 8,464 jobs, respectively. Fond du Lac County is a leading dairy producer ranking 4th in the state and 26th in the nation in dairy production. Sheboygan County ranks near the top of the state's dairy industry as it is home to more than 9 dairy processors and 4 cheese factories.

Market forces affect how much land is in agriculture and which crops are grown, which is a function of population growth, local plans, and zoning controls. Once converted to development, agricultural land will likely never return to agricultural use. The result is a consistent long-term trend in the reduction of agricultural lands.

Population growth and development have led to the incremental loss of farmland in the ICE study area. From 2002 to 2007, Fond du Lac and Sheboygan counties lost almost 5 percent of their cropland. Based on local land use plans, this trend is likely to continue. Population growth in the ICE study area has historically been comparable to the state average. Local land use plans indicate a strong desire by all communities in the ICE study area to preserve agricultural lands by directing development to areas adjacent to existing cities and villages where it can be served by sewer and water and generally developed at greater densities, thereby reducing the acreage needed to accommodate that development and reducing the conversion of agricultural land.

b. Wetlands

Wetlands are scattered throughout the ICE study area, with large concentrations located primarily in the towns of Forest, Marshfield, and Greenbush. The incremental filling of wetlands has occurred over time as a result of development and the conversion of land to agricultural uses. Many of the larger concentrations of remaining wetlands in the ICE study area are located on state-managed lands. Three wetland mitigation banks exist directly adjacent to improvements being considered. They include the Taycheedah Creek wetland mitigation site, the Pit Road wetland mitigation site, and the Old Wade House wetland mitigation site. The Mullet Marsh is located about 1 mile south of the WIS 23 corridor and the Sheboygan Marsh State Wildlife Area is located about 2 miles north of WIS 23 corridor. A comparison of pre-European settlement land cover data (source: WDNR dataset, 1990) and recent land cover (source: United States Geological Survey, National Land Cover dataset, 2001) indicates that approximately 98 percent of presettlement wetlands remain in the ICE study area.

The majority of historic and ongoing wetland loses in the ICE study area have resulted mostly from farming and conversion of small wetlands which are not protected under local, state, or federal regulations. Wetland ecosystems are very sensitive to change from disruption of native

ground cover as a result of farming or development activity. Ongoing significant adverse impacts result from chemical application from farming or lawn care and increased impervious surfaces within their watershed.

c. Water Quality

Water quality in the ICE study area is generally good; however, some waterways have been negatively affected by urban and agricultural runoff, stream channelization, and point source discharges.

The Sheboygan River Basin, of which most of the ICE study area is a part, has been identified by the USEPA as a Great Lakes Area of Concern. Portions of the Sheboygan River are on the Wisconsin's impaired waters list. The section of the river within the WIS 23 corridor is not on the impaired waters list.

Several trout streams are located in the ICE study area, including Feldner's Creek and the Mullet River. Feldner's Creek and Ben Nutt Creek are also considered Exceptional Resource Waterways. Exceptional Resource Waters are characterized by excellent water quality, high recreational value, and high quality fisheries. These may receive treated wastewater discharges or may receive future discharges necessary to correct environmental or public health problems.

The western portion of the ICE study area (west of Taft Road) is located in the Lake Winnebago East Watershed, which generally flows from east to northwest into Lake Winnebago. This watershed includes the Taycheedah Creek and is part of the Upper Wolf River drainage basin and extends along the east shore of Lake Winnebago in Calumet and Fond du Lac counties. It is predominantly an agricultural watershed, but it does include more than one-third of the city of Fond du Lac as well as the rapidly developing area east of Fond du Lac on the west slope of the Niagara Escarpment.

The city of Fond du Lac suffers stormwater peak-flow problems. This is primarily because of its location in a topographical depression next to a lake. The flatness of the terrain does not allow water to drain quickly. This problem is magnified by continued development along the eastern and southern fringe of the city in the watershed (Source: *State of the Upper Fox River Basin*, Wisconsin Department of Natural Resources, 2001).

The quality of groundwater has also been impacted over the years by urban and agricultural land use practices and pollutants associated with chemical storage, road salt use, accidental spills, leaking underground storage tanks, leaking underground pipes and sewers, animal feedlots, fertilizers, septic tanks, sewage lagoons, sumps and dry wells, and improperly abandoned wells.

d. Upland Habitat

Undeveloped lands in the ICE study area are predominantly in agricultural use. Much of the upland habitats are located in the Kettle Moraine State Forest in Sheboygan County and along the Niagara Escarpment. Nearby natural areas include Mullet Marsh and Sheboygan Marsh.

(1) The Kettle Moraine State Forest (Northern Unit) is located within the ICE study area (see footnote 6). This state park comprises mostly forests and lakes and provides habitat for a diversity of species including whitetail deer, hawks, turkeys, raccoons, squirrels, and possums. Figure 4.4-8 illustrates the boundaries of the state forest at the time of this writing as they relate to the WIS 23 corridor and also shows the state's plan for the projected forest boundary.

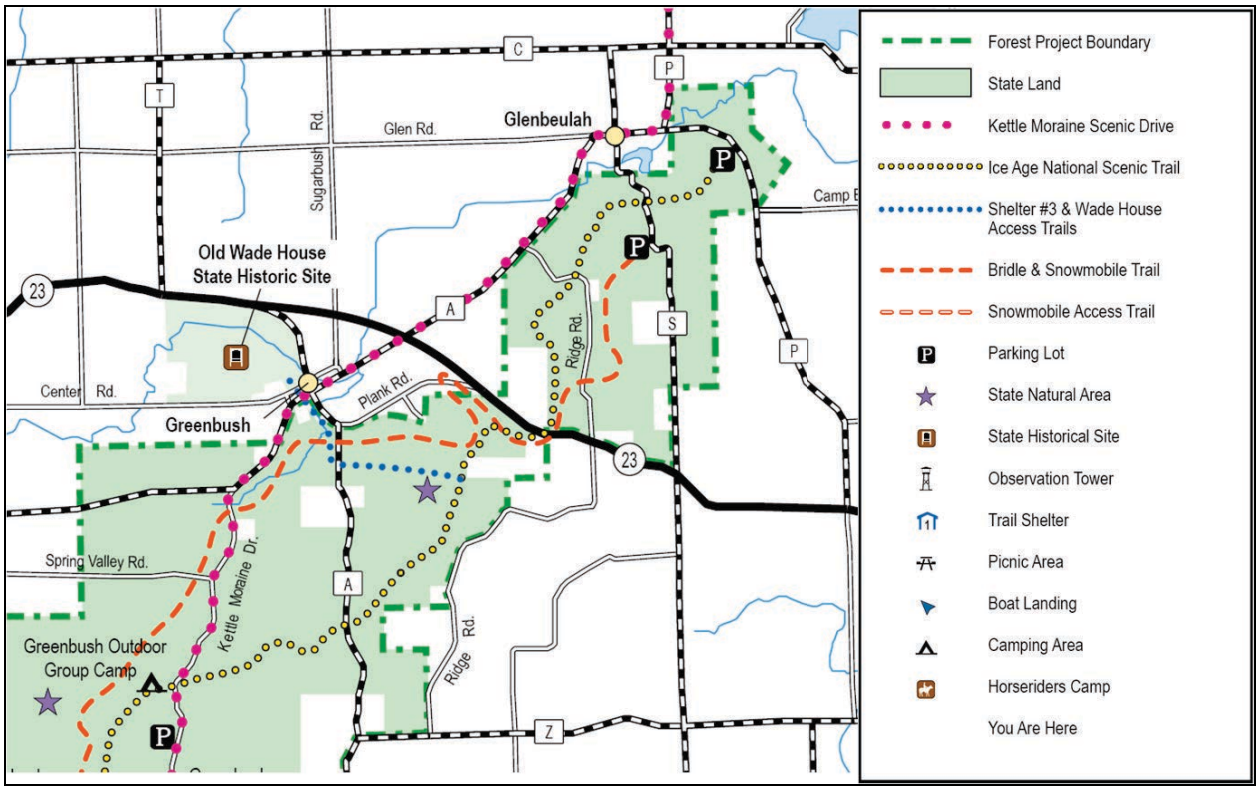


Figure 4.4-8 Kettle Moraine State Forest Boundaries

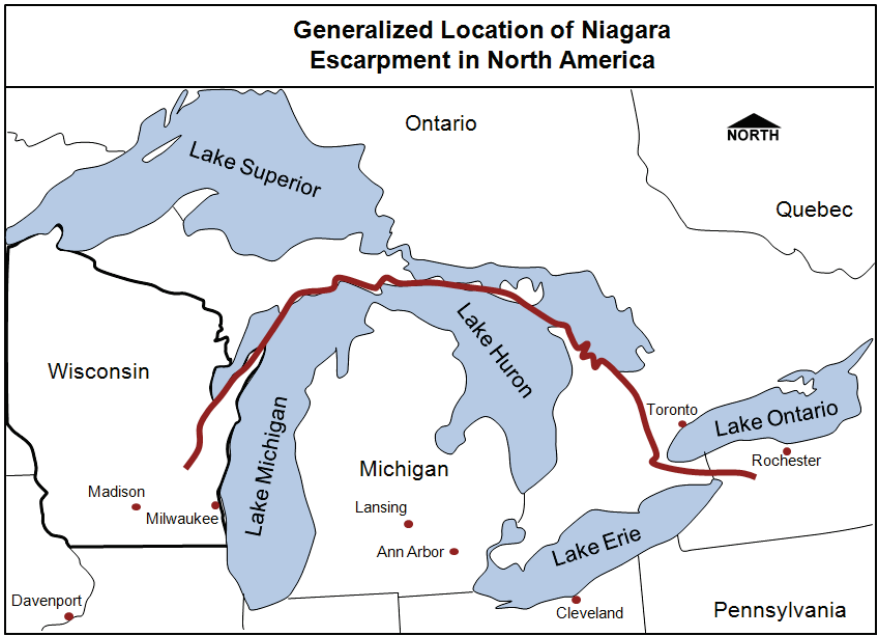


Figure 4.4-9 The Niagara Escarpment (shown in dark line)

(2) The Niagara Escarpment (which is a long cliff, see Figure 4.4-7 and footnote 5), which is located within the ICE study area, is a statewide critical natural resource area because of its unique geology, the number of rare plants and animals that rely on the escarpment's distinct ecosystem and microclimate, and the land's sensitivity to groundwater contamination. The Escarpment extends for over 1,000 miles from New York through Canada, Michigan, and into Wisconsin. Many areas of the Escarpment have been compromised over the years by development. The Niagara Escarpment Report (1999-2001) prepared by the WDNR documents the biodiversity associated with the Escarpment and lists recommended management strategies to ensure the long-term integrity of this significant natural feature.

(3) Sheboygan Marsh County Park and Sheboygan Marsh State Wildlife Area are located 2 miles north of the WIS 23 corridor. Expansive coniferous swamps of northern white cedar and tamarack, more commonly found in northern Wisconsin, occupy over 4,000 acres of the marsh. The Sheboygan River flows through the marsh and its waters are held back by a dam at the northeast corner of the marsh. The open waters and adjoining wetlands of this restored flowage total over 1,700 acres in size. The Sheboygan Marsh is in a 133-square-mile watershed and receives surface and groundwater drainage from farmlands, small urban communities, and part of the Northern Unit of the Kettle Moraine State Forest.

(4) Mullet Marsh is located 1 mile south of the project corridor. Mullet Creek Wildlife Area is located in the southeastern part of the marsh and consists of wetland, forest, grassland and farmland. The 495-acre Mullet Lake State Natural Area is located about 0.5 miles southwest of Mullet Creek Wildlife Area. The 200-acre hard-water seepage lake is surrounded by a wetland complex of tamarack, shrub carr, sedge meadow, and swamp forest. The lake and swamp complex is the headwaters of the Mullet River in the priority watershed of the Sheboygan River.

As mentioned, there also is a variety of privately owned upland areas that lie adjacent to the corridor. Market forces affect how much land is in development and where it is located, which is function of population growth, local plans, and zoning controls. Local plans and zoning rarely protect these areas. Once converted to development, upland habitat will likely never return to undeveloped natural area.

e. Threatened and Endangered Species

There are 54 total plant and animal species listed as either threatened or endangered within Fond du Lac and Sheboygan Counties. Eight state threatened species and two state endangered species could be potentially directly affected by the WIS 23 corridor based on WDNR project coordination. Within the larger ICE area, residential and commercial development also has the opportunity to adversely affect rare species. Habitat loss, habitat disruption or degradation, loss of travel corridors, fragmentation, roadway and other sources of mortality, and depredation from development (whether agricultural or municipal expansion) are some of the primary reasons why these species are state threatened or endangered species.

The three freshwater mussels that may be potentially directly affected by the Preferred Alternative are likely the most susceptible rare species on the project corridor. Their response to change is poor as related to draining, encroachment of habitat, loss of water quality buffers, and water pollution. Fifty-four percent of all mussels in Wisconsin are listed as rare species. Siltation from all mechanisms, including agriculture and roadway runoff, causes loss of aquatic bed habitat for these species. Water chemistry through increased fertilizer and agrichemical use, stormwater runoff, and residential development has also affected these species.

Threatened reptilian species such as the Blanding's turtle and the Butler's garter snake are documented to have stable populations and found to be present in greater extent and density than previously thought throughout the ICE study area. Many impacts to these species result from concentrating beneficial habitats and loss of riparian buffers along streams. Natural succession from the exclusion of fire and reduced forestry management is reducing suitable, open upland habitat needed for many additional species. Increased runoff results in wetland sedimentation that often alters and degrades native plant communities, favoring monotypic stands of nuisance or exotic species not beneficial to these species. Roads have also fragmented habitats and resulted in altered hydrology and mortality for some species.

Migratory-rare woodland-nesting birds and red-shouldered hawk populations in this part of Wisconsin are generally considered stable based on the woodland habitat in and near the Kettle Moraine Forest. Destruction of wintering and breeding habitat through deforestation and rural home development continue to present a large threat. Other limiting factors include forest fragmentation, contaminants, loss of key tree species to diseases, cowbird parasitism, and human disturbance. Invasive shrubs and herbaceous plants could be affecting the long-term

ability of forests to regenerate into conditions suitable for some of these species and is precluding regeneration of large, mature trees in various woodland communities.

Rare plants are the final listed species of concern. The yellow gentian is a candidate for delisting. It has proven to be capable of tolerating change and disturbance and has expanded its presence in suitable habitat types. The snow trillium is a more sensitive listed species in the project. Being a near-climax species, it has low tolerance for change and stress. Wetland clearing and grading of mature, wooded riparian habitat may have a further effect on this species. Continued suburban development, riparian clearing and filling, increased flooding, rural habitat loss and fragmentation from woodland home sites, invasive shrubs and herbaceous plants, and loss or harvest of large, mature trees in oak woodlands diminish the habitat for snow trillium.

f. Historic and Archaeological Resources

As mentioned previously in the indirect effects analysis, there are numerous historic resources within the broader ICE study area. Wisconsin's Architecture and Historic Inventory (AHI) indicates that there are 4119 historic listings for Fond du Lac County and 2664 historic listings for Sheboygan County. Wisconsin also keeps an Archaeological Site Inventory that includes known archaeological sites, cemeteries, and cultural sites. Determinations of Eligibility for the National Register of Historic Places have not been performed for most of the resources listed within these data bases. Directly within the WIS 23 corridor there were 17 potential historic sites and another 2 sites associated with the connection roads and interchange. Effects to all these resources were avoided except for those discussed below.

The Old Wade House Park is under state ownership and is being managed by the State Historical Society for preservation. The St. Mary's Springs Academy is eligible for the National Register of Historic Places (NRHP) and is a functioning school. Facility changes by the owner over the past decade have altered the contributing characteristics and the historic significance of this resource. Future management decisions could change the historic integrity of the site. The Sippel archaeological site directly on the corridor is a small Yankee homestead/farm in the town of Greenbush. It was occupied between 1848 and 1875. This site would likely remain relatively undisturbed in absence of landscape altering activities.

g. Air Quality

Page 4-13 briefly describes the National Ambient Air Quality Standards (NAAQS) and the conformity of Fond du Lac County and Sheboygan County with those standards. Fond du Lac County is presently in attainment of all National Ambient Air Quality Standards (NAAQS). Sheboygan County was designated nonattainment for the 2008 Ozone Standard on April 30, 2012 (Federal Register / Vol. 77, No. 98 / Monday, May 21, 2012 Sheboygan County is also designated nonattainment for the 1997 Ozone standard, but that standard will be revoked effective July 20, 2013.

h. Trails

The three trails in the ICE study area vary in their purpose and character. The Ice Age Trail is intended to provide access to the kettle moraine formations in a manner that highlights glacial land forms. To best meet this objective the natural landscape should be as free from development as possible. Therefore, increasing development diminishes the experience of the resource. The Old Plank Road Trail is intended to provide a recreational experience along the route historically linking Sheboygan to Fond du Lac. For this reason the trail corridor is very close to WIS 23 and adjacent developed areas. Future development will likely occur near the WIS 23 corridor, however, the study team notes that such development is not inconsistent with the recreation purpose and character of this trail.

State, county, and local governments in the ICE study area continually plan for the acquisition and development of new trails. Other agencies, such as the Niagara Escarpment Network, also work toward these goals. The Ice Age Trail and State Equestrian Trail have an established at-grade crossing of WIS 23 that would likely continue in absence of other influences. The Old Plank Road Trail extends from Sheboygan to the Northern Unit of the Kettle Moraine State

Forest. Extension of this trail to the west is planned, but it will probably occur in the distant future unless a funding source is identified.

i. Environmental Justice (EJ) Populations

Environmental justice populations are described in Appendix C and depicted on Maps 2 to 5 of the Appendix. Minority and low income populations are located at the ends of the ICE study in the cities of Plymouth and Fond du Lac. Several census tracks in the ICE study area also have a greater proportion of elderly individuals (age 65+) when compared to county averages. These concentrations are likely to remain because they are closer to urban areas and the associated services, housing, and employment opportunities associated with urban areas. EJ populations have a lower ability to respond to change and capacity to withstand stress related to age, income, education, general health, and access to health care.

6. Characterize Stresses Affecting these Resources, Ecosystems, and Human Communities and their Relation to Regulatory Thresholds

Table 4.4-8 summarizes stresses and factors that are affecting resources.

