



# **White Paper: Applications of the Energy Zones Mapping Tool**

**October 2014 •**



**Illinois Institute of Technology  
For EISPC and NARUC  
Funded by the U.S. Department of Energy**

## Acknowledgements

This material is based upon work supported by the Department of Energy, under Award Number(s) DE-OE0000316. On behalf of the members of this project, we would like to thank the NARUC for making this work possible. The many tasks of this work could not have been completed without the contributions of our colleagues, Vladimir Koritarov, James A. Kuiper, and Donna L. Brunner, at the Argonne National Laboratory. We would also like to thank Dr. Wei Tian, our colleague in the Robert W. Galvin Center at IIT, who performed and analyzed much of the test cases presented in this White Paper.

Mohammad Shahidehpour, PhD  
Zuyi Li, PhD  
Robert W. Galvin Center for Electricity Innovation  
Illinois Institute of Technology, Chicago, IL 60616

## Disclaimer

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof. Copyrights and all rights therein are retained by copyright holders. All individuals who use this report are required to adhere to the copyright terms and conditions.

## Table of Contents

Acknowledgements .....	ii
Disclaimer .....	iii
Table of Contents .....	iv
List of Figures .....	vi
List of Tables .....	vii
Executive Summary .....	1
1. Introduction .....	2
1.1 Background .....	2
1.2 Overview of the EZ Mapping Tool .....	2
1.3 Applications of the EZ Mapping Tool to Generation Planning .....	3
1.4 Applications of the EZ Mapping Tool to Transmission Planning .....	3
1.5 A Demonstration Case for Using the EZ Mapping Tool .....	3
2. EZ Mapping Tool Tasks and Implementation Plan in the White Paper .....	6
2.1 Proposed Tasks .....	6
2.2 Implementation of the Tasks .....	7
3. Area Analyses for Demonstrating the EZ Mapping Tool Applications .....	9
3.1 Protected Land Report .....	11
3.2 Power Plant Report .....	12
3.3 Electrical Transmission Report .....	15
4. Transmission Corridor Analyses .....	16
4.1 EIPC Transmission Corridors .....	16
4.2 Revised EIPC Transmission Corridors .....	18
4.2.1 Re-evaluation of EIPC 6 (Case 13) .....	18
4.2.2 Re-evaluation of EIPC 7 (Case 14) .....	21
4.2.3 Re-evaluation of EIPC 8 (Case 15) .....	24
4.2.4 Re-evaluation of EIPC 9 (Case 16) .....	27
4.3 Transmission Corridors in the New England Area .....	30
4.3.1 NewEngland_Loop (Case 17) .....	30
4.3.2 NewEngland_Northern (Case 18) .....	34
5. Assessment of the Potentials for Using the EZ Mapping Tool .....	37

5.1 Potentials for Using the EZ Mapping Tool with Other Tools.....	37
5.2 Use of EZ Mapping Tool by State and Planning Coordinators for Siting Studies .....	37
5.3 Suggestions for the Enhancement of the EZ Mapping Tool .....	38
5.3.1 Suggestions for General Enhancements .....	38
5.3.2 Suggestions for More Specific Enhancement of the EZ Mapping Tool.....	39
5.3.3 Work Plan: Corridor Analysis and Modeling Enhancements for the EZ Mapping Tool .....	40
6. Conclusions .....	43
Appendix A. Overview of the EZ Mapping Tool Users' Manual .....	45
A.1 Registration .....	45
A.2 Interface of the EZ Mapping Tool.....	45
A.3 Add Map Layers .....	48
A.4 Add Model Layers.....	49
A.5 Removing Layers .....	50
A.6 Using the Map Tools .....	50
A.7 Area and Corridor Analysis.....	51
A.8 Running a Model and Report .....	54
A.9 Advanced Modeling Features.....	58
A.10 Exiting the Mapping Tool .....	62
Appendix B. Detailed Reports of EZ Mapping Tool Simulation Cases .....	63
B.1 Report on Case 1 (Assumed Wind Development Area).....	64
B.2 Report on Case 2 (Revised Wind Development Area).....	71
B.3 Report on Case 17 (New England Loop) .....	78
B.4 Report on Case 19 (Revised New England Loop).....	90

## List of Figures

Figure 1.1 Wind Energy Suitability Results with (top) and without (bottom) the Inclusion of Proximity Factor to Electrical Transmission Planning .....	4
Figure 1.2 A Potential Transmission Corridor (Green Line) Extending from Energy Zone 1 to Omaha.....	5
Figure 1.3 Original Corridor Path (Green) and the Revised (Black) for Bypassing a Sensitive Wildlife Area (Yellow and Orange).....	5
Figure 4.1 EIPC Scenario 1: Combined Policies – New/Upgraded Transmission .....	16
Figure 4.2 Selected Transmission Corridors and Protected Lands (Cases 3-12) .....	17
Figure 4.3 Original EIPC 6 Transmission Corridor (Case 8).....	18
Figure 4.4 Revised EIPC 6 Transmission Corridor (Case 13) .....	21
Figure 4.5 Original EIPC 7 Transmission Corridor (Case 9).....	21
Figure 4.6 Revised EIPC 7 Transmission Corridor (Case 14) .....	23
Figure 4.7 Original EIPC 8 Transmission Corridor (Case 10).....	24
Figure 4.8 Revised EIPC 8 Transmission Corridor (Case 15) .....	24
Figure 4.9 Original EIPC 9 Transmission Corridor (Case 11).....	28
Figure 4.10 Revised EIPC 9 Transmission Corridor (Case 16) .....	28
Figure 4.11 Original Transmission Corridors in New England (Case 17).....	30
Figure 4.12 Revised NewEngland_Loop Corridor (Case 19).....	33
Figure 4.13 Two Segments of the Revised Corridor Crossing Protected Lands (Case 19) .....	33
Figure 4.14 Revised NewEngland_Northern (Case 20).....	35
Figure 5.1 Error Information.....	39
Figure A.1 Registration Page .....	46
Figure A.2 Department of Energy Terms and Conditions Notice .....	46
Figure A.3 EZ Mapping Tool Login Page .....	47
Figure A.4 Interface Layout of the EZ Mapping Tool.....	47
Figure A.5 Model Result Report.....	57

## List of Tables

Table 2.1 EZ Mapping Tool Test Cases .....	8
Table 4.1 Evaluation Results by EZ Mapping Tool (Cases 3-12) .....	17
Table 4.2 Information on Protected Lands for the Original EIPC 6 Transmission Corridor (Case 8).....	19
Table 4.3 Information on Protected Lands for the Revised EIPC 6 Transmission Corridor (Case 13) .....	20
Table 4.4 Information on Protected Lands for the Original EIPC 7 Transmission Corridor (Case 9).....	22
Table 4.5 Information on Protected Lands for the Revised EIPC 7 Transmission Corridor (Case 14) .....	23
Table 4.6 Information on Protected Lands for the Original EIPC 8 Transmission Corridor (Case 10).....	25
Table 4.7 Information on Protected Lands for the Revised EIPC 8 Transmission Corridor (Case 15) .....	26
Table 4.8 Information on Protected Lands for the Original EIPC9 Transmission Corridor (Case 11).....	27
Table 4.9 Information on Protected Lands for the Revised EIPC 9 Transmission Corridor (Case 16) .....	29
Table 4.10 Information on Protected Land crossings for the Original NewEngland_Loop (Case 17) .....	31
Table 4.11 Information on Protected Land Overlaps for the Revised NewEngland_Loop (Case 19).....	32
Table 4.12 Detailed Overlap Information of the Original NewEngland_Northern (Case 18).....	34
Table 4.13 Detailed Overlap Information of the Revised NewEngland_Northern (Case 20) .....	36

## Executive Summary

Illinois Institute of Technology (IIT) presents this White Paper which is on the Applications of the Energy Zones Mapping Tool (“EZ Mapping Tool”) to the transmission corridor development in the Eastern Interconnection. The White Paper is in response to the NARUC solicitation # NARUC-2014-RFP041–DE0316.

The White Paper which includes 20 case studies discusses issues that would advance the previous work performed by the Argonne National Laboratory on the EZ Mapping Tool for addressing transmission planning issues. The White Paper will help EISPC members comprehend the potentials for implementing the EZ Mapping Tool, and provide the members with an assessment of the EZ Mapping Tool for evaluating planning transmission options in environmentally sensitive areas of the country such as national trails or protected lands in the United States.

The technical tasks accomplished as part of this White Paper would include the following subjects:

- 20 case studies for demonstrating the use of the EZ Mapping Tool in transmission facility evaluations.
- Assessment of processes, benefits, and potential obstacles for using the EZ Mapping Tool in transmission facility evaluation.

The project team for this White Paper utilizes the presented case studies to discuss the merits of applying the EZ Mapping Tool with its extensive databases on energy sources, geographical data layers, environmental data layers, policies and regulations, and powerful functionalities, to transmission corridor analysis, new generation capacity suitability studies, and reporting capabilities supported by the GIS-based Multi-Criteria Decision Support System (MCDSS).

Given different market and regulatory structures within the Eastern Interconnection, this White Paper is organized in sections and drafted such that it would be applicable in general to the corresponding geographical regions, and uses examples to address situations that are prevalent in traditionally regulated states with jurisdictional utilities that are either vertically-integrated or participate in electricity markets in the Eastern Interconnection.

The project team recognizes, based on its experience with the applications of EZ Mapping Tool, that there are some technical issues with the implementation of the Tool for new generation and transmission development studies. The White Paper uses numerous tables and figures that help assess the potentials for using the EZ Mapping Tool in practical cases and address some of the existing concerns with the use of the EZ Mapping Tool in the Eastern Interconnection.

The project team has worked closely with engineers and scientists at the Argonne National Laboratory, the leading developer of the EZ Mapping Tool, for preparing this White Paper. The project team would like to express its utmost appreciation to the Argonne team who provided helpful information to the project team for the completion of this project. The financial support and the technical advice provided by NARUC are greatly appreciated.



## 1. Introduction

### 1.1 Background

The Eastern Interconnection States' Planning Council (EISPC) Study on Energy Zones<sup>1</sup> published by Argonne National Laboratory provided a methodology and a comprehensive mapping tool for EISPC members and other stakeholders to identify areas within the U.S. portion of the Eastern Interconnection that are suitable for the development of clean (i.e., low- or no-carbon) power generation. The comprehensive web-based decision support product, labeled as the EISPC Energy Zones Mapping Tool ("EZ Mapping Tool"), is a GIS-based, Multi-Criteria Decision Support System (MCDSS) with a set of operation options to guide the intended analysis<sup>2</sup>. The EZ Mapping Tool is a free online mapping tool for identifying potential clean energy resource areas within the Eastern Transmission Interconnection.

### 1.2 Overview of the EZ Mapping Tool

The EZ Mapping Tool incorporates numerous models for which the user can specify custom screening factors. Many of these screening factors represent terrain, land uses, and other location-based characteristics that can affect regional power system planning decisions, regardless of the economic viability of the proposed energy resources and infrastructure. In this regard, appropriate maps for potential development areas are assembled and provided to users by the EZ Mapping Tool when the screening factors are combined with layers of energy resource data (i.e., locational possibility for wind, solar energy, etc.).

The analytical process for using the EZ Mapping Tool involves a number of steps which may be customized by users for representing specific types of clean energy resource that are being analyzed for power system studies, areas of interest, potentials for regional growth, and other user-specified parameters. These specifications will allow tailored analyses for individual user applications with customized maps of geographical areas which would be suitable for power system planning and the additional development of clean energy resources in the Eastern Interconnection.

The suitability metric embedded in the EZ Mapping Tool combines the locational suitability of energy resources along with limiting factors for power system studies. Having selected an area based on its overall suitability, the EZ Mapping Tool user may then look more closely at other factors that can affect the economics of any energy implementations in the proposed energy zone. The suitability scores generated by the EZ Mapping Tool models would range from 0 (unsuitable) to 100 (very suitable). The score depends on the quality and the accuracy of input data, the user's intuition for weighing the importance of individual parameters, and input suitability scores offered to each layer for comparing locations in a regional screening-level analysis.

In addition to customized suitability maps, the EZ Mapping Tool offers custom reporting capabilities for technologies lacking suitability models. Reports can be generated by the user in a specified map area with useful information pertaining to an energy technology that can help guide zonal planning. Such technical reports can also provide socio-economic information beneficial to identifying potential clean energy zones in regional power system studies.

---

<sup>1</sup> Argonne National Laboratory, *Energy Zones Mapping Tool Help Manual*, Available at <http://eispctools.anl.gov/help/EISPC%20EZ%20Mapping%20Tool%20Manual.pdf>

<sup>2</sup> Argonne National Laboratory, *Energy Zones Study: A Comprehensive Web-Based Mapping Tool to Identify and Analyze Clean Energy Zones in the Eastern Interconnection*, <http://eispctools.anl.gov/document/21/file>, Sept., 2013

### 1.3 Applications of the EZ Mapping Tool to Generation Planning

The EZ Mapping Tool will enable EISPC stakeholders to perform various analyses and identify potential areas in the Eastern Interconnection for planning clean energy resources. To perform these analyses, the web-based EZ Mapping Tool allows EISPC stakeholders to develop customized maps for clean energy resource development in the Eastern Interconnection studies. The stakeholders can perform custom analyses for multiple energy resources by taking into account possible synergies among energy resources. The synergy analyses highlight areas suitable for multiple technologies and consider both positive synergies where energy projects would complement one another, and negative synergies where energy projects would compete with each other.

The EZ Mapping Tool is not intended to provide the means for a detailed power system siting analysis in any specific clean energy projects. Rather, the intention is to enable stakeholders to identify clean energy resource areas in the Eastern Interconnection that could potentially be developed and further analyzed as energy zones in power system planning.

### 1.4 Applications of the EZ Mapping Tool to Transmission Planning

The EZ Mapping Tool helps transmission planners identify certain geographical areas within the Eastern Interconnection which offer significant potential for new transmission lines (or upgrading the existing lines). For this purpose, the EZ Mapping Tool offers a screening capability of potential energy corridors. The corridor screening tool designated by users provides a custom report on regional energy corridors for power transmission studies.

Each corridor report includes the environmental information in corridors such as protected lands, sensitive habitats, and imperiled species in the Eastern Interconnection. Each report also offers a screening-level assessment of key factors for the planning of electrical transmission or natural gas pipeline corridors. By running a corridor report, the user can generate the following information pertaining to transmission studies which will be listed by milepost along the corridor centerline: airports, electrical substations, elevation profile, estimated peak horizontal ground acceleration, imperiled species, major roads, habitat, military installations, pipelines, populated places, protected lands, railroads, rivers, states and counties, topographic slope, and water bodies.

Just as the EZ Mapping Tool is designed for identifying potential geographical areas suitable for clean energy resource development rather than the siting of individual power plants, the corridor screening capability is designed for analyzing potential energy corridors rather than the siting of specific transmission lines or pipelines for delivering natural gas and oil.

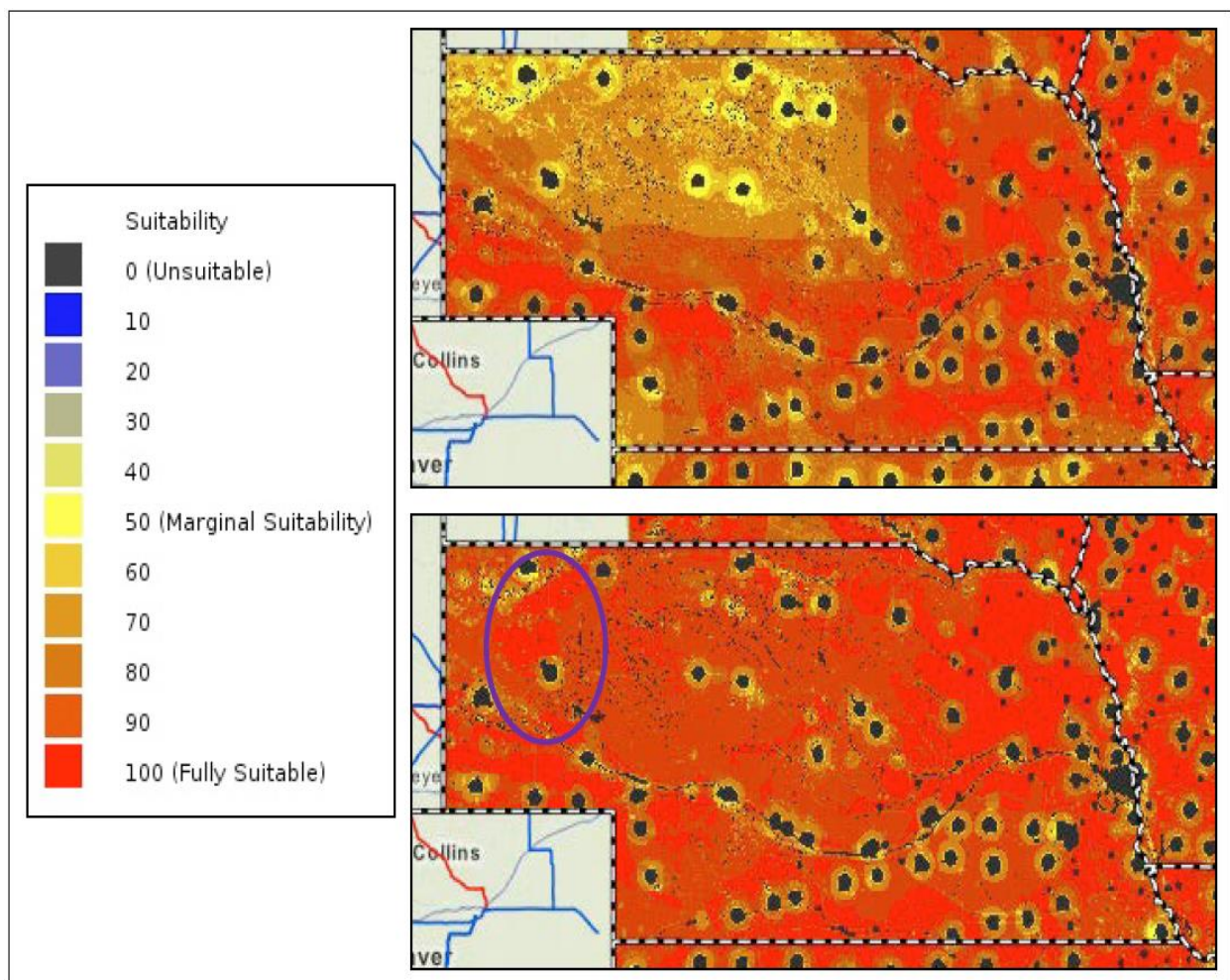
### 1.5 A Demonstration Case for Using the EZ Mapping Tool

Investigating a region in the western part of Nebraska provides an interesting example for using the corridor reporting tool. Figure 1.1 shows the suitability model results for the regional land-based wind energy with a 100-m hub height in Nebraska. We present the solutions in Figure 1.1 with and without the proximity to transmission lines. When the proximity to transmission is removed as a modeling condition, the northwest region in Nebraska (circled and in yellow) is more suitable for the wind energy development. The modeling results of the EZ Mapping Tool indicate that the lack of sufficient electrical transmission lines is a limiting factor for the wind energy development in northwest Nebraska. Extending the existing transmission lines to this region in Nebraska may be an appropriate option in this case.

A utility company in Omaha might be interested in acquiring energy from a wind farm located in northwest Nebraska. To investigate the characteristics of a potential corridor extending from the Energy Zone 1 to Omaha, a corridor with a width of 1,000 feet was input (Figure 1.2). A corridor report

generated by the EZ Mapping Tool provides a quick summary of potential regional planning issues that may be encountered. Revising the corridor as shown in Figure 1.3 would avoid the potential planning issues identified in the corridor report.

The report shows that the corridor is 354 miles long and crosses 16 counties. The elevation range is 923 feet from the highest (west) to lowest (east) point. The crossing items listed in the corridor include roads, railroads, rivers, water bodies, existing electrical transmission lines, substations, pipelines, airports, military areas, and earthquake peak ground acceleration factors. Environmental factors of the study, including protected lands, habitat, and imperiled species are summarized at the end of the report. The report indicates that the proposed corridor crosses protected lands which are marked as “develop with extreme caution.” This layer can be added to the map for revising the proposed corridor route to reduce the potential impacts of protected lands on power system planning and implementation.

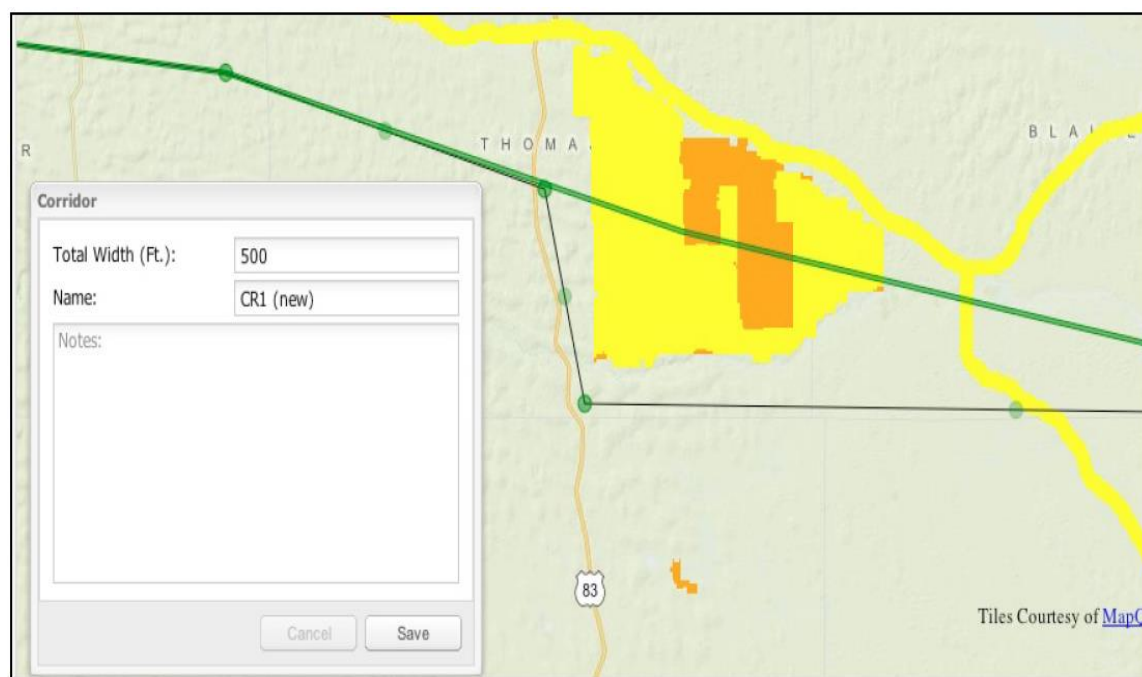


**Figure 1.1 Wind Energy Suitability Results with (top) and without (bottom) the Inclusion of Proximity Factor to Electrical Transmission Planning**





**Figure 1.2 A Potential Transmission Corridor (Green Line) Extending from Energy Zone 1 to Omaha**



**Figure 1.3 Original Corridor Path (Green) and the Revised (Black) for Bypassing a Sensitive Wildlife Area (Yellow and Orange)**

## 2. EZ Mapping Tool Tasks and Implementation Plan in the White Paper

In order to evaluate the EZ Mapping Tool, five tasks are presented in this White Paper for covering the following two general areas:

- 20 case studies for demonstrating the use of the EZ Mapping Tool in transmission facility evaluations.
- Assessment of processes, benefits, and potential obstacles for using the EZ Mapping Tool in transmission facility evaluation.

### 2.1 Proposed Tasks

In this section, the tasks for evaluating the functions and operations of the EZ Mapping Tool are described as follows:

#### **Task 1: Conduct a Case Study to Demonstrate the Use of the EZ Mapping Tool in Transmission Facility Evaluation**

In this task, a case study is conducted to objectively demonstrate and assess the use of the EZ Mapping Tool in transmission corridor evaluations. This task mandate was accomplished by the project team in collaboration with EISPC and Argonne National Laboratory. The project team utilized one of the transmission build-outs in Phase II of the Eastern Interconnection Planning Collaborative (EIPC) Study that includes the concerns with crossing National Trails<sup>3</sup>. This choice, among the options stated in the RFP,<sup>4</sup> uses the EZ Mapping Tool to highlight corridor routing issues not considered in the EIPC transmission planning study.

#### **Task 2: Solicit Comments on the Processes, Benefits, and Potential Obstacles for Using the Mapping Tool in Transmission Facility Evaluation**

In this task, the project team has documented the process of conducting the Task 1 case study. In addition, the project team has worked with the Argonne National Laboratory to solicit comments from other participants and registered users of the EZ Mapping Tool regarding the process, potential benefits of using the Mapping Tool, concerns, and suggested modifications to the Mapping Tool to enhance its applications.

The project team has received comments from Maine Commissioner Honorable David P. Littell regarding its preliminary case studies. His comments are stated as follows, “There are two cases that would be interesting in the Northeast- the loop put forward in Maine in the diagram (It is the ISO-NE proposed 345 loop to support wind from Maine). In reality, it will not be built as ISO-NE proposed but would have interesting impacts because it moves through sensitive areas, populated areas and the AT. The Northern

---

<sup>3</sup> National trails were established by the National Trails System Act (16 USC 1241-51). There are three types of national trails: National scenic trails are 100 miles or longer, continuous, primarily non-motorized routes of outstanding recreation opportunity. Such trails are established by Act of Congress. National historic trails commemorate historic (and prehistoric) routes of travel that are of significance to the entire Nation. They must meet all three criteria listed in Section 5(b)(11) of the National Trails System Act. Such trails are established by Act of Congress. National recreation trails, also authorized in the National Trails System Act, are existing regional and local trails recognized by either the Secretary of Agriculture or the Secretary of the Interior upon application.

<sup>4</sup> There are four options suggested in the RFP: (a) a transmission facility that is under consideration by the Planning Coordinator(s) and the relevant states; (b) one of the transmission build-outs in Phase II of the Eastern Interconnection Planning Collaborative Study; (c) a hypothetical transmission facility; (d) the National Trails or other difficult areas to site transmission facilities.

Pass through NH and alternative routes also would be an interesting case. And that is far along through not clear if will go forward. One of those two cases would be very meaningful for the six New England states.” The project team has incorporated the Commissioner’s comments in the White Paper and simulated the two cases in Section 4.3 of the White Paper using EZ Mapping Tool.

### **Task 3: Assess the Processes, Benefits, and Potential Obstacles for Using the Mapping Tool in Transmission Facility Evaluation**

In this task, the project team has analyzed the processes considered by states and planning coordinators to assess, through risk analysis, the potential benefits of applying the EZ Mapping Tool. The project team has reviewed the efficacy of the transmission facility selected in Task 1 in comparison with other resources. More discussion on this Task can be found in Section 5.1.

