

# Methodology

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The Elgin O’Hare–West Bypass (EO-WB) study is being conducted pursuant to the National Environmental Policy Act (NEPA) regulations issued by the Council of Environmental Quality (CEQ), 40 Code of Federal Regulations (CFR) Part 1502.20, and FHWA 23 CFR Part 771.111. In accordance with 23 CFR Part 771.111, Federal Highway Administration (FHWA) and Illinois Department of Transportation (IDOT) agreed to conduct the EO-WB planning process in two parts, or tiers. The level of detail and the timeframes associated with this project must meet NEPA requirements for the two-step tiered process. This process allows a systems-level study that includes a macro level engineering and environmental analysis to be performed under Tier One, with traditional level of detail studies conducted as part of Tier Two project development.

Tier One will result in recommended multimodal transportation system alternative(s) at a conceptual level of detail. Tier Two studies will then be undertaken for individual parts of the Tier One system plan that have independent and operational utility. This appendix outlines the methods used for the Tier One resource analyses.

## Environmental Studies

Each of the customary resource issues pertaining to transportation system improvement projects were evaluated for existing conditions and potential impacts from the implementation of the build alternative(s). This appendix focuses on the following resource areas:

- Socioeconomics;
- Environmental justice;
- Water resources/Water quality;
- Wetlands;
- Floodplains;
- Biological resources;
- Threatened and endangered species;
- Public use lands - Section 4(f)/Section 6(f)/106 Considerations;
- Air quality;
- Noise;
- Special waste;
- Cumulative and secondary impacts; and

- Mitigation plans.

Intensive field investigations were not performed for the resource studies. Instead, the entire Tier One study consisted of an evaluation of effects on environmental and social resources in the study areas based on available resources and general field reconnaissance. The extent of field reconnaissance was guided by the configuration of the roadway and transit strategies. These strategies share parts or all of the following corridors, and the field reconnaissance was limited to these corridors:

- IL 83;
- York Road/Elmhurst Road;
- Thorndale Avenue/Elgin O'Hare Expressway; and
- O'Hare West Bypass.

A Geographic Information System (GIS) database served as the key tool for estimating and comparing potential impact quantities for alternative strategies. Build alternative footprints were used to evaluate the potential impact area under the Tier One Environmental Impact Statement (EIS). The environmental resources were plotted in GIS and their presence within the build alternative footprints was evaluated as a potential direct impact. Indirect impacts to resources outside the footprint were evaluated based on the resource and the proximity to the footprint, on a case-by-case basis. The methods of analysis for each resource area are detailed below.

## **Socioeconomics**

### **Demographics**

U.S. Census demographic information was collected at the state, county, and individual community level; as well as for census block and census block groups adjacent to the proposed improvements. The most current census data was used including 2000 data and special census data.

The 2030 population, household, and employment forecasts were obtained from the Chicago Metropolitan Agency for Planning (CMAP). County and community forecasts endorsed by CMAP on September 27, 2008 were also used.

In addition, CMAP generated socioeconomic forecasts for the 2030 RTP and 2030 Baseline for the EO-WB Study Area, which served as the starting points for the build alternatives forecast development. Using the CMAP forecasts, specific forecasts were developed for each of the build alternatives. This involved redistribution of population, households, and employment to traffic analysis zones (TAZ's) within the project. The final build alternatives socioeconomic forecasts represented a change/increase in population, household, and employment that was confined to the study area and purely based on project specific conditions. These forecasts did not alter the conformed 2030 CMAP RTP regional totals and socioeconomic relationships that are established by CMAP for the regional planning process. A more detailed explanation is provided in the memos titled "Elgin O'Hare – West Bypass Finalist Build Alternatives 2030 Socio-Economic Data Forecasts: Estimation and

Distribution Methodology,” dated April 2009 and “EO-WB Project - 2030 Baseline (No-Build) Socio-Economic Data Assessment – Meeting Minutes,” dated January 22, 2008.