Table 4.4-8 Stresses Affecting Resources

Resource	Stresses and Factors Affecting Resource
Agricultural Land	Development and urbanization. High commodity prices.
Wetlands	Urban and agricultural runoff. Point-source discharges. Runoff from roads.
Water Quality	Urban and agricultural runoff. Stream channelization and erosion. Point-source discharges. Runoff from roads.
Upland Habitat:	Development and urbanization. High commodity prices encourages land clearing for agriculture.
Northern Unit of Kettle Moraine State Forest	High land prices decrease ability to acquire remaining tracts of land. Built environment, including road and agricultural runoff, diminish resources within State Forest.
Niagara Escarpment	Development and urbanization within the escarpment fragment natural communities. Wind turbines increase fragmentation of natural resources.
Threatened and Endangered Species	Diminished water quality in streams and wetlands. Reduction in upland habitat caused by urbanization and agriculture
Historic and Archaeological Resources	Property modifications and changes in the surrounding area can diminish historic value. Construction activities can disturb unrecorded archaeological sites.
Trails	Funding constraints may prevent trail extensions and enhancements.
Environmental Justice Populations	Gentrification can increase housing costs. Economic conditions affect employment opportunities.
Air Quality	NOx and VOCs from industry and mobile sources create ozone

Population growth, future development, sewer service extensions, transportation and other infrastructure improvements, and agricultural practices could continue to negatively impact wetlands, water quality, upland habitats, and wildlife in the ICE study area. Agricultural land may also be lost because of increasing urbanization in the ICE study area, but rising commodity prices may stem this trend.

7. Baseline Condition for the Resources, Ecosystems, and Human Communities

The baseline conditions for the purposes of this cumulative effects analysis are predicted based on information provided by local land use plans, county plans, United State Geological Survey data, WDNR data, WDOA population plans and reports and generally described in this cumulative effects analysis.

8. Important Cause and Effect Relationships Between Human Activities and Resource, Ecosystems, and Human Communities

The WIS 23 Build Alternatives will directly affect land uses and resources. Land that will be purchased for right of way will decrease the amount of cropland, upland habitat, and housing. The WIS 23 Build Alternatives will also indirectly affect land uses and resources by promoting more efficient and safe travel between the Fond du Lac metropolitan area and the Sheboygan metropolitan area. As described in the indirect effect analysis, this project has the potential to accelerate the timing of future development in the ICE study area. Where access has been restricted and focused by the construction of new interchanges, the project will also likely focus the location of development. Additional development in the ICE study area may lead to a loss in agricultural land and will further encroach on and fragment natural habitats such as wetlands and woodlands. Habitat loss may also threaten rare sensitive species. Development will also generate additional stormwater runoff, which will impact water quality in the region and the previously identified rare species. See Appendix C for additional details in cause and effect relationships between human activities and resource, ecosystems, and human communities. Figure 4.4-5 schematically illustrates how WIS 23 Build Alternatives along with other unrelated actions cumulatively affect resources.

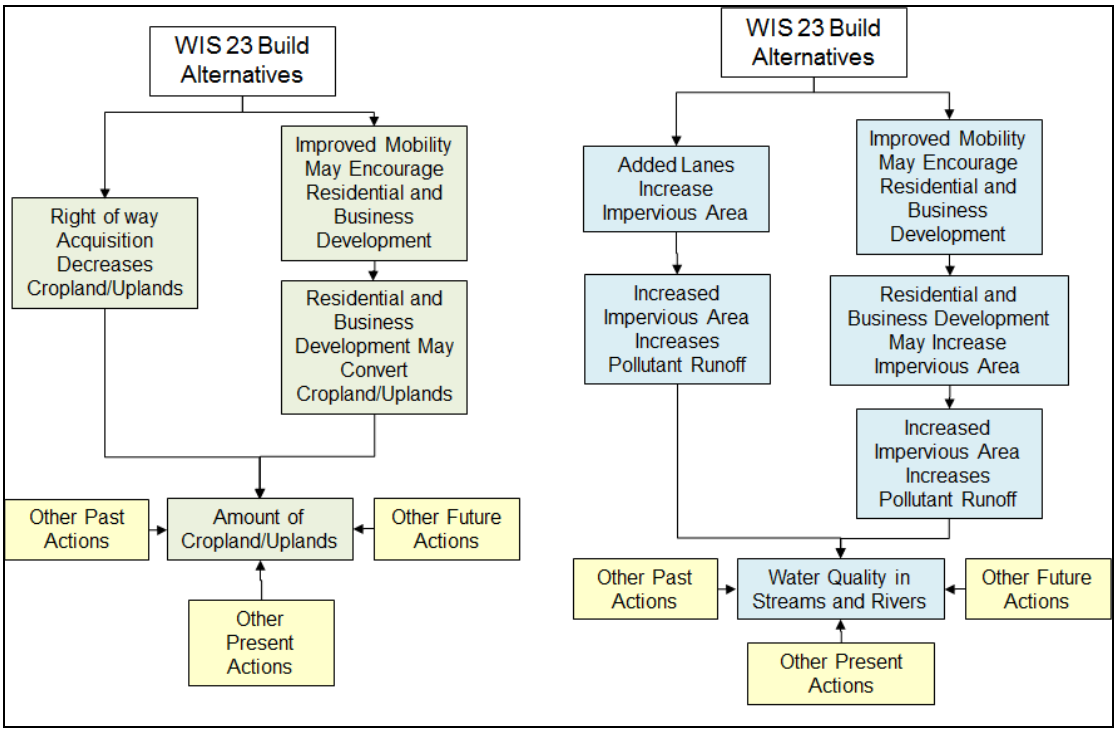


Figure 4.4-10 Examples of Cumulative Effects on Resources

Table 4.4-9 illustrates some cause and effect relationships between resources and the WIS 23 project and how combined they can cause a cumulative impact. The table is meant for illustration purposes only and is not exhaustive.

Table 4.4-9 Example Cause Effect Relationships

Resource	Other Activities Causing Impacts	Potential WIS 23 Impacts
Water quality	Agricultural runoff	Increase pavement and resulting pollutants. Development indirectly enabled by the project have pavements and resulting pollutants.
Farmland	Exurban residential development. Commodity prices	Direct acquisition of farmland for right of way. Indirect residential development on agricultural lands.

Table 4.4-9 Example Cause Effect Relationships		
Resource	**Other Activities Causing Impacts**	**Potential WIS 23 Impacts**
Uplands	Exurban residential development fragmenting uplands	Direct acquisition of uplands for right of way. Indirect residential development on uplands.
Threatened and Endangered Species	Exurban development reducing habitat. Agricultural runoff diminishing water quality and habitat.	Right of way acquisition reducing habitat. Severing habitat corridors. Pavement runoff diminishes water quality.
Archaeological Resources	Development alters landscapes, potentially adversely affecting unknown resources	Road constructing affecting known archaeological resources. Indirect development alters landscapes potentially affecting unknown resources.
Air Quality	Aging vehicle fleet remains in operation, keeping VOC and NOx levels high. Improving standards on newer vehicles reducing VOC and NOx emissions, leading to lower ground level ozone levels Air quality of Chicago Metro area	Increased vehicle miles traveled on WIS 23 may increase vehicle emissions of VOCs and NOx, which are precursors to ground level ozone.,

Local governments have the ability to influence direct, indirect, and cumulative effects to land use and resources through the administration of land use controls that determine where development occurs, what types of development occur, and the density to which the development occurs.

9. Estimated Magnitude and Significance of Cumulative Effects

The following paragraphs describe the estimated magnitude of the cumulative effects based on input from the expert panel and the study team's expertise. Additional detail is provided in Appendix C including:

The status or condition of the resource because of 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.

a. General Development Patterns

The ICE study area has experienced modest change in land use patterns in the past two decades. The majority of the ICE study area is rural and much of it remains in agricultural use. Over the years, some unsewered residential development has occurred in most of the towns in the study area. Most concentrated development has occurred within and around cities and villages located in the study area, primarily in the cities of Fond du Lac and Plymouth, and to a much lesser extent the village of Mount Calvary, Glenbeulah, and St. Cloud. Some industrial development has occurred in the cities of Fond du Lac and Plymouth and some highway-oriented commercial development is very sparsely scattered along the WIS 23 corridor.

Under the No-Build Alternative, future land development within the ICE study area will most likely occur in the locations planned for development in adopted comprehensive plans. The ICE study team believes WIS 23's contribution to cumulative effects on development patterns under the No-Build Alternative will be minimal because there will be no changes to WIS 23. The continuation of steady long-term trends for modest development, lack of major regional transportation improvements and other large scale development projects, and the continued long-term economic viability of agricultural activities will reduce the likelihood of land conversion for other development.

The Preferred Build Alternative has the potential to concentrate development at access points and accelerate the pace of future development in the study area. In general, the expert panel and the ICE study team agreed that the main indirect effect of the Preferred Build Alternative

is creation of a modest demand for more development, primarily located at the ends of the study area.

The panelists generally agreed that long-term economic conditions and local government planning and zoning policies, combined with the access control elements of the Preferred Build Alternative, would strongly influence the location of development, which has a cumulative impact on changing development patterns. The panelists also cited other factors that cumulatively affect development patterns include long-term economic conditions and local policies which could be more influential than the Preferred Build Alternative.

b. Agricultural Land

Under the No-Build Alternative there are no direct impacts or acquisition to agricultural land. The cumulative effect of WIS 23 on agricultural land would be minimal based on development trends and current economic conditions.

Population growth and past development decisions have led to the incremental loss of farmland in the ICE study area. The construction of the Preferred Build Alternative would directly require the acquisition of 225 acres of farmland. Also, as indicated in Appendix C, expert panelists agreed that the Preferred Build Alternative will likely accelerate the conversion of farmland in areas planned for future development, and an overall increase in urbanization may increase development pressure in rural areas (an indirect effect). When the economy makes a recovery, other factors that will contribute to the cumulative loss of farmland include exurban residential development, commodity prices, and agricultural workforce. According to the US Agricultural Census, Fond du Lac and Sheboygan counties lost 8,985 acres of farmland between 2002 and 2007. The amount of agricultural land required for the WIS 23 Preferred Build Alternative represents 2.5 percent of this total. Local government planning and zoning decisions and general economic conditions will also influence the impacts.

c. Wetlands

Wetlands are scattered throughout the area with large concentrations primarily located in the towns of Forest, Marshfield, and Greenbush, which are mostly permanently protected through public ownership. The incremental filling of wetlands elsewhere has occurred over time as a result of development. The conversion of wetlands to agricultural uses has also occurred over time. A comparison of pre-European settlement and current land cover data indicates that approximately 98 percent of historic wetlands remain in the study area because of public acquisition of large wetlands in the Sheboygan Marsh and the Mullet Marsh areas. The cumulative effects on wetlands under the No-Build Alternative will be minimal since there are no direct impacts, and because many of the larger concentrations of remaining study area wetlands are located on state-managed lands or are otherwise subject to state and federal wetland regulations and are therefore protected from development and actively managed.

There may be cumulative impacts on wetlands under the Preferred Build Alternative that will alter or fill about 48.1 acres of wetlands. These are direct project impacts. According to WDNR records using aerial photography, there are about 109,600 acres of wetlands in Fond du Lac and Sheboygan Counties. The wetland filled by the Preferred Alternative represents about 0.04 percent of this total. Wetlands filled by the Preferred Build Alternative will be mitigated at wetland mitigation bank sites near the corridor. With the wetland mitigation, the WIS 23 Preferred Alternative would not have a cumulative effect on wetland acreages.

Expert panelists indicated that additional impervious surfaces associated with the roadway expansion and new development will increase stormwater runoff and reduce the quality and ecological integrity of wetland areas, including wetlands of regional significance. The cumulative effect to wetlands from the Preferred Build Alternative would consist mainly of continued water quality effects created by salt and debris from the existing roadway and slightly increased impervious surfaces. Other factors that contribute to the cumulative impact on wetlands include exurban development and associated pavements, pollutant loadings from agriculture, as well as exotics (see water quality).

d. Water Quality

The quality of surface water and groundwater in the study area has been impacted over the years by urban and agricultural land use practices and pollutants associated with chemical storage, road salt, accidental spills, leaking underground storage tanks, leaking underground pipes and sewers, animal feed lots, fertilizers, septic tanks, sewage lagoons, sumps and dry wells, and improperly abandoned wells.

Transportation projects other than WIS 23 in the region and development increases may affect water quality and will likely contribute to incremental increases in the amount of urban runoff that enters and is distributed throughout the basin because of increased impervious surfaces. Alternatively, future public acquisition or private preservation of natural areas in the study area may help improve water quality by keeping lands undeveloped.

The cumulative effect contribution to surface water and groundwater degradation by the No-Build Alternative will be minimal and limited to what is occurring with pavement runoff.

The construction of the Preferred Build Alternative will add more than 90 acres of impervious surface. Also, expert panelists and the ICE study team indicated that increased stormwater runoff and land development under the Preferred Build Alternative may impact soils for groundwater recharge and may alter surface water levels, particularly after periods of heavy rain and/or snow melt. However, panelists indicated the degree of these impacts to be minimal; this may be because the Preferred Build Alternative would be constructed on-alignment rather than establishing a new route. Over time, the increased development under the Preferred Build Alternative will likely contribute to incremental increases in the amount of urban runoff that enters and is distributed throughout the Sheboygan River basin. As indicated previously, Lake Winnebago and De Neveu Creek are designated as Section 303(d) water resources; they may be at a higher risk for impacts.

One member of the expert panel indicated the marshes in the study area receive much of the runoff in this corridor. There will be an increased impact to the marshes in the study area under the Preferred Build Alternative because of increased impervious surface area and new development. The WisDOT project manager indicated that BMP will be employed during construction of the highway to minimize erosion and runoff.

Other contributors to the cumulative effect on surface water and groundwater quality in the study area include urban and agricultural land use practices and pollutants associated with chemical storage, road salt, accidental spills, leaking underground storage tanks, leaking underground pipes and sewers, animal feed lots, fertilizers, septic tanks, sewage lagoons, sumps and dry wells, and improperly abandoned wells.

e. Upland Habitat

(1) Woodlands and Ecologic Resources

A comparison of pre-European settlement and current land cover data indicates that approximately 55 percent of historic forested lands remain in the study area—a significant portion of this is the Kettle Moraine State Forest. WDNR plans to acquire approximately 7,000 acres of new land, conduct restoration activities, and improve management practices to protect wildlife and enhance recreation. In addition, WDNR recently partnered with the Hardwood Forestry Fund, a 501(c)(3) foundation that establishes sustainable forests for future generations. The foundation received a grant in 2011 from the American Forest's Global ReLeaf program to plant 20,800 trees on 20 acres of the Kettle Moraine State Forest – Northern Unit near Plymouth. The planting efforts will aid in reduction of the forest fragmentation, allowing for more contiguous native hardwood forests. Additional benefits include production of woody biomass, carbon sequestration, the improvement of habitat for forest interior wildlife species, and the increased opportunity for forest-based recreational opportunities.

The No-Build contribution to the cumulative impacts on woodlands is negligible because there will be no direct impacts to woodlands and ecological resources. Other factors, such as long-term development resulting from modest population growth will lead to minimal conversion of woodlands over time. The decisions and actions of state agencies and other environmental organizations, such as those described above, may help counteract the negative cumulative impacts to woodlands over the next 20 years through purchase and permanent protection of lands with woodlands as called for in plans for the Escarpment and Kettle Moraine.

The Niagara Escarpment Report documents the biodiversity associated with the escarpment and lists recommended strategies to ensure long-term integrity of this natural feature. However, many areas of the escarpment continue to see steady population growth and increases in development pressure, including most recently by the development of wind farms along the ridge. In 2011, the Bay-Lake Regional Planning Commission prepared a Niagara Escarpment Overlay Zoning Guide to help Wisconsin communities delineate, develop, implement, and enforce overlay zoning to protect the escarpment. The contribution of the No-Build to this cumulative degradation of the escarpment is negligible because it has no direct acquisition requirements in the escarpment and does not improve mobility or accessibility to the escarpment.

The construction of the Preferred Build Alternative will require 53 acres of woodlands and uplands, a direct impact. According to their respective regional planning commissions, Fond du Lac County has 58,700 acres of woodlands and Sheboygan County has 103,500 acres of woodlands, which is a subset of upland habitat. The Preferred Build Alternative upland requirements represents about 0.05 percent of this total.

Expert panel members and the ICE study team generally agreed that the Preferred Build Alternative will have a modest contribution to the cumulative impact to woodlands, the Escarpment, and other resources areas of ecological significance. Indirect development effects of the Preferred Build Alternative, which contribute to the cumulative impact on uplands, could occur in woodlands or alter woodland and wildlife habitat areas. Table 4.4-7 illustrates recent residential building permits issued for Fond du Lac and Sheboygan counties and shows between 150 and 650 building permits were issued per year between 2006 and 2011. This provides a gauge of development pressures on upland habitat. In addition, other factors contributing to the cumulative impact on uplands include increasing commodity prices that may lead some farmers to clear woodlands for farm fields. Panelists also indicated that invasive species, such as phragmites, spread rapidly along highway corridors, which is another possible impact of the Preferred Build Alternative.

(2) Glacial Features

There are numerous glacial features throughout the study area. One panel member noted these features are not currently protected through local regulation. There will be no direct effects and minimal indirect impacts to glacial features resulting from the No-Build Alternative because of lack of protection (e.g., overlay zoning) and modest amounts of new development. Therefore the No-Build Alternative's contribution to the cumulative negative effects to glacial features will be minimal.

The Preferred Build Alternative will increase the footprint of the WIS 23 corridor, which will add to the cumulative detrimental effect on glacial features, particularly near the Kettle Moraine State Forest. The Preferred Build Alternative's potential to increase the pace of development, an indirect effect, could also contribute to the cumulative negative effect on glacial features.

f. Threatened and Endangered Species

It is difficult to estimate the presettlement populations of threatened and endangered species except by gauging changes in their habitat. The current amount of Wisconsin waters acreages and stream threads is comparable to the amount that existing in presettlement conditions; however, the water quality has diminished which has likely resulted in decreased mussel

populations. The current forested acres in the state and the study area have also declined since presettlement conditions which may contribute to fragmentation and reduced quality of wildlife habitat, including that of the garter snake and turtles. Similarly, wooded species and the introduction of exotic/invasive species into open canopy wetlands and grasslands has decreased suitable habitat for wildlife.

The No-Build Alternative will have no direct impacts and likely minimal indirect impacts to habitat areas and environs that support threatened and endangered species. Therefore the No-Build Alternative's contribution to cumulative adverse effects to threatened and endangered species is likely to be minimal.

The Preferred Build Alternative's direct acquisition of 424 acres will reduce habitat. Indirect impacts associated with expansion of the WIS 23 corridor may include additional reduction and degradation of habitat from development, which could further threaten or potentially cause the displacement or loss of these threatened species.

The Preferred Build Alternative could adversely affect threatened and endangered species through habitat reduction associated with right of way acquisition and other development pressures. Increases in impervious area will degrade water quality that could affect rare mussel populations within the corridor. Increased runoff can result in wetland sedimentation that can alter and degrade native plant communities, favoring monotypic stands of nuisance or exotic species.

The purchase of approximately 424 acres of new right of way needed will alter habitats that support rare birds within the area. Because the right of way purchase follows the existing corridor, limited fragmentation will occur. Right of way acquisition in wetlands and uplands may affect reptilian habitat. The increased roadway corridor width may also increase mortality rates.

g. Historic and Archaeological Resources

The No-Build alternative will have no direct effects on archaeological or historical resources eligible for inclusion on the NRHP. Therefore the No-Build Alternative will have limited contribution to cumulative adverse effects on cultural resources.