### **Task 4: Document the Use of the Mapping Tool in Transmission Planning**

In this task, the project team has developed a detailed discussion on how states and planning coordinators can use the EZ Mapping Tool to assess difficult transmission planning issues. In performing this task, the project team has referred to the EISPC Transmission Planning White Paper and discussed the potential usages of the EZ Mapping Tool with EISPC, Argonne National Laboratory, and other parties interested in transmission planning evaluation issues. More discussion on this Task can be found in Section 5.2.

### **Task 5: Assemble the Final Report**

This task has provided the detailed discussions and charts that summarize the results of Tasks 1-4 in this White Paper. The task aggregates and interprets the project results for providing a comprehensive conclusion along with a glossary of terms and appropriate maps and tables for illustration purposes.

## **2.2 Implementation of the Tasks**

The proposed tasks are implemented in this White Paper by applying the EZ Mapping Tool to the 20 test cases presented in Table 2.1. These cases are categorized as follows:

**Cases 1-2:** Appendix A provides a sample of the users’ manual for EZ Mapping Tool which is used in conjunction with Cases 1-2. The two Cases discuss the introduction to the Tool and demonstrate its usage according to the information provided in Appendix A.

**Cases 3-12:** The project team selected 10 updated/new transmission planning corridors provided in Scenario 1 of the EIPC final report. The EZ Mapping Tool was applied to the 10 cases in order to identify those which cross protected lands in the United States.

**Cases 13-16:** Results from the EZ Mapping Tool indicated that four of the 10 EIPC planning corridors would cross protected lands. Routes for these four cases were adjusted subsequently and the results are presented in Cases 13-16 that discuss ways to avoid identified crossing issues.

**Cases 17-18:** The two New England cases proposed by the Maine Commissioner were examined by EZ Mapping Tool and the results are discussed in Cases 17-18.

**Cases 19-20:** The two proposed Cases 17-18 were revised based on results provided by the EZ Mapping Tool, and the adjusted resource development results are presented in Cases 19- 20.

The detailed EZ Mapping Tool reports for Cases 1, 2, 17, and 19 (highlighted in Table 2.1) are provided in Appendix B.

**Table 2.1 EZ Mapping Tool Test Cases**

Case No.	Line/Area No.	Type	Length (Miles)	Comments
1	Assumed Wind Development Area	Area	---	Case demonstrating the applications of the users' manual
2	Revised Wind Development Area	Area	----	Case demonstrating the applications of the users' manual
3	EIPC 1	765kV AC	598.29	Comparison with the Transmission Planning results presented in EIPC final report
4	EIPC 2	765kV AC	386.69	
5	EIPC 3	765kV AC	489.16	
6	EIPC 4	500kV DC	648.39	
7	EIPC 5	765kV AC	1240.33	
8	EIPC 6	500kV DC	446.78	
9	EIPC 7	765kV AC	561.08	
10	EIPC 8	765kV AC	258.26	
11	EIPC 9	345kV AC	285.06	
12	EIPC 10	365kV AC	679.95	
13	Revised EIPC 6	500kV DC	454.25	Revised EIPC 6 to avoid protected lands
14	Revised EIPC 7	765kV AC	566.87	Revised EIPC 7 to avoid protected lands
15	Revised EIPC 8	765kV AC	260.94	Revised EIPC 8 to avoid protected lands
16	Revised EIPC 9	345kV AC	288.60	Revised EIPC 9 to avoid protected lands
17	NewEngland_Loop	345kV AC	509.2	Case suggested by Commissioner Littell
18	New England_Northern	345kV AC	292.75	Case suggested by Commissioner Littell
19	Revised NewEngland_Loop	345kV AC	536.49	Revised NewEngland_Loop to avoid protected lands
20	Revised New England_Northern	345kV AC	296.3	Revised New England_Northern to avoid protected lands

### 3. Area Analyses for Demonstrating the EZ Mapping Tool Applications

For area analyses, the following reports can be produced using EZ Mapping Tool corresponding to any specified area.

- Imperiled Species
- Electrical Transmission
- Methane from landfills
- Methane from Animal Manure Processing
- Methane from Water Treatment Plants
- River and Tidal Hydrokinetic Project Permits
- Power Plants
- Pulverized Coal
- Existing Hydropower Dams
- Non-powered Dams
- Pumped Storage
- Wave Energy
- Pipeline
- Habitat
- Demand-Side Resource
- Protected Land
- EPA Brownfield

For the purpose of demonstration, the selected (green) area shown in Figure 3.1 was studied using the EZ Mapping Tool from the perspective of a possible wind farm development in the region. Here, the project team discusses three reports: protected land, power plant, and electrical transmission, for the study area using the EZ Mapping Tool.

The protected land dataset consists primarily of lands contained in the latest version of the Protected Areas Database of the United States (<http://www.protectedlands.net/>), and the National Conservation Easement Database (<http://conservationeasement.us/>). The use of protected land report in EZ Mapping Tool could result in important feasible/infeasible information for both area and transmission corridor analyses.

The following categorization, adopted in the EZ Tool Mapping software, and the color designation will be used throughout this White Paper:

#### Protected Areas Database

1. Exclude from development (Red)
2. Develop with extreme caution (Orange)
3. Develop with caution (Yellow)
4. Likely low conflict area (Transparent)

#### National Conservation Easement Database

1. No sensitivity
2. Develop with extreme caution (Orange)

Several additional categories of protected lands were obtained and categorized as follows:

#### Marine Protected Areas Database

1. Exclude from development (Red)
2. Develop with caution (Orange)
3. Develop with caution (Yellow)

#### National Trail (with .5 mile buffer)

1. No sensitivity
2. Develop with caution (Yellow)



#### Scenic Byway (with .5 mile buffer)

1. No sensitivity
2. Develop with caution (Yellow)

#### Marine Sanctuary (NOAA)

1. No sensitivity
2. Exclude from development (Red)

#### Conserved Land (ME)

1. Exclude from development (Red)
2. with extreme caution (Orange)
3. Public Access Easement, NA: Develop with caution (Yellow)

#### Conserved Land (NH)

1. Exclude from development (Red)
2. Develop with extreme caution (Orange)
3. Develop with caution (Yellow)

#### USFS Roadless Area

1. No sensitivity
2. Exclude from development (Red)

For demonstration, the protected land and wind farm site layers are depicted in Figure 3.1 (Case 1). Here, the shaded green representing 806 square miles is the user designated area for possible wind farm development. The area covers some or all of Ford, Grundy, Iroquois, Kankakee, La Salle, and Livingston Counties in Illinois. For the designated area, the three databases considered in the project include: Protected Areas Database, National Conservation Easement Database and Scenic Byway Database.

Figure 3.2 shows the protected area based on the EZ Mapping Tool for the proposed study, in which 0.47% of the area should be excluded from development, 2.21% of the area should be developed with caution, 2.1% of the area is likely to be a low conflict area, and 95.22% of the area has no identified issues for energy resource development. The report produced by the EZ Mapping Tool, which is discussed later in this White Paper, has listed the detailed reference information for manually adjusting the selected area for energy resource development.

### 3.1 Protected Land Report

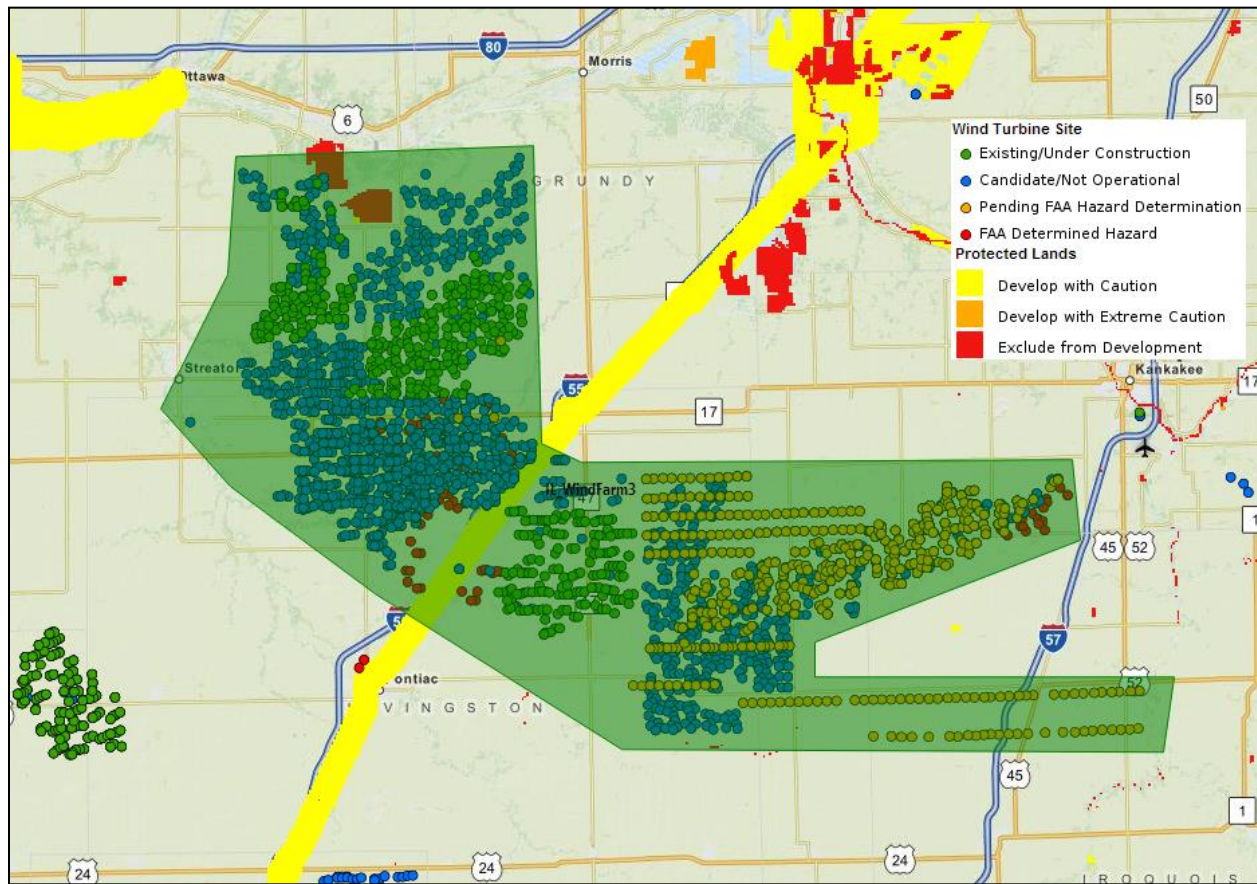


Figure 3.1 Study Area in Green Shaded Zone (Case 1)

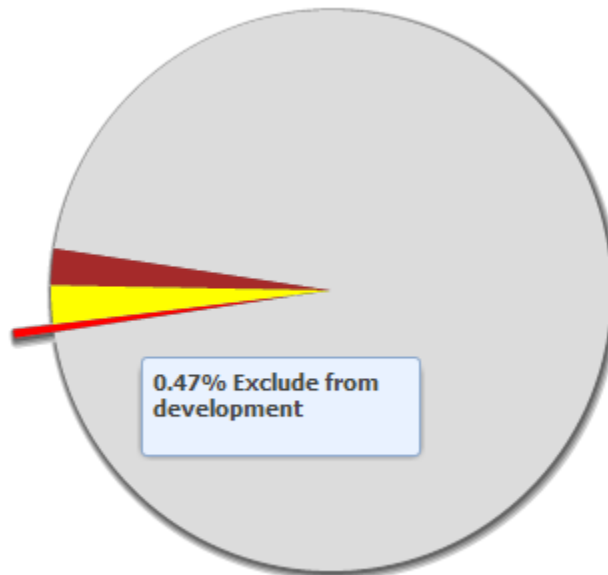
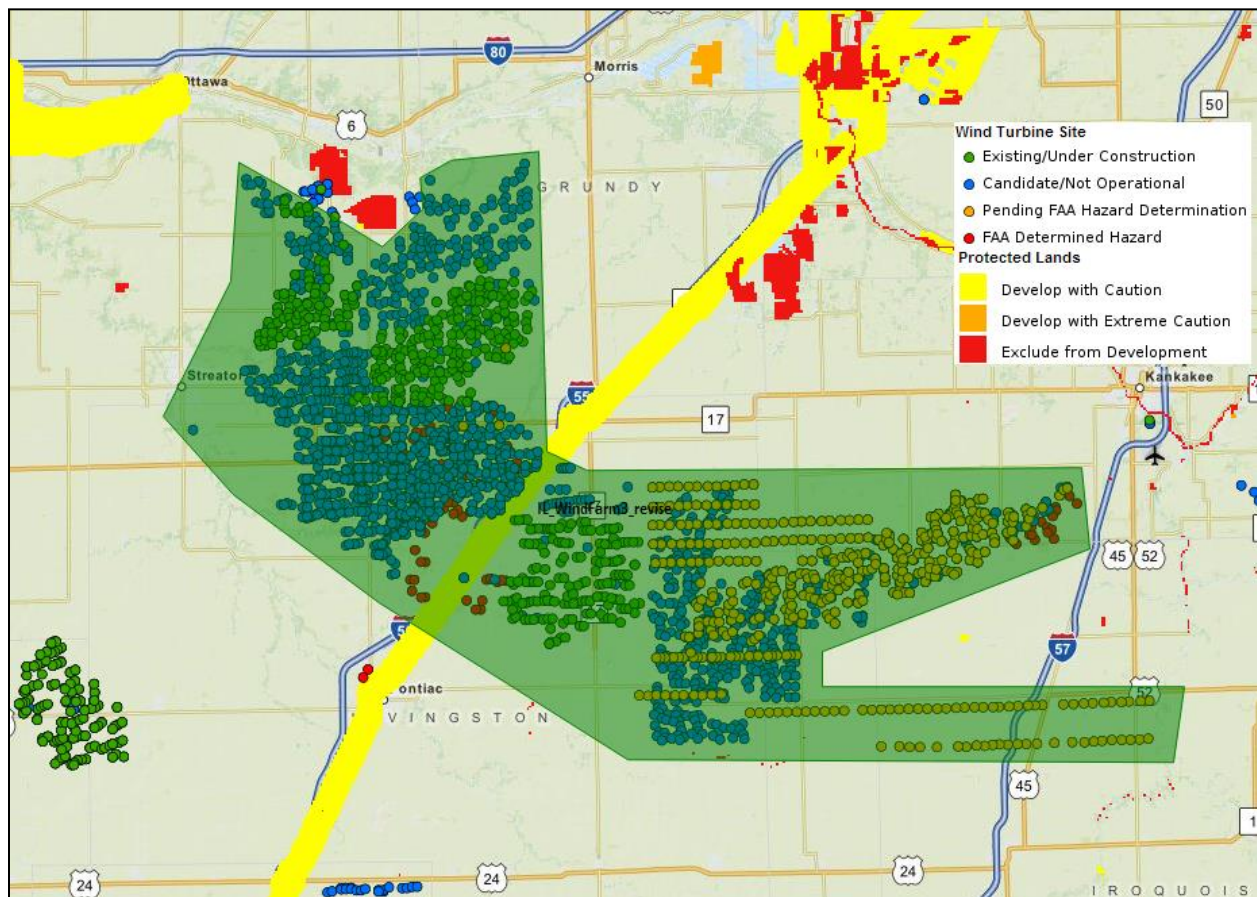


Figure 3.2 Protected Land Results for the Study Area (Case 1)

The manual adjustment function in the EZ Mapping Tool has been used in this White Paper to revise the area for development to avoid the sensitive protected lands shown in Figure 3.3 (Case 2). For the revised area, the protected land report was produced and checked. The revised designated area covers some or all of Ford, Grundy, Iroquois, Kankakee, La Salle, and Livingston Counties in Illinois, and has an area of 779 square miles. Results from the EZ Mapping Tool indicated that for the revised area, 2.27% of the designated area should be developed with caution, 0.73% is likely to be a low conflict area, 96.98% has no identified issues for development, and none of the areas are designated for exclusion from the development. This result shows that the offered by the EZ Mapping Tool adjustments in the designated planning area can mitigate the identified sensitive protected lands issues.



**Figure 3.3 Revised Area Based on the EZ Mapping Tool Application (Case 2)**

Next, the power plant and electrical transmission reports are produced for the revised area and demonstrated using the EZ Mapping Tool and the detailed analyses are presented.

### 3.2 Power Plant Report

The power plant report produced by EZ Mapping Tool includes three parts for the designated area: existing power plants, planned power plants, and not operational/unknown power plants. Figures 3.4 and 3.5 show the existing and planned generation capacity, respectively, for the designated planning area. Table 3.1 shows the details of the existing (already installed) generation capacity based on energy resource type. Table 3.1 and Figure 3.4 show that there is a significant amount of existing natural gas

generation capacity in the designated and the neighboring areas (i.e., within a 50-mile radius) which would facilitate the wind energy deployment.

There are 4,139.5MW of existing natural gas generation capacity within a 25 mile radius of the studied area and 9,962.3MW of existing natural gas generation capacity within 50 miles. Also the existing wind generation capacity is only 402MW as compared to 3,401.86MW of the existing wind generation capacity within a 50 mile radius of the designated area, which indicates that a major potential for wind energy development is available within the designated area.

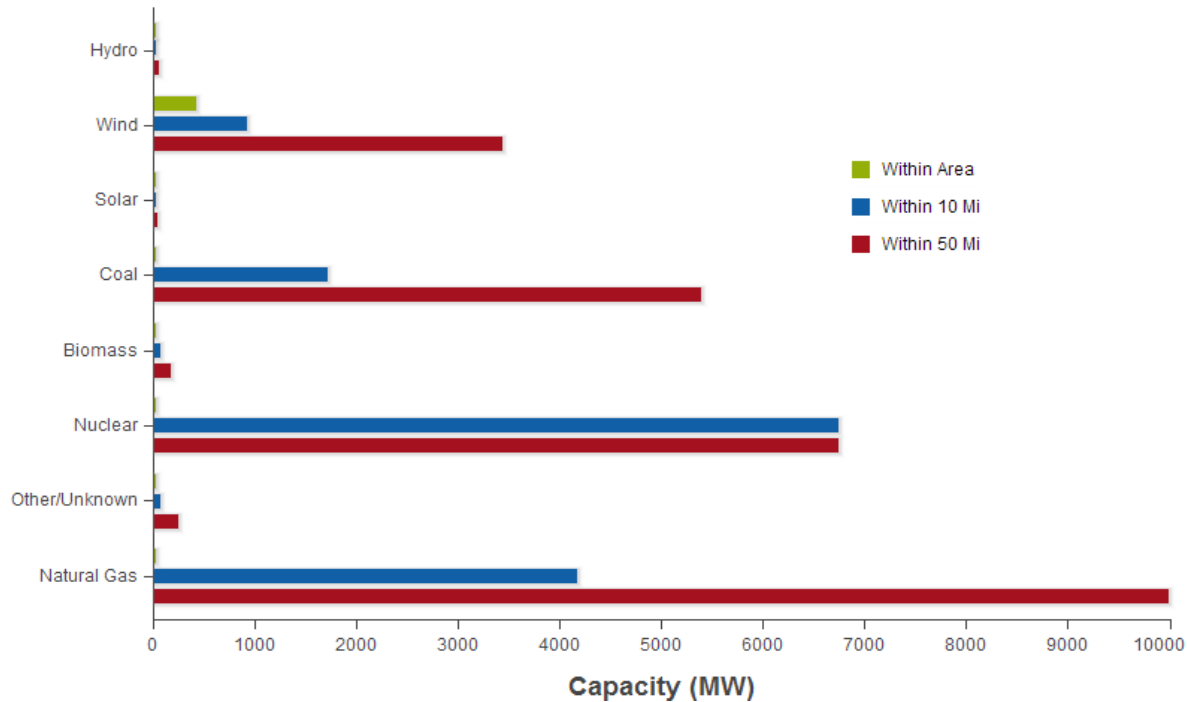


Figure 3.4 Existing Generation Capacity in the Study Area

Table 3.1 Detailed Existing Generation Capacity by Energy Resource Type

EISPC Energy Resource Type	Total Number within the designated Area	Total Operating Capacity (MW) within the designated Area	Total Number within 25 Miles	Total Operating Capacity (MW) within 25 Miles	Total Number within 50 Miles	Total Operating Capacity (MW) within 50 Miles
Natural Gas	0	0	9	4,135.95	50	9,962.30
Other/Unknown	0	0	1	37.10	10	217.80
Nuclear	0	0	3	6,712.90	3	6,712.90
Biomass	0	0	7	45.40	23	140.30
Coal	0	0	2	1,690.40	7	5,355.10
Solar	0	0	0	0	2	17.25
Wind	2	402.00	5	892.90	22	3,401.86
Hydro	0	0	3	6.84	4	22.84
<b>TOTAL</b>	<b>2</b>	<b>402</b>	<b>30</b>	<b>13,521.49</b>	<b>121</b>	<b>25,830.35</b>



Figure 3.5 and Table 3.2 show that wind energy is the primary planned generation resource within the designated area and its neighboring areas. With the planned wind generation capacity, the total wind generation capacity will increase from 402 MW to 1,152 MW within the study area and 3,401 MW to 6,449.5 MW in its neighboring area (within 50 miles).

Due to the variable nature of wind energy, large-scale deployments of wind energy in the designated area can introduce additional challenges for the operation and control of local existing power plants and the transmission system. This issue would require further analytical studies.

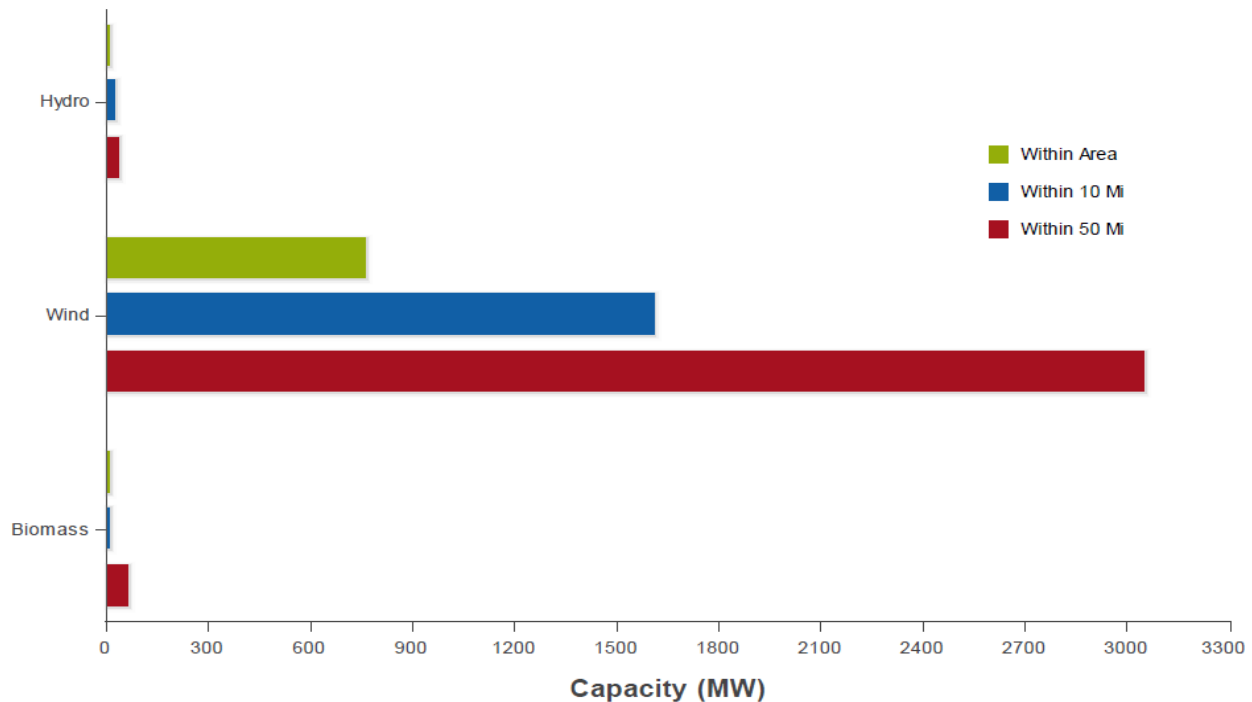


Figure 3.5 Planned Generation Capacity in the Study Area

Table 3.2 Detailed Planned Generation Capacity by Energy Resource Type

EISPC Energy Resource Type	Total Number within the Designated Area	Total Planned Nameplate Capacity (MW) within the Designated Area	Total Number within 25 Miles	Total Planned Nameplate Capacity (MW) within 25 Miles	Total Number within 50 Miles	Total Planned Nameplate Capacity (MW) within 50 Miles
Biomass	0	0	0	0	1	55.25
Wind	1	750.00	4	1,600.00	12	3,038.50
Hydro	0	0	1	18.00	2	28.80
<b>TOTAL</b>	<b>1</b>	<b>750</b>	<b>5</b>	<b>1618</b>	<b>15</b>	<b>3,122.55</b>

### 3.3 Electrical Transmission Report

The electrical transmission report of the EZ Mapping Tool includes existing and planned transmission/sub-transmission system data. Transmission lines can carry alternating current (AC) or direct current (DC) with voltage ranging from 110kV to 765kV. Sub-transmission lines generally carry voltages ranging from 33kV to 100kV.

An electrical transmission report for the studied area in Figure 3.3 was produced using the EZ Mapping Tool. Table 3.3 shows the existing transmission lines and Table 3.4 shows the existing substations in the studied area, respectively. There are 345kV AC transmission lines and two 345KV substations within the studied area which may be able to facilitate additional large-scale wind energy deployment in this study area.

**Table 3.3 Existing Transmission Lines**

<b>Voltage Category</b>	<b>Total Length (mi) in the Studied Area</b>	<b>Total Length (mi) within 25 Miles of the Studied Area</b>	<b>Total Length (mi) within 50 Miles of the Studied Area</b>
100kV or Lower	76.16	1,218.92	3,815.15
115kV - 161kV	2.59	652.27	2,726.75
220kV - 315kV	0.00	0.00	3.91
345kV - 450kV	125.78	829.51	2,163.29
735kV - 765kV	0.00	83.40	115.04
<b>TOTAL</b>	<b>206.52</b>	<b>2,782.09</b>	<b>8,822.15</b>

**Table 3.4 Existing Substations**

<b>Largest Voltage Connection (kV) in the Substation</b>	<b>Total Number within the Studied Area</b>	<b>Total Number within 25 Miles of the Studied Area</b>	<b>Total Number within 50 Miles of the Studied Area</b>
115kV or Lower	17	258	956
116 - 138kV	0	88	373
139 - 230kV	0	0	1
231 - 345kV	2	16	75
501kV or Higher	0	2	4
Unknown	1	16	65
<b>TOTAL</b>	<b>20</b>	<b>380</b>	<b>1,474</b>

## 4. Transmission Corridor Analyses

### 4.1 EIPC Transmission Corridors

In this section, the project team focuses the evaluation of the EZ Mapping Tool on new/updated high voltage DC or AC transmission lines in the Eastern Interconnection. The project team selected 10 updated/new transmission planning cases, which were presented in Scenario 1 of the EIPC final report.<sup>5</sup> These cases are shown in Figure 4.1.