## Displacements

To determine building displacements, all building footprints were digitized within and near the proposed alignments based upon aerial photography. From there, all structures were field verified; and ancillary structures (e.g., garages or sheds) were identified. Boundaries were then refined within the GIS system, as necessary. As part of the field review, specific businesses were identified within each commercial building so that the number of businesses and employees impacted could be calculated. This was continually refined through the alignment development and screening process.

The GIS database and professional interpretation of data was used to estimate potential impacts that the roadway and transit strategies could have on property, structures, and employees.

## Economic Characteristics

To assess economic impacts resulting from construction of the project, an input-output/social accounting matrices (IO/SAM) model<sup>1</sup> known as IMPLAN PRO<sup>2</sup> was utilized. The model assessed total economic impacts, which consisted of direct, indirect, and induced (secondary) effects resulting from project construction. The model generated numerical multipliers that estimated indirect and induced effects – both for the project as well as for cumulative impacts resulting from other reasonably foreseeable projects.

The IMPLAN model output was also used to estimate the economic impact to the region from displaced businesses and employees. The economic impacts of the employee displacements included the loss of earned wages, further employment loss in the region, and loss of added value<sup>3</sup> to the affected industry. The analysis reflected a “worst case” scenario, in that, it assumed that none of the businesses and their employees would relocate in the region.

## Community and Land Use Impacts

This consisted of the collection and review of the official planning/land use documents and land use/zoning maps from each of the core communities, the counties, and CMAP. Each entities’ policies (as articulated in their various official documents), land use, and zoning maps were also reviewed to ascertain whether an expanded Elgin O’Hare Expressway or O’Hare West Bypass were incorporated into their plans, and/or compatible with their plans.

<sup>1</sup> The IO/SAM model is an accounting framework that traces spending and consumption among various economic sectors, including businesses, households, government, and “foreign” economies in the form of exports and imports.

<sup>2</sup> IMPLAN is a modeling system originally developed by the U.S. Forestry Service in the late 1970s. Today, the Minnesota IMPLAN Group (MIG Inc.) owns the copyright and distributes data and software. It is probably the most widely used economic impact model in existence. IMPLAN comes with databases containing the most recently available economic data from a variety of sources.

<sup>3</sup> Added value is the net measure of the economic contribution of an industry to the regional economy less the intermediate goods and services used.

## Environmental Justice

U.S. Census 2000 data was used to evaluate the potential for disproportionate effects in areas containing low income or minority residents. For the finalist alternatives, the influence area was defined by the census tract blocks or block groups bordering the proposed improvements. Block group data was used to analyze economic (income) characteristics and block data to analyze racial characteristics. It compared them to county as well as state statistics. In areas where there appeared to be disproportionate impacts, we reviewed aerial photography and displacement details, to ascertain whether environmental justice impacts would occur.

## Water Resources/Water Quality

Using existing information, an overview of surface water, water quality, aquifer systems/groundwater, groundwater supply wells, and aquatic life within the study area was prepared. The potential effects on these resources were reliant on published research and available data. No water quality testing or modeling was performed. Watersheds and surface water resources proximate to the roadway and transit strategies were defined and described, including land uses within the watershed, approximate drainage area, length of stream segments, flow characteristics of identified streams, flood control projects and designated uses of streams.

ESRI (GIS software) data was used to identify mapped water resources (e.g., rivers, creeks, and lakes) within the study area. The ESRI data was supplemented with information provided by Cook and DuPage Counties and through available resources such as DuPage County Wetland Inventory (DCWI), Hydrologic Atlases, U.S. Geological Survey Quadrangle Maps, and Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) and Flood Insurance Studies (FIS).

Based on available mapping, approximate water resource boundaries were added to the GIS database along with recent aerial photography. The data was plotted to identify potential water resources in the study area. Mapped water resources proximate to the proposed EO-WB alternatives were field verified. Field reconnaissance was completed during June, July, and October 2008 and May 2009<sup>4</sup> to generally confirm water resource boundaries previously identified on the maps, as well as to identify other water resources.<sup>5</sup> Field reconnaissance focused on water resources located near the proposed EO-WB improvements.<sup>6</sup>

Based on the results of the field reconnaissance and review of available aerial photography, water resource locations and boundaries were refined within the GIS system, as necessary. Surface water boundaries are approximate. Open water stormwater management facilities were also inventoried as part of this study due to their potentially jurisdictional nature. On

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<sup>4</sup> Data refinement, including occasional field visits, was completed between October 2008 and May 2009, as necessary.