As for direct effects of the Preferred Build Alternative, the proposal will not affect St. Mary's Springs Academy (eligible for the NRHP) nor will it adversely affect the Old Wade House State Park. Data recovery will be performed at the Sippel archaeological site, which will be affected by the Preferred Build Alternative. The direct effects of the Preferred Build Alternative will modestly contribute to cumulative effects on historic resources.

Other actions that could affect historic and archaeological sites include the redevelopment and/or razing of existing buildings with historic significance. Also residential and commercial development activities that alter the landscape could adversely affect unknown archaeological resources. The number of historic resources within Fond du Lac and Sheboygan Counties is briefly discussed on page 4-12 and includes 4119 historic listings for Fond du Lac County and 2664 historic listings for Sheboygan County on Wisconsin's Architecture and Historic Inventory. The direct effects of WIS 23 improvements, combined possible redevelopment and development impacts could create a cumulative impact to historic resources. This impact is anticipated to be modest when compared to the direct effects of Preferred Build Alternative. This characterization is based on a comparison of potential ground disturbing activities. The WIS 23 Preferred Build Alternative will disturb about 430 acres of new right of way and will have an adverse effect on one archaeological site eligible for the NRHP. Increased development directly occurring as an indirect effect of the Preferred Alternative could cause the disturbance of 0 to 25 acres, which is a small fraction of the ground disturbance activities that are a direct result of the Preferred Build Alternative.

h. Air Quality

As mentioned previously, NOx and VOC emissions are precursors to the formation of ozone, and Sheboygan County is in nonattainment for the 8-hour standard for ground-level ozone (Fond du Lac County is in attainment.) The impact-causing effects of the WIS 23 Preferred Build Alternative on these emissions is complicated. Figure 4.4-11 shows generic emission graphs for VOCs and NOx emissions versus speed. These curves do not represent the full range of effects associated with travel at different speeds. Emissions rates are higher during stop-and-go, congested traffic conditions than free-flow conditions operating at the same average speed. Emission rates vary based on the speed a vehicle is traveling. USEPA's model for highway vehicle emissions - MOBILE 6.2[9] - shows how speed affects emissions rates. VOC and CO emissions rates typically drop as speed increases. NOx emission rates increase at higher speeds. Emissions rates at all speeds have been falling over time as newer, more controlled vehicles enter the fleet.[10]

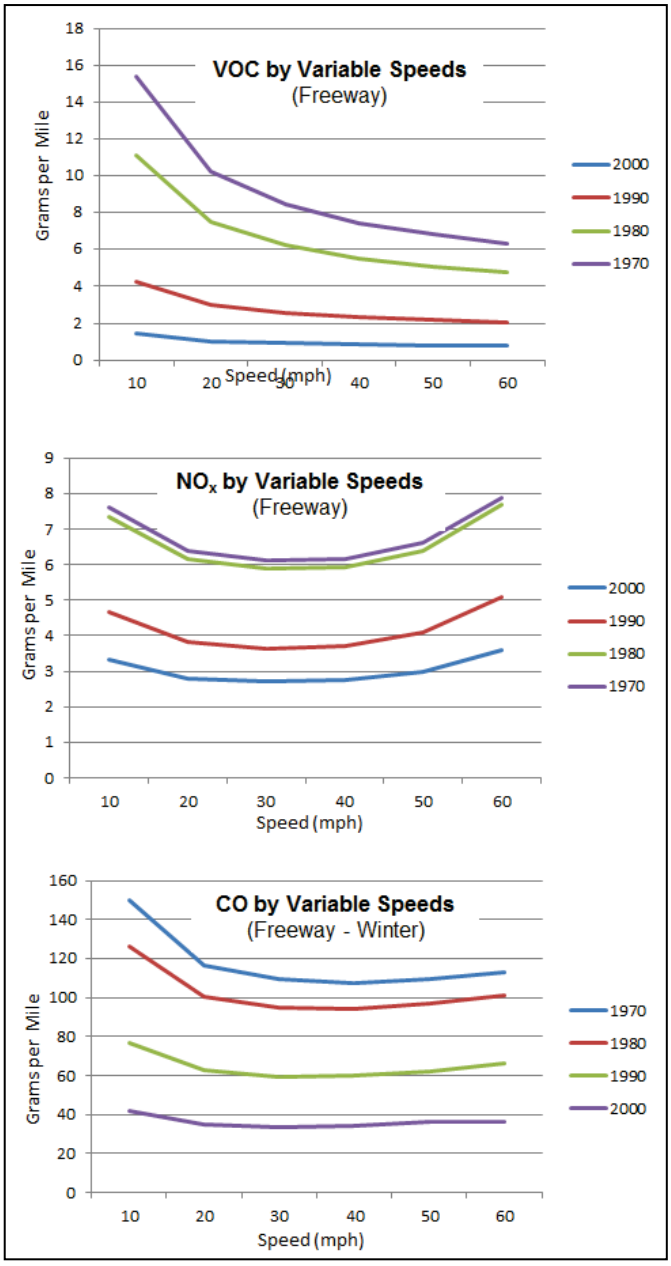


Figure 4.4-11 Generic Emission vs. Speed
Source :US EPA. MOBILE 6.2 Model run 24 September 2003

The No-Build Alternative will have lower traffic volumes and lower travel speeds than the Preferred Build Alternative. The 8 to 23 percent WIS 23 traffic volume increase that is forecast to occur between 2012 and 2035 with the No-Build Alternative will increase the number of vehicles on the roadway, potentially increasing vehicle emissions. That combined with increases in vehicle miles traveled throughout Fond du Lac and Sheboygan counties may lead to increases in exhaust pollutants that could be partially offset by technology advances. The projected 2020 daily summer traffic on the Sheboygan County portion of WIS 23 represents about 2.39 percent of the total vehicle miles traveled (VMT) in Sheboygan County for a summer day.[11]

The Preferred Build Alternative will have higher traffic volumes and higher travel speeds. Additionally, the projected 2035 daily traffic volumes are 10 to 25 percent higher than what would

[9] USEPA has a new air quality model called MOVES; however, air quality modeling for Sheboygan County was performed using the previous model Mobile 6.2)
[10] http://www.fhwa.dot.gov/environment/air_quality/publications/fact_book/page15alt2.cfm June 2013
[11] Based on the Table C-5 in Appendix C, the conformity analysis for the Sheboygan MPO TIP for the 2013 to 2016 Calendar Years. Only Sheboygan County is referenced because it is in nonattainment. Fond du Lac County is in attainment.

normally occur with the No-Build alternative. The projected 2020 daily summer traffic on the Sheboygan County portion of WIS 23 represents about 2.52 percent of the total vehicle miles traveled in Sheboygan County for a summer day. With the Preferred Build Alternative, WIS 23 has 0.13 percent more VMT contribution to the total county VMT. The emissions associated with these higher traffic volumes combined with other human activities such as manufacturing, off-road vehicles, and other sources emit VOCs and NOx that contribute to ground-level ozone levels in Sheboygan County. WDNR and USEPA have in place a set of regulations that are designed to decrease emissions from motor vehicles, areas sources and industrial sources over time. Programs and regulations are in place at the federal and state level to control vehicle emission including regulations in the early 2000s and 2007 further controlling emissions from vehicles and fuels. These are projected to reduce vehicle pollutant emissions over the next 25 years.

As mentioned, Sheboygan County is nonattainment for the 8-hour standard for ground-level ozone NAAQS. The Clean Air Act requires that states prepare state implementation plans (SIP) for air quality to identify how the NAAQS in the nonattainment area will ultimately be met. In Wisconsin, this is the responsibility of the WDNR. The attainment demonstration included in the SIP takes into account many emission sources and details regulations to reduce emissions from those sources. The mobile source sector is responsible for reducing its emissions as well. The SIP provides emissions budgets that act as emissions ceilings for the mobile sector. The Clean Air Act requires that in nonattainment areas the planning agencies demonstrate that mobile source emissions resulting from the modeling for changes to the transportation system "conform" to the budgets included in Wisconsin's SIP. In Sheboygan County, Bay Lake Regional Planning Commission prepares a conformity analysis for ozone as part of its long range transportation plan as well as its transportation improvement program. The most recent conformity analysis is contained in Appendix C of the Sheboygan MPO TIP for Calendar Years 2013 to 2016. The expansion of WIS 23 to 4 lanes included in the conformity analysis and is discussed on pages C-5 and C-19. As for VOC emissions, the conformity plan states the following:

> *The transportation system volatile organic compound emissions under the transportation system plan and transportation improvement program, when analyzed for all of Sheboygan County, are less than the motor vehicle emissions budgets for volatile organic compounds …thus meeting this criterion for consistency.*[12]

Table C.6
Forecast Volatile Organic Compound Emissions from the Transportation System in Sheboygan County Under the Update to the Year 2035 SATP/2013 - 2016 TIP and the State Implementation Plan for Air Quality: 2015, 2020, 2030 and 2035 (On a Hot Summer Weekday) Using Mobile 6.2 Emission Factors

	Sheboygan County	
Year	State Implementation Plan (tons)*	Year 2035 SATP (tons)
2015	2.010	1.071
2020	1.320	0.879
2030	1.320	0.884
2035	1.320	0.919

*The State Implementation Plan budget for volatile organic compounds was 2.010 tons for 2012, and 1.320 tons for 2020.

Source: Wisconsin Department of Natural Resources, 2010 and 2013; and Bay-Lake Regional Planning Commission, 2013.

Note: SATP = Sheboygan Area Transportation Plan

[12] The motor vehicle emission budgets used for conformity purposes are contained in the "8-Hour Ozone Redesignation Request and Maintenance Plan for the Sheboygan County Subpart 2 Moderate Nonattainment Area".

As for NOx emissions, the conformity plan states the following:

> *The transportation system nitrogen oxide emissions under the transportation system plan and transportation improvement program, when analyzed for all of Sheboygan County, are less than the motor vehicle emissions budgets for nitrogen oxides …thus meeting this criterion for consistency.* [13]

Table C.7
Forecast Nitrogen Oxide Emissions from the Transportation System in Sheboygan County Under the Update to the Year 2035 SATP/2013 - 2016 TIP and the State Implementation Plan for Air Quality: 2015, 2020, 2030 and 2035 (On a Hot Summer Weekday) Using Mobile 6.2 Emission Factors

	Sheboygan County	
Year	State Implementation Plan (tons)*	Year 2035 SATP (tons)
2015	4.150	2.117
2020	1.790	1.300
2030	1.790	0.893
2035	1.790	0.882

*The State Implementation Plan budget for nitrogen oxides was 4.150 tons for 2012, and 1.790 tons for 2020.

Source: Wisconsin Department of Natural Resources, 2010 and 2013; and Bay-Lake Regional Planning Commission, 2013.

Therefore, while the Preferred Build Alternative is projected to produce more vehicle miles traveled, it represents a very modest increase in the overall VMT for Sheboygan County (0.13 percent in 2020). The conformity analysis indicates the Sheboygan Area Transportation Plan is consistent with the approved motor vehicle emissions budgets for Air Quality even with the expansion of WIS 23 to 4 lanes. Therefore while the Preferred Build Alternative could have more VOC and NOx emissions than the No-Build Alternative, the conformity analysis indicates the Sheboygan Area Transportation Plan is consistent with the emission budgets set forth to bring the county back into attainment.

i. Trails

State, county, and local governments and other organizations in the study area continually plan for the acquisition and development of new trails. The potential indirect impacts to trails of the No-Build Alternative include delay of extension of the Old Plank Road Trail west to Fond du Lac and delay of construction of underpass for safe passage across WIS 23 for the Ice Age Trail and snowmobiles. There would be no cumulative impact from the No-Build Alternative to trails. The current WIS 23 at-grade high speed crossing of the Ice Age Trail and State Equestrian Trail on WIS 23 would remain. This alternative also would delay extension of the Old Plank Road Trail from the Northern Unit of the Kettle Moraine State Forest to Fond du Lac.

The Preferred Build Alternative's contribution to cumulative impact to trails and nonmotorized travel is beneficial through the provision of a more complete local and regional trail network. The Preferred Alternative extends the Old Plank Road Trail west to the Prairie Trail in Fond du Lac. It also provides a grade-separated trail crossing of WIS 23 for the Ice Age Trail. This combined with other actions, such as local trail improvements which include the Wild Goose-Prairie Connector, the Mascoutin Valley Trail Extension, and Union Pacific Trail Conversion, will make nonmotorized travel easier. Another factor contributing to the positive cumulative effect on trails and nonmotorized travel are the provisions contained in Wisconsin Administrative Code Trans 75,

[13] The motor vehicle emission budgets used for conformity purposes are contained in the "8-Hour Ozone Redesignation Request and Maintenance Plan for the Sheboygan County Subpart 2 Moderate Nonattainment Area".

which requires bicycle and pedestrian facilities on highway projects unless the project qualifies for an exception.

j. Environmental Justice Populations

There are no direct impacts to environmental justice populations under the No-Build Alternative. In terms of indirect impacts, the study team determined that concentrations of minority and low-income populations will not be disproportionately adversely impacted by the No-Build Alternative because generally employment and social services are available in Fond du Lac and Plymouth where such population concentrations occur. Conversely, concentrations of elderly populations will be more adversely affected where they are concentrated in the central portion of the ICE study area and need to travel to the urban areas at the ends of the ICE study area for services.

In terms of cumulative impacts, in the long term, the percentage of elderly populations is projected to increase in the coming decades based on data from the Wisconsin Department of Administration Demographic Services. The lack of improvements under the No-Build Alternative will not address safety problems currently found in the corridor. This safety issue may contribute to the cumulative adverse safety impact on elderly residents and drivers who are more at risk where safety problems exist. As a result, these safely problems that are not addressed with the No-Build Alternative are likely to adversely impact a slightly larger percentage of the population within the ICE study area.

There are no direct impacts to environmental justice populations under the Preferred Build Alternative. Indirect impacts under the Preferred Build Alternative may include access restrictions which are proposed along points in the corridor that may make access somewhat less convenient and trips slightly longer for the concentrations of elderly population in the central part of the ICE study area in the towns of Marshfield and Forest and the villages of Mount Calvary and St. Cloud. However, such access restrictions are likely to be offset by reduced highway congestion and safer conditions under the Preferred Build Alternative.

In terms of cumulative impacts, in the long term, the percentage of elderly populations is projected to increase in the coming decades based on data from the Wisconsin Department of Administration Demographic Services. The improvements under the Preferred Build Alternative will address safety problems currently found in the corridor and thus help correct a problem which disproportionately impacts elderly residents and drivers who are more at risk where safety problems exist. Other cumulative effects of the Preferred Build Alternative will be modest and may include:

(a) Need for additional public and nonmotorized vehicle transportation. The availability of public and nonmotorized vehicle transportation options (i.e., sidewalks, bike lanes, paths, and trails) varies throughout the study area, with metro areas having a greater abundance of such options. As new development occurs, additional transportation options may be needed to provide multiple transportation options beyond the single occupancy vehicle. Transportation options will be helpful for all individuals in the ICE study area to reach new employment destinations.

(b) Need for safe, affordable housing in vicinity of employment destinations. Similarly, as modest new employment related growth occurs as a result of the Preferred Build Alternative, the need for new, safe, affordable housing will likely occur. In Fond du Lac and Plymouth, higher density housing is planned near locations planned for employment. Future development of these areas may fill the need to provide affordable housing in the ICE study area.

Primary cumulative adverse effects resulting from the WIS 23 Preferred Alternative include the conversion of farmland to right of way, which augments other development activities that are converting farmland to other uses. Another cumulative effect is residential development in the Niagara Escarpment lands east of Fond du Lac. Residential development is currently occurring in the escarpment. Improved mobility from WIS 23 could indirectly increase the pace of residential development in the escarpment (and indirect effect), which would create a cumulative impact to the uplands of the escarpment.

The combination of access controls and interchanges associated with the Preferred Build Alternative will likely have the result of focusing development near the interchanges and reducing scattered development throughout the remainder of the ICE study area (an indirect effect). By reducing the indirect effect of scattered development, the cumulative effect to agricultural lands and uplands will be reduced.

The cumulative effect of the WIS 23 project when combined with other actions analyzed above will be the incremental loss of agricultural land and other natural areas in the ICE study area, particularly surrounding the cities of Fond du Lac and Plymouth where development is planned.

10. Alternatives to Avoid, Minimize, or Mitigate Significant Cumulative Effects

The WIS 23 Preferred Alternative will contribute to the cumulative effect on resources, with other contributors being past, present, and future actions by other entities. The predominant contribution to cumulative effects from the WIS 23 Preferred Alternative includes loss of farmland, loss of uplands, degradation of water quality, and a small degradation air quality.

The indirect effects section of this LS SDEIS excerpted FHWA's environmental toolkit that described FHWA's responsibility in the mitigation of indirect and cumulative effects.[14] NEPA does not specifically require substantive mitigation for project impacts; direct, indirect, or cumulative. The CEQ regulations require that the environmental impacts statement include consideration and discussion of possible mitigation for project impacts (40 CFR §§ 1502.14((f), 1502.16(e-h), 1505.2(c), 1508.25(b)(3)).

While this section specifically addresses cumulative effects, direct and indirect effects represent WIS 23's contribution toward the cumulative effect on a resource and are therefore discussed.

a. Avoidance Measures

(1) Corridor Selection

In the development, evaluation, and screening of alternative corridors, WisDOT considered both the direct environmental impacts of the corridor alternatives as well as the indirect and cumulative effects. The consideration of direct, indirect, and cumulative effects led to the selection of the on-alignment corridor, Alternative 1, as the Preferred Alternative. The selection of Alternative 1 had the following effects:

(a) It reduced the quantity of direct impacts to farmland, wetlands, and uplands. (See Table 4.5-1 of the LS SDEIS. Alternative 1 requires up to 23 percent less right of way and 42 percent fewer wetland impacts than some of the off-alignment alternatives.) In doing so, it reduced the highway improvement's contribution to cumulative effects.
(b) It reduced the number of severed farm parcels and the amount of farmland required. Alternative 1 requires up to 57 percent less farmland then some of the off-alignment alternatives. Farm severances make agriculture less sustainable and can lead to a reduction in farming activities and the conversion of severed parcels to other land uses (an indirect effect which leads to a cumulative effect on resources). Alternative 1 had the least amount of farm severances and cropland required.
(c) It reduced the amount of roadway lane mileage associated with WIS 23 improvements. Selection of an off-alignment corridor would have increased lane mileage because new bypass lanes would be constructed in addition to the existing WIS 23 lanes. Alternative 1 would have about a third less pavement than some off-alignment alternatives. Additional lane mileage has direct environmental effects, such as degraded water quality, induced traffic, the corresponding air quality impacts, and severance of natural communities. Selection of Alternative 1 avoided the impacts that would have occurred with additional lane mileage of the off-alignment alternatives.