The 10 selected transmission lines, provided to the EZ Mapping Tool, are also shown in Figure 4.2 (Cases 3-12) along with protected land data. The EZ Mapping Tool evaluation results are summarized in Table 4.1. Four of the 10 transmission lines selected from the EIPC report would cross sensitive protected lands, and refinements to the proposed routes are considered by the EZ Mapping Tool.

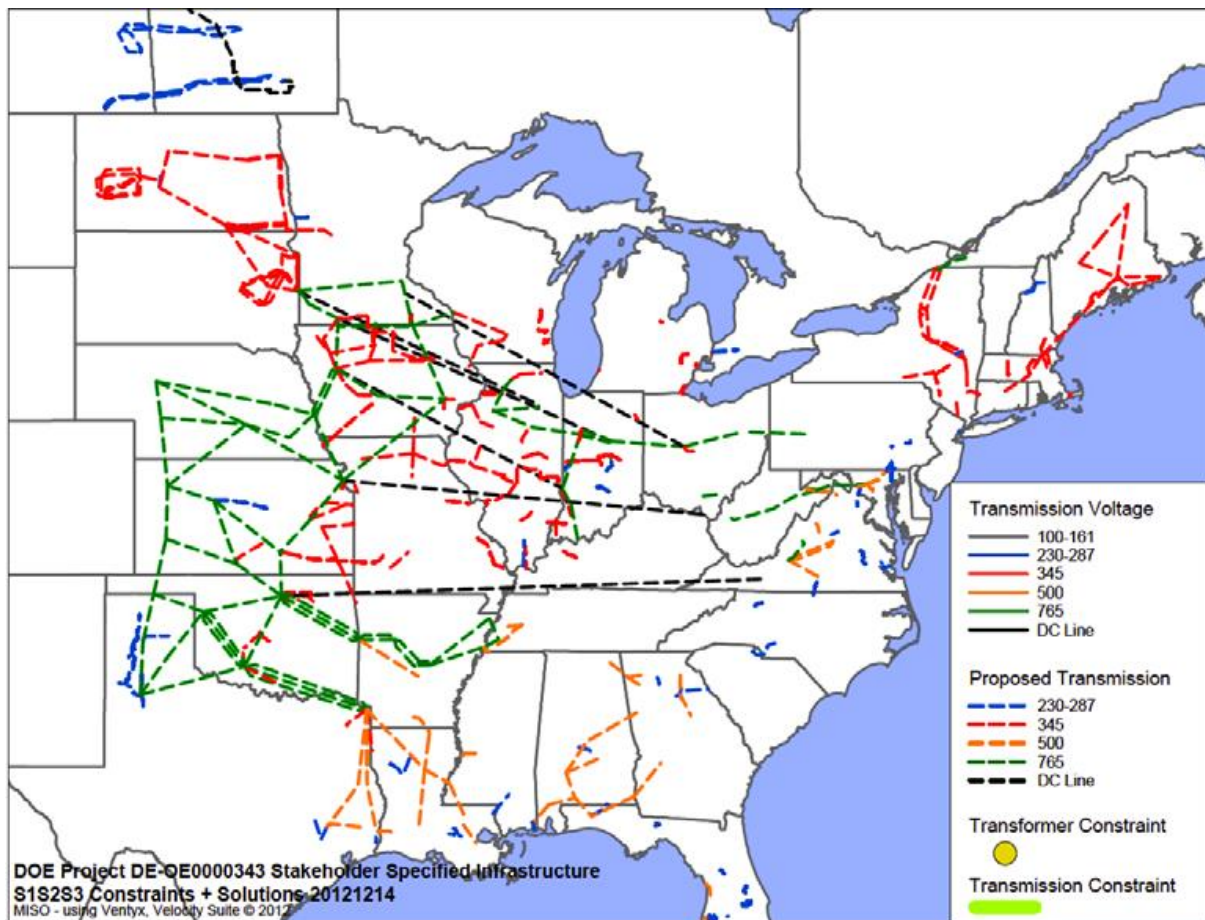


Figure 4.1 EIPC Scenario 1: Combined Policies – New/Upgraded Transmission

<sup>5</sup> Eastern Interconnection Planning Collaborative (EIPC), *Phase 2 Report: DOE Draft - Part 1 Interregional Transmission Development and Analysis for Three Stakeholder Selected Scenarios*, Available at [http://eipconline.com/Resource\\_Library.html](http://eipconline.com/Resource_Library.html), December 2011

We would like to emphasize that the EZ Mapping Tool results do not alter the electrical characteristics of the proposed EIPC lines. The EZ Mapping Tool provides a means of investigating protected areas issues which are located along the transmission corridor. The 10 cases are discussed in the following sections, with complete reports for selected cases included in Appendix B.

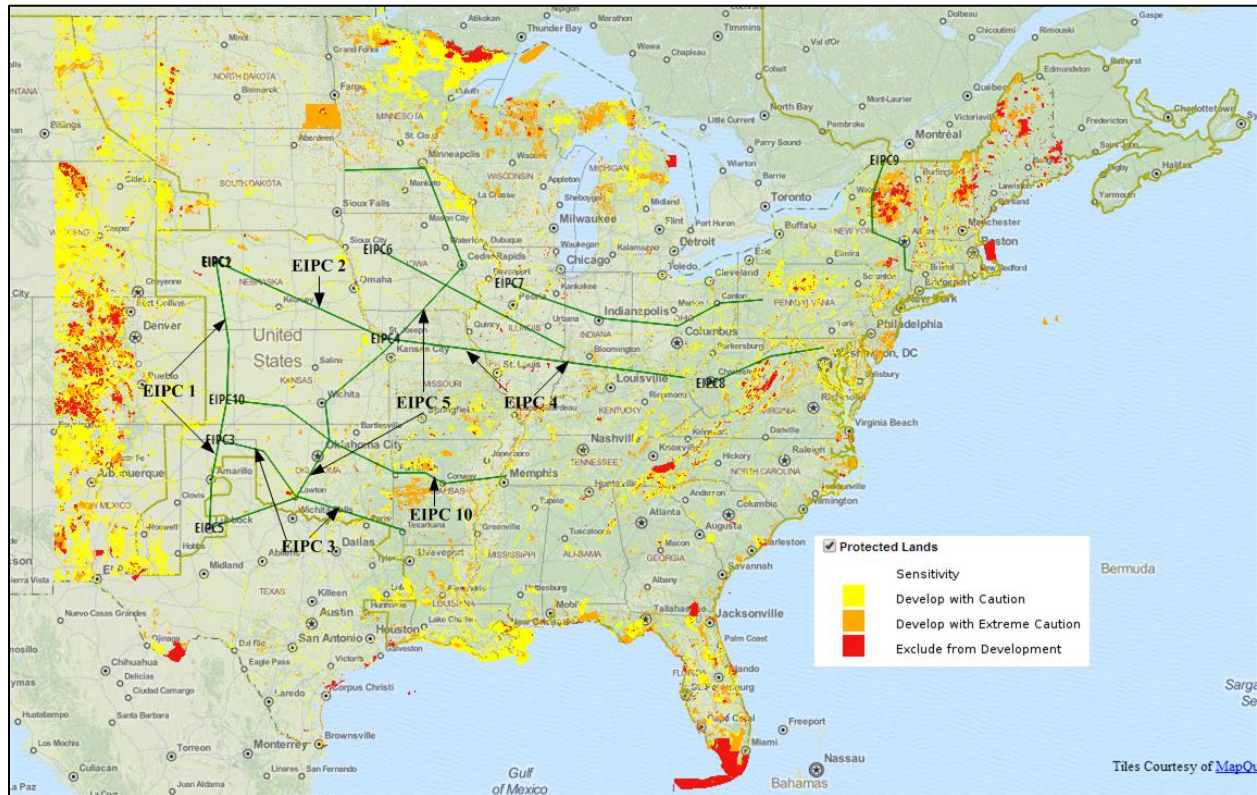


Figure 4.2 Selected Transmission Corridors and Protected Lands (Cases 3-12)

Table 4.1 Evaluation Results by EZ Mapping Tool (Cases 3-12)

Line No.	Line Type	Length (Miles)	Feasible	Comments on the Proposed EIPC Corridor
EIPC 1	765kV AC	598.29	Yes	Develop with extreme caution
EIPC 2	765kV AC	386.69	Yes	Develop with extreme caution
EIPC 3	765kV AC	489.16	Yes	Develop with extreme caution
EIPC 4	500kV DC	648.39	Yes	Develop with extreme caution
EIPC 5	765kV AC	1240.33	Yes	Develop with extreme caution
EIPC 6	500kV DC	446.78	No	Exclude from development
EIPC 7	765kV AC	561.08	No	Exclude from development
EIPC 8	765kV AC	258.26	No	Exclude from development
EIPC 9	345kV AC	285.06	No	Exclude from development
EIPC 10	365kV AC	679.95	Yes	Develop with extreme caution



## 4.2 Revised EIPC Transmission Corridors

We used the EZ Mapping Tool to re-evaluate Cases EIPC 6 – EIPC 9 listed in Table 4.1. The EZ Mapping Tool offers an option to adjust the transmission corridors manually in order to avoid the prohibited areas for transmission routes. The infeasibilities of EIPC 6 – EIPC 9 lines are depicted in Figure 4.2 as these four corridors cross protected lands. In this section, EIPC 6 – EIPC 9 lines are rerouted according to the EZ Mapping Tool results in order to avoid the identified protected lands. The revised transmission corridors and the simulation results are discussed in the following sections.

### 4.2.1 Re-evaluation of EIPC 6 (Case 13)

The original transmission corridor for EIPC 6 (Case 8) is shown in Figure 4.3. The reason for the exclusion of the original EIPC 6 by the EZ Mapping Tool is that this corridor crosses sensitive protected lands. The crossing details are represented in Table 4.2. The Table shows four sections of the corridor EIPC 6 which cross the protected lands and flagged as excluded from development by the EZ Mapping Tool.

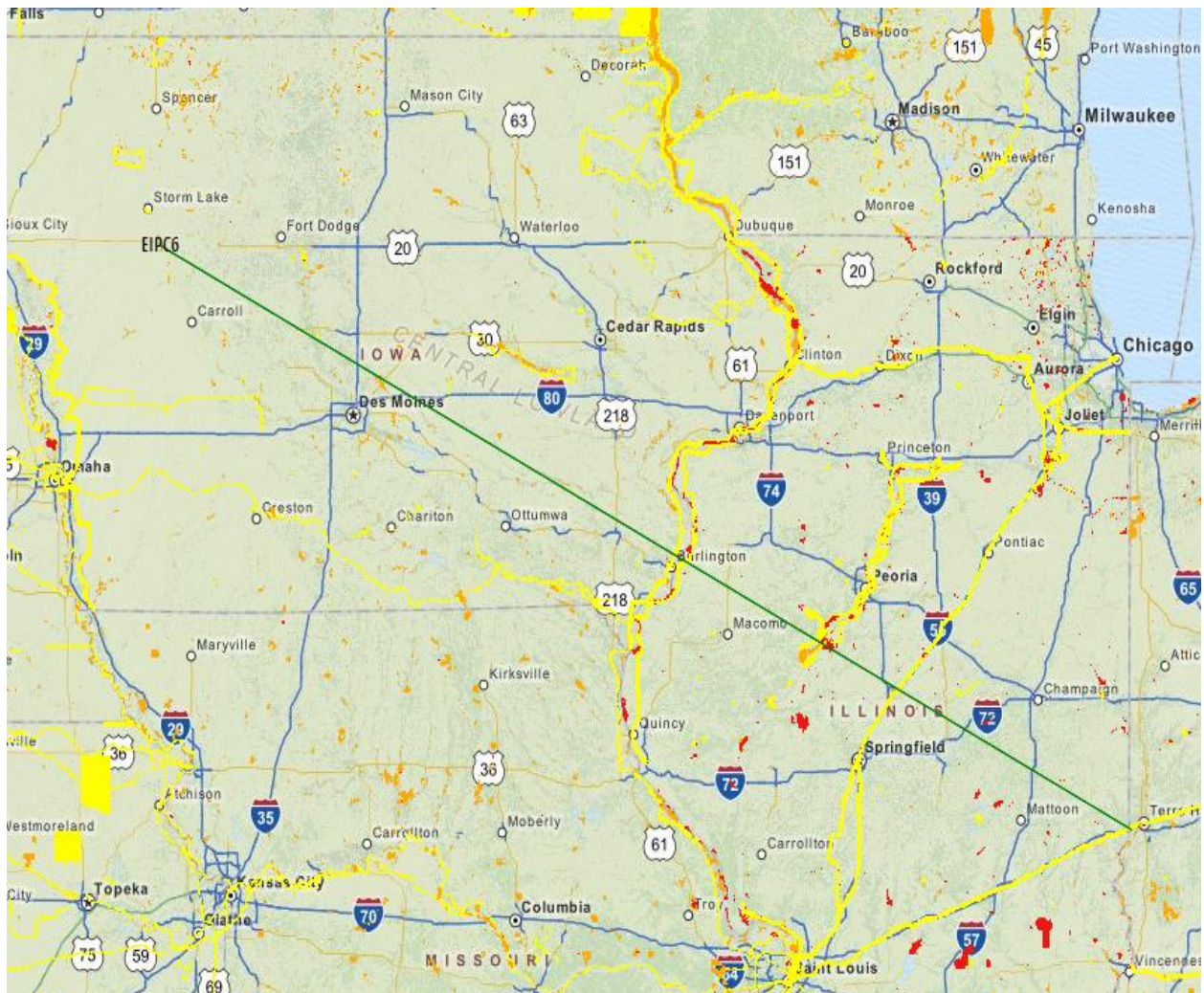


Figure 4.3 Original EIPC 6 Transmission Corridor (Case 8)

**Table 4.2 Information on Protected Lands for the Original EIPC 6 Transmission Corridor (Case 8)**

From Milepost (mile)	To Milepost (mile)	Recommendation	Percentage
0.0	25.0	No issues identified in data	97.49%
		Develop with extreme caution	2.51%
25.0	50.0	No issues identified in data	100.00%
50.0	75.0	No issues identified in data	98.32%
		Develop with caution	1.68%
75.0	100.0	No issues identified in data	100.00%
100.0	125.0	No issues identified in data	100.00%
125.0	150.0	No issues identified in data	100.00%
150.0	175.0	No issues identified in data	92.24%
		Develop with extreme caution	7.76%
175.0	200.0	No issues identified in data	100.00%
200.0	225.0	No issues identified in data	100.00%
225.0	250.0	No issues identified in data	81.69%
		Develop with caution	11.63%
		Develop with extreme caution	0.58%
		Exclude from development	6.10%
250.0	275.0	No issues identified in data	100.00%
275.0	300.0	No issues identified in data	93.26%
		Develop with caution	6.74%
300.0	325.0	No issues identified in data	75.22%
		Develop with caution	22.71%
		Develop with extreme caution	1.18%
		Exclude from development	0.88%
325.0	350.0	No issues identified in data	93.18%
		Develop with caution	6.53%
		Exclude from development	0.30%
350.0	375.0	No issues identified in data	98.21%
		Develop with extreme caution	1.79%
375.0	400.0	No issues identified in data	100.00%
400.0	425.0	No issues identified in data	99.70%
		Exclude from development	0.30%
425.0	446.78	No issues identified in data	91.32%
		Develop with caution	8.68%

The original EIPC 6 route is revised in Case 13 to avoid the most problematic protected lands using the manual adjustment function of EZ Mapping Tool. After manually adjusting the route, a report for the new corridor path is generated and presented in Table 4.3. The revised EIPC 6 route is depicted in Figure 4.4 in which the revised sections of the corridor are highlighted. Table 4.3 indicates that the revised EIPC 6 has a feasible route, having eliminated the “exclude from development” segments shown in Table 4.2.

**Table 4.3 Information on Protected Lands for the Revised EIPC 6 Transmission Corridor (Case 13)**

From Milepost (mile)	To Milepost (mile)	Recommendation	Percentage
0.0	25.0	No issues identified in data	96.68%
		Develop with extreme caution	3.32%
25.0	50.0	No issues identified in data	100.00%
50.0	75.0	No issues identified in data	95.79%
		Develop with caution	2.21%
75.0	100.0	No issues identified in data	100.00%
100.0	125.0	No issues identified in data	100.00%
125.0	150.0	No issues identified in data	100.00%
150.0	175.0	No issues identified in data	100.00%
175.0	200.0	No issues identified in data	95.11%
		Develop with caution	2.59%
		Develop with extreme caution	2.30%
200.0	225.0	No issues identified in data	100.00%
225.0	250.0	No issues identified in data	85.09%
		Develop with caution	12.91%
250.0	275.0	No issues identified in data	100.00%
275.0	300.0	No issues identified in data	100.00%
300.0	325.0	No issues identified in data	82.00%
		Develop with caution	10.15%
		Develop with extreme caution	5.85%
325.0	350.0	No issues identified in data	93.39%
		Develop with caution	6.61%
350.0	375.0	No issues identified in data	100.00%
375.0	400.0	No issues identified in data	100.00%
400.0	425.0	No issues identified in data	99.39%
		Develop with caution	0.61%
425.0	450.0	No issues identified in data	100.00%
450.0	452.25	No issues identified in data	52.55%
		Develop with caution	45.45%



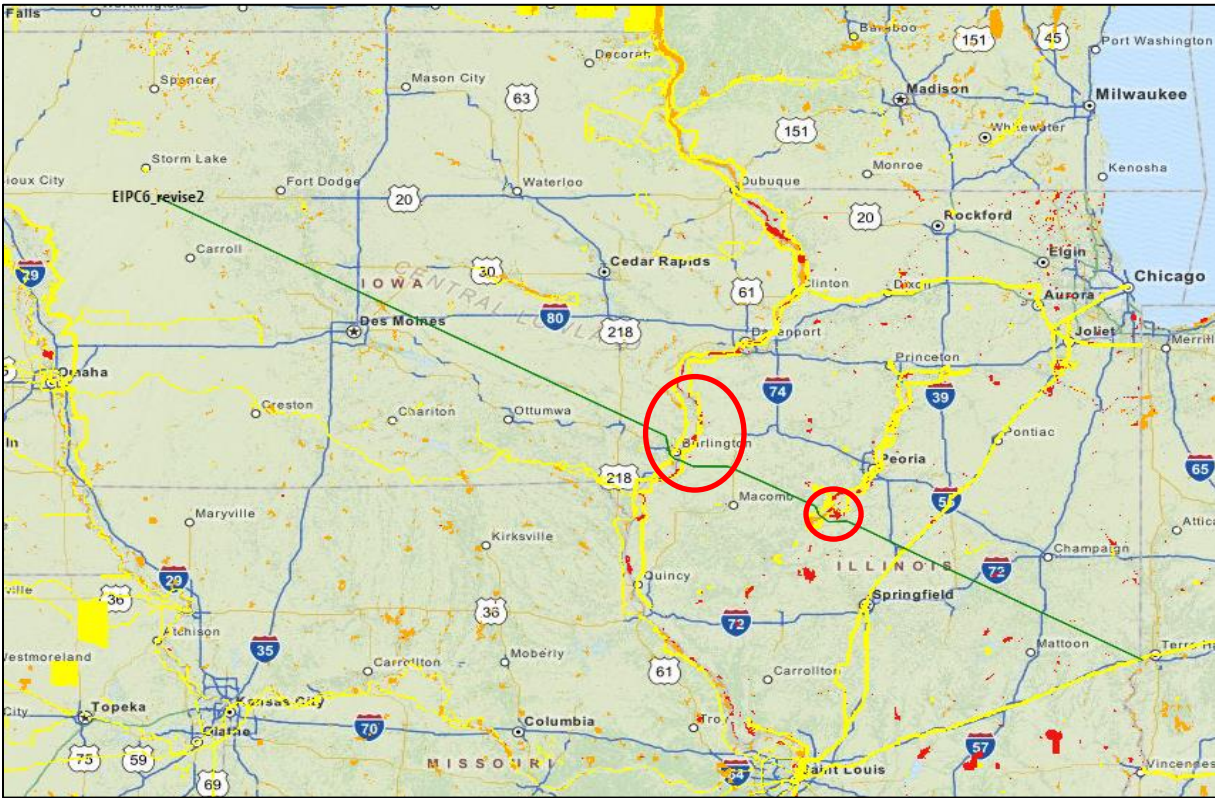


Figure 4.4 Revised EIPC 6 Transmission Corridor (Case 13)

#### 4.2.2 Re-evaluation of EIPC 7 (Case 14)

The original EIPC 7 transmission corridor (Case 9) is shown in Figure 4.5. The sections of the original corridor report that cross protected lands are shown in Table 4.4 indicating that the original EIPC 7 corridor crosses the highest level of protected lands in three places.

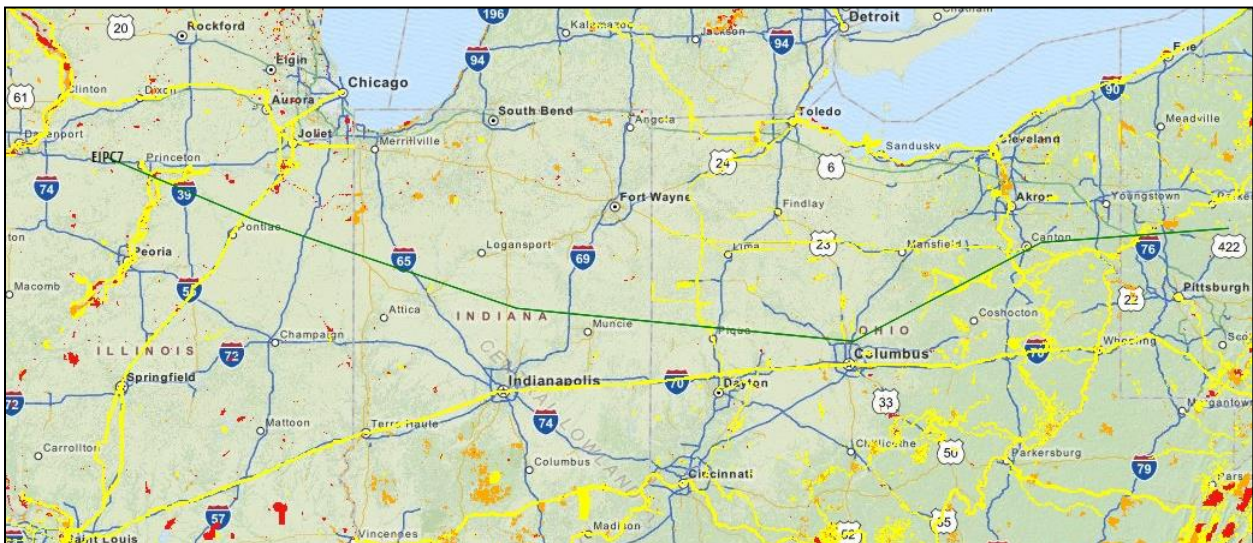


Figure 4.5 Original EIPC 7 Transmission Corridor (Case 9)

**Table 4.4 Information on Protected Lands for the Original EIPC 7 Transmission Corridor (Case 9)**

From Milepost (mile)	To Milepost (mile)	Recommendation	Percentage
0.0	50.0	No issues identified in data	86.35%
		Develop with caution	12.07%
		Exclude from development	1.58%
50.0	100.0	No issues identified in data	97.10%
		Develop with caution	2.90%
100.0	150.0	No issues identified in data	100.00%
150.0	200.0	No issues identified in data	100.00%
200.0	250.0	No issues identified in data	100.00%
250.0	300.0	No issues identified in data	98.22%
		Develop with caution	1.78%
300.0	350.0	No issues identified in data	96.57%
		Develop with caution	2.98%
		Develop with extreme caution	0.45%
350.0	400.0	No issues identified in data	95.99%
		Develop with caution	2.38%
		Develop with extreme caution	1.19%
		Exclude from development	0.45%
400.0	450.0	No issues identified in data	76.99%
		Develop with caution	23.01%
450.0	500.0	No issues identified in data	91.95%
		Develop with caution	8.05%
500.0	550.0	No issues identified in data	88.53%
		Develop with caution	10.60%
		Exclude from development	0.87%
550.0	561.08	No issues identified in data	100.00%

The original EIPC 7 corridor route was manually adjusted in the EZ Mapping Tool (Case 14), and the revised route is depicted in Figure 4.6, with the highlighted revisions to the original corridor segments. The adjusted corridor with the EZ Mapping Tool, which is shown in Table 4.5, indicates that the revised EIPC 7 has eliminated the most problematic crossings with protected lands.





Figure 4.6 Revised EIPC 7 Transmission Corridor (Case 14)

Table 4.5 Information on Protected Lands for the Revised EIPC 7 Transmission Corridor (Case 14)

From Milepost (mi)	To Milepost (mi)	Recommendation	Percentage
0.0	50.0	No issues identified in data	87.84%
		Develop with caution	12.16%
50.0	100.0	No issues identified in data	96.96%
		Develop with caution	3.04%
100.0	150.0	No issues identified in data	100.00%
150.0	200.0	No issues identified in data	100.00%
200.0	250.0	No issues identified in data	100.00%
250.0	300.0	No issues identified in data	97.93%
		Develop with caution	2.07%
300.0	350.0	No issues identified in data	95.42%
		Develop with caution	3.99%
		Develop with extreme caution	0.59%
350.0	400.0	No issues identified in data	98.80%
		Develop with caution	1.20%
400.0	450.0	No issues identified in data	80.95%
		Develop with caution	19.05%
450.0	500.0	No issues identified in data	88.32%
		Develop with caution	11.68%
500.0	550.0	No issues identified in data	92.40%
		Develop with caution	5.60%
550.0	566.87	No issues identified in data	100.00%



#### 4.2.3 Re-evaluation of EIPC 8 (Case 15)

The original EIPC 8 transmission corridor (Case 10) is shown in Figure 4.7, and the protected lands section of the corridor report is shown in Table 4.6. There are two segments of EIPC 8 corridor which cross the protected lands designated as “excluded from development.” Figure 4.8 shows the revised route in which the two segments of the corridor, originally crossing the most incompatible protected lands, are highlighted. Table 4.7 lists the results for the revised corridor according to the EZ Mapping Tool in which the most problematic crossings with protected lands are eliminated.