<sup>5</sup> Identified based on the "ordinary high water mark" - a line established by fluctuations of water, which can be indicated by physical characteristics such as: a scour line, shelving, changes in the character of soil, destruction of terrestrial vegetation, or the presence of litter and debris.

<sup>6</sup> The O'Hare Modernization Program (OMP) obtained a Section 404 permit from the USACE in December 2005. A jurisdictional determination was completed as part of the OMP. This study relied on OMP data to identify surface waters within OMP limits.

an individual basis, the open water stormwater management facilities may be determined to be exempt from federal regulation following a review of soils data, site records, and/or coordination with the U.S. Army Corps of Engineers (USACE).

Surface waters and stormwater basins that were identified included a predominance of open water at the time of the preliminary field reconnaissance. Open water areas may include wetland fringe vegetation along the perimeter. The dominant cover type was used for descriptive purposes in this study. More detailed analysis will be completed during the Tier Two environmental studies.

Field reconnaissance at potential stream crossings was also completed and used to provide general notations regarding stream conditions/streambank erosion, riparian corridors, potential wildlife/in-stream habitat, and mussel shells (if any) on the streambanks. Field reconnaissance was completed during August and September 2008 and January and May 2009. Aquatic sampling/field surveys were not conducted as part of the study; instead, national, state, and county databases were searched for information. Data was refined through coordination with resource agencies as necessary. More detailed analysis will be completed during the Tier Two environmental studies.

The GIS database and professional interpretation of available data was used to estimate potential impacts that the roadway and transit strategies could have on water resources and water quality, emphasizing potential impacts at stream crossings or other project effects on surface waters.

## Wetlands

The 1987 Corps of Engineers' Wetland Delineation Manual identifies three essential characteristics of a jurisdictional wetland: hydrophytic vegetation, hydric soils, and wetland hydrology.<sup>7</sup> Routine wetland delineations in accordance with the 1987 wetland delineation manual were not performed for the EO-WB Tier One study. Instead, published wetland data sources and preliminary field reconnaissance were used to locate potential wetland areas.

The DCWI was used to identify mapped wetlands in DuPage County. In general, it is considered more locally accurate than the National Wetlands Inventory (NWI). Because the DCWI does not include Cook County information, the NWI was used for Cook County.<sup>8</sup> Wetland data from the OMP was used for parts of the study area that overlapped with the OMP project limits.<sup>9</sup>

Based on the wetland mapping, approximate wetland boundaries were added to the GIS database along with recent aerial photography. The data was plotted to identify potential wetlands in the study area and proximate to the EO-WB alternatives. Mapped wetlands potentially affected by roadway and transit strategies were field verified. Field

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<sup>7</sup> The Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region, (September 2008) provides additional guidance regarding completion of wetland delineations in most of Illinois.

<sup>8</sup> The Natural Resources Conservation Service (NRCS) Wetland Maps were not used for this study. The NRCS Wetland Maps will be used as a reference during the Tier Two environmental studies.

<sup>9</sup> OMP obtained a Section 404 permit from the USACE in December 2005. As authorized by that permit, onsite wetlands are in the process of being filled and these wetland acreages are likely to decrease; as such, the wetlands within OMP limits were kept separate in the data.

reconnaissance was completed during June, July, and October 2008 and May 2009<sup>10</sup> to generally confirm wetland boundaries previously identified on the maps, as well as to identify other wetlands and waters of the United States. The preliminary field reconnaissance focused on wetlands near the proposed EO-WB improvements.<sup>11</sup> Based on the results of the preliminary field reconnaissance and review of available aerial photography, wetland locations and boundaries were refined within the GIS system, as necessary.