[14] http://www.environment.fhwa.dot.gov/projdev/qaimpact.asp June 2013

(d) It avoided potential residential and commercial development from occurring along an off-alignment corridor (an indirect effect which leads to a cumulative effect on resources). This included avoiding the corresponding environmental impacts that would have been associated with this development.

(2) Alignment Refinements

With the selection of Alternative 1 as the Preferred Alternative, several alignment modifications were incorporated into the alternative to avoid direct impacts, which then decrease the cumulative impact of the project on area resources. These alignment refinements included shifting the roadway alignment north of the Old Wade House State Park and south of the Pit Road wetland mitigation site. Both alignment shifts decreased wetland impacts, decreasing the cumulative effect of the project on area wetlands.

(3) Preferred Alternative Features

WisDOT seeks to incorporate design components and features into the Preferred Alternative that minimize the adverse effects of the potential project. Many of these components address direct effects, but they also have regional influence and a cumulative effect. The WIS 23 Preferred Project incorporates a 16-mile extension of the Old Plank Road Trail. This extension enhances the ability of WIS 23 to serve nonmotorized modes of transportation and offsets potential negative project effects to nonmotorized modes.

b. Minimization Measures

(1) Impact Minimization

Through the final design process, WisDOT seeks to minimize impacts to adjacent properties and resources. This minimization reduces the direct impacts of the alternatives, which contribute to the overall cumulative impacts on particular resources. Between the publishing of the 2010 FEIS, design refinements have reduced the amount of impact on some resources, such as cropland which was reduced by 20 acres and uplands/woodlands which was reduced by 24 acres. Some impact categories have risen since the publishing of the 2010 FEIS- mostly because of revised boundaries (wetlands) or property owner requests (residential relocations).

(2) Construction Impact Minimization

WisDOT will seek to minimize construction impacts through the implementation of various measures which are described in Section 6 of the LS SDEIS. These measures reduce direct construction impacts, which consequently reduce the project's contribution on the cumulative impact on these resources. Measures to minimize construction impacts include the following:

(a) A transportation management plan (TMP) will provide reasonably convenient access to residences, businesses, farm parcels, community services, and local roads during construction.
(b) Special provisions to reduce the short-term impacts of construction noise will require that motorized equipment be operated in compliance with all applicable local, state, and federal laws and regulations on noise levels permissible within and adjacent to the project construction site.
(c) The special provisions and plan set will include measures to reduce water quality and quantity impacts occurring through construction. WisDOT through Trans 401, Wisconsin Administrative Code, and the WisDOT/WDNR Cooperative Agreement will comply with the substantive requirements of Chapter 147, Wisconsin Statutes, Wisconsin Pollutant Discharge Elimination System (WPDES) to reduce water quality and hydrology impacts. Precautions will be taken at the Sheboygan River and Mullet River Creek crossings to preclude erosion and stream siltation.
(d) To reduce impacts to wildlife, construction work will be scheduled during nonbreeding seasons. Section 4.6 C-7 of this LS SDEIS details commitments being made to reduce impacts to rare species as coordinated with the WDNR over the winter of 2013.
(e) During construction, impacts to wetlands from erosion and sediment transport will be minimized or prevented by implementing erosion control best management practices as specified in the construction contract
(f) For agriculture, reasonable access will be provided to farms. Existing drainage systems (ditches and tiles) will be kept operational during construction.

(3) Access Management

WisDOT implements access management on roadways and access points along state highways. Access management reduces the indirect effects of a project, which reduces the Preferred Alternative's overall contribution to a cumulative effect on a resource. Access management and its affect in development was described in the indirect effects section. Of the current 42 full-access intersections, the Preferred Alternative incorporates 6 cul-de-sacs, 14 right-in/right-out access restrictions, 10 J-turn access restrictions, and 3 interchanges/jug-handle. While providing sufficient local access, these access restrictions will have the effect of directing development away from rural intersections with less access toward intersections with more access.

c. Mitigation Measures

(1) Direct Impact Mitigation and Corresponding Contribution to Cumulative Impacts

WisDOT is providing mitigation for several types of direct impacts. Mitigating direct impacts reduces or eliminates the WIS 23 project's contribution to cumulative impacts of specific resources. Direct impact mitigation includes:

(a) The mitigation of approximately 48 acres of wetlands being filled through the establishment of a wetland mitigation bank.
(b) The provision of a grade-separated crossing of WIS 23 for the Ice Age Trail and State Equestrian Trail.
(c) The replacement of 2.2 acres of land required from the Northern Unit of the Kettle Moraine State Forest with 4.275 acres of land to be transferred to State Forest ownership.
(d) The Phase III data recovery at the Sippel Archaeological Site to document the information from this archaeological resource.

d. Avoidance, Minimization, and Mitigation Measures Outside of WisDOT's and FHWA's Jurisdiction.

As mentioned in the indirect effects section, neither WisDOT nor FHWA has jurisdiction over local land use policy and, or decisions. The project team has identified several avoidance, minimization, and mitigation measures that may further reduce indirect and cumulative effects if implemented by other entities. They are identified here for consideration by the appropriate outside entities. Policy choices by local governments regarding planning and existing and future land use regulations can play a large role in either facilitating or minimizing potential indirect effects of the WIS 23 project, and their resulting contribution to cumulative effects on resources. WisDOT can control WIS 23's direct effects that contribute to the cumulative effect of other past, present, and future actions on resources. Land use tools available to local jurisdictions commonly used to avoid and reduce impacts to resources were described in the indirect effects section and include the following:

- Comprehensive Planning
- Farmland Preservation Planning
- Zoning Ordinance
- Subdivision/Land Division Ordinance
- Extraterritorial Jurisdiction
- Official Mapping
- Conservation Easements
- Urban Service Area
- Tax Increment Financing (TIF).

Use of these tools can decrease the negative consequences of indirect development on resources.

11. Monitor and Evaluate the Cumulative Effects of the Selected Alternative and Adapt Management

Section 6 of this LS SDEIS contains the commitments to mitigation and monitoring regarding effects of the Preferred Alternative. It includes continued coordination with WDNR regarding threatened and

endangered species, commitments regarding archaeological and historic sites, wetland monitoring, as well as measures to offset impacts to Section 4(f) properties. WisDOT and FHWA will work within their jurisdictional limitations to minimize adverse indirect and cumulative effects. These efforts will be primarily associated with the roadway project corridor and are primarily limited to the duration of the construction project. Local communities and state agencies with jurisdiction in the study area will have the ability to monitor and evaluate impacts on land and resources on a long-term basis. Communities have the ability to approve or not approve development decisions and can influence the pace of development for years after WIS 23 improvements are completed. Other agencies with federal authority, such as the US EPA and US Army Corps of Engineers, also have the authority to monitor impacts to natural resources such as floodplains, wetlands, and water quality.

4.5 ENVIRONMENTAL COST MATRICES

The DEIS released in 2004 broadly evaluated 6 alternatives on various alignments that expanded WIS 23 to 4 lanes. The analysis did not include local road improvements, interchanges, or extension of the Old Plank Road Trail but was used to select a basic alignment in which WIS 23 improvements would take place. Table 4.5-1 lists the impacts and alternatives as they were presented in the 2004 DEIS. These impacts were used in the initial evaluation and in the selection of a preferred alternative.

Table 4.5-1 DEIS Comparison of 4-Lane Expansion Alternatives
(Without interchanges, local roads, and Old Plank Road Trail)

			DEIS QUANTITIES - 2004					
			4-Lane Expansion Impacts Only					
Route Segments		NO	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Road Type	UNIT	BUILD	Expressway	Expressway	Future	Convertible	Freeway	
Road Length	Miles	19.07	19.07	18.80	19.00	19.10	19.00	19.10
FOUR-LANE EXPANSION COST								
Roadway - New Construction	Millions 2003$ (2012$)	0.00	39.4 (48.3)	47.4 (58.1)	61.2 (75.1)	61.1 (74.9)	61.3 (75.1)	61.1 (74.9)
Roadway - Rehab of Old Roadway	Millions 2003$ (2012$)	0.00	5.9 (7.3)	4.7 (5.7)	1.7 (2.1)	1.9 (2.4)	1.7 (2.1)	1.9 (2.4)
Real Estate - Land and Buildings	Millions 2003$ (2012$)	0.00	5.3 (6.5)	3.0 (3.7)	1.2 (1.5)	1.7 (2.1)	1.0 (1.2)	1.5 (1.8)
Real Estate - Property Without Buildings	Millions 2003$ (2012$)	0.00	2.2 (2.7)	2.6 (3.2)	3.3 (4.0)	3.3 (4.0)	3.2 (4.0)	3.2 (4.0)
SUBTOTAL	Millions 2003$ (2012$)	**0.00**	**52.9 (64.8)**	**57.7 (70.8)**	**67.5 (82.7)**	**68.0 (83.4)**	**67.2 (82.4)**	**67.8 (83.1)**
ACCESS PRESERVATION COST								
Grade Separations (# of crossings)		0	0	2	10	10	10	10
SUBTOTAL	Millions 2003$ (2012$)	**0.0**	**0.0**	**2.0 (2.5)**	**10 (12.3)**	**10 (12.3)**	**10 (12.3)**	**10 (12.3)**
OTHER COSTS								
Utilities	Millions 2003$ (2012$)	0.00	1.1 (1.4)	0.9 (1.0)	0.5 (0.6)	0.5 (0.6)	0.5 (0.6)	0.5 (0.6)
Jurisdictional Transfers	Millions 2003$ (2012$)	0.00	0.00	1.2 (1.5)	3.9 (4.8)	3.6 (4.4)	3.9 (4.8)	3.6 (4.4)
Wetland Mitigation	Millions 2003$ (2012$)	0.00	0.4 (0.5)	0.3 (0.4)	0.4 (0.5)	0.4 (0.5)	0.4 (0.5)	0.5 (0.6)
Side-Road Connection and Rehab	Millions 2003$ (2012$)	0.00	2.0 (2.5)	3.0 (3.7)	3.0 (3.7)	3.0 (3.7)	3.0 (3.7)	3.0 (3.7)
SUBTOTAL	Millions 2003$ (2012$)	**0.00**	**3.5 (4.3)**	**5.4 (6.6)**	**7.8 (9.5)**	**7.5 (9.2)**	**7.8 (9.6)**	**7.6 (9.3)**
TOTAL COSTS	Millions 2003$ (2012$)	**0.00**	**56.3 (69.1)**	**65.1 (79.8)**	**85.3 (104.5)**	**85.6 (104.9)**	**85.0 (104.2)**	**85.3 (104.6)**
EIS IMPACTS								
Existing R/W Used	Acres	0	420 (429)+	311	152	152	182	182
Total Land Converted to Highway R/W	Acres	0	277 (215)+	331	427	430	408	411
Farmland Converted to Highway R/W	Acres	0	128 (92)+	169	296	298	282	283
Residential Relocations	Number	0	26 (21)+	19 (17)+	8 (20)+	8	8	8
Business Relocations (Not Including Farms)	Number	0	7 (3)+	10 (2)+	6 (2)+	8	6	8
Farm Relocations	Number	0	11 (17)+	5 (7)+	3 (4)+	3	3	3
Farms Severed	Number	0	0	5	28	25	25	22
Wetland Acres Filled	Acres	0	58 (37.1)+	52 (37.9)	64 (59.5)	73 (63.9)	70 (59.0)	79 (64.5)
Upland Habitat Affected	Acres	0	12 (38.4)+	19	31	30	31	30
Floodplain Encroachment	yes/no	NO	YES	YES	YES	YES	YES	YES
Threatened and Endangered Species	yes/no	NO	YES	YES	YES	YES	YES	YES
Historical Resources	number	0	6 (19)+	7	3	3	3	3
Archaeological *(Sites needing future evaluation)	Resources	0	18 (4)*	22 (9)*	22 (12)*	22 (12)*	22 (12)*	22 (12)*
Contaminated Sites	Each	0	(27)	(16)	(7)	ND	ND	ND
Noise Receptors - Currently exceeding NLC - Future (2035) exceeding NLC	 Each Each	 (29) (44)	 (29) (47)	 (29) (54)	 (21) (47)	ND	ND	ND

( )+ Subsequent evaluation after the 2004 revised the number of relocations. Costs revised using implicit price deflator.

Note: Broad Corridor Impacts associated with the 4-lane expansion were used to selected a preferred alignment. Once the preferred alignment was selected, the Preferred Alternative augmented it with other access and multimodal features, increasing the total impacts.

Following comments on the 2004 DEIS from the public and agencies, additional components were added to the Preferred Build Alternative to enhance its function and meet community needs. These added components include extending a multiuse trail alongside WIS 23 and providing grade-separated interchanges/connections at several high-use intersections. Table 4.5-2 presents the impacts listed in the 2009 SDEIS and 2010 FEIS that show the impacts for each added component (e.g., the trail, the grade-separated crossings, and the interchanges) with the figures updated to reflect the most recent data.

Table 4.5-2 Alternative Environmental Cost Matrix

Updated 2013 Impact Values and Categories	UNIT	NO BUILD[3]	Build Alternatives: Preferred Build Alternative: Alt 1 4-ln Expansion Totals[1]	Build Alternatives: Preferred Build Alternative: Connection Roads and Interchanges Totals	Build Alternatives: Preferred Build Alternative: Old Plank Trail[5] Totals	Build Alternatives Total	Corridor Preservation Measures: WIS 23 Corridor Connection Rds, Grade Separation, and Interchanges: No WIS 23 Preservation Totals	Corridor Preservation Measures: WIS 23 Corridor Connection Rds, Grade Separation, and Interchanges: Preferred WIS 23 Preservation Totals	Corridor Preservation Measures: US 151 / WIS 23 System Interchange: Preferred No US 151/WIS 23 Preservation Totals	Corridor Preservation Measures: US 151 / WIS 23 System Interchange: US 151/WIS 23 23-1 Preservation Totals	Corridor Preservation Measures: US 151 / WIS 23 System Interchange: US 151/WIS 23 23-2 Preservation Totals	Preferred Corridor Preservation Measures
Road Length	Miles	19.07	19.07	N/A	N/A	19.07	N/A	N/A	N/A	N/A	N/A	N/A
FOUR-LANE EXPANSION AND ACCESS PRESERVATION COST												
Design	Millions $	6.7	9			9.0	N/A	N/A	N/A	N/A	N/A	N/A
Real Estate[5]	Millions $		26.5			26.5	N/A	N/A	N/A	N/A	N/A	N/A
Utility	Millions $		5.4			5.4	N/A	N/A	N/A	N/A	N/A	N/A
Construction	Millions $		87.3			87.3						
SUBTOTAL	Millions $	**6.7**	**128.2**			**128.2**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
FUTURE ACCESS PRESERVATION COST (Construction and Real Estate)												
System interchange Roadway Construction	Millions $	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	47.2	70.9	N/A
System interchange Real Estate	Millions $	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3.1	0.9	N/A
CTH W Interchange with Connections	Millions $	N/A	N/A	N/A	N/A	N/A	N/A	9.8	N/A	N/A	N/A	9.8
CTH A Interchange with Connections	Millions $	N/A	N/A	N/A	N/A	N/A	N/A	8.6	N/A	N/A	N/A	8.6
Grade Separation Overpass (Sugarbush, Tower, Seven Hills, Hillview, Scenic View, County P)	Millions $	N/A	N/A	N/A	N/A	N/A	N/A	19.6	N/A	N/A	N/A	19.6
SUBTOTAL	Millions $	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**38.0**	**N/A**	**50.3**	**71.8**	**38.0**
TOTAL COSTS[2]	Millions $	**6.7**	**128.2**			**128.2**	**N/A**	**38.0**	**N/A**	**50.3**	**71.8**	**38.0**
EIS IMPACTS												
Existing R/W Used	Acres	0	429	25	32	**486**	0	20	0	36	55	**20**
Total Land Converted to Highway R/W	Acres	0	215	119	90	**424**	0	68	0	62	52	**68**
Cropland Converted to Highway R/W	Acres	0	92	81	52	**225**	0	39	0	4	28	**39**
Residential Relocations	Number	0	21[6]	12	0	**33**	0	3	0	5	0	**3**
Business Relocations (Not Including Farms)	Number	0	3	5 Bldgs 7 Bus	0	**8 Bldgs 10 Bus**	0	2	0	3 Bldgs 5 Bus	0	**2**
Farm Relocations (One or more farm buildings)	Number	0	17	2	0	**19**	0	4	0	0	0	**4**
Farms Severed	Number	0	0	5[4]	0	**5**	0	2	0	1	1	**2**
Wetlands filled	Acres	0	37.1	0.8	10.2	**48.1**	0	1.7	0	12.1	7.6	**1.7**
Upland/Woodland Habitat Affected	Acres	0	38.4	2.2	7.3	**47.9**	0	8.5	0	5.9	0.1	**8.5**
Excess Right of Way Purchased	Acres	0	158.2			**158**	0	N/A	0	N/A	N/A	**N/A**
Floodplain Encroachment	yes/no	NO	YES	YES	YES	**YES**	NO	YES	NO	YES	YES	**YES**
Threatened and Endangered Species	yes/no	NO	YES	YES	NO	**YES**	NO	YES	NO	YES	YES	**YES**
Impacted Noise Receptors (2035)	Each	44	47			**47**	ND	ND	9	2	2	**9**
Potentially Contaminated Sites (Phase II)	Each	0	27 (5)			**27 (4)**	0	2	0	0	0	**0**
Historical Resources In Corridor (Number Adversely Effected)	Number	0	19(0)	2(0)	N/A	**19(0)**	0	0	0	2 (0)	2 (0)	**0**
Archaeological Resources	Number Phase II (III)	0	4(1)	0	0	**4(1)**	0	0	0	2 (0)	1 (0)	**0**

[1] Includes crossing for Ice Age Trail.

[2] All Costs are in Year of Expenditure dollars, 2015 for Preferred Build Alternative, 2030 for Improvements Associated with Corridor Preservation

[4] Three of the farms severed by the connection roads and interchanges are also severed by the trail that runs along the proposed roadway.

[5] Approximately 35% of right of way allocated to Old Plank Road Trail would be needed if WIS 23 were expanded without trail. See discussion Section 4.1

[6] Residential relocations for 4-Lane expansion also includes the relocation due to the relocation of the utility poles.

As mentioned, since the publication of the 2010 FEIS, the impacts have been updated as part of the normal design refinement process. Table 4.5-3 compares the impacts presented in the 2010 FEIS with the updated impacts obtained from the current design refinement. The impacts vary from what was presented in the 2010 FEIS because as design has progressed there is a greater understanding of the actual right of way needs. Many of these refinements involved access and right of way modifications that occurred during right of way negotiations and are described in Section 2.7 in this LS SDEIS. In most cases, the direct right of way impacts have been reduced. The number of relocations has increased, primarily because of property owners requesting relocation because of access changes.