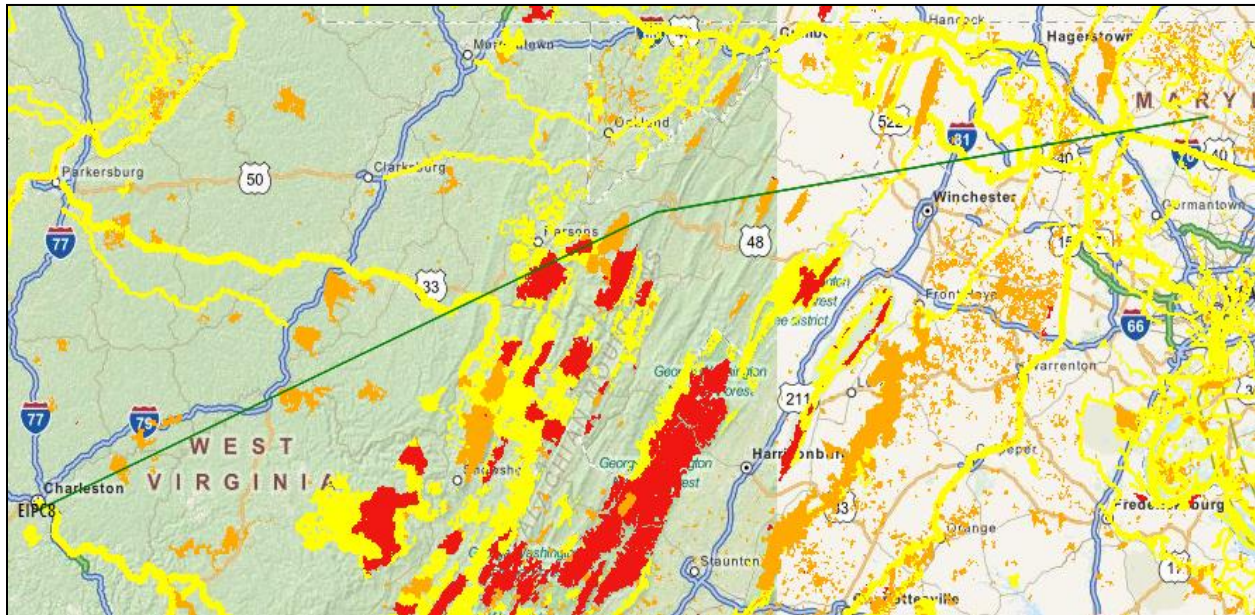


Figure 4.7 Original EIPC 8 Transmission Corridor (Case 10)

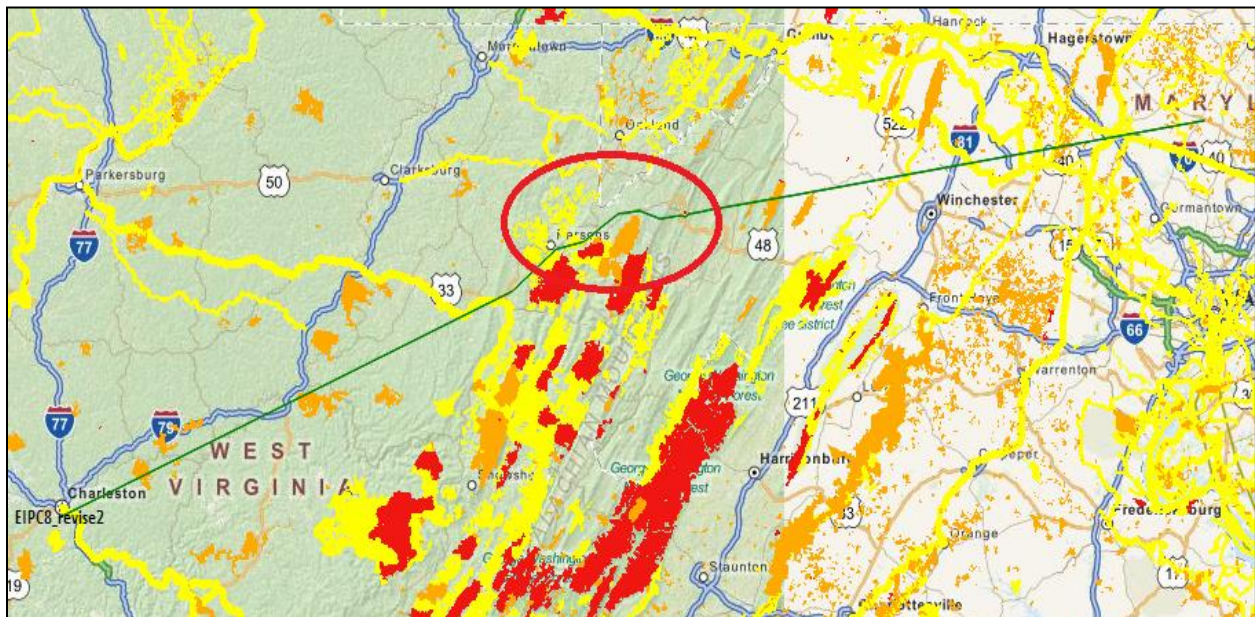


Figure 4.8 Revised EIPC 8 Transmission Corridor (Case 15)

**Table 4.6 Information on Protected Lands for the Original EIPC 8 Transmission Corridor (Case 10)**

From Milepost (mile)	To Milepost (mile)	Recommendation	Percentage
0.0	25.0	No issues identified in data	76.80%
		Develop with caution	10.97%
		Develop with extreme caution	12.23%
25.0	50.0	No issues identified in data	100.00%
50.0	75.0	No issues identified in data	93.79%
		Develop with extreme caution	6.21%
75.0	100.0	No issues identified in data	72.92%
		Develop with caution	25.08%
100.0	125.0	No issues identified in data	39.69%
		Develop with caution	28.31%
		Exclude from development	32.00%
125.0	150.0	No issues identified in data	55.02%
		Develop with caution	7.29%
		Develop with extreme caution	22.49%
		Exclude from development	15.20%
150.0	175.0	No issues identified in data	88.11%
		Develop with extreme caution	11.89%
175.0	200.0	No issues identified in data	96.31%
		Develop with caution	3.69%
200.0	225.0	No issues identified in data	80.24%
		Develop with caution	19.76%
225.0	250.0	No issues identified in data	66.06%
		Develop with caution	23.03%
		Develop with extreme caution	10.91%
250.0	258.26	No issues identified in data	82.24%
		Develop with caution	11.21%
		Develop with extreme caution	6.54%



**Table 4.7 Information on Protected Lands for the Revised EIPC 8 Transmission Corridor (Case 15)**

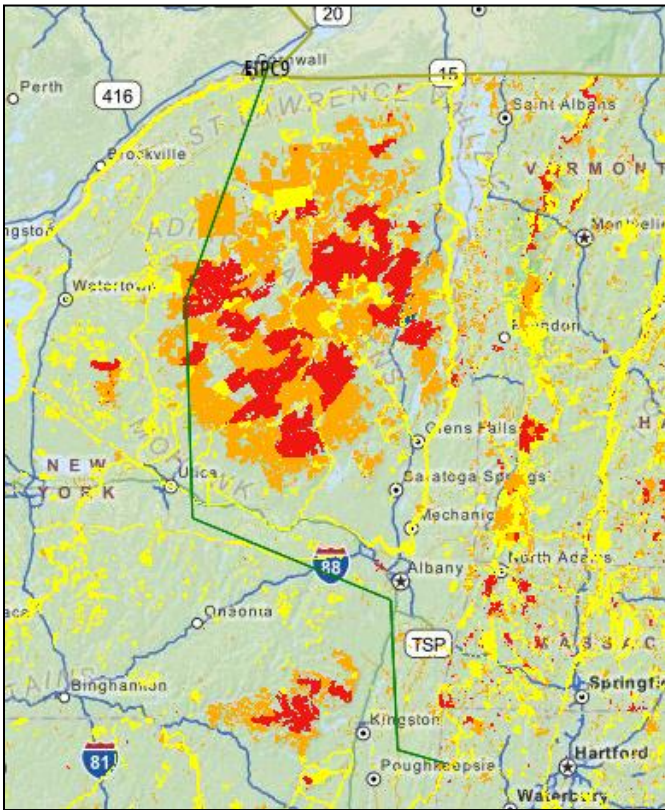
From Milepost (mi)	To Milepost (mi)	Recommendation	Percentage
0.0	25.0	No issues identified in data	76.58%
		Develop with caution	11.08%
		Develop with extreme caution	12.34%
25.0	50.0	No issues identified in data	100.00%
50.0	75.0	No issues identified in data	87.23%
		Develop with extreme caution	12.77%
75.0	100.0	No issues identified in data	78.35%
		Develop with caution	21.65%
100.0	125.0	No issues identified in data	58.13%
		Develop with caution	41.87%
125.0	150.0	No issues identified in data	93.92%
		Develop with caution	6.08%
150.0	175.0	No issues identified in data	82.68%
		Develop with extreme caution	15.32%
175.0	200.0	No issues identified in data	92.77%
		Develop with caution	3.49%
		Develop with extreme caution	1.74%
200.0	225.0	No issues identified in data	83.03%
		Develop with caution	16.36%
		Develop with extreme caution	0.61%
225.0	250.0	No issues identified in data	60.61%
		Develop with caution	28.18%
		Develop with extreme caution	11.21%
250.0	260.94	No issues identified in data	88.03%
		Develop with caution	7.04%
		Develop with extreme caution	2.93%

#### 4.2.4 Re-evaluation of EIPC 9 (Case 16)

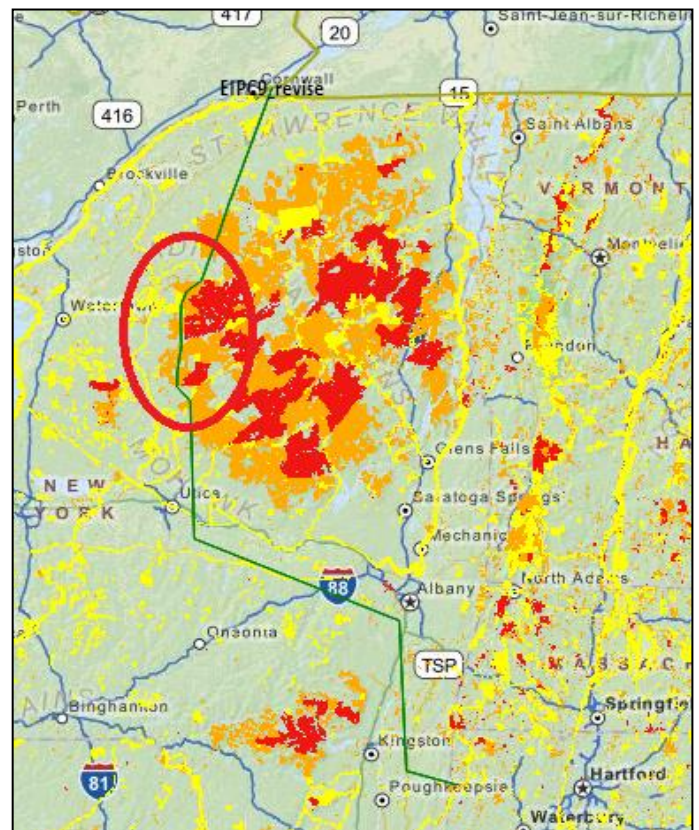
The detailed information on overlaps with protected lands for the original EIPC 9 transmission corridor (Case 11) is shown in Table 4.8, and the route is shown in Figure 4.9. According to the information, two segments of the original EIPC 9 would overlap with protected lands which are designated as “excluded from development.” Figure 4.10 shows the revised path of EIPC 9, with the two revised segments highlighted (Case 16). Table 4.9 lists the EZ Mapping Tool results for the revised corridor in which the most problematic crossings with protected the lands are eliminated.

**Table 4.8 Information on Protected Lands for the Original EIPC9 Transmission Corridor (Case 11)**

From Milepost (mile)	To Milepost (mile)	Recommendation	Percentage
0.0	25.0	No issues identified in data	82.87%
		Develop with caution	15.13%
25.0	50.0	No issues identified in data	57.22%
		Develop with caution	3.09%
		Develop with extreme caution	39.69%
50.0	75.0	No issues identified in data	28.27%
		Develop with caution	3.40%
		Develop with extreme caution	56.28%
		Exclude from development	12.04%
75.0	100.0	No issues identified in data	20.42%
		Develop with extreme caution	36.07%
		Exclude from development	43.50%
100.0	125.0	No issues identified in data	78.67%
		Develop with caution	9.87%
		Develop with extreme caution	11.47%
125.0	150.0	No issues identified in data	93.78%
		Develop with caution	6.22%
150.0	175.0	No issues identified in data	99.46%
		Develop with extreme caution	0.54%
175.0	200.0	No issues identified in data	91.76%
		Develop with caution	8.24%
200.0	225.0	No issues identified in data	100.00%
225.0	250.0	No issues identified in data	92.10%
		Develop with extreme caution	5.90%
250.0	275.0	No issues identified in data	100.00%
275.0	285.06	No issues identified in data	97.92%
		Develop with extreme caution	2.08%



**Figure 4.9 Original EIPC 9 Transmission Corridor  
(Case 11)**



**Figure 4.10 Revised EIPC 9 Transmission Corridor  
(Case 16)**

**Table 4.9 Information on Protected Lands for the Revised EIPC 9 Transmission Corridor (Case 16)**

From Milepost (mile)	To Milepost (mile)	Recommendation	Percentage
0.0	25.0	No issues identified in data	85.64%
		Develop with caution	13.85%
		Develop with extreme caution	0.51%
25.0	50.0	No issues identified in data	60.62%
		Develop with caution	3.63%
		Develop with extreme caution	35.75%
50.0	75.0	No issues identified in data	27.15%
		Develop with caution	7.31%
		Develop with extreme caution	65.54%
75.0	100.0	No issues identified in data	43.97%
		Develop with caution	12.87%
		Develop with extreme caution	43.16%
100.0	125.0	No issues identified in data	68.02%
		Develop with caution	12.09%
		Develop with extreme caution	17.89%
125.0	150.0	No issues identified in data	95.43%
		Develop with caution	2.57%
150.0	175.0	No issues identified in data	99.73%
		Develop with extreme caution	0.27%
175.0	200.0	No issues identified in data	91.74%
		Develop with caution	8.26%
200.0	225.0	No issues identified in data	100.00%
225.0	250.0	No issues identified in data	95.00%
		Develop with extreme caution	5.00%
250.0	275.0	No issues identified in data	99.15%
		Develop with extreme caution	0.85%
275.0	288.60	No issues identified in data	98.46%
		Develop with extreme caution	1.54%



### 4.3 Transmission Corridors in the New England Area

We implemented the New England cases commented on by the Honorable David Littell indicating that “There are two cases that would be interesting in the Northeast- the loop put forward in Maine in the diagram (I think it is the ISO-NE proposed 345 loop to support wind from Maine). In reality, it will not be built as ISO-NE proposed but would have interesting impacts because it moves through sensitive areas, populated areas and the AT. The Northern Pass through NH and alternative routes also would be an interesting case. And that is far along through not clear if it will go forward. One of those two cases would be very meaningful for the six New England states.”

These two proposed cases, referred to as “NewEngland\_Loop” and “NewEngland\_Northern” are evaluated using the EZ Mapping Tool, which are shown in Figure 4.11. For the reference, the protected land data layers are also displayed.

#### 4.3.1 NewEngland\_Loop (Case 17)

The EZ Mapping Tool report for the New England Loop transmission corridor (Case 17) shown in Figure 4.11 indicates that the portions of the loop corridor should be excluded from development due to protected lands conflicts. The corridor report of the EZ Mapping Tool shown in Table 4.10 which portions designated as “exclude from development” indicates that there are crossings with most of the milepost ranges with protected lands.

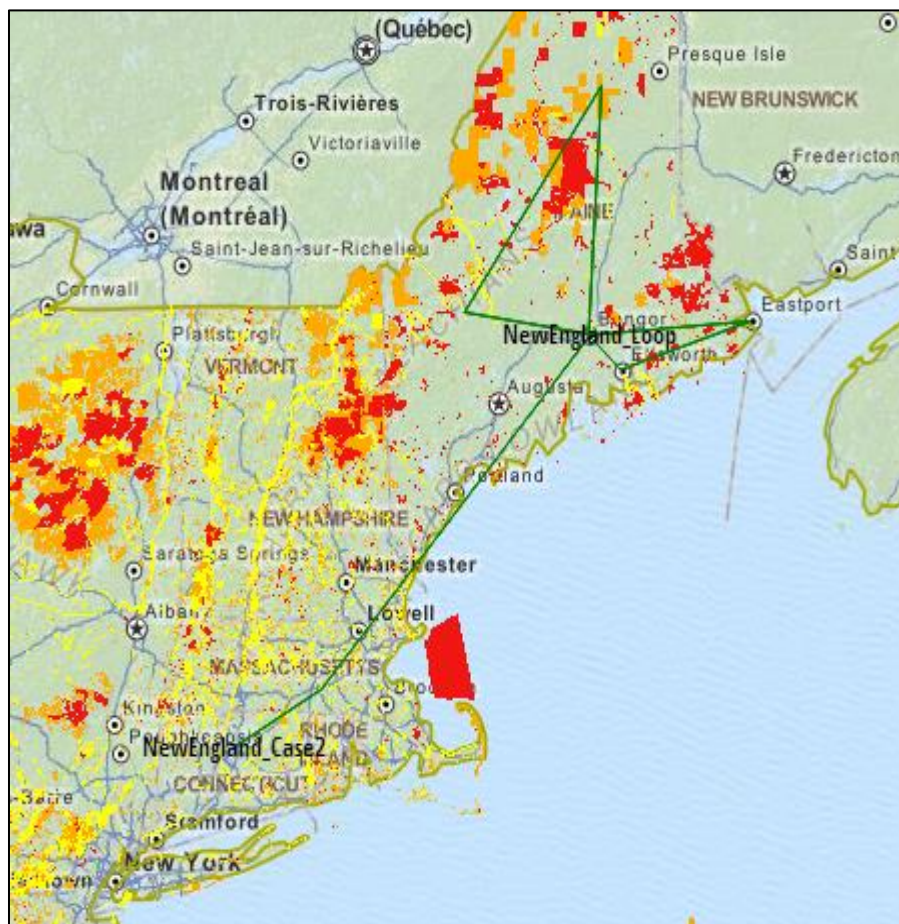


Figure 4.11 Original Transmission Corridors in New England (Case 17)

**Table 4.10 Information on Protected Land crossings for the Original NewEngland\_Loop (Case 17)**

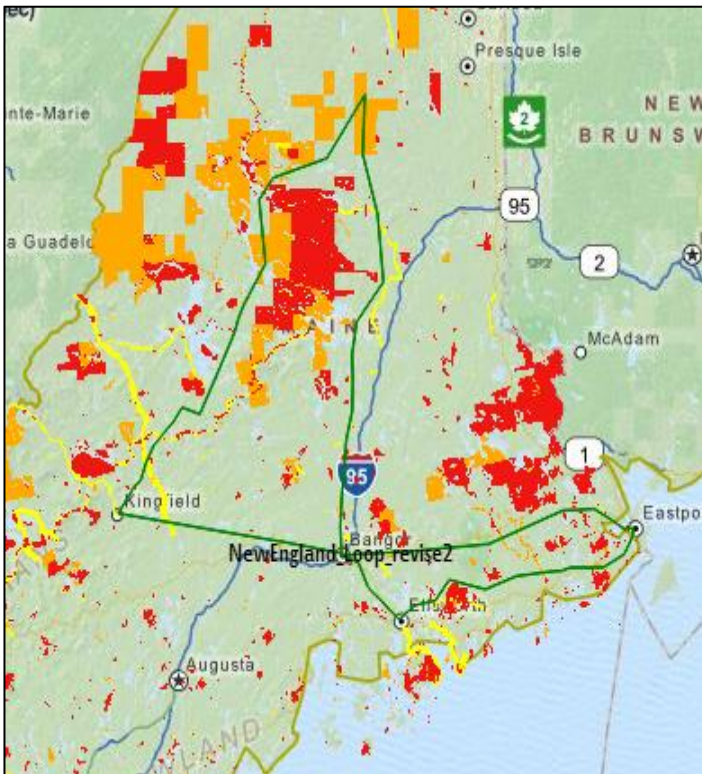
From Milepost (mile)	To Milepost (mile)	Recommendation	Percentage
0.0	50.0	No issues identified in data	99.17%
		Develop with extreme caution	0.77%
		Exclude from development	0.06%
50.0	100.0	No issues identified in data	90.59%
		Develop with caution	7.89%
		Develop with extreme caution	0.25%
		Exclude from development	1.27%
100.0	150.0	No issues identified in data	75.31%
		Develop with caution	2.24%
		Develop with extreme caution	10.45%
		Exclude from development	12.00%
150.0	200.0	No issues identified in data	50.91%
		Develop with extreme caution	32.00%
		Exclude from development	17.09%
200.0	250.0	No issues identified in data	60.91%
		Develop with caution	1.72%
		Develop with extreme caution	33.39%
		Exclude from development	3.98%
250.0	300.0	No issues identified in data	91.56%
		Develop with caution	1.44%
		Develop with extreme caution	0.19%
		Exclude from development	6.82%
300.0	350.0	No issues identified in data	96.90%
		Develop with caution	0.51%
		Develop with extreme caution	0.25%
		Exclude from development	2.34%
350.0	400.0	No issues identified in data	79.30%
		Develop with caution	8.32%
		Develop with extreme caution	0.84%
		Exclude from development	11.54%
400.0	450.0	No issues identified in data	88.44%
		Develop with caution	0.78%
		Exclude from development	10.78%
450.0	500.0	No issues identified in data	92.75%
		Develop with caution	0.19%
		Develop with extreme caution	2.43%
		Exclude from development	2.62%
500.0	509.20	No issues identified in data	100.00%

The detailed information on overlaps with protected lands for the revised NewEngland\_Loop transmission corridor (Case 19) is shown in Table 4.811, and the revised route is shown in Figure 4.912. The Figure shows that two segments of the revised New England Loop will still overlap with protected lands designated as “excluded from development” in Table 4.11. Figure 4.13 shows closely the highlighted crossing segments in the revised path of the New England Loop. This New England study points out that the EZ Mapping Tool results for the proposed transmission corridors cannot completely bypass the protected lands designated as “excluded from development” and the proposed transmission planning case ought to be further analyzed holistically by system planners in order to avoid protected lands.

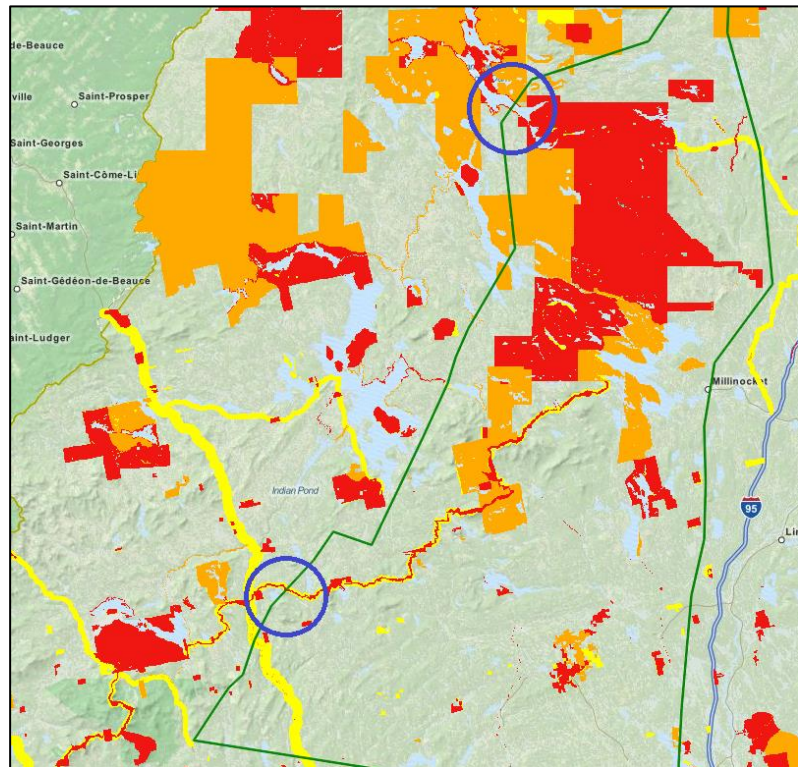
**Table 4.11 Information on Protected Land Overlaps for the Revised NewEngland\_Loop (Case 19)**

From Milepost (mi)	To Milepost (mi)	Recommendation	Percentage
0.0	50.0	No issues identified in data	99.10%
		Develop with extreme caution	0.90%
50.0	100.0	No issues identified in data	90.03%
		Develop with caution	9.28%
		Develop with extreme caution	0.06%
		Exclude from development	0.64%
100.0	150.0	No issues identified in data	92.02%
		Develop with caution	0.25%
		Develop with extreme caution	5.73%
150.0	200.0	No issues identified in data	71.61%
		Develop with extreme caution	27.72%
		Exclude from development	0.67%
200.0	250.0	No issues identified in data	52.07%
		Develop with caution	2.56%
		Develop with extreme caution	41.37%
250.0	300.0	No issues identified in data	100.00%
300.0	350.0	No issues identified in data	96.88%
		Develop with extreme caution	3.12%
350.0	400.0	No issues identified in data	100.00%
400.0	450.0	No issues identified in data	98.83%
		Develop with caution	0.19%
		Develop with extreme caution	0.97%
450.0	500.0	No issues identified in data	97.25%
		Develop with caution	0.06%
		Develop with extreme caution	2.68%
500.0	536.49	No issues identified in data	100.00%





**Figure 4.12 Revised NewEngland\_Loop Corridor (Case 19)**



**Figure 4.13 Two Segments of the Revised Corridor Crossing Protected Lands (Case 19)**



### 4.3.2 NewEngland\_Northern (Case 18)

The original route of the NewEngland\_Northern transmission corridor (Case 18) is shown in Figure 4.11, and the protected land information derived from the corridor report is shown in Table 4.12. There are several segments of the corridor that cross protected lands designated as excluded from development.