During the preliminary field reconnaissance, dominant wetland plant species were identified, and general notes pertaining to wetland functions and values were recorded. Based on the preliminary field observations, the general quality of the identified wetlands was established. Detailed plant inventories were not completed, and a Floristic Quality Index and native mean C-value were not calculated.<sup>12</sup> Preliminary quality determinations are subject to change pending additional data collection completed during the Tier Two environmental studies. Additionally, function and value evaluation was also aided by the use of DuPage County interpretation of “critical” or “regulatory” designated wetlands and whether threatened/endangered species were mapped as potentially present at the wetland.

Approximate wetland areas were identified based on a general assessment of a dominance of hydrophytic vegetation. Some wetlands include more than one community type or contained areas of open water. The dominant community type was used for descriptive purposes in this study. In general, roadside/railroad<sup>13</sup> stormwater conveyance ditches, in-channel wetland in predominantly unvegetated linear water bodies, and fringe wetlands at the perimeter of open water areas were not inventoried as wetlands during the preliminary field review. Some roadside/railroad ditches and in-channel/perimeter wetland areas may be considered federal and/or state jurisdictional wetlands following more detailed wetland studies and regulatory review. Wetland bottom stormwater management facilities were inventoried as part of this study due to their possible jurisdictional nature; however, some may be found to be exempt from state or federal regulation following a site specific review of soils data, site records, and/or coordination with the USACE and/or the Illinois Department of Natural Resources (IDNR).

Based on preliminary data collection, an estimate regarding jurisdictional status was provided. Jurisdictional status is based on preliminary assessment and is subject to change pending more detailed studies to be completed as part of the Tier Two environmental studies and following a USACE jurisdictional determination.

Based on available data, existing wetland mitigation sites located proximate to the build alternatives were also added to the GIS database. Examples of wetland mitigation sites included areas within the Elgin O'Hare Expressway right-of-way, Wood Dale/Itasca Reservoir, and Redmond Reservoir. Mitigation sites within OMP limits were categorized as “OMP Wetlands.” Mitigation sites may not meet all three wetland parameters (i.e.,

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<sup>10</sup> Limited data collection was completed outside of the 2008 growing season. Wetlands located within the proposed alternative footprints were re-visited in May 2009.

<sup>11</sup> A farmed wetland determination using the procedures followed by the NRCS was not completed for agricultural areas.

<sup>12</sup> Swink, F. A., and G. Wilhelm. 1994. *Plants of the Chicago Region*. 4th edition. Indianapolis: Indiana Academy of Science: Indianapolis, IN.

<sup>13</sup> Access to railroad property was limited.

vegetation, soils, and hydrology). Known mitigation sites proximate to the proposed EO-WB alternative footprints were assumed to be USACE jurisdictional and higher quality.

The approximate size of each identified wetland and the percentage located within the build alternative footprints were calculated. The wetland database was used to compare wetland impacts across the roadway and transit alternatives. Potential direct wetland impacts were determined by calculating the approximate wetland acreage located within the footprint of each build alternative using GIS photographic interpretation. Wetlands not directly impacted by the footprint were not counted as affected. Based upon coordination, the USACE, U.S. Fish and Wildlife Service (USFWS), and U.S. Environmental Protection Agency (USEPA) concurred with the Tier One wetland methodology, wherein the level of detail and field verification was sufficient to support reasonably representative levels of impact for this type of study.<sup>14</sup> The agencies concurred that only direct wetland impacts need be calculated as part of the Tier One study. Indirect wetland impacts need not be quantified at this time, but will be assessed individually during Tier Two environmental studies.

A comprehensive wetland delineation and assessment will be completed in Tier Two environmental studies for the preferred alternative(s) to determine exact wetland sizes and locations with respect to the proposed limits of the EO-WB improvements. The assessment would provide a qualitative analysis of wetland functions and values, including floristic composition and wildlife habitat presence.

## Floodplains

Based on available data, FEMA mapped floodplains were identified and included as a GIS layer.<sup>15</sup> Potential effects to drainage patterns and encroachments in floodplains and floodways were identified with an emphasis on identifying longitudinal and transverse floodplain encroachments.