Table 4.5-3 Preferred Alternative Environmental Cost Matrix

		UPDATED 2013 LS SDEIS Values		2010 FEIS Values (No Longer Current)	
Updated 2013 Values and Impact Categories	**UNIT**	**Build Alternatives Total**	**Preferred Corridor Preservation Measures**	Build Alternatives Total	Preferred Corridor Preservation Measures
Road Length	Miles	19.07	N/A	19.07	N/A
FOUR-LANE EXPANSION AND ACCESS PRESERVATION COST					
Design	Millions $	9.0	N/A	9.0	N/A
Real Estate [2]	Millions $	26.5	N/A	26.5	N/A
Utility	Millions $	5.4	N/A	5.4	N/A
Construction	Millions $	87.3		98.8	
SUBTOTAL	Millions $	**128.2**	**N/A**	139.7	N/A
FUTURE ACCESS PRESERVATION COST (Construction and Real Estate)					
System interchange Roadway Construct	Millions $	N/A	N/A	N/A	N/A
System interchange Real Estate	Millions $	N/A	N/A	N/A	N/A
CTH W Interchange with Connections	Millions $	N/A	9.8	N/A	9.8
CTH A Interchange with Connections	Millions $	N/A	8.6	N/A	8.6
Grade Separation Overpass (Sugarbush, Tower, Seven Hills, Hillview, Scenic View, County P)	Millions $	N/A	19.6	N/A	19.6
SUBTOTAL	Millions $	**N/A**	**38.0**	N/A	38.0
TOTAL COSTS[1]	Millions $	**128.2**	**38.0**	139.7	38.0
EIS IMPACTS					
Existing R/W Used	Acres	**486**	**20**	494	31
Total Land Converted to Highway R/W	Acres	**424**	**68**	423	72
Cropland Converted to Highway R/W	Acres	**225**	**39**	245	41
Residential Relocations	Number	**33**	**3**	24	4
Business Relocations (Not Including Farms)	Number	**8 Bldgs 10 Bus**	**2**	5	2
Farm Relocations (One or more farm buildings)	Number	**19**	**4**	16	1
Farms Severed	Number	**5**	**2**	7	2
Wetlands filled	Acres	**48.1**	**1.7**	43	2
Upland/Woodland Habitat Affected	Acres	**47.9**	**8.5**	72	11
Excess R/W Puchased	Acres	**158**	**N/A**	N/A	N/A
Floodplain Encroachment	yes/no	**YES**	**YES**	YES	YES
Threatened and Endangered Species	yes/no	**YES**	**YES**	YES	YES
Impacted Noise Receptors (2035)	Each	**47**	**3**	ND	ND
Potentially Contaminated Sites (Ph II)	Each	**27 (4)**	**0**	ND	ND
Historical Resources Nearby (Number Adversely Effected)	Number	**19(0)**	**0**	19(0)	N/A
Archaeological Resources	Number Phase II (III)	**4(1)**	**0**	5(1)	0

[1] All Costs are in Year of Expenditure dollars, 2015 for Preferred Build Alternative, 2030 for Improvements Associated with Corridor Preservation

[2] Approximately 35% of right of way allocated to Old Plank Road Trail would be needed if WIS 23 were expanded without trail. See discussion Section 4.1

Since the release of the 2010 FEIS WisDOT has been purchasing right of way and relocating businesses and households. In the rural portion of the WIS 23 corridor (east of Taft Road) right of way has been acquired from 57 parcels, 12 residences have been relocated, and 1 business has been relocated. In the urban section of the WIS 23 corridor (west of Taft Road), 9 residences have been relocated and 2 businesses have been relocated. Other than these relocations, no direct right of way has been purchased in the urban section because the right of way plat has not yet been completed.

The Environmental Evaluation Matrix summarizes the impacts of the alternatives according to different impact categories. This section contains revisions, clarifications, and updates to information presented in the 2010 FEIS. These changes include the following:

- The presentation order of the impact categories has been changed to coincide with the new Factor Sheets.
- The impacts have been updated to reflect design refinements that have been made since the Record Of Decision (ROD).

*Factor Sheets are a more condensed method for documenting the results of the NEPA process. They are generally used by WisDOT and FHWA in Environmental Assessments and Environmental Reports. The sheets were used in this EIS as part of a WisDOT pilot effort to streamline the environmental documentation process. Since the FEIS used the Factor Sheet format, it has been retained in this Limited Scope SDEIS, except for Section 5, which was significantly revised.

4.6 ENVIRONMENTAL EVALUATION MATRIX

ENVIRONMENTAL FACTORS	EFFECTS: ADVERSE	EFFECTS: BENEFIT	EFFECTS: NONE	NOT APPLICABLE	COMMENTS (Blackened-out cells in Not Applicable column require a check in at least one of the other columns).
A-1 General Economics					See Factor Sheet 4.6 A-1 for detailed evaluation.
Build Alternatives					
No-Build Alternative	☒	☐	☐	☐	The economic impact of the No-Build Alternative would primarily be noticed in the long term. Increased traffic would create more congestion on WIS 23 and result in less efficient movement of goods between economic centers. The No-Build Alternative would not accommodate farm equipment as well as the Build Alternatives.
Alternative 2	☐	☒	☐	☐	All Build Alternatives involve capacity expansion from 2 lanes to 4 lanes. One economic advantage of the proposed action is the travel time savings and improved safety because of reduced delays and congestion. The Build Alternatives would update WIS 23 to meet the standards for Corridors 2030 Connector routes and decrease the cost of moving goods and services between economic centers.
Alternative 3	☐	☒	☐	☐	
Preferred Build Alternative	☐	☒	☐	☐	The Preferred Build Alternative (Alternative 1) would have the same benefits as the 4-lane expansion associated with Alternatives 2 and 3. Connection roads and interchanges would reduce the conflict points created by at-grade intersections, which would improve safety and congestion. Also, the Old Plank Road Trail would provide a continuous trail from Sheboygan to Fond du Lac, which could create specialized tourist-oriented businesses along the corridor.
Alternative 1 (4-Lane Expansion)	☐	☒	☐	☐	
Connection Roads and Interchanges	☐	☒	☐	☐	
Old Plank Road Trail					

4.6 ENVIRONMENTAL EVALUATION MATRIX					
	EFFECTS				
ENVIRONMENTAL FACTORS	ADVERSE	BENEFIT	NONE	NOT APPLICABLE	COMMENTS (Blackened-out cells in Not Applicable column require a check in at least one of the other columns).
Corridor Preservation Alternatives					
WIS 23 Corridor					
No Corridor Preservation	☒	☐	☒	☐	The WIS 23 No Corridor Preservation Alternative would leave land unencumbered–maintaining property values and usages. Future transportation improvements could lead to greater business impacts.
Preferred WIS 23 Corridor Preservation	☒	☒	☐	☐	The Preferred WIS 23 Corridor Preservation Alternative could reduce the utility and value of land within the corridor preservation boundaries. Long-term benefits include easier implementation of future WIS 23 transportation improvements and reduced impacts on business properties.
US 151/WIS 23 Interchange					
Preferred No Corridor Preservation	☒	☒	☐	☐	The Preferred US 151/WIS 23 Interchange No Corridor Preservation Alternative would leave land unencumbered–maintaining property values and usages. Future transportation improvements could lead to much greater business impacts, particularly in the southeast interchange quadrant.
Option 23-1 Corridor Preservation	☒	☒	☐	☐	The US 151/WIS 23 Interchange Corridor Preservation Alternatives could reduce the utility and value of land within the corridor preservation boundaries. For Option 23-1, the effects would be primarily in the southeast interchange quadrant. For Option 23-2, they would be primarily in the northeast, northwest, and southwest quadrants. Long-term benefits include easier implementation of a future US 151/WIS 23 system interchange and reduced impacts on business properties.
Option 23-2 Corridor Preservation	☒	☒	☐	☐	
A-2 Economic Development and Business Impact					See Factor Sheet 4.6 A-2 for detailed evaluation.
Build Alternatives					
No-Build Alternative	☒	☐	☐	☐	Over time, increased congestion associated with the No-Build Alternative could adversely affect the local economy. Increased traffic would create more congestion on WIS 23 and result in less efficient movement of goods between economic centers. This could result in less economic investment in corridor communities.

4.6 ENVIRONMENTAL EVALUATION MATRIX

ENVIRONMENTAL FACTORS	EFFECTS: ADVERSE	EFFECTS: BENEFIT	EFFECTS: NONE	NOT APPLICABLE	COMMENTS (Blackened-out cells in Not Applicable column require a check in at least one of the other columns).
Alternative 2	☒	☒	☐	☐	All Build Alternatives involve capacity expansion from 2 lanes to 4 lanes. An economic advantage of the proposed action is the travel time savings and improved safety because of reduced delays and congestion. The Build Alternatives would update WIS 23 to standards for Corridors 2030 Connector routes and improve the efficiency of moving goods and services between economic centers. For Alternative 2 and Alternative 3, an adverse effect would occur from the relocation of 2 businesses, not including up to an additional 7 business relocations if connection roads and interchanges were incorporated with these alternatives. Up to 7 operating farms would need to be acquired, removing them from the farm business.
Alternative 3	☒	☒	☐	☐	
Preferred Build Alternative	☒	☒	☐	☐	The Preferred Build Alternative (Alternative 1) along with connection roads and interchanges would save travel time and improve safety. Improved transportation facilities improve the real and perceived access to corridor businesses. High quality transportation corridors also help attract business and industry to area communities. The Preferred Alternative would improve the efficiency of moving goods and services between economic centers. Adverse effects from the Preferred Build Alternative include the right of way required from business and farm operations. The 4-lane expansion, connection roads, and interchanges would require 10 individual business relocations in 8 business buildings. There would be 19 farm relocations required. Additionally, there are several utilities that border WIS 23 that would require relocation. These include overhead and underground power lines, overhead and underground telecommunications lines, and some natural gas and petroleum pipeline crossings. The majority of the utility relocations would occur within or directly adjacent to the roadway right of way. WisDOT would continue to coordinate with affected utilities through the design process.
Alternative 1 (4-Lane Expansion)	☒	☒	☐	☐	
Connection Roads and Interchanges	☒	☒	☐	☐	
Old Plank Road Trail					
Corridor Preservation Alternatives					
WIS 23 Corridor	☒	☐	☒	☐	The WIS 23 No Corridor Preservation Alternative would leave land unencumbered. Safety would deteriorate as traffic and congestion increase; however, no relocations would be required for this alternative.
No Corridor Preservation					
Preferred WIS 23 Corridor Preservation	☒	☒	☐	☐	The Preferred WIS 23 Corridor Preservation Alternative would ease the construction of future transportation improvements that improve the safety of WIS 23. These future improvements would concentrate access to the safest locations (benefit). When improvements associated with the Preferred WIS 23 Corridor Preservation Alternative are constructed in the future, an additional 2 business relocations and 4 farm relocations would be required.

4.6 ENVIRONMENTAL EVALUATION MATRIX					
	EFFECTS				
ENVIRONMENTAL FACTORS	ADVERSE	BENEFIT	NONE	NOT APPLICABLE	COMMENTS (Blackened-out cells in Not Applicable column require a check in at least one of the other columns).
US 151/WIS 23 Interchange					
Preferred No Corridor Preservation	☒	☐	☒	☐	The Preferred US 151/WIS 23 Interchange No Corridor Preservation Alternative would leave land unencumbered. The existing interchange is not as efficient as a high quality transportation connection.
Option 23-1 Corridor Preservation	☒	☒	☐	☐	The US 151/WIS 23 Interchange Corridor Preservation Alternatives would ease the future construction of system interchange improvements. These improvements, when implemented, would further improve corridor mobility and safety, reducing business transportation costs and providing a high quality transportation connection. The construction of improvements associated with the Option 23-1 Corridor Preservation Option would require the future relocation of 3 business buildings containing 5 individual businesses and would sever the Wisconsin American business park. In the near term, the Option 23-1 Corridor Preservation Option could also reduce the marketability of vacant parcels within the business park. The Option 23-2 Corridor Preservation Option would not require any future business relocations.
Option 23-2 Corridor Preservation	☐	☒	☐	☐	
A-3 Agricultural Impact					See Factor Sheet 4.6 A-3 for detailed evaluation and the project's Agricultural Impact Statement (AIS) in Appendix K of the 2010 FEIS.
Build Alternatives					
No-Build Alternative	☒	☒	☐	☐	Adverse effects include farm equipment having difficulty accessing field entrances, crossing the highway, and traveling adjacent to the highway. The high WIS 23 traffic volumes pose a hazard to the equipment, and the equipment can interfere with WIS 23 traffic. The No-Build alternative has the benefit of having no farm operations or agricultural land affected by the highway expansion. No farms are severed or farm operations relocated.
Alternative 2	☒	☒	☐	☐	Alternative 2's 4-lane expansion would create a wider cross section that better accommodates slow-moving farm equipment. The median would also provide a refuge so that some farm equipment can cross the roadway in two stages (benefit). The 4-lane expansion would require the relocation of about 7 farm operations and require the acquisition of about 169 acres of cropland for new highway right of way. This alternative may also sever about 5 farm operations.
Alternative 3	☒	☒	☐	☐	Alternative 3's 4-lane expansion would create a wider cross section that better accommodates slow-moving farm equipment. The median would also provide a refuge so that farm equipment can cross the roadway in two stages (benefit). The 4-lane expansion would require the relocation of 4 farm operations and the acquisition of about 296 acres of cropland for new highway right of way. This alternative may also sever about 28 farm operations.

4.6 ENVIRONMENTAL EVALUATION MATRIX

ENVIRONMENTAL FACTORS	EFFECTS: ADVERSE	EFFECTS: BENEFIT	EFFECTS: NONE	NOT APPLICABLE	COMMENTS (Blackened-out cells in Not Applicable column require a check in at least one of the other columns).
Preferred Build Alternative					
Alternative 1 (4-Lane Expansion)	☒	☒	☐	☐	The Preferred Build Alternative (Alternative 1) 4-lane expansion would create a wider cross section that better accommodates slow-moving farm equipment. The median would also provide a refuge so that farm equipment can cross the roadway in two stages (benefit). It would require the relocation of about 17 farm operations and the acquisition of about 92 acres of cropland for new highway right of way. The 4-lane expansion does not sever any farms. Additionally, utility relocations associated with the project may have a small effect on farm operations. It is anticipated the majority of these relocations would occur within or directly adjacent to the proposed right of way.
Connection Roads and Interchanges	☒	☒	☐	☐	Connection roads and interchanges associated with the Preferred Build Alternative would aid access to fields and in some cases provide a grade-separated crossing of WIS 23. They would require the relocation of 2 farm operations and the acquisition of an additional 81 acres of cropland for new highway right of way, and they would sever 5 farm operations.
Old Plank Road Trail	☒	☐	☐	☐	Old Plank Road Trail would require the acquisition of about 52 acres of cropland for right of way. Some of this would have been required without the Old Plank Road Trail. See discussion in Section 4.1. In total, the Preferred Build Alternative requires 19 farm relocations, severs 5 farms, and converts 225 acres of cropland to highway right of way.
Corridor Preservation Alternatives					
WIS 23 Corridor					
No Corridor Preservation	☒	☐	☒	☐	The WIS 23 No Corridor Preservation Alternative would leave land unencumbered. There would be no additional cropland required or farm relocations. However, future transportation improvements could create greater impacts to farm operations.
Preferred WIS 23 Corridor Preservation	☒	☒	☐	☐	The Preferred WIS 23 Corridor Preservation Alternative would reserve right of way for future grade separations and interchanges. When implemented, these grade separations would provide opportunities to travel across WIS 23 without crossing WIS 23 traffic (benefit). The grade separations would require the relocation of about 4 farm operations and the acquisition of about 39 acres of cropland for new highway right of way. These overpasses and interchanges would sever 2 farm operations.
US 151/WIS 23 Interchange					
Preferred No Corridor Preservation	☒	☐	☒	☐	The Preferred US 151/WIS 23 Interchange No Corridor Preservation Alternative would leave land unencumbered. If future system interchange improvements are ever implemented, they likely would have greater business impacts because future right of way would not be preserved.

4.6 ENVIRONMENTAL EVALUATION MATRIX

ENVIRONMENTAL FACTORS	EFFECTS: ADVERSE	EFFECTS: BENEFIT	EFFECTS: NONE	NOT APPLICABLE	COMMENTS (Blackened-out cells in Not Applicable column require a check in at least one of the other columns).
Option 23-1 Corridor Preservation	☒	☒	☐	☐	The US 151/WIS 23 Option 23-1 Corridor Preservation Option would preserve about 4 acres of farmland that would eventually be purchased for highway right of way. When implemented, the improvements associated with the Option 23-1 Corridor Preservation Option would sever 1 farm operation.
Option 23-2 Corridor Preservation	☒	☒	☐	☐	The US 151/WIS 23 Option 23-2 Corridor Preservation Option would preserve about 28 acres of farmland that would eventually be purchased for new highway right of way. When implemented, the improvements associated with the Option 23-2 Corridor Preservation Option would sever 1 farm operation.
B-1 Community or Residential					See Factor Sheet 4.6 B-1 for detailed evaluation.
Build Alternatives					
No-Build Alternative	☐	☐	☒	☐	No effect.
Alternative 2	☒	☒	☐	☐	Improvements to WIS 23 would make traveling on WIS 23 safer. WIS 23 serves as a roadway that allows people to drive to community facilities such as churches, commercial development, parks, and municipal buildings. The Build Alternatives would allow residents to continue to drive to community facilities. Access restrictions at some intersections on WIS 23 could increase indirection to some community facilities. The WIS 23 improvements would not divide any communities. Alternatives 2 and 3 would result in some adverse effects. Right of way acquisition would be required from residential and community properties and 17 to 20 residential relocations would be necessary.
Alternative 3	☒	☒	☐	☐	
Preferred Build Alternative					
Alternative 1 (4-Lane Expansion)	☒	☒	☐	☐	The Preferred Build Alternative (Alternative 1) would have similar benefits and adverse effects as Alternatives 2 and 3. Residential right of way acquisition would be necessary and the relocation of 33 households would be needed. About 21 households would be needed for the 4-lane expansion. Connection roads and interchanges would provide connectivity across and to the WIS 23 highway (benefit) yet would require about 12 residential relocations. The Old Plank Road Trail would provide a continuous trail from Sheboygan to Fond du Lac, which would enhance nonmotorized access but would also require right of way acquisition.
Connection Roads and Interchanges	☒	☒	☐	☐	
Old Plank Road Trail					
Corridor Preservation Alternatives					
WIS 23 Corridor					
No Corridor Preservation	☒	☐	☒	☐	The WIS 23 No Corridor Preservation Alternative would leave land unencumbered. No additional relocations would occur; however, future transportation improvements could lead to greater residential and community impacts.