**Table 4.12 Detailed Overlap Information of the Original NewEngland\_Northern (Case 18)**

From Milepost (mi)	To Milepost (mi)	Recommendation	Percentage
0.0	25.0	No issues identified in data	98.59%
		Develop with caution	1.41%
25.0	50.0	No issues identified in data	76.69%
		Develop with caution	18.82%
		Develop with extreme caution	2.49%
50.0	75.0	No issues identified in data	87.15%
		Develop with caution	8.10%
		Develop with extreme caution	2.75%
75.0	100.0	No issues identified in data	83.82%
		Develop with caution	15.77%
		Develop with extreme caution	0.41%
100.0	125.0	No issues identified in data	90.97%
		Develop with caution	2.74%
		Develop with extreme caution	2.79%
		Exclude from development	1.50%
125.0	150.0	No issues identified in data	82.54%
		Develop with caution	7.23%
		Develop with extreme caution	6.82%
		Exclude from development	3.41%
150.0	175.0	No issues identified in data	87.11%
		Develop with caution	0.40%
		Develop with extreme caution	1.21%
		Exclude from development	11.28%
175.0	200.0	No issues identified in data	99.87%
		Exclude from development	0.13%
200.0	225.0	No issues identified in data	97.90%
		Develop with extreme caution	0.79%
		Exclude from development	1.31%
225.0	250.0	No issues identified in data	99.74%
		Develop with extreme caution	0.26%
250.0	275.0	No issues identified in data	87.47%
		Develop with caution	0.39%
		Exclude from development	12.14%
275.0	292.75	No issues identified in data	100.00%

The corridor report results of the EZ Mapping Tool show that this corridor has many significant issues with protected lands. The route was manually adjusted in the EZ Mapping Tool (Case 20) as shown in Figure 4.14. After making adjustments, the revised corridor report given in Table 4.13 indicates that the crossings with protected lands designated as excluded from development are eliminated in the revised route.

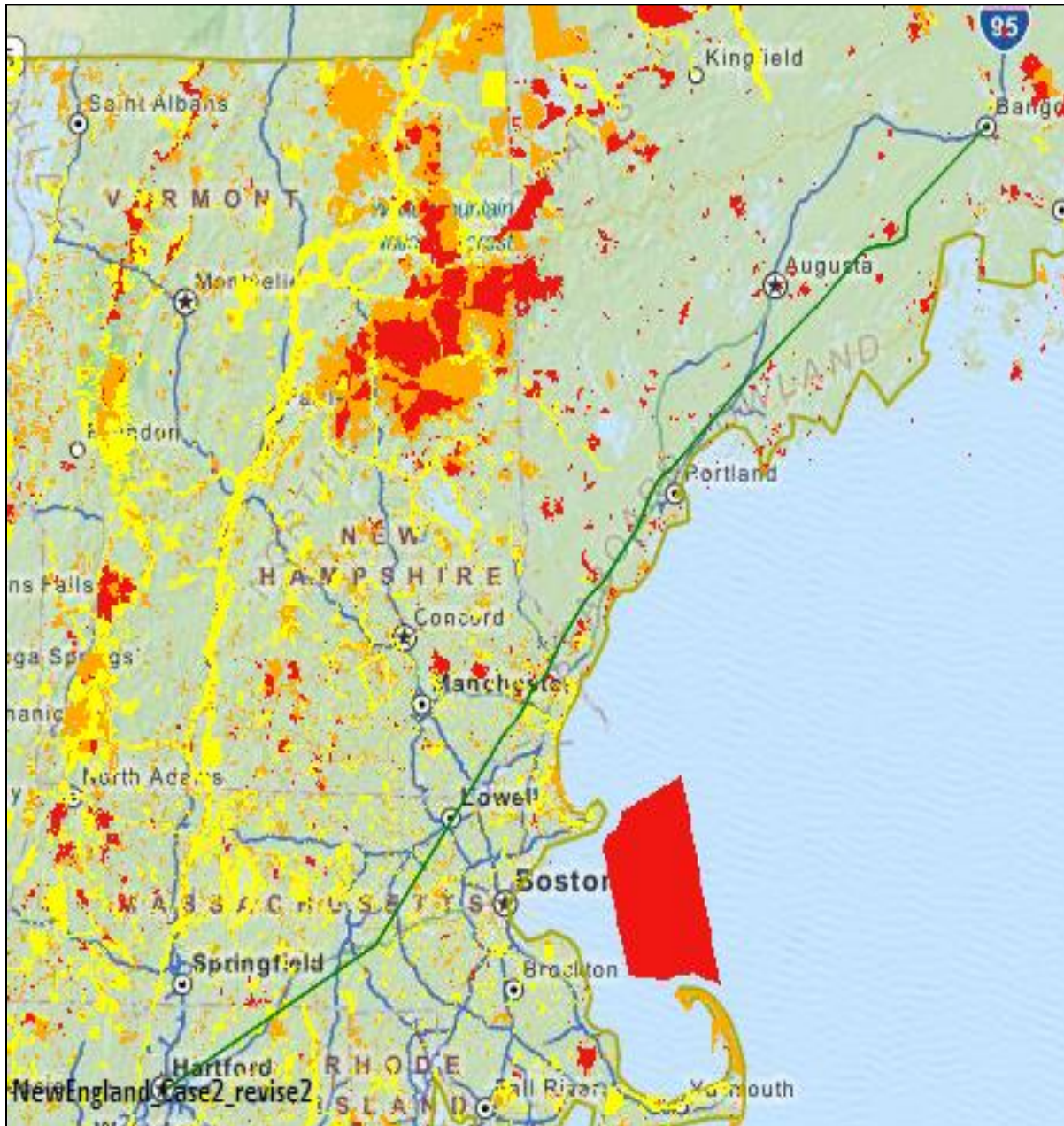


Figure 4.14 Revised NewEngland\_Northern (Case 20)

**Table 4.13 Detailed Overlap Information of the Revised NewEngland\_Northern (Case 20)**

From Milepost (mi)	To Milepost (mi)	Recommendation	Percentage
0.0	25.0	No issues identified in data	98.59%
		Develop with caution	1.41%
25.0	50.0	No issues identified in data	76.69%
		Develop with caution	18.82%
		Develop with extreme caution	2.49%
50.0	75.0	No issues identified in data	87.08%
		Develop with caution	8.01%
		Develop with extreme caution	2.92%
75.0	100.0	No issues identified in data	82.49%
		Develop with caution	12.54%
		Develop with extreme caution	0.97%
100.0	125.0	No issues identified in data	91.86%
		Develop with caution	3.12%
		Develop with extreme caution	5.02%
125.0	150.0	No issues identified in data	76.93%
		Develop with caution	19.81%
		Develop with extreme caution	3.26%
150.0	175.0	No issues identified in data	99.87%
		Develop with caution	0.13%
175.0	200.0	No issues identified in data	100.00%
200.0	225.0	No issues identified in data	96.99%
		Develop with caution	0.52%
		Develop with extreme caution	2.49%
225.0	250.0	No issues identified in data	98.95%
		Develop with extreme caution	1.05%
250.0	275.0	No issues identified in data	100.00%
275.0	296.30	No issues identified in data	100.00%

## 5. Assessment of the Potentials for Using the EZ Mapping Tool

### 5.1 Potentials for Using the EZ Mapping Tool with Other Tools

Our review of EZ Mapping Tool indicated that it can be used in conjunction with other tools for production costing, capacity expansion planning, and probabilistic risk analyses to identify potential benefits and costs of transmission facilities in comparative planning studies of the Eastern Interconnection. Many of the issues and risks confronting the long-term electricity delivery in the Eastern Interconnection extend beyond traditional short-term operation planning concerns. They require examining risks and uncertainty over a time frame that spans a few decades and issues that are inter-regional rather than local. The EZ Mapping Tool, supplemented by other analytical tools, can offer more detailed versions of new generation and transmission investment studies, enhance coordinated generation and transmission planning studies, analyze the interdependent planning of electricity and natural gas energy corridors, and perhaps expand analyses that will encompass cyber physical systems in the long-term planning studies of the Eastern Interconnection.

The leading developer of the EZ Mapping Tool, Argonne National Laboratory, will be adding more tools, data layers, and models in the next steps of the Tool development which will enable the EZ Mapping Tool to provide even more comprehensive modeling opportunities and results. For instance, the applicability of the EZ Mapping Tool can be further enhanced with the Corridor Suitability Models currently under development at Argonne. The planned approach is similar to the existing suitability modeling framework in the current EZ Mapping Tool. The user adjustable models in the EZ Mapping Tool will generate corridor suitability maps. Screening-level factors contributing positively or negatively to corridor routes will be represented in separate input model layers with values ranging from 0 (completely unsuitable for a corridor) to 100 (fully suitable for a corridor), and combined in sets in the model configurations. The corridor suitability maps can then be used as inputs to a least-cost path routing algorithm that provides partial assessment for a specific transmission facility.

### 5.2 Use of EZ Mapping Tool by State and Planning Coordinators for Siting Studies

The EZ Mapping Tool is a free online mapping tool that can provide detailed planning results for state and planning coordinators. The EZ Mapping Tool is a valuable evaluation tool at the initial stage of transmission planning or clean energy development for general assessment purposes. The Tool is able to provide the general conflict information across a large area within the Eastern Interconnection. Thus, the states and planning coordinators can use the Tool for redrawing of potential corridor to avoid sensitive areas, wildlife areas and populated areas, thus minimizing both ecological and human impacts. Cases 13, 14, 15, 16, 19, and 20 presented in this White Paper are examples of how states and planning coordinators can use the EZ Mapping Tool for achieving those functions.

Furthermore, the EZ Mapping Tool provides comprehensive modeling capabilities for state and planning coordinators which are not readily available in other planning tools and databases. For instance, the EZ Mapping Tool identifies clean energy resource regions in a mapping format that can potentially be developed without crossing protected lands. The demonstration case in Section 1.5 is a very good example that illustrates such an application. In that example, when the proximity to transmission is removed as a modeling condition, the northwest region in Nebraska is more suitable for wind energy development. However, the modeling results of the EZ Mapping Tool indicate that the lack of sufficient electrical transmission lines would be a limiting factor for the wind energy development in northwest Nebraska. Furthermore, the results point out that extending the existing transmission lines to this region of Nebraska may be an appropriate option for wind development in this case.



However, if the designated transmission path has a crossing with national trails, protected lands, or other sensitive areas, many of the planning adjustments have to be done manually at the current stage of the development in the EZ Planning Tool. The EZ Mapping Tool should automatically provide an alternate transmission route which would avoid the sensitive areas. Argonne is working on the Corridor Path Models, which will have the automatic redrawing capability in the future and could provide multiple options for users including states and planning coordinators. We should point out that the EZ Mapping Tool, even with its powerful GIS-based MCDSS, is not intended to provide the means for a detailed siting of transmission corridors for any specific clean energy project. Rather, the EZ Mapping Tool intention would enable state and planning coordinators to identify clean energy resource regions in a mapping format that could potentially be developed without crossing protected lands in the Eastern Interconnection.

## 5.3 Suggestions for the Enhancement of the EZ Mapping Tool

### 5.3.1 Suggestions for General Enhancements

We would like to offer a few suggestions for enhancing the EZ Mapping Tool that could better serve state and planning coordinators and other stakeholders interested in detailed planning studies in the Eastern Interconnection. Other suggestions are listed as follows:

#### Revise Transmission Corridor Automatically

If the designated transmission path has a crossing with national trails, protected lands, or other sensitive areas, it would be helpful if the EZ Mapping Tool could automatically provide an alternate transmission route which would avoid the sensitive areas.

#### Estimated Cost for Transmission Corridor and Clean Energy Development

It would be useful if the EZ Mapping Tool could provide an interface for calculating the total cost of the proposed transmission corridor based on the user's input parameters, such as the transmission type, voltage level, etc. Also provide an interface for calculating the total cost of the clean energy resource development in the studied area.

#### Estimated Running Time

There are some mapping cases which require a substantially longer processing time. It would be helpful if the EZ Mapping Tool can provide the estimated run time for a report. Also, at times, the processing time is very long when two simulation requests are submitted simultaneously.

#### Renewable Energy Report

Since the EZ Mapping Tool is intended to identify areas within the U.S. Eastern Interconnection that are suitable for the development of clean energy resources, it would be valuable if a report on potential zones for renewable energy resources can be provided in which the regional land opportunities for developing the wind, solar, hydro, and other types of renewable sources are highlighted.

#### Unsuccessful EZ Mapping Tool Cases/Reports

It would be useful if the EZ Mapping Tool could provide the additional information on how users would further modify the revised transmission model when the EZ Mapping Tool cannot provide a feasible revised corridor (see Figure 5.1).





Figure 5.1 Error Information

### 5.3.2 Suggestions for More Specific Enhancement of the EZ Mapping Tool

More specific suggestions for the enhancements of EISPC EZ Mapping Tool are provided as follows:

- Regular updates of resource data, the policy inventory, and the addition of new data layers identified by EISPC and other users as available and relevant.
- More detailed screening analysis of potential energy corridors, including developing models that use screening factors to create a suitability surface map and optimization techniques to compute the best path connecting two locations specified by the user. The optimization routine would avoid sensitive ecological areas and other protected lands and attempt to minimize the overall path distance and other factors such as close proximity to densely populated areas and large river crossings.
- Development of a model for identifying areas suitable for smaller natural gas combined-cycle plants (250–500 MW) in populated areas at industrial or brownfield locations, including existing power plants that might be repowered.
- Development of models for estimating electricity generation potential of certain clean energy technologies within an analysis area.
- Development of models to analyze an optimal mix of generating resources and the number of power plants that can be located within a selected analysis area.
- Addition of wind resource layers showing the temporal characteristics of wind power in a given location (i.e., seasonal profiles and diurnal profiles).
- Enhancement of models to account for zone contiguity (i.e., eliminate areas computed as otherwise suitable but too small and too isolated from other suitable areas to accommodate a project).
- Ability to upload new GIS layers for individual users, groups of users, or all users. it would be convenient for user if an interface is provide for uploading GIS file, so user doesn't have to draw the transmission path on the map manually which may cause deviation from the original planning results.

- Enhancements to facilitate virtual collaboration, such as sharing models and analysis areas among different users.
- Integration of policy data as a map layer to allow users to include relevant policy information in reports.

More comprehensive enhancements would include layers showing current load, load growth, the potential for distributed resources in addition to rooftop solar, current and future water consumption needs for electricity generation, potential load changes due to energy efficiency, and potential load changes resulting from increased use of electric vehicles.

### 5.3.3 Work Plan: Corridor Analysis and Modeling Enhancements for the EZ Mapping Tool

This work plan provides details on the ongoing work that will be completed by the Argonne National Laboratory for enhancing the corridor analysis capabilities in the EZ Mapping Tool. The current EZ Mapping Tool provides users with an option to input a centerline and width, resulting in a specific linear area for transmission analyses. Using this designated location, a corridor report can be generated by the EZ Mapping Tool to provide details on screening-level characteristics along the corridor path. The characteristic information include political jurisdictions, intersections with transportation and energy infrastructure, topographic profile, seismic characteristics, proximity to airports and military installations, protected lands, sensitive habitat, and imperiled species. Based on the EZ Mapping Tool results, users can review potential issues on the corridor map, make modifications to the corridor route, and rerun the corridor report to the EZ Mapping Tool to determine the characteristics of the updated route. This descriptive approach requires the users to study issues along the route and manually adjust routes to avoid them if possible. The key element of Argonne's planned corridor tool enhancements is to allow potential routing alternatives to be generated automatically with user-defined inputs, supporting data, and a model, thereby identifying more optimal potential routes that would avoid many potential issues as much as possible. The Argonne's Work Plan includes the following tasks:

#### Task 1: Provide Subject-Matter Expertise

A Corridor Focus Team (CFT) will be staffed by subject-matter experts in corridor planning, national trails and other major obstacles, and Geographic Information Systems (GIS). Argonne will provide the core team, and invite volunteer participants from EISPC project partners and interested stakeholders. Argonne will host several teleconferences to solicit feedback on data sources, methods, and potential refinements to the planned approach.

#### Task 2: Corridor Suitability Models

The planned approach is similar to the existing suitability modeling framework in EZ Mapping Tool. User-adjustable models will generate corridor suitability maps. Screening-level factors contributing positively or negatively to corridor routes will be represented in separate input model layers with values ranging from 0 (completely unsuitable for a corridor) to 100 (fully suitable for a corridor), and combined in sets in the model configurations. Using an interface similar to the suitability modeling framework, input layers in a model will be selected, weights within and between layers can be adjusted, and a composite corridor suitability map will be computed when the model is launched. The output will be a composite corridor suitability map with a value for each cell in the analysis region. Several alternative corridor suitability models will be set up in the interface to illustrate different strategies (such as minimizing visibility, following existing infrastructure, minimizing environmental risk, etc.). Using different corridor suitability models will result in different route alternatives later in the analysis process.

A special emphasis will be placed on the National Trail System, large rivers, and other areas that are challenging for multi-agency planning. Input modeling layers especially relevant to these themes will be developed. For example, scenic resources are a key concern for National Trails. Viewshed analysis will be used to help determine locations where potential scenic resource impacts could be minimized by taking advantage of topography and land cover. If available, data on trail usage, distance to trailheads, locations of scenic overlooks, and campsite locations will be collected and used to help represent more sensitive locations for corridors. Different siting factors would be important for river crossings, such as water depth and velocity, shipping traffic, bank characteristics (bluff vs. flood plain), and width, and others.

The following is a list of potential model input layers to be included in corridor suitability models, or developed and added. This list will be reviewed and revised by the CFT:

**1. Layers already existing in the current version of EZ Mapping Tool:**

- 100-Year Flood Zone
- Distance to Airport
- Distance to Military Installation
- Distance to Pipeline
- Distance to Transmission Line
- Distance to Railroad
- Distance to River
- Habitat
- Protected Land
- Imperiled Species
- Seismic Hazard
- Slope
- Land Cover
- Population Density

**2. Planned additional layers (pending the data availability and quality):**

- National trail crossing composite
  - Historic/scenic categorization
  - Relative visibility (view shed computations)
  - Land cover
  - Priority trail segments
  - Trail condition/usage
  - Distance to trailhead
  - Scenic overlooks
  - Campsite locations
  - Existing crossings
  - Population density
- River crossing composite
  - Width
  - Bridges and other pre-existing crossings
  - Flow
  - Depth
  - Shipping traffic
  - National Park Service: Nationwide Rivers Inventory designation
  - Wild and Scenic Rivers Designation
  - Bank characteristics (bluff vs. flood plain)
- Scenic byways

The results of this task will include:

1. A library of model input layers representing individual corridor siting factors.
2. Pre-configured default corridor suitability models emphasizing different routing strategies.
3. Pre-computed corridor suitability maps corresponding to each default corridor suitability model.
4. Updates to EZ Mapping Tool interface to allow users to access the new content and models, and to generate and manage their own custom corridor suitability maps.

### **Task 3: Corridor Path Models**

In this task, a capability to compute a most-suitable path will be added to EZ Mapping Tool. The corridor suitability maps will be used as inputs to a least-cost path routing algorithm (better termed most-suitable path in this application). The user interface will prompt for two corridor endpoints for path generation, and a total width. Widths exceeding the cell size of the input corridor suitability map will be accommodated by preprocessing the corridor suitability map with a neighbor sum function. The system will then generate a most suitable path and store it as a corridor, which can then be viewed on the map and used to generate a corridor report. The tool currently allows corridors to be copied and their centerlines revised for manual changes, and this will also be possible for the corridors generated by the tool. It will also be possible to generate multiple alternative paths by repeating the process with different corridor suitability maps.

As part of this task, the existing EZ Mapping Tool corridor report will be enhanced to include new information identified as the siting factors, input data, and methodology for defining corridor routes are refined during this study, and based on the conclusions of the IIT whitepaper.

### **Task 4: Media Preparation and Training**

Argonne will update the help materials, develop a video illustrating the use of EZ Mapping Tool for the analysis and modeling conducted during this study, and host at least one web-based training session.



## 6. Conclusions

The EZ Mapping Tool is a power tool which can support a broad range of goals of facilitating strategic facility planning studies throughout the Eastern Interconnection. The tool can also help states collaboratively examine common risks and opportunities to provide participating electric utilities with an impetus to engage in their own long-term strategic planning studies.

The EZ Mapping Tool is a GIS-based, Multi-Criteria Decision Support System (MCDSS), with a set of operation options to guide the transmission planning analyses in the Eastern Interconnection. The analytical process in EZ Mapping Tool involves a number of steps which may be customized by the user depending on the type of clean energy resource being considered, the area of interest, and other user-specified parameters. This allows for a transmission corridor analysis tailored to the specific needs of individual users which will result in customized maps of areas suitable for clean energy resource development in the Eastern Interconnection. The MCDSS methodology and the EISPC EZ Mapping Tool are not intended to provide the means for a detailed siting of transmission corridors for any specific clean energy project. Rather, the EZ Mapping Tool intention is to enable state and planning coordinators to identify clean energy resource regions in a mapping format that could potentially be developed without crossing the protected lands in the Eastern Interconnection.

The EZ Mapping tool will enable stakeholders to identify geographical areas within the Eastern Interconnection that are suitable for the development of clean (low- or no-carbon) power generation and new transmission corridors. The EZ Mapping Tool currently includes the 263 GIS data layers. Each layer has its own limitations corresponding to the scale, completeness, and accuracy of the layer data, since much of the data are compiled from a variety of sources for the purpose of screening-level analyses. However, the Tool can still provide very important and useful reference information when applied to transmission expansion planning or clean resource planning studies in the Eastern Interconnection. Most importantly, the data layers can be added, updated, and removed over time in order to facilitate extensive regional studies for power systems.

Many of the issues and risks confronting the long-term transmission of electric energy in the Eastern Interconnection extend beyond traditional short-term operation planning concerns. They require a thorough examination of risks and uncertainties over a long framework which concern inter-regional generation and transmission studies. The EZ Mapping Tool can supplement analytical tools such as probabilistic production costing algorithms and capacity expansion planning models for performing investment studies and perhaps supplement studies that pertain to the interdependent planning of electricity and natural gas energy corridors in the Eastern Interconnection.

It is believed that the leading developer of the EZ Mapping Tool, Argonne National Laboratory, will be adding more tools, data layers, and models in the next steps of the Tool development which will enable the EZ Mapping Tool to provide even more comprehensive modeling opportunities and results.

## Appendices

The two Appendices are introduced in this section.

Appendix A provides an overview of the users' manual for the EZ Mapping Tool.

Appendix B provides the samples of the reports generated by the EZ Mapping Tool software.

These samples include the following cases listed in Table 2.1:

Case No.	Line/Area No.	Type	Length (Miles)	Comments
1	Wind Development Area	Area	---	Case demonstrating the examples in the user's manual
2	Revised Wind Development Area	Area	----	Case demonstrating the examples in the user's manual
17	NewEngland_Loop	345kV AC	509.2	Case suggested by Commissioner Littell
19	Revised NewEngland_Loop	345kV AC	536.49	Revised NewEngland_Loop to avoid protected lands

## Appendix A. Overview of the EZ Mapping Tool Users' Manual

This section provides an overview of the users' manual for EZ Mapping Tool. The Appendix includes the following: registering for and launching the tool, explaining the default layout, adding and removing mapping layers, using the map tools, creating analysis areas, creating corridors, copying and revising analysis areas and corridors, running models and reports, and exiting the system. This information and supplemental help videos are available on the website <https://eispctools.anl.gov>.

### A.1 Registration

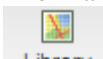
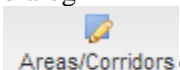
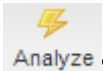
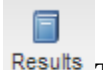
In order to use the EISPC EZ Mapping Tool, user must first register at the EZ Mapping Tool's website <https://eispctools.anl.gov>. The user's email address and a password are used for as login credentials, and subsequent activities within the mapping tool are saved with the account. The registration page is shown in Figure A.1. Once the online registration is submitted, the user receives an email in which a confirmation link is included. The registration information is reviewed for acceptance by the system administrators. Once the registration has been approved, the user is able to access the online EZ Mapping Tool with the email and password they provided. From the Home Page, clicking on Login or the Launch Tool icon will bring user to a banner containing the Department of Energy terms and conditions notice as shown in Figure A.2. Once users have read and agreed to the terms and conditions, clicking the "I Agree" button leads to the Sign In page (Figure A.3). After the registration e-mail and password have been entered, the Sign In button is clicked. The user is then prompted to accept the "Terms and Conditions" of the EZ Mapping Tool.

Clicking on Accept Terms will either launch the EZ Mapping Tool (if user originally clicked the Launch Tool icon) or will take user back to the home page (if user originally clicked Login) where user can now click the Launch Tool icon or adjust their account settings.

When the tool launches, a splash screen appears with links to training videos and a version of the help document. The check box in the lower left corner controls whether the splash screen will be displayed in later sessions, and it can be displayed at any time by clicking Help at the top right of the page.

### A.2 Interface of the EZ Mapping Tool

Launching the tool will open a new tab or browser window with the default layout of the mapping tool as shown in Figure A.4. The default map shows a few base map options and the EISPC region, but over 250 mapping layers are available in the tool. All other layers are added by using icons in the Main Menu panel.

- The panel on the left side of the screen contains the Main Menu and Map Contents.
- The Main Menu contains the Library, Areas/Corridors, Analyze, and Results icons.
-  The Library icon is used to add new map layers or model layers to the map Contents dialog
-  The Areas/Corridors icon is used to create analysis areas, and corridors.
-  The Analyze icon is used to run models or reports.
-  The Results icon is used to view model and report results.

## Register

Please fill out the following form to request access.

First name

Last name

Job title or function

Organization

Other organization

State/Province

Email Address

Email Confirmation

Password

Password confirmation

☐ **Do not** list me on the User Community page.  
(Only first name, last name, organization, and state are listed on the page.)

☒ Send me occasional e-mail messages when significant changes are made to this site.

Figure A.1 Registration Page

## EISPC EZ Mapping Tool

### Sign in

NOTICE TO USERS - This is a Federal computer system and is the property of the United States Government. It is for authorized use only. Users (authorized or unauthorized) have no explicit or implicit expectation of privacy. Any or all uses of this system and all files on this system may be intercepted, monitored, recorded, copied, audited, inspected, and disclosed to authorized site, Department of Energy, and law enforcement personnel, as well as authorized officials of other agencies, both domestic and foreign. By using this system, the user consents to such interception, monitoring, recording, copying, auditing, inspection, and disclosure at the discretion of authorized site or Department of Energy personnel. Unauthorized or improper use of this system may result in administrative disciplinary action and civil and criminal penalties. By continuing to use this system you indicate your awareness of and consent to these terms and conditions of use. LOG OFF IMMEDIATELY if you do not agree to the conditions stated in this warning.