Potential floodplain encroachments were identified by overlaying proposed roadway locations onto FEMA FIRMs. Proposed roadways were separated by county (Cook or DuPage) and compensatory storage requirements (due to fill in floodplains) were analyzed in accordance with the respective local stormwater management ordinance since they are more strenuous or demanding than IDNR requirements. Because of the absence of a proposed roadway profile, all floodplains were assumed to be affected to the 100-year flood elevation. The width of encroachment area was based on proposed roadway width (roadway footprint) from proposed typical cross sections. Shoulder-to-shoulder roadway widths were used to determine the amount of fill in the floodplain or floodway. Methodology will be redefined during the Tier Two environmental studies, when proposed profiles and templated cross sections are available. Impacted floodplain and floodway areas were calculated using GIS software and overlaying proposed roadways onto the FIRMs.

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<sup>14</sup> Resource Agency field visit on November 12, 2008.

<sup>15</sup> Floodplain refinement was completed based on additional available studies, as necessary.

## Biological Resources

For the purposes of this study, biological resources refer to vegetation/land cover and wildlife resources. Available data was used to characterize vegetation, land cover, and upland habitat within the study area. The methodology used to describe aquatic resources, such as surface waters and wetlands, was previously discussed. The primary database used for land cover within the study area was the Land Cover of Illinois 1999 – 2000, which is the result of the Illinois Interagency Landscape Classification Project (IILCP).<sup>16</sup> This data was used to identify mapped habitat types (forests, prairie, and urban open space), urban/built up land, and agricultural land within the EO-WB study area (if any). Based on available mapping, approximate land cover types were added to the GIS database along with recent aerial photography. The data was plotted to identify potential upland habitat types and agricultural land in the study area. Mapped habitat types and agricultural land proximate to the proposed EO-WB alternatives were field verified.

Field reconnaissance was completed during August and December 2008 and June 2009 to generally confirm previously mapped land cover types, as well as to identify other potential habitat. Field reconnaissance focused on land cover near the proposed EO-WB improvements. Field reconnaissance was completed to provide preliminary information on vegetative cover types and a general description of the quality of the areas, including identification of woodlands, tallgrass prairie, and old fields. Wildlife identified during the field reconnaissance was also noted. A wildlife survey was not conducted as part of the study; instead, national, state, and county databases and/or resource agencies were contacted to obtain wildlife information.

The GIS database and professional interpretation of available data were used to estimate potential impacts that the EO-WB roadway and transit strategies could have on identified habitat areas and on mammals, birds, reptiles, amphibians, and invasive species.

## Threatened and Endangered Species

Threatened and endangered (T&E) species information was obtained from USFWS, IDNR, and other resource agencies and/or available sources (see Section 5, Coordination, of this Draft EIS). Based on existing data, a general summary of available T&E species information was provided for the EO-WB study area. Electronic shape files of potential T&E species sites obtained through the coordination process were used for the GIS database. General locations were identified and boundaries included as a GIS layer.

For Tier One of the study, no detailed consultation under Section 7 of the Endangered Species Act or the Illinois Endangered Species Protection Act was completed; but the potential need for consultation and potential impacts to T&E species sites was identified. The accuracy of available data does not allow a conclusive determination of specific impact to the state- and federal-listed species. As part of Tier Two, additional studies will be conducted to determine potential presence and potential impacts to T&E species. Under Tier

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<sup>16</sup> IILCP includes the following agencies: USDA National Agricultural Statistics Service, Illinois Department of Agriculture, and IDNR.



Two, future work associated with the build alternative(s) will include detailed T&E species field surveys (if necessary) and the required consultation with IDNR and USFWS.

## Public Use Lands – Sections 4(f)/6(f)/106 Considerations

To identify publicly-owned recreational properties, publicly owned natural areas, and potential historically significant properties that may qualify as 4(f), available published data was reviewed including public entities' internet web sites or documents (community, county, and state agencies), USGS quadrangle mapping, and aerial photography. Sites were then verified in the field. Properties purchased or developed using Land and Water Conservation (LAWCON) funds or Open Space Land Acquisition and Development (OSLAD) grant program funds that are located within or immediately adjacent to the roadway and transit strategy corridors were also identified by reviewing available data to determine if any properties qualified as Section 6(f) or OSLAD-assisted lands. The property boundaries of identified potential 4(f), 6(f), and OSLAD-assisted resources were then digitized in the GIS database relative to each alternative.