4.6 ENVIRONMENTAL EVALUATION MATRIX

ENVIRONMENTAL FACTORS	EFFECTS: ADVERSE	BENEFIT	NONE	NOT APPLICABLE	COMMENTS (Blackened-out cells in Not Applicable column require a check in at least one of the other columns).
Preferred WIS 23 Corridor Preservation	☒	☒	☐	☐	The Preferred WIS 23 Corridor Preservation Alternative would allow the future construction of improvements that enhance roadway safety and provide connections across and to the WIS 23 highway (benefit). The Preferred WIS 23 Corridor Preservation would require right of way acquisition and the eventual relocation of about 3 households when improvements are fully implemented.
US 151/WIS 23 Interchange					
Preferred No Corridor Preservation	☒	☐	☒	☐	The Preferred US 151/WIS 23 Interchange No Corridor Preservation Alternative would leave land unencumbered. Future development could cause greater residential and community impacts.
Option 23-1 Corridor Preservation	☒	☒	☐	☐	The US 151/WIS 23 Interchange Corridor Preservation Alternatives would allow future construction of system interchanges that accommodate high traffic volumes safely and provide a high mobility connection. Both Corridor Preservation Options would reduce development options for private land and would require future right of way acquisition. The Option 23-1 Corridor Preservation option would eventually require the purchase of 5 homes and the relocation of associated households. The Option 23-2 Corridor Preservation option does not require the purchase of any homes.
Option 23-2 Corridor Preservation	☐	☒	☐	☐	
B-2 Indirect Effects					See Section 4.4 and Appendix C for more information.
Build Alternatives					
No-Build Alternative	☒	☒	☐	☐	The Build Alternatives are likely to increase the pace of population growth and development in the study area. The result could be an increased pace of incremental loss of agricultural land and other natural areas in the study area, particularly surrounding the cities of Fond du Lac and Plymouth. Tables 4.4-4 and 4.4-5 summarize some of the impact-causing activities associated with the No-Build and Preferred Build Alternatives and the corresponding indirect effect. The tables also summarize influencing factors that support and discourage those changes.
Alternative 2	☒	☒	☐	☐	
Alternative 3	☒	☒	☐	☐	
Preferred Build Alternative					
Alternative 1 (4-Lane Expansion)	☒	☒	☐	☐	
Connection Roads and Interchanges	☒	☒	☐	☐	
Old Plank Road Trail	☒	☒	☐	☐	
Corridor Preservation Alternatives					
WIS 23 Corridor					
No Corridor Preservation	☒	☒	☐	☐	
Preferred WIS 23 Corridor Preservation	☒	☒	☐	☐	

4.6 ENVIRONMENTAL EVALUATION MATRIX					
	EFFECTS				
ENVIRONMENTAL FACTORS	ADVERSE	BENEFIT	NONE	NOT APPLICABLE	COMMENTS (Blackened-out cells in Not Applicable column require a check in at least one of the other columns).
US 151/WIS 23 Interchange					
Preferred No Corridor Preservation	☒	☒	☐	☐	
Option 23-1 Corridor Preservation	☒	☒	☐	☐	
Option 23-2 Corridor Preservation	☒	☒	☐	☐	
B-3 Cumulative Effects					See Section 4.4 for more information.
Build Alternatives					The estimated magnitude and significance of cumulative effects are described in Appendix C including: ▪ The status or condition of the resource from 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. The WIS 23 Preferred Alternative's main contribution to cumulative adverse effects include the conversion of farmland to right of way, which augments other development activities that are converting farmland to other uses. Other contributions to cumulative impacts include the conversion of uplands and wetlands to right of way, water quality effects, and some air quality effects. Improved mobility from WIS 23 could indirectly increase the pace of resident development in the Niagara Escarpment (and indirect effect), which would create a cumulative impact to the uplands including those of the escarpment.
No-Build Alternative	☐	☐	☒	☐	
Alternative 2	☒	☐	☐	☐	
Alternative 3	☒	☐	☐	☐	
Preferred Build Alternative					
Alternative 1 (4-Lane Expansion)	☒	☐	☐	☐	
Connection Roads and Interchanges	☒	☐	☐	☐	
Old Plank Road Trail	☒	☐	☐	☐	
Corridor Preservation Alternatives					
WIS 23 Corridor					
No Corridor Preservation	☒	☐	☐	☐	
Preferred WIS 23 Corridor Preservation	☒	☐	☐	☐	
US 151/WIS 23 Interchange					
Preferred No Corridor Preservation	☒	☐	☐	☐	
Option 23-1 Corridor Preservation	☒	☐	☐	☐	
Option 23-2 Corridor Preservation	☒	☐	☐	☐	

4.6 ENVIRONMENTAL EVALUATION MATRIX

ENVIRONMENTAL FACTORS	EFFECTS: ADVERSE	EFFECTS: BENEFIT	EFFECTS: NONE	NOT APPLICABLE	COMMENTS (Blackened-out cells in Not Applicable column require a check in at least one of the other columns).
B-4 Environmental Justice					WisDOT collected and analyzed information on the race, color, national origin, and income level of persons located within the project area by checking 2010 census information and contacting the County Human Services. As depicted in Figure 3.6-1, concentrations of Environmental Justice populations are located at the east and west ends of the corridor around the cities of Fond du Lac and Plymouth.
Build Alternatives					
No-Build Alternative	☐	☐	☒	☐	The No-Build will not affect low income or minority populations.
Alternative 2	☐	☐	☒	☐	
Alternative 3	☐	☐	☒	☐	Alternatives 2 and 3 will not affect low income and minority populations.
Preferred Build Alternative					
Alternative 1 (4-Lane Expansion)	☐	☐	☒	☐	Disproportionate adverse impacts to minority groups or low-income communities are not anticipated as a result of Alternative 1 and the Old Plank Road Trail. The Connection Roads and Interchanges portion of the Preferred Alternative would relocate one access that could serve environmental justice populations. A manufactured home community near Greenbush would have its access to WIS 23 changed, increasing indirection by up to 1.1 miles. No other impacts would occur to residents within the subdivision.
Connection Roads and Interchanges	☒	☐	☐	☐	
Old Plank Road Trail	☐	☐	☒	☐	
Corridor Preservation Alternatives					The public involvement process was inclusive of all residents and population groups in the study area and did not exclude any persons because of income, race, color, religion, national origin, sex, age or handicap.
WIS 23 Corridor					
No Corridor Preservation	☐	☐	☒	☐	
Preferred WIS 23 Corridor Preservation	☐	☐	☒	☐	Corridor Preservation Alternatives would not affect low income and minority populations within the corridor. There are no known low income or minority populations in the areas being preserved for overpasses, interchanges, or access removals.
US 151/WIS 23 Interchange					
Preferred No Corridor Preservation	☐	☐	☒	☐	
Option 23-1 Corridor Preservation	☐	☐	☒	☐	
Option 23-2 Corridor Preservation	☐	☐	☒	☐	

4.6 ENVIRONMENTAL EVALUATION MATRIX

ENVIRONMENTAL FACTORS	EFFECTS: ADVERSE	BENEFIT	NONE	NOT APPLICABLE	COMMENTS (Blackened-out cells in Not Applicable column require a check in at least one of the other columns).
B-5 Historic Resources					See Factor Sheet 4.6 B-5 for detailed evaluation.
Build Alternatives					
No-Build Alternative	☐	☐	☐	☒	No effects.
Alternative 2	☐	☐	☒	☐	Based on updated 2006 evaluation, there were 7 potential historic sites in Alternative 2 with 1 of these sites currently listed on the National Register of Historic Places.
Alternative 3	☐	☐	☒	☐	Based on updated 2006 evaluation, there were 3 potential historic sites on Alternative 3 with 1 site currently on the NHRP and 2 sites eligible for the NRHP.
Preferred Build Alternative					
Alternative 1 (4-Lane Expansion)	☐	☐	☒	☐	There were 19 potential historic sites on the 4-lane expansion associated with the Preferred Build Alternative (Alternative 1). There were another 2 sites associated with the connection roads and interchange. One site is already on the NRHP and 2 sites are eligible for the NRHP. After refinement of the highway design, only 1 of the NRHP eligible sites was affected by the proposed expansion (St. Mary's Springs Academy). A Memorandum of Agreement (MOA) regarding this site was provided in the 2010 FEIS. In 2005, St. Mary's Springs removed two of the contributing resources to the historic complex. This resulted in a revision to the historic boundary in 2012. The WIS 23 project no longer has an adverse effect on the complex with the revised historic boundary. SHPO signed a new Determination of Eligibility with the revised historic boundary on December 6, 2012. A revised MOA was signed on March 19, 2013. See the discussion of Historic Resources in Section 4.6 B-5, and Appendix D.
Connection Roads and Interchanges	☐	☐	☐	☒	No effects.
Old Plank Road Trail	☐	☐	☒	☐	Old Plank Road Trail requires additional right of way acquisition from St. Mary's Springs Academy since the trail is located north of WIS 23 at this location. The trail will be located outside the historic boundary of the complex, and there is no effect. The trail will also require right of way from the Old Wade House State Park. No adverse effect would occur to structures within the park that are on the NRHP. The impacts associated with the trail were included in the 106 process. See the discussion of Historic Resources in Section 4.6 B-5.
Corridor Preservation Alternatives					
WIS 23 Corridor					
No Corridor Preservation	☐	☐	☐	☒	No effects.
Preferred WIS 23 Corridor Preservation	☐	☐	☐	☒	No effects.

4.6 ENVIRONMENTAL EVALUATION MATRIX					
	EFFECTS				
ENVIRONMENTAL FACTORS	ADVERSE	BENEFIT	NONE	NOT APPLICABLE	COMMENTS (Blackened-out cells in Not Applicable column require a check in at least one of the other columns).
US 151/WIS 23 Interchange	☐	☐	☐	☒	No effects.
Preferred No Corridor Preservation					
Option 23-1 Corridor Preservation	☐	☐	☐	☒	The US 151/WIS 23 Interchange Corridor Preservation Options would not affect any historic resources eligible for the NRHP.
Option 23-2 Corridor Preservation	☐	☐	☐	☒	
B-6 Archaeological Sites					See Factor Sheet 4.6 B-6 for detailed evaluation.
Build Alternatives					
No-Build Alternative	☐	☐	☒	☒	No effects.
Alternative 2	☒	☐	☐	☐	There are 9 archaeological sites potentially affected that may be eligible for the NRHP.
Alternative 3	☒	☐	☐	☐	There are 12 archaeological sites potentially affected that may be eligible for the NRHP.
Preferred Build Alternative					
Alternative 1 (4-Lane Expansion)	☒	☐	☐	☐	Four sites were identified as potentially affected and potentially eligible for the NRHP. After evaluation, 3 sites were avoided. The remaining 1 site was determined to be eligible for the NRHP (Sippel Site) and a Phase II and Data Recovery Plan have been completed. Four-lane expansion (Alternative 1) would disturb 100 percent of this site. An MOA between FHWA, WisDOT, SHPO, and other interested parties has been signed and is included in Section 4.6 B-6. Section 106 coordination is complete. Impacts to the Sippel Site qualify for an exception to Section 4(f) approval. 23 CFR 774.13(b) states that an archaeological site can be excepted from Section 4(f) approval when the resource has minimal value for preservation in place and the SHPO does not object to this finding.
Connection Roads and Interchanges	☐	☐	☒	☒	No effects.
Old Plank Road Trail	☐	☐	☒	☒	No effects.

4.6 ENVIRONMENTAL EVALUATION MATRIX					
	EFFECTS				
ENVIRONMENTAL FACTORS	ADVERSE	BENEFIT	NONE	NOT APPLICABLE	COMMENTS (Blackened-out cells in Not Applicable column require a check in at least one of the other columns).
Corridor Preservation Alternatives					
WIS 23 Corridor					
No Corridor Preservation	☐	☐	☒	☒	No effects.
Preferred WIS 23 Corridor Preservation	☐	☐	☒	☒	No effects.
US 151/WIS 23 Interchange					
Preferred No Corridor Preservation	☐	☐	☒	☒	No effects.
Option 23-1 Corridor Preservation	☐	☐	☒	☒	No effects.
Option 23-2 Corridor Preservation	☐	☐	☒	☒	No effects.
B-7 Tribal Issues					
Build Alternatives					
No-Build Alternative	☐	☐	☒	☐	Letters about the project were sent to 16 tribes asking if they would like to be a consulting party or have any concerns with the project. Two tribes, the Menominee Indian Tribe and the Iowa Tribe of Oklahoma, replied that they would like to be a consulting party. These tribes were sent additional information including the final Section 106 documentation. No issues have been noted by any of the tribes.
Alternative 2	☐	☐	☒	☐	
Alternative 3	☐	☐	☒	☐	
Preferred Build Alternative					
Alternative 1 (4-Lane Expansion)	☐	☐	☒	☐	
Connection Roads and Interchanges	☐	☐	☒	☐	
Old Plank Road Trail	☐	☐	☒	☐	
Corridor Preservation Alternatives					
WIS 23 Corridor					
No Corridor Preservation	☐	☐	☒	☐	
Preferred WIS 23 Corridor Preservation	☐	☐	☒	☐	
US 151/WIS 23 Interchange					
Preferred No Corridor Preservation	☐	☐	☒	☐	
Option 23-1 Corridor Preservation	☐	☐	☒	☐	
Option 23-2 Corridor Preservation	☐	☐	☒	☐	

4.6 ENVIRONMENTAL EVALUATION MATRIX

ENVIRONMENTAL FACTORS	EFFECTS: ADVERSE	EFFECTS: BENEFIT	EFFECTS: NONE	NOT APPLICABLE	COMMENTS (Blackened-out cells in Not Applicable column require a check in at least one of the other columns).
B-8 Section 4(f) and 6(f) or Other Unique Area					The information pertaining to Section 4(f) and Section 6(f) resources has been moved and consolidated in Section 5 of this LS SDEIS. The following sentences briefly identify corridor Section 4(f) resources as well as other types of unique properties.
No-Build Alternative	☐	☐	☒	☐	No effects.
All Build Alternatives affect the following properties:	☒	☒	☐	☐	There are four Section 4(f) properties that are potentially affected by the Preferred Build Alternative: • The Northern Unit of the Kettle Moraine State Forest is a 4(f)/6(f) property, which incorporates the Ice Age Trail (IAT) and State Equestrian Trail near the WIS 23 corridor. The WIS 23 Preferred Alternative will have an effect on this property which is described in Section 5.3 and Section 5.7 of this LS SDEIS. • The Old Wade House State Park is a 4(f) property and will be affected by the WIS 23 Preferred Alternative. Section 5.4 of this LS SDEIS describes impacts to this resource. • The St. Mary's Springs Academy is eligible for the NRHP and a Section 4(f) property. Because of recent revisions in the historic boundary for the property, the WIS 23 Preferred Alternative will not have a Section 4(f) use of the property. This property is described in Section 5.5 of this LS SDEIS. • The Sippel Archaeological Site is eligible for the NRHP. This site qualifies for an exception for Section 4(f) approval. 23 CFR 774.13(b) states that an archaeological site can be excepted from Section 4(f) approval when the resource has minimal value for preservation in place and the SHPO does not object to this finding. More information is provided in Section 5.6 of this LS SDEIS.
Preferred Build Alternative					
Alternative 1 (4-Lane Expansion)	☒	☒	☐	☐	
Connection Roads and Interchanges	☐	☐	☐	☒	
Old Plank Road Trail	☒	☒	☐	☐	
Corridor Preservation Alternatives					
WIS 23 Corridor					
No Corridor Preservation	☐	☐	☒	☐	
Preferred WIS 23 Corridor Preservation	☐	☐	☒	☐	
US 151/WIS 23 Interchange					
Preferred No Corridor Preservation	☐	☐	☒	☐	
Option 23-1 Corridor Preservation	☐	☐	☒	☐	The Old Plank Road Trail is not considered a Section 4(f) property according to 23 CFR 774.13(f). Trail continuity will be maintained.
Option 23-2 Corridor Preservation	☒	☐	☐	☐	The Taycheedah Creek Mitigation Site in the southwest quadrant of the existing US 151 and WIS 23 interchange was created as part of the US 151 bypass project. This is not a 4(f) property, but it is a covenanted property with special restrictions. The US 151/WIS 23 Interchange Corridor Preservation Option 23-2 would encompass a portion of this area and impact it when constructed. See Section 4.6 B-8 for additional information on this site. The Pit Road Wetland Mitigation site in the northwest quadrant of the existing Pit Road and WIS 23 intersection was created in the late 1980s as part of the improvements made to WIS 23. This is not a 4(f) property, but it is a covenanted property with special restrictions. The Preferred Build Alternative would not impact this area. See Section 4.6 B-8 for additional information on this site.

4.6 ENVIRONMENTAL EVALUATION MATRIX					
	EFFECTS				
ENVIRONMENTAL FACTORS	ADVERSE	BENEFIT	NONE	NOT APPLICABLE	COMMENTS (Blackened-out cells in Not Applicable column require a check in at least one of the other columns).
B-9 Aesthetics					See Factor Sheet 4.6 B-9 for detailed evaluation.
Build Alternatives					
No-Build Alternative	☐	☐	☒	☐	No change.
Alternative 2	☒	☐	☐	☐	The 4-lane expansion associated with Alternative 2 would increase the width of highway right of way approximately 125 feet when on the existing alignment. This would diminish the visual character of the area and countryside. Alignment 2 travels off the existing alignment for about 4 miles and would clear a corridor about 300 feet wide. This area is minimally disturbed and consists primarily of agricultural fields. This alignment would create agricultural viewsheds for travelers of the highway, but it could diminish visual quality for residents adjacent to the new highway facility.
Alternative 3	☒	☐	☐	☐	Some of the visual impacts would occur on the existing alignment where the width of the highway right of way would increase approximately 125 feet. This would diminish the visual character of the existing corridor and countryside. Alternative 3 would disturb the greatest amount of farmland and countryside of the Build Alternatives as it travels off-alignment for up to 8 miles clearing a corridor 300 feet wide. This off-alignment area is minimally disturbed and consists primarily of agricultural fields. This would create agricultural viewsheds for travelers of the highway, but it would diminish the visual quality for residents adjacent to the new highway.
Preferred Build Alternative Alternative 1 (4-Lane Expansion)	☒	☐	☐	☐	The Preferred Build Alternative 4-lane expansion (Alternative 1) would increase the width of highway right of way approximately 125 feet. The increased highway width would diminish the visual character of the area and countryside. The view of the roadway corridor would become more pronounced for residents adjacent to the current roadway.
Connection Roads and Interchanges	☒	☐	☐	☐	Connection roads and interchanges could diminish the visual quality of the area. The grade-separated roadways would have the side road raised to cross over WIS 23. This would block views for both travelers on the highway and residents located near the grade-separated crossings.
Old Plank Road Trail	☐	☐	☒	☐	Old Plank Road Trail does not currently exist along much of the corridor. Trail users would have rural views to one side and views of a 4-lane expanded highway to the other side. The trail would increase the width of the transportation corridor, yet it probably would not reduce the visual quality for adjacent residents.