Figure A.2 Department of Energy Terms and Conditions Notice



## EISPC EZ Mapping Tool

Sign in

Email

Password

Remember me

☐

Sign in

[Register](#)  
[Forgot your password?](#)  
[Didn't receive unlock instructions?](#)

Figure A.3 EZ Mapping Tool Login Page

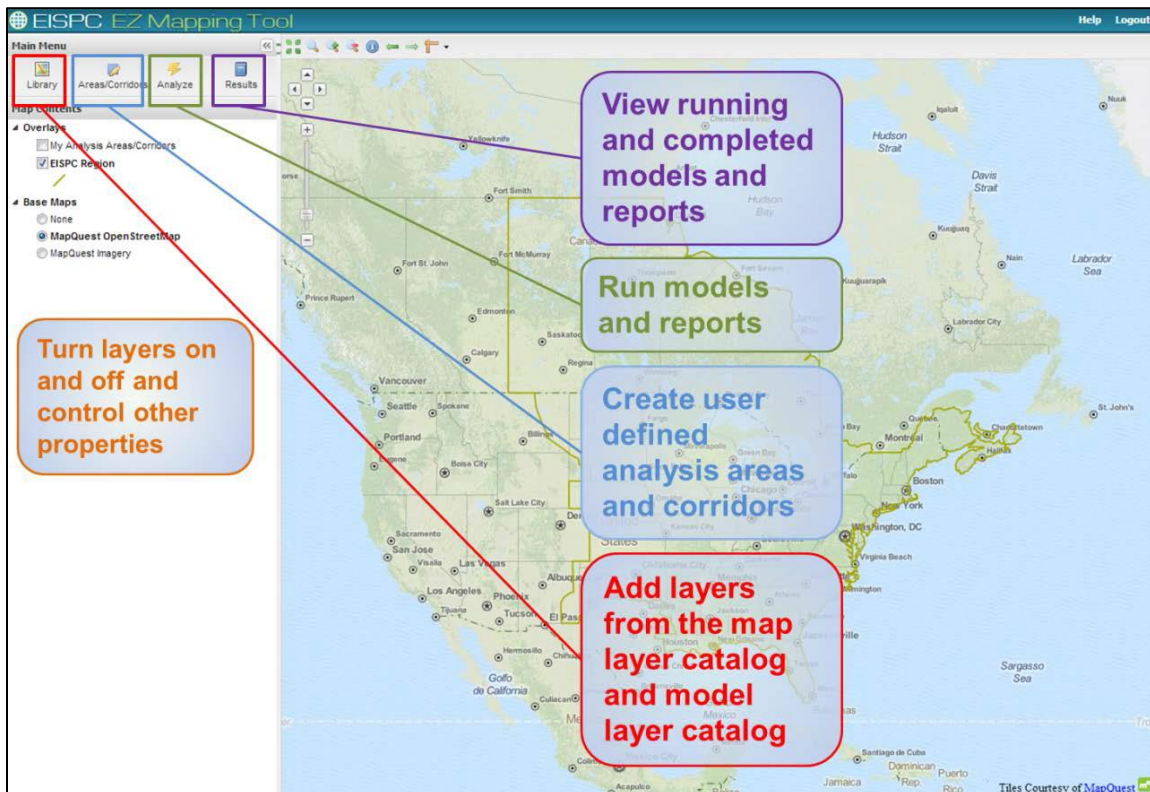

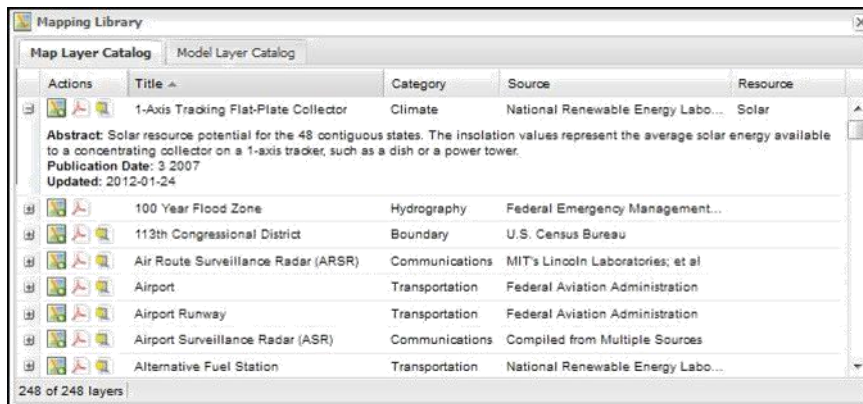


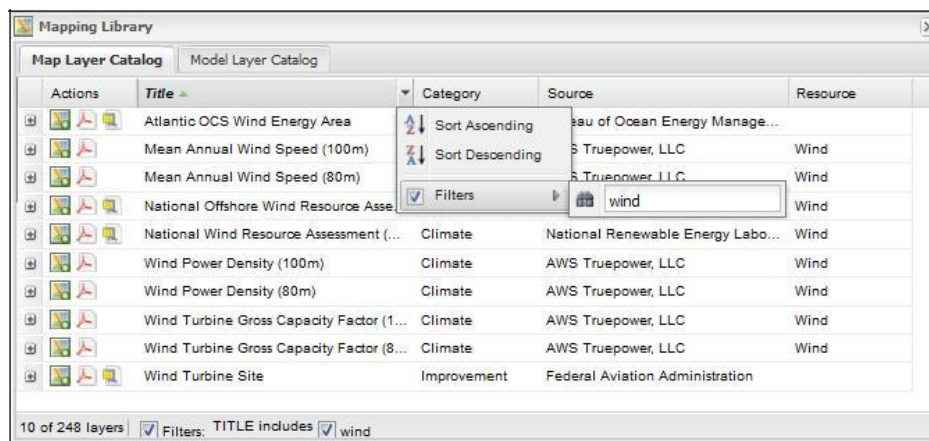
Figure A.4 Interface Layout of the EZ Mapping Tool




### A.3 Add Map Layers

- 1) Click the Library icon (  ) in the upper left corner of the Main Menu.
- 2) A dialog opens, displaying all of the layers contained in the Map Layer Catalog. Click on the plus (+) next to a layer name to display the abstract, publication date, and last date that the layer was updated.



- 3) Place the cursor over a heading (Title, Category, Source, or Resource) and a down arrow appears to the right of the heading name. Click the down arrow to sort or filter the list. The Category and Resource columns list all possible options to sort by. Click the filters that user wishes to use. The Title and Source columns allow user to choose a filter term. Place the cursor over Filters and type a word in the box that appears. User can remove the filters by unchecking the boxes at the bottom of the dialog.



- 4) Click the Map icon (  ) to add a layer to the map. It will also be listed in the Overlays section of the Map Contents dialog.
- 5) If user would like to see the metadata for a particular layer, click on the PDF icon (  ) next to the layer name. A PDF will open containing the metadata for that layer.
- 6) If user would like to export the layer as either a shapefile or geotiff, click on the Export data icon (  ). A zip file with the GIS files for that layer will be downloaded.

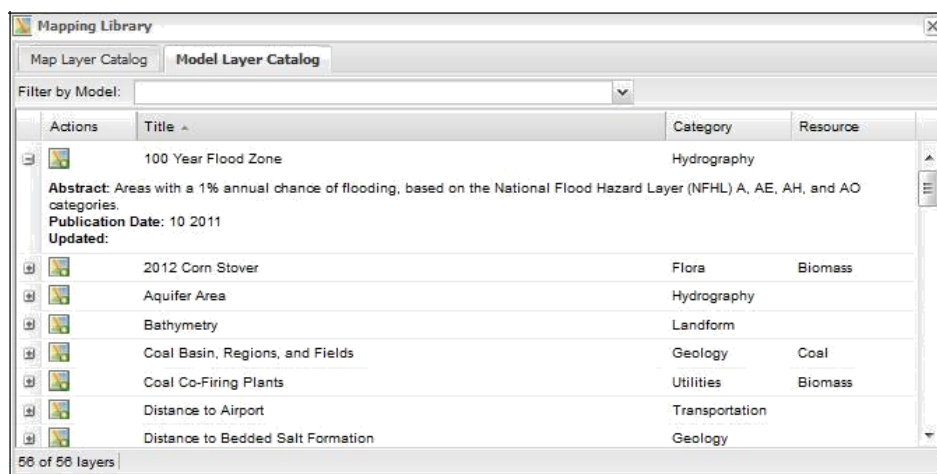
## A.4 Add Model Layers

- 1) If users are interested in viewing the screening layers for a particular model, click the

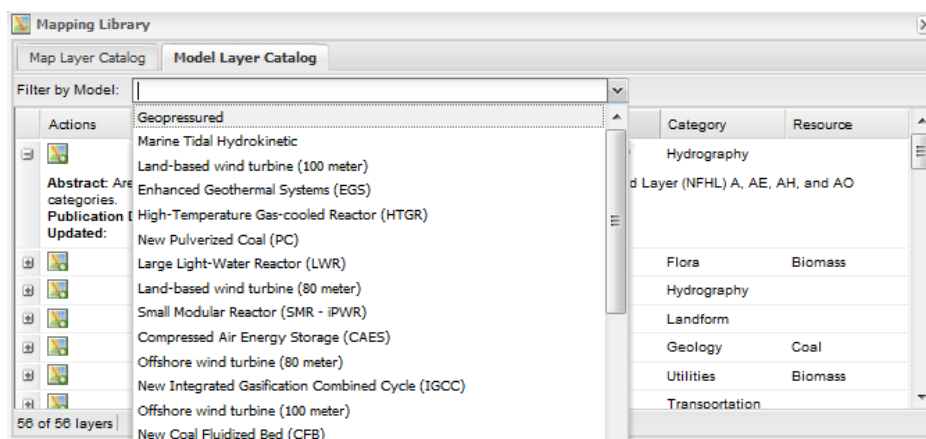


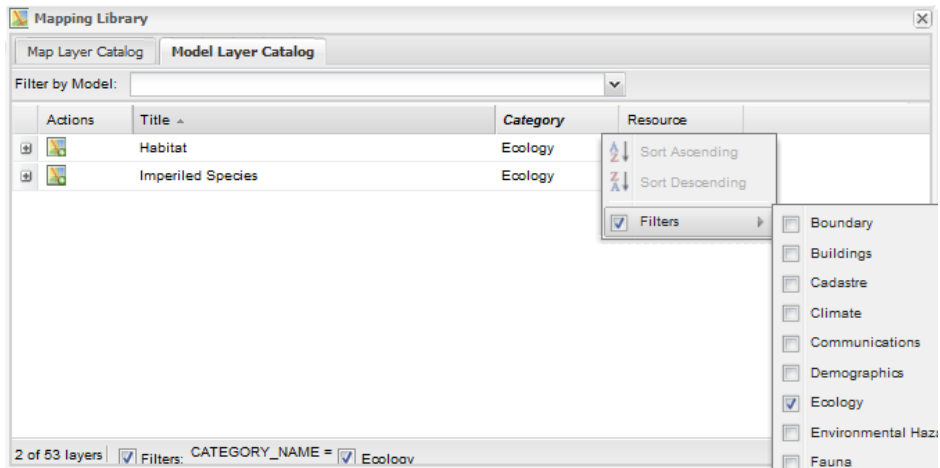
Library icon ( ) in the upper left corner of the Main Menu.

- 2) In the Mapping Library dialog, click the Model Layer Catalog tab. Click on the plus (+) next to a layer name to display the abstract, publication date, and last date that the layer was updated.



- 3) There are two ways to filter the modeling layers in the Model Layer Catalog. The Filter by Model dropdown displays only the modeling layers for the selected model. User can also place the cursor over a heading (Title, Category, or Resource) and a down arrow appears to the right of the heading name. Click the down arrow to sort or filter the list. The Category and Resource columns list all possible options to sort by. Click the filters that user wish to use. The Title column allows user to choose a filter term. Place the cursor over Filters and type a word in the box that appears. User can remove the filters by unchecking the boxes at the bottom of the dialog.





- 4) Click the Map icon ( ) to add the layer to the map.
- 5) The selected layer is added to the Map Contents panel.

## A.5 Removing Layers

- To remove a layer from the map but keep it in the Map Contents panel, uncheck its box.
- To remove a layer from the map and the Map Contents panel, right-click the layer name and then click Remove layer ( ). This does not permanently remove the layer from the application, but only from user's Map Contents panel. To add the layer again at a later time, repeat the steps under *Add Map Layers/Add Model Layers*.

## A.6 Using the Map Tools

- The map tools are located at the top of the map and allow user to navigate the map.

	<i>Zoom to Max Extent</i>	Click to display the map at its maximum extent (i.e., zoom out as far as possible).
	<i>Zoom by Dragging</i>	When active, click or click-and-drag on the map to zoom to the selected area. Click the icon again to stop zooming.
	<i>Zoom In</i>	Click to zoom in one level on the map.
	<i>Zoom Out</i>	Click to zoom out one level on the map.
	<i>Identify</i>	When active, click a feature on the map to retrieve more information about that specific feature. If there is more than one layer or feature at the click point, the information for each one will be listed in the results. Click the Identify tool icon again to stop using it.



	Zoom to Previous Extent	Return to the previous zoom level/view.
	Zoom to Next Extent	Go to the next zoom level/view (after going to Previous Extent).
	Measure	Click the black down arrow, choose Length or Area, then click the map to draw a polygon to measure. Click once to draw each point on the line (Length) or polygon (Area). To complete the polygon, double click. Click the Measure tool again to stop measuring.

- Map Navigation

	Pan Controls	Use the pan controls to pan the map up and down, left and right.
	Zoom In	Click to zoom in one level.
	Zoom Out	Click to zoom out one level.
	Zoom Slider	Click and drag the slider to zoom in (up) and out (down).

## A.7 Area and Corridor Analysis

The EZ Mapping Tool allows areas of interest to be drawn on the map for further analysis. The suggested approach is to use models to identify regions with high suitability for specific technologies and then to sketch areas on the map for further analysis. Corridor analysis offers a screening-level assessment of key factors for planning an electrical transmission or pipeline corridor. Similar to defining an analysis area, corridors are sketched on the map.

### Creating an Analysis Area



- 1) Click the Areas/Corridors icon ( ) in the *Main Menu* panel. The *Analysis Areas and Corridors* dialog opens.
- 2) Click the New Analysis Area icon ( )
- 3) Add an analysis area to the map by clicking the mouse once for each point and double-clicking to complete the analysis area. The *Analysis Area* dialog will open to assign a name and notes for

the analysis area.

- 4) Click **Save**. The analysis area will be listed in the *analysis Areas and Corridors* dialog. To display the analysis area on the map, click the box next to *My Analysis Areas/Corridors* in the *Overlays* section of the *Map Contents* panel. A shaded region will then appear on user's map. The analysis area can now be chosen in the *Choose Region* drop down when user run a report (See **Running a Report** for instructions).
- 5) There are several actions to choose in the *Actions* column of the *Analysis Area and Corridors* dialog.
  - The Show/Hide Area icon ( ) controls whether individual analysis areas are shown on the map.
  - The Magnifying Glass icon ( ) zooms the map to the analysis area.
  - The Report icon ( ) runs a report on that analysis area.
  - The Edit icon ( ) allows the name and notes for analysis areas to be edited, and also copy and revise the copies on the map.
  - The Delete icon ( ) permanently deletes the analysis area.



## Create a Corridor

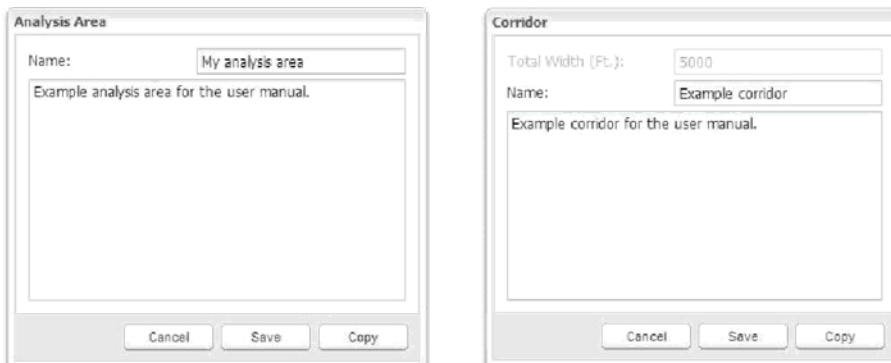
- 1) Click the Areas/Corridors icon ( ) in the Main Menu panel. The Analysis Areas and Corridors dialog opens.
- 2) Click the New Corridor icon ( ).
- 3) Add a corridor centerline to the map by clicking the mouse once for each point and double-clicking the last point to complete the centerline. Then the *Corridor* dialog will open to assign a name and notes for the corridor.
- 4) Click **Save**. The corridor will be listed in the Analysis Areas and Corridors dialog. To display the corridor on the map, click the box next to *My Analysis Areas/Corridors* in the *Overlays* section of the *Map Contents* panel. The corridor will then appear on the map with the width shown as a shaded area around the centerline. The corridor can now be chosen in the *Choose Region* drop down when user run a corridor report.
- 5) There are several actions to choose in the *Actions* column of the *Analysis Areas and Corridors* dialog.
  - The Show/Hide Area icon ( ) controls whether individual corridors are shown on the map.
  - The Magnifying Glass icon ( ) zooms the map to the corridor.
  - The Report icon ( ) runs a report on that corridor.
  - The Edit icon ( ) allows the name and notes for corridors to be edited, and also copy and revise the copies on the map.
  - The Delete icon ( ) permanently deletes the corridor.

## Copying and Revising Analysis Areas and Corridors

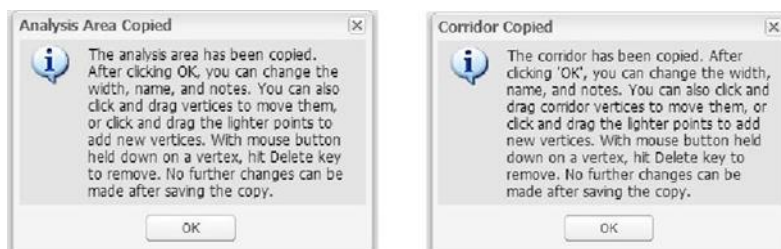
In some cases it is useful to copy and revise an analysis area or corridor to investigate alternate extents.

For example, if a potential issue is found along a corridor route, an adjustment to the centerline or width might avoid the issue.

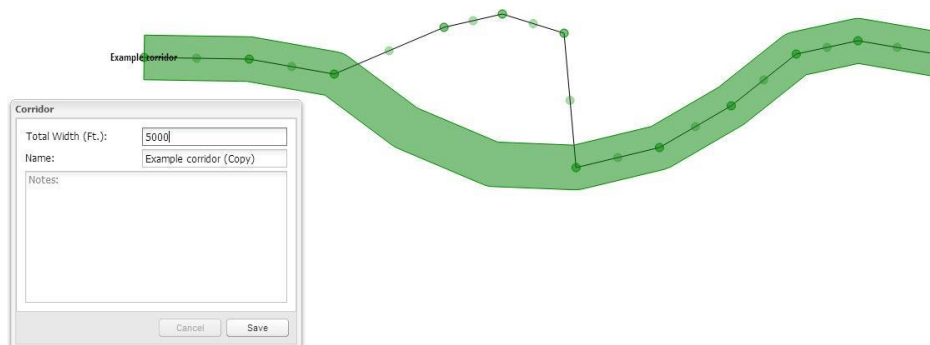
- 1) Click the Areas/Corridors icon (  ) in the Main Menu panel. The Analysis Areas and Corridors dialog opens.
- 2) Click the Edit Icon (  ) for the analysis area or corridor to be copied and revised.
- 3) Depending on whether an analysis area or corridor is chosen, the Analysis Area or Corridor dialog will open, with Copy button added.



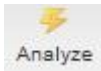
- 4) Clicking Copy displays one of the instructional dialogs shown below. Click OK.

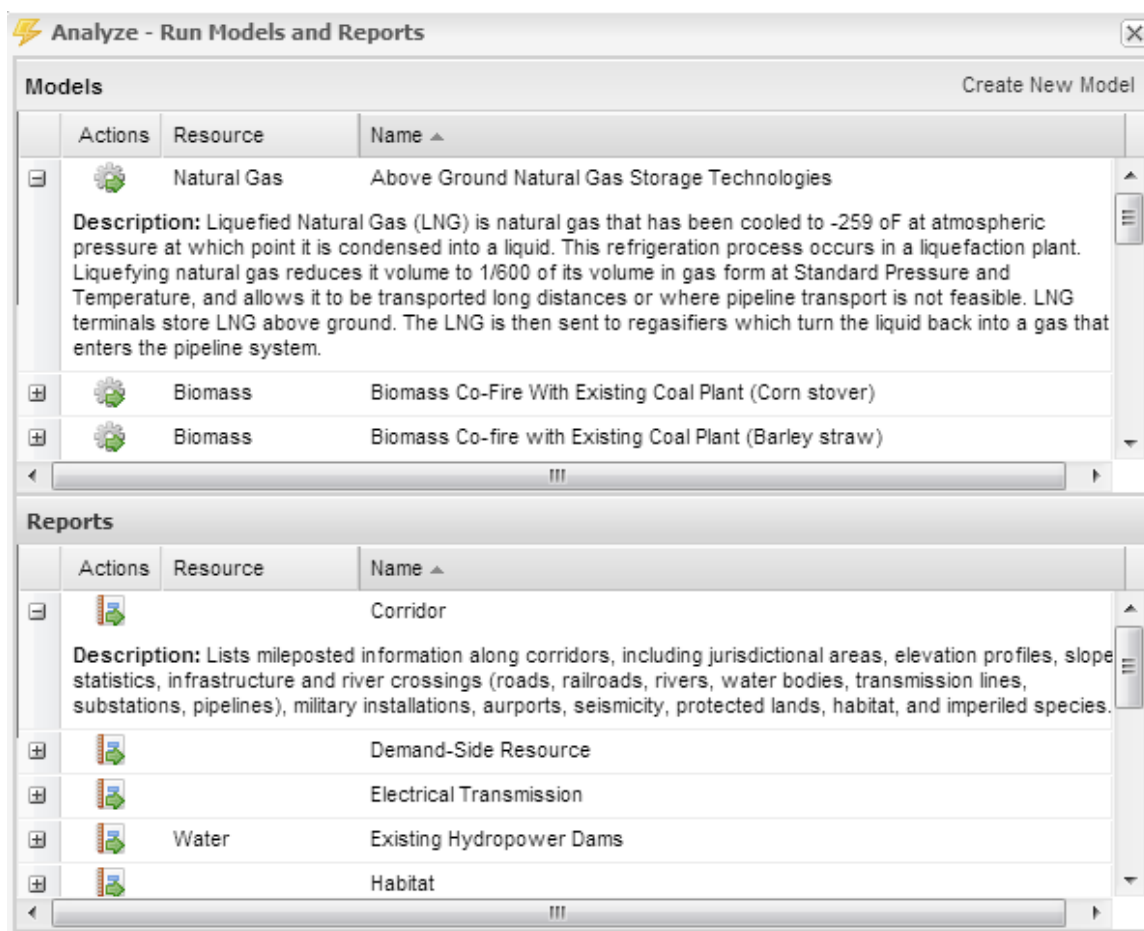



- 5) Until user click Save in the main dialog, user can change the name and notes, change the width for corridors, and edit the analysis area boundary or corridor centerline on the map. On the map, edit handles are shown at each point making up the analysis area or corridor centerline. Click and drag these handles to move them. Midway between each point are lighter handles. Clicking and dragging these handles adds a new point to the shape. To delete a point, hold down the mouse button over a handle and hit the Delete key. Click Save when user finished making changes. The image below shows an example of a corridor being revised.



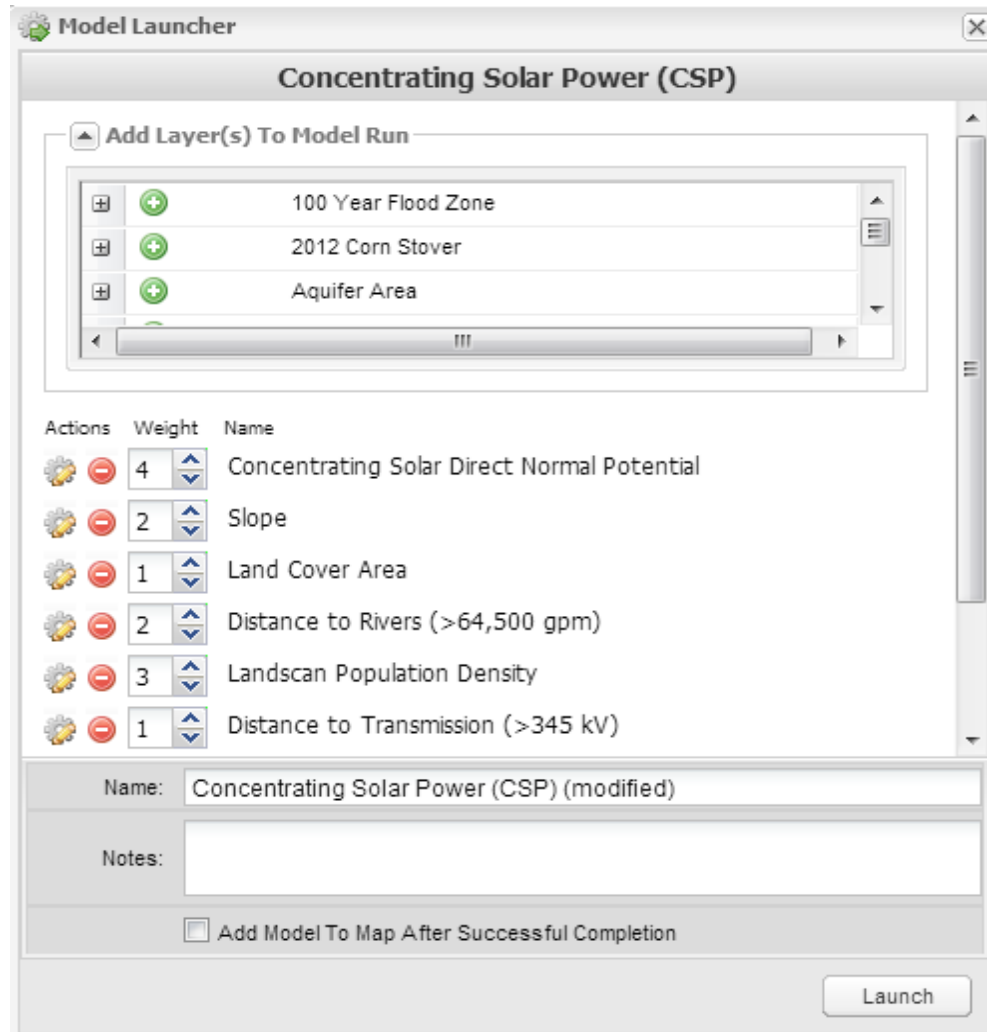
## A.8 Running a Model and Report

- 1) Click the Analyze icon (  ) in the *Main Menu* panel to open the *Analyze – Run Models and Reports* dialog. All of the available models are listed in the *Models* section of the dialog. Click on the plus (+) next to a model name to display a description of that model.



- 2) Click on the Run Model icon (  ) to the left of a model name to open the *Model Launcher*.