Identified properties were assessed for their ownership and use (size, type of use, level of development, habitat quality, etc.). The identified properties went through a determination step as to whether FHWA would consider them as Section 4(f) properties. For purposes of Section 4(f), historical significance was based on whether a historic site was included on or eligible for, the National Register of Historic Places (NRHP).

## Air Quality

Neither IDOT's computer screening model *Illinois Carbon Monoxide Screen for Intersection Modeling* (COSIM), which is used to estimate worst-case carbon monoxide concentrations for proposed roadway projects affecting signalized intersections with a sensitive receptor within 1,000 feet of the intersection, nor the *Hot Spot Analysis*, which is used to estimate the future localized PM concentrations and assess potential standard violations, were performed at this stage (Tier One) of the study. These analyses have been reserved for Tier Two documents when more specificity is available.

This Tier One Draft EIS included a basic Mobile Source Air Toxic (MSAT) analysis of the likely emission impacts of this project. Available technical tools did not enable us to readily predict the project-specific health impacts of the emission changes associated with the alternatives. Due to these limitations, a discussion of MSATs was included in accordance with CEQ regulations (40 CFR 1502.22(b)) regarding incomplete or unavailable information. The need for a quantitative analysis will be evaluated during subsequent environmental studies.

## Noise

Noise modeling to determine existing and design-year dBA at noise-sensitive receivers was not undertaken. Similarly, noise abatement analysis to identify techniques to mitigate noise impacts was not undertaken during the Tier One analysis.

Residential areas that could approach or exceed the Noise Abatement Criteria (NAC) were identified using available information on the property types along the corridor. Sensitive non-residential noise receptors within 500 feet of the proposed improvements, such as churches, schools, or parks, were also identified. This was done using existing aerial base mapping to determine locations where the proposed improvements would result in potential impacts. These areas were then verified in the field.

## Special Waste

Internet web sites were reviewed to determine potential hazardous waste locations. Follow-up with appropriate agencies was undertaken. The potential hazardous waste locations were mapped and referenced in GIS, for use throughout the study. A visual reconnaissance was also conducted of sites proximate to proposed improvements associated with the finalist alternatives. Based on engineering judgment, a broad-risk assessment was applied to each site associated with the finalist alternatives based on the type of sites encountered (i.e., high, medium, and low). These ratings were used to indicate properties with a high potential for contamination to those that have no indication of releases from suspected materials.

## Cumulative and Secondary Impacts

Evaluating cumulative and secondary impacts stems from NEPA and the CEQ regulations for implementing NEPA (40 CFR 1500-1508). The cumulative and secondary impacts were prepared in compliance with CEQ's 11-step process. Other reasonably foreseeable actions in the study area were identified for which cumulative impacts were assessed. These impacts focused on several target resources that were mutually agreed upon by IDOT and FHWA and included: socioeconomics, wetlands, biological, and water quality resources. The analysis also included an assessment of indirect land use impacts, or induced development.

## Mitigation Plans

Mitigation measures will be provided to compensate for acknowledged unavoidable impacts to resources that may be affected by the proposed EO-WB roadway and transit strategies. Mitigation proposals and concepts for resource losses or for managing short-term and long-term social effects were prepared. Detailed mitigation strategies will be developed during the Tier Two environmental studies.

The Tier One Draft EIS includes a description of conceptual mitigation plans. Measures that may be required and will be considered during the Tier Two environmental studies include, but are not limited to: erosion/sediment control, noise, air quality, floodplain, wetland, water quality, land use, and displacement mitigation. Types of mitigation measures will be identified to relocate or mitigate habitat impacts. IDOT's "no overall net loss of the State's existing wetland acres or their functional value" policy will be coordinated with relevant federal and state agencies during Tier Two.

Tier One was limited to screening the roadway and transit strategies and identifying what potential mitigation options are practical. The analysis included an assessment of

unavoidable adverse impacts. Best Management Practices (BMPs) that could be implemented to minimize impacts to the environment are discussed in the Tier One Draft EIS. Mitigation concepts are presented, but no specific mitigation commitments are made in the Tier One Draft EIS.