4.6 ENVIRONMENTAL EVALUATION MATRIX					
	EFFECTS				
ENVIRONMENTAL FACTORS	ADVERSE	BENEFIT	NONE	NOT APPLICABLE	COMMENTS (Blackened-out cells in Not Applicable column require a check in at least one of the other columns).
Corridor Preservation Alternatives					
WIS 23 Corridor					
No Corridor Preservation	☐	☐	☒	☐	No change.
Preferred WIS 23 Corridor Preservation	☐	☐	☒	☐	The Preferred WIS 23 Corridor Preservation Alternative in itself would not affect the visual quality of the area. Improvements associated with the corridor preservation, if implemented, would diminish the visual character in a similar fashion to the Preferred Build Alternative's interchanges. The grade-separated roadways would raise the side roads over WIS 23. This would block rural views for both travelers on the highway and residents located near the grade-separated crossings.
US 151/WIS 23 Interchange					
Preferred No Corridor Preservation	☐	☐	☒	☐	No change.
Option 23-1 Corridor Preservation	☐	☐	☒	☐	The US 151/WIS 23 Interchange Corridor Preservation Options in themselves would not degrade the visual quality of the corridor. If constructed, the improvements associated with the corridor preservation would raise the US 151/WIS 23 connection above the existing roadway and therefore would block views from adjacent land uses, which are primarily commercial. Option 23-1 is a two-level interchange, yet it travels through a business park. Parcels on one side of the free-flowing ramps would not be visible to parcels on the other side of the free-flowing ramp. Option 23-2 would be a three-level interchange that would be a prominent feature in the surrounding area as it would be at least 50 feet higher than the adjacent ground. While these options would not split the business park in the southeast quadrant, land uses in each quadrant of the interchange would not be able to see land uses in other quadrants.
Option 23-2 Corridor Preservation	☐	☐	☒	☐	
C-1 Wetlands					See Factor Sheet 4.6 C-1 for detailed evaluation.
Build Alternatives					
No-Build Alternative	☐	☐	☒	☐	No effect.
Alternative 2	☒	☐	☐	☐	About 60 wetland sites were identified within the 4-lane expansion corridor for Alternative 2. There are about 99.5 acres of wetlands within the Alternative 2 corridor, with 37.9 acres likely to be filled. If interchanges, connection roads, and the Old Plank Road Trail extension were constructed with Alternative 2, additional wetland acreage would be filled.
Alternative 3	☒	☐	☐	☐	About 46 wetland sites were identified within the 4-lane expansion corridor for Alternative 3, totaling 115.8 acres. About 59.5 acres of these wetlands are likely to be filled. If interchanges, connection roads, and the Old Plank Road Trail extension were constructed with Alternative 3, additional wetland acreage would be filled.

4.6 ENVIRONMENTAL EVALUATION MATRIX

ENVIRONMENTAL FACTORS	EFFECTS: ADVERSE	EFFECTS: BENEFIT	EFFECTS: NONE	NOT APPLICABLE	COMMENTS (Blackened-out cells in Not Applicable column require a check in at least one of the other columns).
Preferred Build Alternative					A permit from the USACE under Section 404 of the Clean Water Act will be required for the Preferred Build Alternative. The actual permit status will determined through coordination with the USACE. Any fill associated with crossings of the rivers would be included in the application for the permit for the entire project. A water quality certification from the WDNR would also be necessary to comply with Section 401 of the Clean Water Act.
Alternative 1 (4-Lane Expansion)	☒	☐	☐	☐	The Preferred Build Alternative 4-lane expansion (Alternative 1) would affect about 69 wetland sites and would fill 37.1 acres of wetlands.
Connection Roads and Interchanges	☒	☐	☐	☐	Connection roads and interchanges would disturb about 0.8 acres of wetlands, and the Old Plank Road Trail would disturb about 10.2 acres of wetlands for a total of 48.1 acres of wetlands filled.
Old Plank Road Trail	☒	☐	☐	☐	
Corridor Preservation Alternatives					Utility relocations associated with the project may have a small effect on wetlands. It is anticipated that the majority of these relocations would occur within or directly adjacent to the proposed right of way. Most of the impacts are associated primarily with pole relocations but may also include conduit placement. These impacts are reasonably represented by acreages depicted above. More information would become available during the design phase.
WIS 23 Corridor					
No Corridor Preservation	☐	☐	☒	☐	The WIS 23 No Corridor Preservation Alternative would not affect any wetlands.
Preferred WIS 23 Corridor Preservation	☐	☐	☒	☐	The Preferred WIS 23 Corridor Preservation Alternative would preserve future right of way in areas containing about 1.7 acres of wetlands. The improvements associated with the Corridor Preservation, if implemented, would likely result in the filling of these wetlands.
US 151/WIS 23 Interchange					
Preferred No Corridor Preservation	☐	☐	☒	☐	The Preferred US 151/WIS 23 Interchange No Corridor Preservation Alternative would not affect any wetlands.
Option 23-1 Corridor Preservation	☐	☐	☒	☐	With the US 151/WIS23 Interchange Corridor Preservation Options, Option 23-1 would preserve future right of way that contains about 12.1 acres of wetlands, primarily in the southeast quadrant. The Option 23-2 Corridor Preservation would protect future right of way that contains about 7.6 acres of wetlands, of which 1.6 acres are part of the Taycheedah Creek wetland mitigation bank. When constructed, the ramps associated with the Option 23-2 would bridge the wetlands in this bank.
Option 23-2 Corridor Preservation	☐	☐	☒	☐	

4.6 ENVIRONMENTAL EVALUATION MATRIX					
	EFFECTS				
ENVIRONMENTAL FACTORS	ADVERSE	BENEFIT	NONE	NOT APPLICABLE	COMMENTS (Blackened-out cells in Not Applicable column require a check in at least one of the other columns).
C-2 Rivers, Streams & Floodplains					See Factor Sheet 4.6 C-2 for detailed evaluation.
Build Alternatives					
No-Build Alternative	☐	☐	☒	☐	No effect.
Alternative 2	☒	☐	☐	☐	The 4-lane expansion associated with Alternative 2 would require additional bridge crossings at the Sheboygan River for the new set of lanes. Also, new box culvert crossings would be required north of the existing WIS 23 box culvert at the Mullet River and a new culvert at an unnamed tributary to the Sheboygan River.
Alternative 3	☒	☐	☐	☐	The 4-lane expansion associated with Alternative 3 would require two new bridge crossings of the Sheboygan River, south of existing WIS 23. Alternative 3 would also require an extension of the Mullet River culvert and a new box culvert for an unnamed tributary to the Sheboygan River north of the existing WIS 23 box culvert.
Preferred Build Alternative					
Alternative 1 (4-Lane Expansion)	☒	☐	☐	☐	The Preferred Build Alternative (Alternative 1) would require an additional bridge crossing of the Sheboygan River and a box culvert extension at the Mullet River. It will also require 2 new culvert pipes at an unnamed tributary to the Sheboygan River.
Connection Roads and Interchanges	☐	☐	☒	☐	There are no crossings associated with the Preferred Build Alternative's connection roads and interchanges.
Old Plank Road Trail	☒	☐	☐	☐	Old Plank Road Trail would require a crossing of the Sheboygan River, the Mullet River, and an unnamed tributary to the Sheboygan River. There will be increased backwater effects within the right of way at the Sheboygan River crossing, see Factor sheet 4.6 C-2 for more details.
Corridor Preservation Alternatives					
WIS 23 Corridor					
No Corridor Preservation	☐	☐	☒	☐	The WIS 23 No Corridor Preservation Alternative would not have an effect on streams and floodplains.
Preferred WIS 23 Corridor Preservation	☐	☐	☒	☐	There are no crossings associated with the Preferred WIS 23 Corridor Preservation Alternative.
US 151/WIS 23 Interchange					
Preferred No Corridor Preservation	☐	☐	☒	☐	The Preferred US 151/WIS 23 Interchange No Corridor Preservation Alternative would not affect any streams and floodplains.

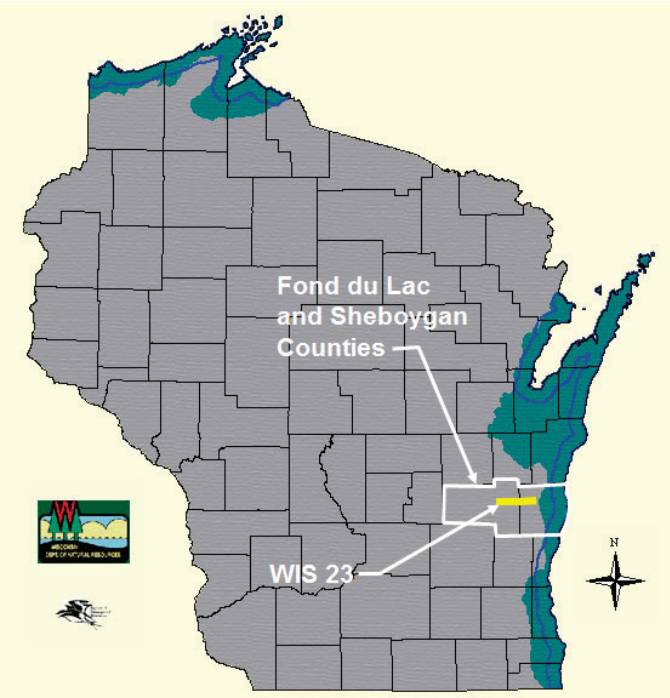
4.6 ENVIRONMENTAL EVALUATION MATRIX					
	EFFECTS				
ENVIRONMENTAL FACTORS	ADVERSE	BENEFIT	NONE	NOT APPLICABLE	COMMENTS (Blackened-out cells in Not Applicable column require a check in at least one of the other columns).
Option 23-1 Corridor Preservation	☐	☐	☒	☐	The Option 23-1 and Option 23-2 Corridor Preservation Options would encompass part of Taycheedah Creek. Initially no impacts would occur. If constructed, the improvements associated with these Corridor Preservation Options would require bridged crossings of Taycheedah Creek.
Option 23-2 Corridor Preservation	☐	☐	☒	☐	
C-3 Lakes or Other Open Water					There is no further need for detailed evaluation.
Build Alternatives					
No-Build Alternative	☐	☐	☐	☒	There are no lakes or open water resources directly affected by any of the alternatives considered.
Alternative 2	☐	☐	☐	☒	
Alternative 3	☐	☐	☐	☒	
Preferred Build Alternative					
Alternative 1 (4-Lane Expansion)	☐	☐	☐	☒	
Connection Roads and Interchanges	☐	☐	☐	☒	
Old Plank Road Trail	☐	☐	☐	☒	
Corridor Preservation Alternatives					
WIS 23 Corridor					
No Corridor Preservation	☐	☐	☐	☒	
Preferred WIS 23 Corridor Preservation	☐	☐	☐	☒	
US 151/WIS 23 Interchange					
Preferred No Corridor Preservation	☐	☐	☐	☒	
Option 23-1 Corridor Preservation	☐	☐	☐	☒	
Option 23-2 Corridor Preservation	☐	☐	☐	☒	
C-4 Groundwater, Wells and Springs					
Build Alternatives					
No-Build Alternative	☐	☐	☐	☒	There are no known potable wells or monitoring wells affected by any of the alternatives considered. There are no known spring recharge areas affected by the alternatives considered.
Alternative 2	☐	☐	☐	☒	
Alternative 3	☐	☐	☐	☒	
Preferred Build Alternative					The increased impervious surface area of the Build Alternatives will result in more stormwater runoff and a less even distribution and natural infiltration of precipitation along the project corridor. The additional paved area will reduce the extent and distribution of areas along the corridor where precipitation can infiltrate exposed soils and will increased stormwater runoff.
Alternative 1 (4-Lane Expansion)	☐	☐	☐	☒	
Connection Roads and Interchanges	☐	☐	☐	☒	

4.6 ENVIRONMENTAL EVALUATION MATRIX					
	EFFECTS				
ENVIRONMENTAL FACTORS	ADVERSE	BENEFIT	NONE	NOT APPLICABLE	COMMENTS (Blackened-out cells in Not Applicable column require a check in at least one of the other columns).
Old Plank Road Trail	☐	☐	☐	☒	The stormwater will be directed to grass swales and eventually conveyed to the groundwater table via infiltration, to wetlands, or to streams along the project corridor. At these stormwater management locations, the stormwater is treated and used to recharge groundwater replenish wetlands or stream base flow. This redistribution of precipitation is not expected to have any significant adverse or beneficial effects on spring recharge areas, aquifer recharge, or groundwater levels.
Corridor Preservation Alternatives					
WIS 23 Corridor					
No Corridor Preservation	☐	☐	☐	☒	
Preferred WIS 23 Corridor Preservation	☐	☐	☐	☒	
US 151/WIS 23 Interchange					
Preferred No Corridor Preservation	☐	☐	☐	☒	
Option 23-1 Corridor Preservation	☐	☐	☐	☒	
Option 23-2 Corridor Preservation	☐	☐	☐	☒	
C-5 Upland Habitat					See Factor Sheet 4.6 C-5 for detailed evaluation.
Build Alternatives					
No-Build Alternative	☐	☐	☒	☐	No effect.
Alternative 2	☒	☐	☐	☐	The 4-lane expansion associated with Alternative 2 would affect about 19 acres of uplands. Most impacts would be along the edges and borders of existing upland habitat areas.
Alternative 3	☒	☐	☐	☐	The 4-lane expansion associated with Alternative 3 would affect about 31 acres of uplands. Most impacts would be along the edges and borders of existing upland habitat areas, yet some of these upland impacts do occur as the alternative travels off the existing alignment.
Preferred Build Alternative					
Alternative 1 (4-Lane Expansion)	☒	☐	☐	☐	The Preferred Build Alternative 4-lane expansion (Alternative 1) would affect about 38.4 acres of uplands. Because the expansion is along the existing WIS 23 alignment, all impacts would be along the edges of existing upland habitat areas bordering the highway. Utility relocations associated with the project may affect some upland habitat. It is anticipated that the majority of these relocations would occur within or directly adjacent to the proposed right of way and are associated primarily with pole relocations and conduit placement.
Connection Roads and Interchanges	☒	☐	☐	☐	The Preferred Build Alternative's connection roads and interchanges would require the acquisition of about 2.2 acres of uplands. Impacts would be along the edges of existing upland habitat areas bordering the highway.

4.6 ENVIRONMENTAL EVALUATION MATRIX					
	EFFECTS				
ENVIRONMENTAL FACTORS	**ADVERSE**	**BENEFIT**	**NONE**	**NOT APPLICABLE**	**COMMENTS** **(Blackened-out cells in Not Applicable column require a check in at least one of the other columns).**
Old Plank Road Trail	☒	☐	☐	☐	Old Plank Road Trail would require the acquisition of approximately 7.3 acres of uplands. Because the trail borders the highway, impacts would be along the edges of existing upland habitat areas bordering the highway.
Corridor Preservation Alternatives					
WIS 23 Corridor					
No Corridor Preservation	☐	☐	☒	☐	The WIS 23 No Corridor Preservation Alternative would not have an effect on upland habitat.
Preferred WIS 23 Corridor Preservation	☐	☐	☒	☐	The Preferred WIS 23 Corridor Preservation Alternative would preserve 8.5 acres of uplands for the future construction of the connection roads, overpasses, and interchanges. Areas preserved would be along the edges of existing upland habitat areas bordering the highway. Initially no impacts would occur. Improvements associated with the corridor preservation, if constructed, would clear these uplands.
US 151/WIS 23 Interchange					
Preferred No Corridor Preservation	☐	☐	☒	☐	The Preferred US 151/WIS 23 Interchange No Corridor Preservation Alternative would not affect any upland habitat.
Option 23-1 Corridor Preservation	☐	☐	☒	☐	The US 151/WIS 23 Interchange Corridor Preservation Alternatives would preserve lands that contain upland habitat. Approximately 5.9 acres of uplands are contained in areas being preserved with Option 23-1, and approximately 0.1 acre of uplands is contained in areas being preserved by Option 23-2. Initially no impacts would occur. If improvements associated with these corridor preservation areas are constructed, impacts would be along the edges of existing upland habitat areas bordering the highway.
Option 23-2 Corridor Preservation	☐	☐	☒	☐	

4.6 ENVIRONMENTAL EVALUATION MATRIX

ENVIRONMENTAL FACTORS	EFFECTS: ADVERSE	BENEFIT	NONE	NOT APPLICABLE	COMMENTS (Blackened-out cells in Not Applicable column require a check in at least one of the other columns).
C-6 Coastal Zone					
Build Alternatives					The project's effects do not extend into or affect any of the Coastal Zone Management Areas of Special Concern.
No-Build Alternative	☐	☐	☐	☒	
Alternative 2	☐	☐	☐	☒	
Alternative 3	☐	☐	☐	☒	
Preferred Build Alternative					
Alternative 1 (4-Lane Expansion)	☐	☐	☐	☒	
Connection Roads and Interchanges	☐	☐	☐	☒	
Old Plank Road Trail	☐	☐	☐	☒	
Corridor Preservation Alternatives					
WIS 23 Corridor					
No Corridor Preservation	☐	☐	☐	☒	
Preferred WIS 23 Corridor Preservation	☐	☐	☐	☒	
US 151/WIS 23 Interchange					
Preferred No Corridor Preservation	☐	☐	☐	☒	
Option 23-1 Corridor Preservation	☐	☐	☐	☒	
Option 23-2 Corridor Preservation	☐	☐	☐	☒	There is no further need for detailed evaluation.
C-7 Threatened and Endangered Species					See Factor Sheet 4.6 C-7 for detailed evaluation.
Build Alternatives					Threatened, endangered, or special concern species within the corridor include 1 federally protected species and 20 state protected species in the project corridor. Communication with the WDNR transportation liaison indicates that the WDNR has no current concern, as of December 12, 2012, for 10 of the 20 state-listed species and the one federally listed species occurring in the WIS 23 corridor.
No-Build Alternative	☐	☐	☒	☐	
Alternative 2	☒	☐	☐	☐	
Alternative 3	☒	☐	☐	☐	
Preferred Build Alternative					No federally listed species will be affected by the project. State endangered species possibly affected by the project include rainbow shell mussel and the Midwest Pleistocene vertigo upland snail. State threatened species possibly affected by the project include snow trillium, Blanding's turtle, slippershell mussel, ellipse mussel, Cerulean warbler, Acadian flycatcher, hooded warbler, and red-shouldered
Alternative 1 (4-Lane Expansion)	☒	☐	☐	☐	
Connection Roads and Interchanges	☒	☐	☐	☐	



This graphic of the State of Wisconsin illustrates the Coastal Wetlands Project Study Area. Green-shaded areas are the Coastal Zone, and blue lines represent a 6-mile buffer from the coasts.