- 3) The default screening layers and weights are displayed in the *Model Launcher* dialog. These settings are based on the recommendations of subject-matter experts familiar with the technology being modeled, but should be reviewed and revised by individual users to meet their analysis goals and assumptions. If desired, adjust the relative weights given to each screening layer by increasing or decreasing the numbers to the left of the layer names from 1 to 10, with 1 meaning that the layer should be given the smallest possible influence on the model and 10 meaning that the layer should be given the highest possible influence on the model. User can also remove a screening layer from the model run by clicking the Remove Layer icon ( ).
- 4) Additional screening layers can be added to the model run by clicking the down arrow next to *Add Layer(s) To Model Run* and clicking the Add layer icon ( ) next to the layer name.
- 5) To inspect or adjust the suitability values within a screening layer, click on the Edit Suitability Settings icon ( ) to the left of the layer name. The *Suitability Adjustment* dialog opens. To adjust suitability values for one of the ranges in a screening layer, type a value or use the arrows. Suitability values range from 0 (unsuitable) to 100 (most suitable). Click **Save** if user have made changes that user want to keep, or **Cancel**, to return to the *Model Launcher* dialog.


**Suitability Adjustment: Distance to Transmission (>345 kV)**

Description: Distance in miles to nearest overhead or underground electric transmission line with at least 345kV capacity, based on Bentek Energy/Platts data.

Suitability	Range in Distance (miles)
100	No data
100	0 - 5
75	6 - 10
50	11 - 15
25	16 - 20
5	21 - 50
1	51 - 100000

Cancel Save

- 6) If user would like to view a screening layer listed in the Model Launcher dialog on the map, user can add it using the Model Layer Catalog.
- 7) Change the default name of the model and add any notes about the model run by typing in the boxes at the bottom of the Model Launcher dialog.
- 8) Check the box at the bottom of the dialog to add the model to the map after the model run has completed.
- 9) When user has finished customizing the model run, click Launch. User can view the status of

user's model run by clicking on the Results icon (  ). The Analysis Results dialog will open. The status will be displayed as an hourglass while the model is running and a check mark when the model is complete. The Analysis Results dialog also lists default versions of each model as System runs. Users add these results to the map and view them without having to run the model.

**Analysis Results**

Actions	Type	Owner	Status	Name	Extent	Created
	Model	Me	✓	Concentrating Solar Pow...	EISPC Region	7/17/2013 1:20 PM
	Model	System	✓	Geopressured (default)	EISPC Region	11/14/2013 11:35 AM
	Model	System	✓	Marine Tidal Hydrokinetic...	EISPC Region	11/14/2013 11:35 AM
	Model	System	✓	Land-based wind turbin...	EISPC Region	11/14/2013 11:35 AM
	Model	System	✓	Enhanced Geothermal S...	EISPC Region	11/14/2013 11:35 AM
	Model	System	✓	High-Temperature Gas-c...	EISPC Region	11/14/2013 11:35 AM
	Model	System	✓	New Pulverized Coal (PC...	EISPC Region	11/14/2013 11:35 AM
	Model	System	✓	Large Light-Water React...	EISPC Region	11/14/2013 11:36 AM
	Model	System	✓	Land-based wind turbin...	EISPC Region	11/14/2013 11:36 AM
	Model	System	✓	Small Modular Reactor (...)	EISPC Region	11/14/2013 11:36 AM
	Model	System	✓	Compressed Air Energy ...	EISPC Region	11/14/2013 11:36 AM
	Model	System	✓	Offshore wind turbine (8...	EISPC Region	11/14/2013 11:37 AM
	Model	System	✓	New Integrated Gasificat...	EISPC Region	11/14/2013 11:38 AM

Refresh

10) There are several actions to choose in the Actions column of the Analysis Results dialog.






- The Add Results icon (  ) allows user to add model results to the *Map Contents* panel, and the map.
- The Report icon (  ) runs a model results report on that model. See the example report below.
- The Modify Model icon (  ) opens up the *Model Launcher* dialog with the model settings saved. The settings can be revised and run as a new model.
- The Edit icon (  ) allows user to edit the name and notes for personal model runs.
- The Delete icon (  ) allows user to permanently delete personal model runs.

Figure A.5 shows the mean and total range of suitability values in the model output and each input layer for the analysis extent for which it was run.

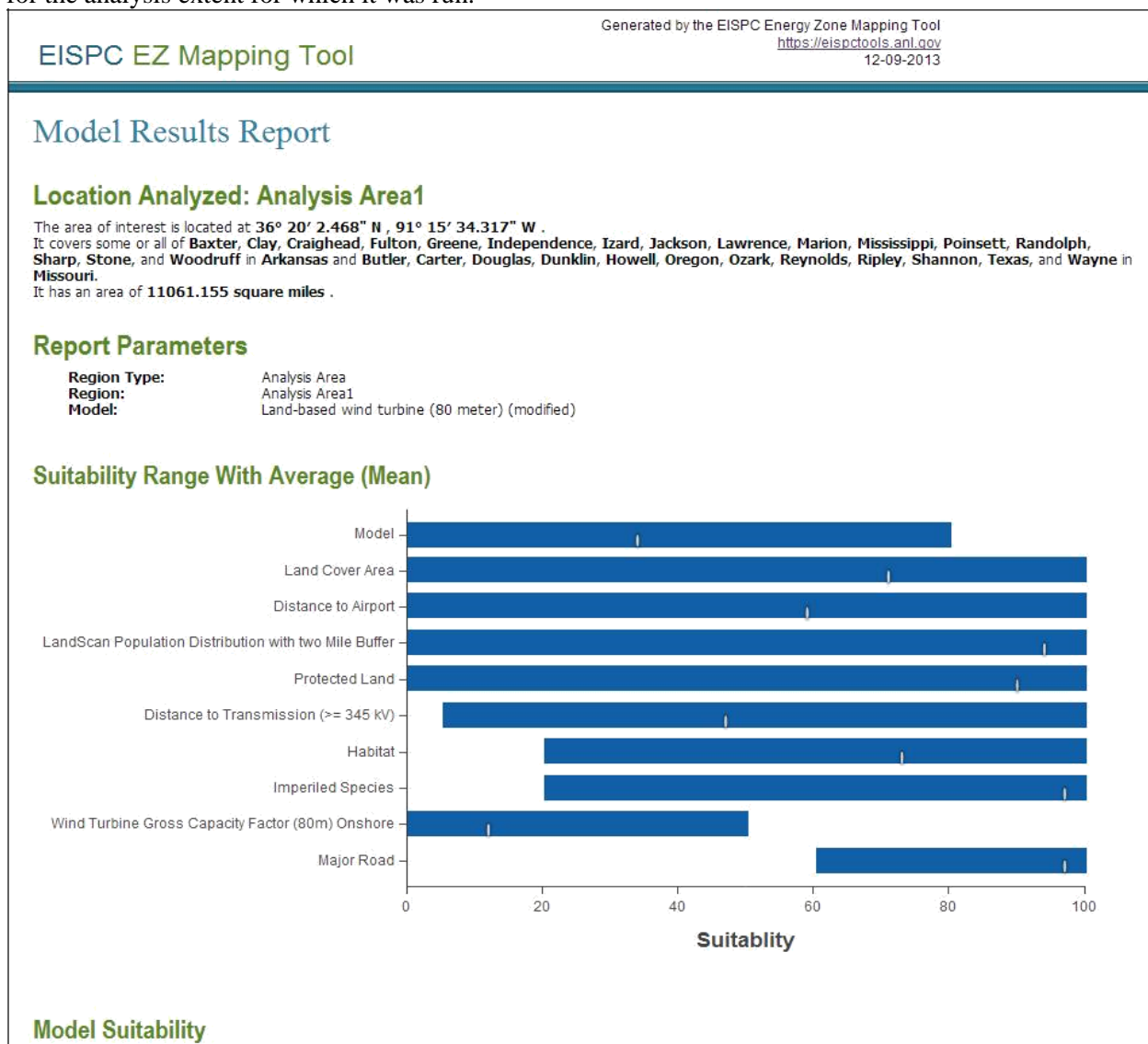


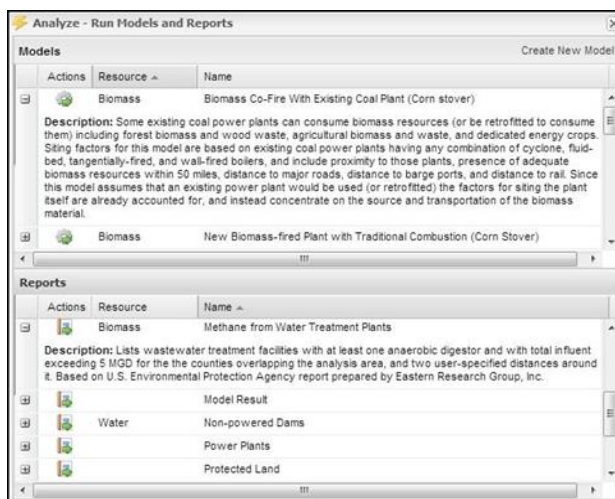
Figure A.5 Model Result Report

The Model Results Report is very useful for understanding the results of any suitability model for an analysis area and documenting the specific layers and settings that were used in the model. It displays results for the composite model output and each model input layer. In this example, the overall output in the analysis area was not very suitable (mean of approximately 35) and ranged from unsuitable (0) to about 80. Contributions to the score of each input can be rapidly assessed. Those with higher means were generally more favorable (such as population density), and those with lower means (such as transmission proximity and wind turbine gross capacity factor) were generally less favorable. With one of the most important factors of wind turbine gross capacity factor being unsuitable to marginally suitable for this location, it is doubtful that this region would be advantageous for wind turbines.

## A.9 Advanced Modeling Features

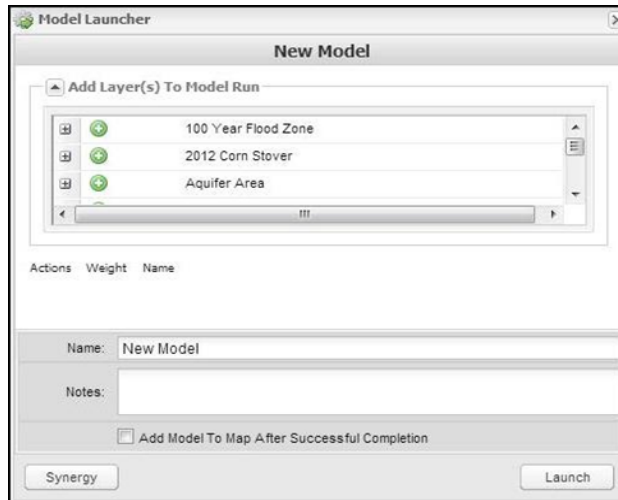
### Designing a Model from Scratch

- 1) Click the Analyze icon (  ) in the *Main Menu* panel. The *Analyze – Run Models and Reports* dialog opens.

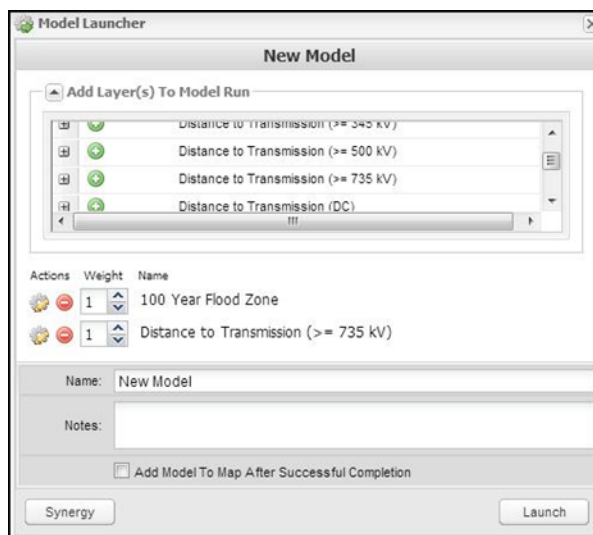


- 2) Click Create New Model on the upper right corner of the dialog and the Model Launcher dialog opens.





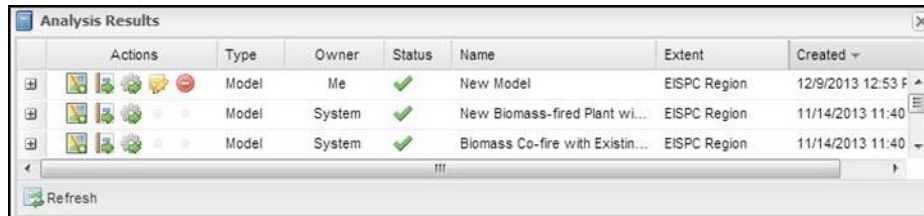
- 3) Screening layers can be added to the model by clicking the down arrow next to *Add Layer(s) To Model Run* and clicking the Add layer icon ( ) next to the layer name.
- 4) If desired, adjust the relative weights given to each screening layer by increasing or decreasing the numbers to the left of the layer names from 1 to 10, with 1 meaning that the layer should be given the smallest possible influence on the model and 10 meaning that the layer should be given the highest possible influence on the model. User can also remove a screening layer from the model run by clicking the Remove Layer icon ( ).


















- 5) Change the default name of the model and add any notes about the model run by typing in the boxes at the bottom of the Model Launcher dialog.
- 6) Check the box at the bottom of the dialog to add the model to the map after the model run has completed. Click **Launch**. User can view the status of user's model run by clicking on the Results








icon ( ). The *Analysis Results* dialog will open. The status will be displayed as an hourglass while the model is running and a check mark when the model is complete.



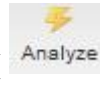
Actions	Type	Owner	Status	Name	Extent	Created
    	Model	Me	✓	New Model	EISPC Region	12/9/2013 12:53 F
    	Model	System	✓	New Biomass-fired Plant wi...	EISPC Region	11/14/2013 11:40
    	Model	System	✓	Biomass Co-fire with Existin...	EISPC Region	11/14/2013 11:40

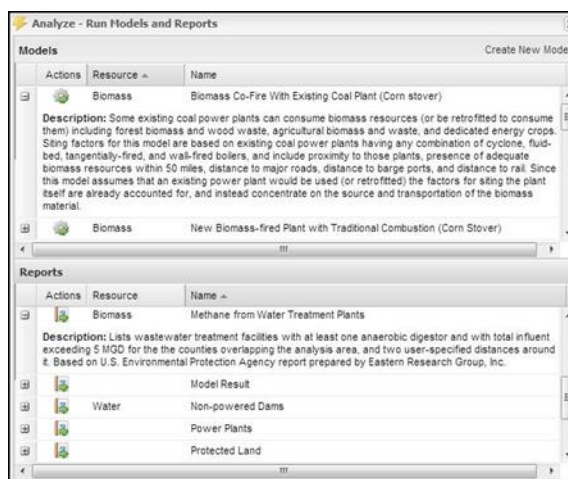
Refresh











- 7) There are several actions to choose in the Actions column of the Analysis Results dialog.
- The Add Results icon (  ) allows user to add model results to the Map Contents panel, and the map.
  - The Report icon (  ) runs a model results report on that model.
  - The Modify Model icon (  ) opens up the Model Launcher dialog with the model settings saved. The settings can be revised and run as a new model.
  - The Edit icon (  ) allows user to edit the name and notes for model runs.
  - The Delete icon (  ) allows user to permanently delete model runs.

## Synergy


























The main objective of synergy analysis is to integrate the results of multiple “single-resource” analyses and to produce a map showing a composite analysis for two or more selected clean energy resources.


- Click the Analyze icon (  ) in the *Main Menu* panel. The *Analyze – Run Models and Reports* dialog opens.
- Click on *Create New Model* in the upper right corner of the dialog. The Model Launcher dialog opens.



Models		
Actions	Resource	Name
    	Biomass	Biomass Co-Fire With Existing Coal Plant (Corn stover)
Description: Some existing coal power plants can consume biomass resources (or be retrofitted to consume them) including forest biomass and wood waste, agricultural biomass and waste, and dedicated energy crops. Siting factors for this model are based on existing coal power plants having any combination of cyclone, fluid-bed, tangentially-fired, and wall-fired boilers, and include proximity to those plants, presence of adequate biomass resources within 50 miles, distance to major roads, distance to barge ports, and distance to rail. Since this model assumes that an existing power plant would be used (or retrofitted) the factors for siting the plant itself are already accounted for, and instead concentrate on the source and transportation of the biomass material.		
    	Biomass	New Biomass-fired Plant with Traditional Combustion (Corn Stover)

Reports		
Actions	Resource	Name
    	Biomass	Methane from Water Treatment Plants
Description: Lists wastewater treatment facilities with at least one anaerobic digester and with total influent exceeding 5 MGD for the counties overlapping the analysis area, and two user-specified distances around it. Based on U.S. Environmental Protection Agency report prepared by Eastern Research Group, Inc.		
    	Model Result	
    	Water	Non-powered Dams
    		Power Plants
    		Protected Land

- Click the Synergy button. Default system models or user’s personal model runs can be added to the synergy analysis by clicking the down arrow next to *Add Model(s) To Synergy Run* and clicking the Add layer icon (  ) next to the model name.

- 4) If desired, adjust the relative weights given to each model by increasing or decreasing the numbers to the left of the layer names. The weights represent ratios where a 1:1 ratio means that equal weight will be given to both models for the synergy analysis.

Analysis Results							
	Actions	Type	Owner	Status	Name	Extent	Created
		Model	Me		New Synergy Model	EISPC Region	12/4/2013 3:43 PM
		Model	System		New Biomass-fired PL...	EISPC Region	11/14/2013 11:40 AM
		Model	System		Biomass Co-fire with ...	EISPC Region	11/14/2013 11:40 AM
		Model	System		Biomass Co-fire with ...	EISPC Region	11/14/2013 11:38 AM
Refresh							

- 5) Change the default name of the Synergy model and add any notes about the synergy model run by typing in the boxes at the bottom of the Model Launcher dialog.
- 6) Check the box at the bottom of the dialog to add the synergy model to the map after the synergy model run has completed. Click **Launch**. User can view the status of user's synergy model run by

clicking on the Results icon ( ). The *Analysis Results* dialog will open. The status will be displayed as an hourglass while the model is running and a check mark when the model is complete.

**Model Launcher**

**New Synergy**

▲ Add Model(s) To Synergy Run

- New Combined-Cycle Gas Turbine (CCGT) (default)
- New Integrated Gasification Combined Cycle (IGCC) (default)
- New Pulverized Coal (PC) (default)
- Offshore wind turbine (100 meter) (default)

Weight Name

- 1 Concentrating Solar Power (CSP) (default)
- 1 New Pulverized Coal (PC) (default)

Name: New Synergy Model

Notes:

☐ Add Model To Map After Successful Completion

Model Launch

- 7) There are several actions to choose in the Actions column of the Analysis Results dialog.
- The Add Results icon ( ) allows user to add synergy model results to the Map Contents panel, and the map.
  - The Modify Model icon ( ) opens up the Model Launcher dialog with the synergy model settings saved. The settings can be revised and run as a new synergy model.
  - The Edit icon ( ) allows user to edit the name and notes for synergy model runs.
  - The Delete icon ( ) allows user to permanently delete synergy model runs.

## A.10 Exiting the Mapping Tool

To exit the mapping tool, simply close the browser window or tab, or click Logout in the upper right hand corner of the screen. User's layers in the Map Contents panel as well as user's model runs and reports are saved as user's work and can be accessed the next time when user logs in to the mapping tool.



## Appendix B. Detailed Reports of EZ Mapping Tool Simulation Cases

Appendix B provides the samples of the reports generated by the EZ Mapping Tool software. These samples include the following cases originally listed in Table 2.1:

Case No.	Line/Area No.	Type	Length (Miles)	Comments
1	Assumed Wind Development Area	Area	---	Case demonstrating the examples in the user's manual
2	Revised Wind Development Area	Area	----	Case demonstrating the examples in the user's manual
17	NewEngland_Loop	345kV AC	509.2	Case suggested by Commissioner Littell
19	Revised NewEngland_Loop	345kV AC	536.49	Revised NewEngland_Loop to avoid protected lands

## **B.1 Report on Case 1 (Assumed Wind Development Area)**

## EISPC EZ Mapping Tool

Generated by the EISPC Energy Zone Mapping Tool  
<https://eispctools.anl.gov>  
 09-08-2014

## Protected Lands Report

## Location Analyzed: IL\_WindFarm3

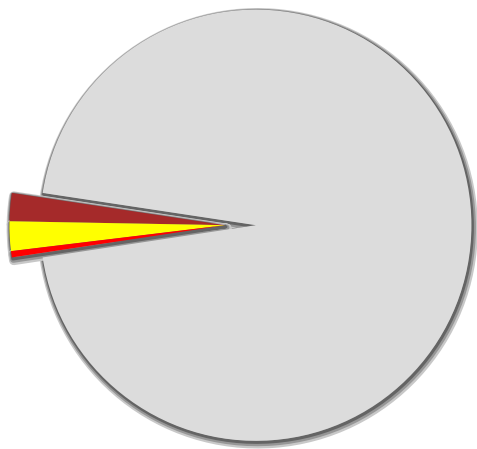
The area of interest is located at **41° 2' 5.388" N, 88° 24' 49.630" W**.

It covers some or all of **Ford, Grundy, Iroquois, Kankakee, La Salle, and Livingston** in **Illinois**.

It has an area of **806.054 square miles** with surrounding buffers of areas **6508.729** and **15881.373 square miles**.

Mapping Color*	Recommendation
Red	Exclude from development
Orange	Develop with extreme caution
Yellow	Develop with caution

## Combined Protected Lands Results Within Analysis Area



95.22% No issues  
identified in data

## Protected Areas Database

Primary Designation Name	Owner Name	IUCN Category	GAP Status	Exists inside Analysis Area	Exists within 25 Miles of Analysis Area	Exists within 50 Miles of Analysis Area
Lasalle Fish Hatchery	Other State	Unassigned	3 - Permanent Protection: Subject to extractive (e.g. mining or logging) or OHV use	✓	✓	✓
Sunbury Railroad Prairie Nature Preserve	Other State	IV - Habitat or species management area	1 - Permanent Protection: Ecological disturbance events allowed to proceed	✓	✓	✓
Don Gardner's Prairie Restoration	Private Conservation	V - Protected landscape/seascape	1 - Permanent Protection: Ecological disturbance events allowed to proceed	✓	✓	✓
North Fork Of The Vermilion River - Livingston County	Private Conservation	V - Protected landscape/seascape	1 - Permanent Protection: Ecological disturbance events allowed to proceed	✓	✓	✓
Kelly Creek	Private Conservation	V - Protected landscape/seascape	1 - Permanent Protection: Ecological disturbance events allowed to proceed	✓	✓	✓
Lasalle Lake	Other State	IV - Habitat or species management area	1 - Permanent Protection: Ecological disturbance events allowed to proceed	✓	✓	✓
Marseilles	Other State	IV - Habitat or species management area	1 - Permanent Protection: Ecological disturbance events allowed to proceed	✓	✓	✓
Otter Creek	Private	IV - Protected	1 - Permanent Protection: Ecological			

	Conservation	landscape/seascape	disturbance events allowed to proceed	✓	✓	✓
Route 66 Railroad Prairie - Cayuga	Private Conservation	V - Protected landscape/seascape	1 - Permanent Protection: Ecological disturbance events allowed to proceed	✓	✓	✓
Lasalle Lake	Private Conservation	V - Protected landscape/seascape	1 - Permanent Protection: Ecological disturbance events allowed to proceed	✓	✓	✓
Voight Pauper Cemetery Prairie Land And Water Reserve	Private Conservation	V - Protected landscape/seascape	1 - Permanent Protection: Ecological disturbance events allowed to proceed	✓	✓	✓
Lasalle Lake	Other State	IV - Habitat or species management area	1 - Permanent Protection: Ecological disturbance events allowed to proceed	✓	✓	✓
Felky Slough	Private Conservation	V - Protected landscape/seascape	1 - Permanent Protection: Ecological disturbance events allowed to proceed	✓	✓	✓
Wier Hill Prairie Nature Preserve	Private Conservation	IV - Habitat or species management area	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Kankakee Sands Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
Kankakee Sands Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
Kankakee Sands Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
Kankakee Sands Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
Kankakee Sands Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
Wilmington Shrub Prairie Nature Preserve	Other State	IV - Habitat or species management area	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Wilmington Shrub Prairie Nature Preserve	Other State	IV - Habitat or species management area	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Wilmington Shrub Prairie Nature Preserve	Other State	IV - Habitat or species management area	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Kankakee Sands Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
Marsh Relicts	Private Conservation	V - Protected landscape/seascape	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Kankakee Sands Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
Mazon River Bed	Private Conservation	V - Protected landscape/seascape	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Pembroke Savanna Nature Preserve	Private Conservation	IV - Habitat or species management area	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Peotone Railroad Prairie	Private Conservation	V - Protected landscape/seascape	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Wilmington West Geological Area	Private Conservation	V - Protected landscape/seascape	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Kankakee Sands Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
Goodrich Railroad Prairie	Private Conservation	V - Protected landscape/seascape	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Spring Creek - Iroquois Township Site	Private Conservation	V - Protected landscape/seascape	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Goodrich Railroad Prairie	Private Conservation	V - Protected landscape/seascape	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Iroquois County	Other State	Unassigned	3 - Permanent Protection: Subject to			

			extractive (e.g. mining or logging) or OHV use		✓	✓
Kankakee Sands Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
Kankakee Sands Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
Kankakee Sands Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
Kankakee Sands Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
Grant Creek Prairie Nature Preserve	Other State	IV - Habitat or species management area	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Campbell's Woods	Other State	V - Protected landscape/seascape	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Rock Creek Canyon	Private Conservation	V - Protected landscape/seascape	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Campbell's Woods	Other State	V - Protected landscape/seascape	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Kankakee Sands Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
Kankakee Sands Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
Beaver Creek - North Hooper Site	Private Conservation	V - Protected landscape/seascape	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Kankakee Sands Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
Bourbonnais Geological Area Nature Preserve	Private Conservation	IV - Habitat or species management area	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Hitts Siding Prairie Nature Preserve	Other State	IV - Habitat or species management area	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Hitts Siding Prairie Nature Preserve	Other State	IV - Habitat or species management area	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Kankakee Sands Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
TOTAL *				13	378	946

\*Maximum table length exceeded. 896 rows are not listed, but are included in the totals.

Source: [U.S. Geological Survey, et al \(Protected Areas Database\)](#).