4.6 ENVIRONMENTAL EVALUATION MATRIX					
	EFFECTS				
ENVIRONMENTAL FACTORS	ADVERSE	BENEFIT	NONE	NOT APPLICABLE	COMMENTS (Blackened-out cells in Not Applicable column require a check in at least one of the other columns).
Old Plank Road Trail	☒	☐	☐	☐	hawk. Provisions will be made to minimize adverse effects to these species. See Section 4.6 C-7.
Corridor Preservation Alternatives					
WIS 23 Corridor	☒	☐	☐	☐	
No Corridor Preservation	☒	☐	☐	☐	
Preferred WIS 23 Corridor Preservation	☒	☐	☐	☐	
US 151/WIS 23 Interchange	☒	☐	☐	☐	
Preferred No Corridor Preservation	☒	☐	☐	☐	
Option 23-1 Corridor Preservation	☒	☐	☐	☐	
Option 23-2 Corridor Preservation	☒	☐	☐	☐	
D-1 Air Quality					See Factor Sheet 4.6 D-1 for detailed evaluation.
Build Alternatives					
No-Build Alternative	☐	☐	☒	☐	The proposed WIS 23 project is located in the Lake Michigan Intrastate Air Quality Control Region. These air quality regions monitor National Ambient Air Quality Standards (NAAQS) established by the USEPA under the authority of the Clean Air Act. Six pollutants are monitored under different period durations for a total of 12 National Ambient Air Quality Standards. The Clean Air Act requires federal highway projects conform to the purpose of the State Implementation Plan (SIP). Conformity to a SIP means that proposed projects will not cause or contribute to any new violations of NAAQS; increase the frequency or severity of NAAQS violations; or delay timely attainment of the NAAQS. Fond du Lac County is presently in attainment of all National Ambient Air Quality Standards (NAAQS). Sheboygan County was designated nonattainment for the 2008 Ozone Standard on April 30, 2012 (Federal Register / Vol. 77, No. 98 / Monday, May 21, 2012 Sheboygan County is also designated nonattainment for the 1997 Ozone standard, but that standard will be revoked effective July 20, 2013. The project is located outside of a Metropolitan Planning Organization's boundaries. As such, WisDOT is responsible for carrying out air quality conformity analyses for projects in these areas. WisDOT has agreed with the Sheboygan Metropolitan Planning Organization to include the WIS 23 project in its conformity analysis. The most recent plan conformity finding is February 27, 2013. Wisconsin Administrative Code NR 411 used to govern indirect sources of carbon monoxide by establishing a permitting process for highway and parking facilities. Proposed highway projects needed to qualify for an exemption or model the proposed carbon monoxide emissions and obtain a permit. Wisconsin Act 121 repealed the provisions of Wisconsin Administrative Code NR 411. WisDOT still uses the provisions of NR 411 in NEPA
Alternative 2	☐	☐	☒	☐	
Alternative 3	☐	☐	☒	☐	
Preferred Build Alternative					
Alternative 1 (4-Lane Expansion)	☐	☐	☒	☐	
Connection Roads and Interchanges	☐	☐	☒	☐	
Old Plank Road Trail	☐	☐	☒	☐	
Corridor Preservation Alternatives					
WIS 23 Corridor					
No Corridor Preservation	☐	☐	☒	☐	
Preferred WIS 23 Corridor Preservation	☐	☐	☒	☐	
US 151/WIS 23 Interchange					
Preferred No Corridor Preservation	☐	☐	☒	☐	

4.6 ENVIRONMENTAL EVALUATION MATRIX					
	EFFECTS				
ENVIRONMENTAL FACTORS	ADVERSE	BENEFIT	NONE	NOT APPLICABLE	COMMENTS (Blackened-out cells in Not Applicable column require a check in at least one of the other columns).
Option 23-1 Corridor Preservation	☐	☐	☒	☐	documentation to evaluate air quality impacts of a proposed action.
Option 23-2 Corridor Preservation	☐	☐	☒	☐	The WIS 23 expansion associated with the Preferred Build Alternative would have been exempt from indirect source permit requirements under NR 411 because it meets the following exceptions detailed under NR 411.04(2)(b): • A portion of the modified highway is located in Sheboygan County (a metropolitan county), and the increase in peak-hour volume is less than 1200 motor vehicles per hour for all segments. • The remaining portion of the modified highway located in Fond du Lac County (a nonmetropolitan county) and the increase in peak-hour volume is less than 1800 motor vehicles per hour for all segments. • Where there is a shift in intersection approach legs ° Roadway edge shifted toward any potential receptor location is 12 or more feet. ° The highway segment has no more than 2 approach lanes. ° Any potential receptor is located more than 25 feet from the nearest proposed roadway edge. ° The peak-hour volume on each approach is less than 1800 motor vehicles per hour for all segments The FHWA's Interim Guidance on MSAT (December 6, 2012) presents a tiered approach to analyzing MSAT in NEPA documents. Using that guidance, the proposed WIS 23 project is considered to have low potential MSAT effects, requiring a qualitative analysis. Examples of the types of projects considered to have low potential MSAT effects include minor widening projects, new interchanges, or projects where design year traffic is projected to be less than 140,000 to 150,000 AADT. Forecast WIS 23 traffic volumes range from 8,000 to 12,000 vpd, less than 10 percent of these values.
D-2 Construction Stage Sound Quality **Build Alternatives**					See Factor Sheet 4.6 D-2 for detailed evaluation.
No-Build Alternative	☐	☐	☒	☐	Variations in building setbacks, land use activity zones, local intensity of specific construction activities, and special temporal distribution would result in varying degrees of exposure to construction noise and therefore varying impacts. Adverse impacts resulting from construction noise are expected to be localized and temporary. WisDOT Standard Specifications 107.8(6) and 108.7.1 would apply
Alternative 2	☒	☐	☐	☐	
Alternative 3	☒	☐	☐	☐	
Preferred Build Alternative					
Alternative 1 (4-Lane Expansion)	☒	☐	☐	☐	

4.6 ENVIRONMENTAL EVALUATION MATRIX					
	EFFECTS				
ENVIRONMENTAL FACTORS	ADVERSE	BENEFIT	NONE	NOT APPLICABLE	COMMENTS (Blackened-out cells in Not Applicable column require a check in at least one of the other columns).
Connection Roads and Interchanges	☒	☐	☐	☐	
Old Plank Road Trail	☒	☐	☐	☐	
Corridor Preservation Alternatives					
WIS 23 Corridor					
No Corridor Preservation	☐	☐	☒	☐	The WIS 23 Corridor Preservation Alternative and the US 151/WIS 23 Interchange Corridor Preservation Options do not have construction stage sound impacts. When and if the improvements associated with these improvements are implemented, applicable measures from WisDOT Standard Specifications would apply.
Preferred WIS 23 Corridor Preservation	☐	☐	☒	☐	
US 151/WIS 23 Interchange					
Preferred No Corridor Preservation	☐	☐	☒	☐	
Option 23-1 Corridor Preservation	☐	☐	☒	☐	
Option 23-2 Corridor Preservation	☐	☐	☒	☐	
D-3 Traffic Noise					See Factor Sheet 4.6 D-3 for detailed evaluation.
Build Alternatives					
No-Build Alternative	☒	☐	☐	☐	No-Build–Approximately 109 receptors are in receiving range of existing highway noise, with 29 already experiencing noise levels approaching or exceeding the national criteria used to consider noise abatement measures. Under the No-Build Alternative, noise levels would continue and likely increase as traffic volumes increases.
Alternative 2	☒	☐	☐	☐	With the 4-lane expansion associated with Alternative 2–Approximately 116 receptors are in receiving range of existing highway noise, with 27 already experiencing noise levels approaching or exceeding the national criteria used to consider noise abatement measures. Under Alternative 2, 54 receptors would experience noise levels approaching or exceeding the national criteria, a net increase of 27 receptors.
Alternative 3	☒	☐	☐	☐	With the 4-lane expansion associated with Alternative 3–Approximately 122 receptors are in receiving range of existing highway noise, with 21 already experiencing noise levels approaching or exceeding the national criteria used to consider noise abatement measures. Under Alternative 3, 41 receptors would experience noise levels approaching or exceeding the national criteria, a net increase of 26 receptors.

4.6 ENVIRONMENTAL EVALUATION MATRIX

ENVIRONMENTAL FACTORS	EFFECTS: ADVERSE	BENEFIT	NONE	NOT APPLICABLE	COMMENTS (Blackened-out cells in Not Applicable column require a check in at least one of the other columns).
Preferred Build Alternative					
Alternative 1 (4-Lane Expansion)	☒	☐	☐	☐	The Preferred Build Alternative 4-lane expansion (Alternative 1)–Approximately 109 receptors are in receiving range of existing highway noise, with 29 already experiencing noise levels approaching or exceeding the national criteria used to consider noise abatement measures. Under Alternative 1, 47 receptors would experience noise levels approaching or exceeding the national criteria, a net increase of 18 receptors. Noise barriers are not reasonable along WIS 23 generally because of the rural nature of the corridor and the spacing between receptors. A letter with this noise analysis was sent to the jurisdictions informing them of these impacts and asking them to consider this in their land use plans.
Connection Roads and Interchanges	☐	☐	☒	☐	Connection roads and interchanges would not have an additional effect (not already considered) on receptors along the corridor.
Old Plank Road Trail	☐	☐	☒	☐	Old Plank Road Trail would not increase noise levels for receptors along the corridor.
Corridor Preservation Alternatives					
WIS 23 Corridor					
No Corridor Preservation	☐	☐	☒	☐	The WIS 23 No Corridor Preservation Alternative would not increase noise levels for households along the corridor.
Preferred WIS 23 Corridor Preservation	☐	☐	☒	☐	The Preferred WIS 23 Corridor Preservation Alternative would not increase noise levels for households along the corridor. When improvements associated with this corridor preservation are constructed, noise impacts would be evaluated at that time.
US 151/WIS 23 Interchange					
Preferred No Corridor Preservation	☐	☐	☒	☐	The Preferred US 151/WIS 23 Interchange No Corridor Preservation Alternative would not increase noise levels for households along the corridor beyond normal traffic noise impacts based on increasing volumes. Currently no houses experience noise levels approaching or exceeding the national criteria used to consider noise abatement measures.
Option 23-1 Corridor Preservation	☐	☐	☒	☐	The US 151/WIS 23 Interchange Corridor Preservation Option 23-1 in itself would not increase noise levels. Improvements associated with this corridor preservation would increase noise levels. Approximately 64 receptors are in receiving range of existing highway noise. With the construction of Option 23-1, 2 receptors would experience noise levels approaching or exceeding the national criteria.
Option 23-2 Corridor Preservation	☐	☐	☒	☐	The US 151/WIS 23 Interchange Corridor Preservation Option 23-2 in itself would not increase noise levels. Improvements associated with this corridor preservation option would increase noise levels. Approximately 65 receptors are in receiving range of existing highway noise. Under Option 23-2 Preservation, 2 households would experience noise levels approaching or exceeding the national criteria.

4.6 ENVIRONMENTAL EVALUATION MATRIX

ENVIRONMENTAL FACTORS	EFFECTS: ADVERSE	BENEFIT	NONE	NOT APPLICABLE	COMMENTS (Blackened-out cells in Not Applicable column require a check in at least one of the other columns).
D-4 Hazardous Substances or Contamination					See Factor Sheet 4.6 D-4 for detailed evaluation.
Build Alternatives					
No-Build Alternative	☐	☐	☐	☒	No effects.
Alternative 2	☒	☒	☐	☐	There are 12 aboveground storage tank (AST) sites along Alternative 2. There are 2 leaking underground storage tank (LUST) sites along Alternative 2. There are 2 underground storage tank (UST) sites along Alternative 2.
Alternative 3	☒	☒	☐	☐	There are 6 AST sites along Alternate 3. There is one LUST site on Alternative 3.
Preferred Build Alternative					
Alternative 1 (4-Lane Expansion)	☒	☒	☐	☐	An updated assessment indicates 27 sites along the existing roadway alignment. There are 13 AST sites (one is a AST/Junk site), 3 LUST/UST sites, 3 junk sites, 3 vehicle repair sites, 1 vacant site, and 4 UST sites along the Preferred Build Alternative. Phase 2 investigations have been performed. WisDOT is seeking to avoid the limits of contamination on contaminated parcels. If contamination cannot be avoided, WisDOT will work with concerned parties to ensure that the disposition of any petroleum contamination is resolved to the satisfaction of the WDNR, WisDOT BTS, and the FHWA before acquisition of, or proposed construction within questionable sites and before advertising the project for letting. More information is contained in Section 4.6 D-4.
Connection Roads and Interchanges	☐	☐	☒	☒	No additional effects.
Old Plank Road Trail	☐	☐	☒	☒	No additional effects.
Corridor Preservation Alternatives					
WIS 23 Corridor					
No Corridor Preservation	☐	☐	☐	☒	No effects.
Preferred WIS 23 Corridor Preservation	☐	☐	☒	☒	No additional effects.
US 151/WIS 23 Interchange					
Preferred No Corridor Preservation	☐	☐	☐	☒	No effects.
Option 23-1 Corridor Preservation	☐	☐	☒	☒	No additional effects.
Option 23-2 Corridor Preservation	☐	☐	☒	☒	No additional effects.

4.6 ENVIRONMENTAL EVALUATION MATRIX

ENVIRONMENTAL FACTORS	EFFECTS: ADVERSE	EFFECTS: BENEFIT	EFFECTS: NONE	NOT APPLICABLE	COMMENTS (Blackened-out cells in Not Applicable column require a check in at least one of the other columns).
D-5 Storm Water Management					See Factor Sheet 4.6 D-5 for detailed evaluation.
Build Alternatives					
No-Build Alternative	☐	☐	☐	☒	All Build Alternatives would increase the amount of impervious area and increase peak flow discharges. Stormwater management issues would be addressed by following TRANS 401 and the WisDOT/WDNR Cooperative Agreement during the design phase of the project. Stormwater provisions for the construction project would follow Wisconsin State Regulations and guidelines for highway projects and Postconstruction Standards outlined in TRANS 401.106.
Alternative 2	☒	☒	☐	☐	
Alternative 3	☒	☒	☐	☐	
Preferred Build Alternative					
Alternative 1 (4-Lane Expansion)	☒	☒	☐	☐	Other than to comply with the state stormwater management regulations that are in place at the time of construction, there are no additional commitments. Stormwater management measures will be accommodated within the proposed right of way. The following is a list of Best Management Practices (BMPs) the WisDOT typically incorporates into projects similar to the WIS 23 project.
Connection Roads and Interchanges	☒	☒	☐	☐	
Old Plank Road Trail	☒	☒	☐	☐	
Corridor Preservation Alternatives					
WIS 23 Corridor					Basic Principles and BMPs Limit disturbance of natural drainage features and vegetation. Prior to land disturbance, prepare and implement an approved erosion and sediment control plan. Protect areas that provide important water quality benefits and/or that are susceptible to erosion and sediment loss. Reduce direct discharge of highway runoff into streams and wetlands by having it flow through a filter strip or vegetated swale. Reduce runoff velocities by using weirs or other barriers to dissipate high velocities. Geometric Design Features/Stormwater Facilities Vegetated grass strips or grass swales adjacent to the highway could remove about 65 percent of suspended sediments. Infiltrated trenches that consist of shallow ditches backfilled with stone could remove about 75 percent of suspend sediments. Filtration basins and sand filters that are lined with filter media such as sand or gravel, depending on the design, could remove up to about 80 to 90 percent of suspended sediments. The WIS 23 Corridor Preservation Alternative and the US 151/WIS 23 Interchange Corridor Preservation Options do not affect stormwater. When and if the improvements associated with these improvements are implemented, the previous described measures would apply.
No Corridor Preservation	☐	☐	☒	☒	
Preferred WIS 23 Corridor Preservation	☐	☐	☒	☐	
US 151/WIS 23 Interchange					
Preferred No Corridor Preservation	☐	☐	☒	☒	
Option 23-1 Corridor Preservation	☐	☐	☒	☐	
Option 23-2 Corridor Preservation	☐	☐	☒	☐	

4.6 ENVIRONMENTAL EVALUATION MATRIX

ENVIRONMENTAL FACTORS	EFFECTS: ADVERSE	EFFECTS: BENEFIT	EFFECTS: NONE	NOT APPLICABLE	COMMENTS (Blackened-out cells in Not Applicable column require a check in at least one of the other columns).
D-6 Erosion Control					See Factor Sheet 4.6 D-6 for detailed evaluation.
Build Alternatives					
No-Build Alternative	☐	☐	☐	☒	The No-Build Alternative has no need for erosion control.
Alternative 2	☒	☐	☐	☐	Build Alternatives would require erosion control. To protect the drainage areas, streams, and rivers and to control construction site runoff, all Build Alternative construction documents would include detailed sedimentation and erosion control measures. The use of silt fences, turbidity barriers, sedimentation ponds, cofferdams, and the timely mulching and seeding or sodding of roadway slopes and other exposed areas would reduce runoff and siltation for all the build alternatives. An erosion control implementation plan would be prepared by the contractor and approved by WisDOT before the construction begins.
Alternative 3	☒	☐	☐	☐	
Preferred Build Alternative					
Alternative 1 (4-Lane Expansion)	☒	☐	☐	☐	
Connection Roads and Interchanges	☒	☐	☐	☐	
Old Plank Road Trail	☒	☐	☐	☐	During construction, erosion and sedimentation into adjacent surface waters would be minimized through the strict application of WisDOT's *Standard Specifications for Highway and Structure Construction.* Timely mulching and seeding or sodding of roadway slopes and other exposed areas would provide long-term erosion control. During construction, techniques such as silt fences, turbidity barriers, bale dikes, temporary interceptor ditches, ditch checks, ditch liners, and sediment ponds would be used where possible to minimize erosion. The use of a silt screen below the water level during construction operations in drainage areas might also be used to reduce off-site siltation. Unstable materials would be disposed of in upland areas, not in wetlands or waterways.
Corridor Preservation Alternatives					
WIS 23 Corridor					
No Corridor Preservation	☐	☐	☐	☒	
Preferred WIS 23 Corridor Preservation	☐	☐	☐	☒	
US 151/WIS 23 Interchange					Actual in-river construction for any bridge structure would stir up bottom sediment. Resuspension of the sediments would increase turbidity, release nutrients, and increase the oxygen demand on the river. This type of sedimentation is difficult to control and is an unavoidable impact of bridge construction. However, minimizing the use of in-river construction techniques and using cofferdams, silt screens, and turbidity barriers would reduce sedimentation.
Preferred No Corridor Preservation	☐	☐	☐	☒	
Option 23-1 Corridor Preservation	☐	☐	☐	☒	
Option 23-2 Corridor Preservation	☐	☐	☐	☒	Riprap would be placed along the waterline at bridge abutments as necessary to reduce damage caused by erosion or wave action. Use of a granular-type material for fill in the wetlands and adjacent to the streams would also be required as necessary to reduce potential siltation. The WIS 23 Corridor Preservation Alternative and the US 151/WIS 23 Interchange Corridor Preservation Options do not affect erosion. When and if the improvements associated with these improvements are implemented, the previous described measures would apply.