## National Conservation Easement Database

Site Name	Easement Holder	Conservation Purpose	Exists inside Analysis Area	Exists within 25 Miles of Analysis Area	Exists within 50 Miles of Analysis Area
Voight Pauper Cemetery Prairie Land and Water Reserve	Illinois Nature Preserves Commission	Environmental System	✓	✓	✓
Sunbury Railroad Prairie Nature Preserve	Illinois Nature Preserves Commission	Environmental System	✓	✓	✓
Rock Run Land and Water Reserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Sandy Ford Land and Water Reserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Lake of the Woods	Forest Preserve District of Will County	Open Space - Other		✓	✓
Pembroke Savanna Nature Preserve	Illinois Nature Preserves Commission	Environmental System		✓	✓



Kankakee River Nature Preserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Lake of the Woods	Forest Preserve District of Will County	Open Space - Other		✓	✓
	Prairielands Preservation Foundation	Open Space - Other		✓	✓
CONRAD SAVANNA NATURE PRESERVE	Indiana Department of Natural Resources	Environmental System		✓	✓
Wetlands Reserve Program	Natural Resources Conservation Service	Environmental System		✓	✓
Mackinaw River Land and Water Reserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Lake of the Woods	Forest Preserve District of Will County	Open Space - Other		✓	✓
Weston Cemetery Prairie Nature Preserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Wetlands Reserve Program	Natural Resources Conservation Service	Environmental System		✓	✓
CONRAD SAVANNA NATURE PRESERVE	Indiana Department of Natural Resources	Environmental System		✓	✓
Lower Fox River-Wedron Palisades Nature Preserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Wetlands Reserve Program	Natural Resources Conservation Service	Environmental System		✓	✓
Iroquois County State Wildlife Area Land and Water Reserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Iroquois Sands Land and Water Reserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Wetlands Reserve Program	Natural Resources Conservation Service	Environmental System		✓	✓
Theodore Marsh Land and Water Reserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Maze Woods Land and Water Reserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Rock Run Preserve	Forest Preserve District of Will County	Open Space - Other		✓	✓
Bourbonnais Geological Area Nature Preserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Braidwood Dunes and Savanna Nature Preserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
George S. Park Memorial Woods Nature Preserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Momence Wetlands Land and Water Reserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Sweet Fern Savanna Land and Water Reserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Wetlands Reserve Program	Natural Resources Conservation Service	Environmental System		✓	✓
Lake of the Woods	Forest Preserve District of Will County	Open Space - Other		✓	✓
Lower Rock Run Preserve	Forest Preserve District of Will County	Open Space - Other		✓	✓
Tucker-Millington Fen Nature Preserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Goose Lake Prairie Nature Preserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Gooseberry Island Nature Preserve	Illinois Nature Preserves Commission	Environmental System		✓	✓

Lake of the Woods	Forest Preserve District of Will County	Open Space - Other		✓	✓
Rock Run Land and Water Reserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Bonnie's Prairie Nature Preserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Lake of the Woods	Forest Preserve District of Will County	Open Space - Other		✓	✓
Camp River Trails Land and Water Reserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Lake of the Woods	Forest Preserve District of Will County	Open Space - Other		✓	✓
Rock Run Preserve	Forest Preserve District of Will County	Open Space - Other		✓	✓
Momence Wetlands Nature Preserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Wetlands Reserve Program	Natural Resources Conservation Service	Environmental System		✓	✓
Emmons' Woods Land and Water Reserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Raccoon Grove Nature Preserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
The Conservation Foundation Easement	The Conservation Foundation	Open Space - Other		✓	✓
Kankakee River Nature Preserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
The Conservation Foundation Easement	The Conservation Foundation	Open Space - Other		✓	✓
Hooper Branch Savanna Nature Preserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
TOTAL *			2	121	473

\*Maximum table length exceeded. 423 rows are not listed, but are included in the totals.

Source: [The Conservation Registry \(National Conservation Easement Database\)](#).

## Scenic Byway

Name	Designation	Designation Organization(s)						Exists inside Analysis Area	Exists within 25 Miles of Analysis Area	Exists within 50 Miles of Analysis Area
		National	U.S. Forest Service	National Park Service	State	Bureau of Land Management	Other			
Historic Route 66	All-American Road, National Scenic Byway	✓						✓	✓	✓
Historic Route 66 - Illinois	National Scenic Byway	✓						✓	✓	✓
Historic Route 66	All-American Road, National Scenic Byway	✓						✓	✓	✓
Historic Route 66	All-American Road, National Scenic Byway	✓							✓	✓
Historic Route 66	All-American Road, National Scenic Byway	✓							✓	✓
Historic Route 66	All-American Road, National Scenic Byway	✓							✓	✓
Historic Route 66	All-American Road, National Scenic Byway	✓							✓	✓
Historic Route 66	All-American Road, National Scenic Byway	✓							✓	✓
Historic Route 66	All-American Road, National Scenic Byway	✓							✓	✓

66	Scenic Byway									
Historic Route 66	All-American Road, National Scenic Byway	✓							✓	✓
Illinois River Road	National Scenic Byway	✓							✓	✓
Historic Route 66	All-American Road, National Scenic Byway	✓							✓	✓
Historic Route 66	All-American Road, National Scenic Byway	✓							✓	✓
Historic Route 66	All-American Road, National Scenic Byway	✓							✓	✓
Historic Route 66	All-American Road, National Scenic Byway	✓								✓
Historic Route 66	All-American Road, National Scenic Byway	✓								✓
Historic Route 66	All-American Road, National Scenic Byway	✓								✓
Historic Route 66	All-American Road, National Scenic Byway	✓								✓
Historic Route 66	All-American Road, National Scenic Byway	✓								✓
Historic Route 66	All-American Road, National Scenic Byway	✓								✓
Lincoln Highway	Illinois State Scenic Byway, National Scenic Byway	✓			✓					✓
Historic Route 66	All-American Road, National Scenic Byway	✓								✓
Historic Route 66	All-American Road, National Scenic Byway	✓								✓
Historic Route 66	All-American Road, National Scenic Byway	✓								✓
Historic Route 66	All-American Road, National Scenic Byway	✓								✓
Historic Route 66	All-American Road, National Scenic Byway	✓								✓
Historic Route 66	All-American Road, National Scenic Byway	✓								✓
Historic Route 66	All-American Road, National Scenic Byway	✓								✓
Historic Route 66	All-American Road, National Scenic Byway	✓								✓
Historic Route 66	All-American Road, National Scenic Byway	✓								✓
Historic Route 66	All-American Road, National Scenic Byway	✓								✓
Historic Route 66	All-American Road, National Scenic Byway	✓								✓
Historic Route 66	All-American Road, National Scenic Byway	✓								✓
Historic Route 66	All-American Road, National Scenic Byway	✓								✓
Historic Route 66	All-American Road, National Scenic Byway	✓								✓
Historic Route 66	All-American Road, National Scenic Byway	✓								✓
TOTAL								3	14	33

Source: [U.S. Department of Transportation \(Scenic Byway\)](#).

Disclaimer: This report was prepared as part of work sponsored by an agency of the United States Government. Neither the United States Government, nor any agency thereof, nor the University of Chicago, nor any of their employees or officers, makes any warrantee, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product or process disclosed, or represents that its use would not infringe on privately owned rights. Reference herein to any specific commercial product, process, or service, by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The view and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

## B.2 Report on Case 2 (Revised Wind Development Area)

## EISPC EZ Mapping Tool

Generated by the EISPC Energy Zone Mapping Tool  
<https://eispctools.anl.gov>  
 09-08-2014

## Protected Lands Report

## Location Analyzed: IL\_WindFarm3\_revise

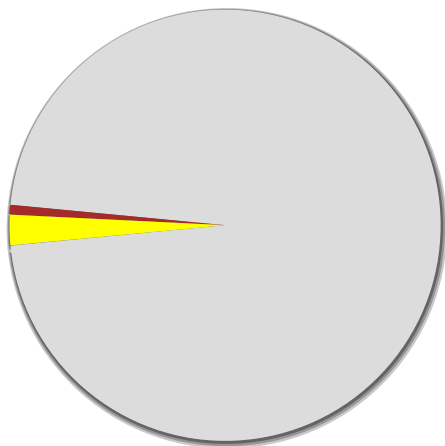
The area of interest is located at **41° 1' 35.288" N , 88° 24' 19.433" W**.

It covers some or all of **Ford, Grundy, Iroquois, Kankakee, La Salle, and Livingston** in **Illinois**.

It has an area of **778.684 square miles** with surrounding buffers of areas **6503.335** and **15876.723 square miles**.

Mapping Color*	Recommendation
Red	Exclude from development
Orange	Develop with extreme caution
Yellow	Develop with caution

## Combined Protected Lands Results Within Analysis Area



## Protected Areas Database

Primary Designation Name	Owner Name	IUCN Category	GAP Status	Exists inside Analysis Area	Exists within 25 Miles of Analysis Area	Exists within 50 Miles of Analysis Area
Lasalle Lake	Other State	IV - Habitat or species management area	1 - Permanent Protection: Ecological disturbance events allowed to proceed	✓	✓	✓
Sunbury Railroad Prairie Nature Preserve	Other State	IV - Habitat or species management area	1 - Permanent Protection: Ecological disturbance events allowed to proceed	✓	✓	✓
Don Gardner's Prairie Restoration	Private Conservation	V - Protected landscape/seascape	1 - Permanent Protection: Ecological disturbance events allowed to proceed	✓	✓	✓
North Fork Of The Vermilion River - Livingston County	Private Conservation	V - Protected landscape/seascape	1 - Permanent Protection: Ecological disturbance events allowed to proceed	✓	✓	✓
Kelly Creek	Private Conservation	V - Protected landscape/seascape	1 - Permanent Protection: Ecological disturbance events allowed to proceed	✓	✓	✓
Voight Pauper Cemetery Prairie Land And Water Reserve	Private Conservation	V - Protected landscape/seascape	1 - Permanent Protection: Ecological disturbance events allowed to proceed	✓	✓	✓
Otter Creek	Private Conservation	V - Protected landscape/seascape	1 - Permanent Protection: Ecological disturbance events allowed to proceed	✓	✓	✓
Route 66 Railroad Prairie - CAVIQA	Private Conservation	V - Protected landscape/seascape	1 - Permanent Protection: Ecological disturbance events allowed to proceed	✓	✓	✓



Property	Ownership	Designation	Disturbance Events Allowed to Proceed	1 - Permanent Protection: Ecological disturbance events allowed to proceed	2 - Permanent Protection: Ecological disturbance events suppressed	3 - Permanent Protection: Subject to extractive (e.g. mining or logging) or OHV use
Felky Slough	Private Conservation	V - Protected landscape/seascape	1 - Permanent Protection: Ecological disturbance events allowed to proceed	✓	✓	✓
Kankakee Sands Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
Kankakee Sands Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
Kankakee Sands Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
Kankakee Sands Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
Wilmington Shrub Prairie Nature Preserve	Other State	IV - Habitat or species management area	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Lower Fox River-wedron Palisades Nature Preserve	Private Conservation	IV - Habitat or species management area	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Wilmington Shrub Prairie Nature Preserve	Other State	IV - Habitat or species management area	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Marsh Relicts	Private Conservation	V - Protected landscape/seascape	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Kankakee Sands Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
Mazon River Bed	Private Conservation	V - Protected landscape/seascape	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Pembroke Savanna Nature Preserve	Private Conservation	IV - Habitat or species management area	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Kankakee Sands Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
Kankakee Sands Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
Wilmington West Geological Area	Private Conservation	V - Protected landscape/seascape	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Peotone Railroad Prairie	Private Conservation	V - Protected landscape/seascape	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Goodrich Railroad Prairie	Private Conservation	V - Protected landscape/seascape	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Kankakee Sands Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
Goodrich Railroad Prairie	Private Conservation	V - Protected landscape/seascape	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Iroquois County	Other State	Unassigned	3 - Permanent Protection: Subject to extractive (e.g. mining or logging) or OHV use		✓	✓
Kankakee Sands Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
Kankakee Sands Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
Kankakee Sands Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
Kankakee Sands Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
Grant Creek Prairie Nature Preserve	Other State	IV - Habitat or species management area	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Campbell's Woods	Other State	V - Protected landscape/seascape	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Campbell's Woods	Other State	V - Protected landscape/seascape	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓

		landscape/seascape	disturbance events allowed to proceed		✓	✓
Kankakee Sands Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
Kankakee Sands Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
Bourbonnais Geological Area Nature Preserve	Private Conservation	IV - Habitat or species management area	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Beaver Creek - North	Private Conservation	V - Protected landscape/seascape	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Hooper Site						
Kankakee Sands Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
Hitts Siding Prairie Nature Preserve	Other State	IV - Habitat or species management area	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Hitts Siding Prairie Nature Preserve	Other State	IV - Habitat or species management area	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Kankakee Sands Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
Braceville Railroad Prairie	Private Conservation	V - Protected landscape/seascape	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Kankakee Sands Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
Kankakee Sands Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
Conrad Savanna Site Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
Braidwood Dunes And Savanna Nature Preserve	Private Conservation	IV - Habitat or species management area	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Braidwood Dunes And Savanna Nature Preserve	Private Conservation	IV - Habitat or species management area	1 - Permanent Protection: Ecological disturbance events allowed to proceed		✓	✓
Kankakee Sands Fee	The Nature Conservancy	V - Protected landscape/seascape	2 - Permanent Protection: Ecological disturbance events suppressed		✓	✓
TOTAL *				9	378	945

\*Maximum table length exceeded. 895 rows are not listed, but are included in the totals.

Source: [U.S. Geological Survey; et al \(Protected Areas Database\)](#).

## National Conservation Easement Database

Site Name	Easement Holder	Conservation Purpose	Exists inside Analysis Area	Exists within 25 Miles of Analysis Area	Exists within 50 Miles of Analysis Area
Voight Pauper Cemetery Prairie Land and Water Reserve	Illinois Nature Preserves Commission	Environmental System	✓	✓	✓
Sunbury Railroad Prairie Nature Preserve	Illinois Nature Preserves Commission	Environmental System	✓	✓	✓
Rock Run Land and Water Reserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Sandy Ford Land and Water Reserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Lake of the Woods	Forest Preserve District of Will County	Open Space - Other		✓	✓
Pembroke Savanna Nature Preserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Kankakee River Nature Preserve	Illinois Nature Preserves	Environmental		✓	✓

	Commission	System			
Lake of the Woods	Forest Preserve District of Will County	Open Space - Other		✓	✓
	Prairielands Preservation Foundation	Open Space - Other		✓	✓
CONRAD SAVANNA NATURE PRESERVE	Indiana Department of Natural Resources	Environmental System		✓	✓
Wetlands Reserve Program	Natural Resources Conservation Service	Environmental System		✓	✓
Mackinaw River Land and Water Reserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Lake of the Woods	Forest Preserve District of Will County	Open Space - Other		✓	✓
Weston Cemetery Prairie Nature Preserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Wetlands Reserve Program	Natural Resources Conservation Service	Environmental System		✓	✓
CONRAD SAVANNA NATURE PRESERVE	Indiana Department of Natural Resources	Environmental System		✓	✓
Lower Fox River-Wedron Palisades Nature Preserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Wetlands Reserve Program	Natural Resources Conservation Service	Environmental System		✓	✓
Iroquois County State Wildlife Area Land and Water Reserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Iroquois Sands Land and Water Reserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Wetlands Reserve Program	Natural Resources Conservation Service	Environmental System		✓	✓
Theodore Marsh Land and Water Reserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Maze Woods Land and Water Reserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Rock Run Preserve	Forest Preserve District of Will County	Open Space - Other		✓	✓
Bourbonnais Geological Area Nature Preserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Braidwood Dunes and Savanna Nature Preserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
George S. Park Memorial Woods Nature Preserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Momence Wetlands Land and Water Reserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Sweet Fem Savanna Land and Water Reserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Wetlands Reserve Program	Natural Resources Conservation Service	Environmental System		✓	✓
Lake of the Woods	Forest Preserve District of Will County	Open Space - Other		✓	✓
Lower Rock Run Preserve	Forest Preserve District of Will County	Open Space - Other		✓	✓
Tucker-Millington Fen Nature Preserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Goose Lake Prairie Nature Preserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Gooseberry Island Nature Preserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Lake of the Woods	Forest Preserve District of Will County	Open Space - Other		✓	✓

	Will County	Other			
Rock Run Land and Water Reserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Bonnie's Prairie Nature Preserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Lake of the Woods	Forest Preserve District of Will County	Open Space - Other		✓	✓
Camp River Trails Land and Water Reserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Lake of the Woods	Forest Preserve District of Will County	Open Space - Other		✓	✓
Rock Run Preserve	Forest Preserve District of Will County	Open Space - Other		✓	✓
Momence Wetlands Nature Preserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Wetlands Reserve Program	Natural Resources Conservation Service	Environmental System		✓	✓
Emmons' Woods Land and Water Reserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
Raccoon Grove Nature Preserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
The Conservation Foundation Easement	The Conservation Foundation	Open Space - Other		✓	✓
Kankakee River Nature Preserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
The Conservation Foundation Easement	The Conservation Foundation	Open Space - Other		✓	✓
Hooper Branch Savanna Nature Preserve	Illinois Nature Preserves Commission	Environmental System		✓	✓
TOTAL *			2	121	474

\*Maximum table length exceeded. 424 rows are not listed, but are included in the totals.

Source: [The Conservation Registry \(National Conservation Easement Database\)](#).

## Scenic Byway

Name	Designation	Designation Organization(s)						Exists inside Analysis Area	Exists within 25 Miles of Analysis Area	Exists within 50 Miles of Analysis Area
		National	U.S. Forest Service	National Park Service	State	Bureau of Land Management	Other			
Historic Route 66	All-American Road, National Scenic Byway	✓						✓	✓	✓
Historic Route 66 - Illinois	National Scenic Byway	✓						✓	✓	✓
Historic Route 66	All-American Road, National Scenic Byway	✓						✓	✓	✓
Historic Route 66	All-American Road, National Scenic Byway	✓							✓	✓
Historic Route 66	All-American Road, National Scenic Byway	✓							✓	✓
Historic Route 66	All-American Road, National Scenic Byway	✓							✓	✓
Historic Route 66	All-American Road, National Scenic Byway	✓							✓	✓
Historic Route 66	All-American Road, National Scenic Byway	✓							✓	✓
Historic Route 66	All-American Road, National Scenic Byway	✓							✓	✓

Source: U.S. Department of Transportation (Scenic Byway).

77



## B.3 Report on Case 17 (New England Loop)

## EISPC EZ Mapping Tool

Generated by the EISPC Energy Zone Mapping Tool  
<https://eispctools.anl.gov>  
 09-08-2014

## Corridor Report

## Corridor Analyzed: NewEngland\_Loop

The corridor starts at **44° 48' 41.615" N, 68° 47' 11.424" W**, and ends at **44° 48' 13.555" N, 68° 47' 11.424" N**.

The centerline length is 509.20 miles long.

The 1000 foot (0.189 mile) width results in a total area of 96.31 square miles.

## States and Counties Crossed, by Milepost

From Milepost (mi)	To Milepost (mi)	State Name	County Name	Area Within Corridor (sq mi)
0.00	25.08	Maine	Penobscot	4.08
25.08	65.77	Maine	Somerset	1.85
65.77	70.15	Maine	Franklin	0.11
70.15	104.42	Maine	Somerset	**
104.42	185.03	Maine	Piscataquis	2.03
185.03	185.65	Maine	Penobscot	**
185.65	213.65	Maine	Aroostook	0.72
213.65	322.94	Maine	Penobscot	**
322.94	332.49	Maine	Penobscot	**
332.49	369.51	Maine	Hancock	1.42
369.51	417.00	Maine	Washington	2.40
427.76	474.03	Maine	Washington	**
474.03	493.10	Maine	Hancock	**
493.10	322.94	Maine	Penobscot	**
TOTAL				12.61

\*\* Area previously reported for this feature includes total area crossed by the corridor.

Source: U.S. Census Bureau; et al (County Boundary (Generalized)) not available.

## Populated Places

From Milepost (mi)	To Milepost (mi)	Name	Type	Area Within Corridor (sq mi)
0.00	3.00	Bangor	city	0.26
32.59	33.67	Hartland	CDP	0.05
33.78	34.53	Hartland	CDP	**
262.86	264.39	Millinocket	CDP	0.04
310.25	316.09	Old Town	city	0.15
317.98	322.94	Bangor	city	**
322.94	324.02	Bangor	city	**
324.02	327.46	Brewer	city	0.16
338.11	349.62	Ellsworth	city	0.29
420.65	422.78	Eastport	city	0.05
504.43	507.49	Brewer	city	**
507.49	322.94	Bangor	city	**
TOTAL				1.00

\*\* Area previously reported for this feature includes total area crossed by the corridor.

Source: U.S. Census Bureau (U.S. Populated Place).

## Population

From Milepost (mi)	To Milepost (mi)	Estimated Daytime Population <sup>†</sup>	Estimated Ambient (24-hour average) Population <sup>‡</sup>
0.0	50.0	522	1,079
50.0	100.0	0	66

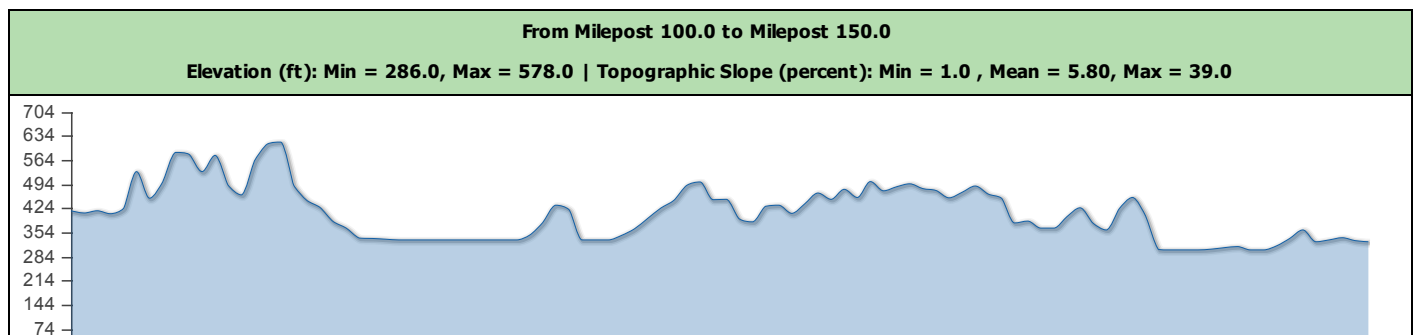
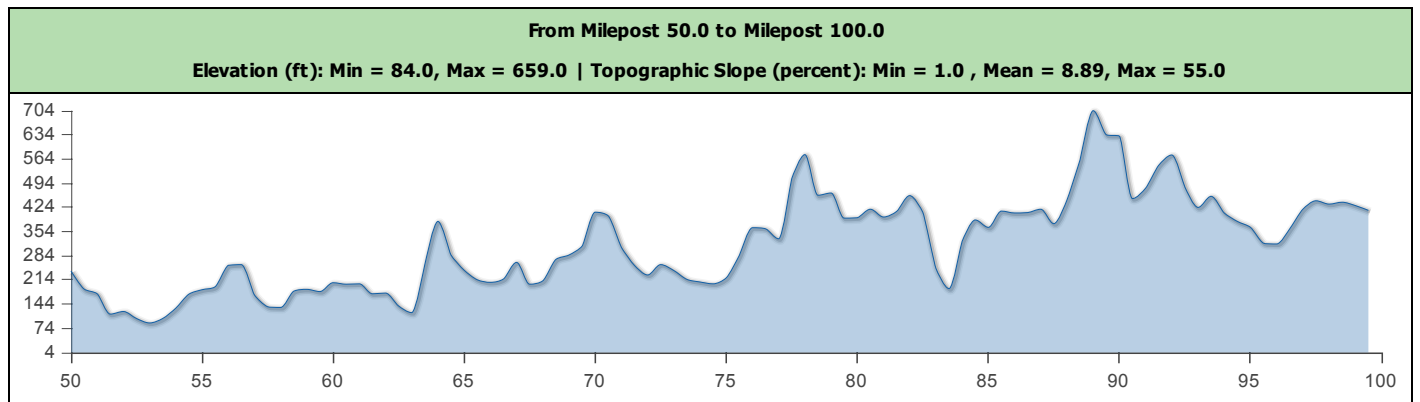
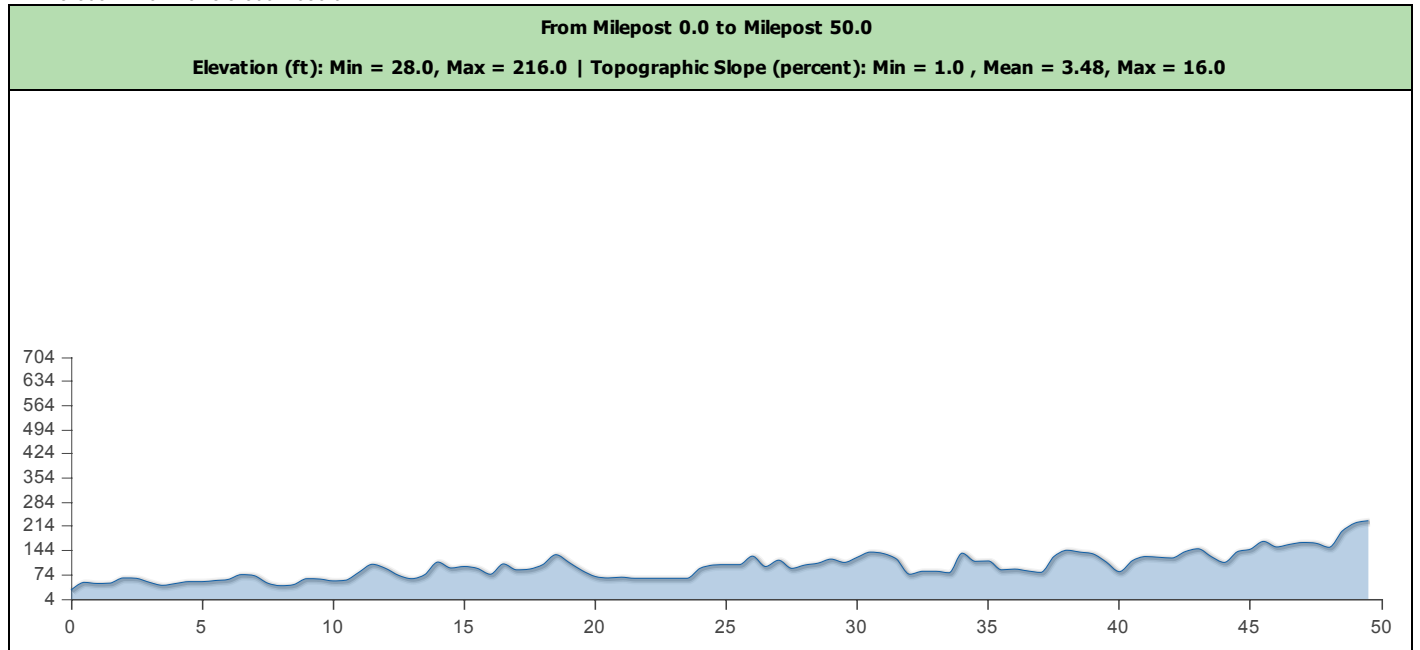
100.0	150.0	0	0
150.0	200.0	0	0
200.0	250.0	0	0
250.0	300.0	33	7
300.0	350.0	7,717	2,370
350.0	400.0	5	32
400.0	450.0	6	21
450.0	500.0	1	96
500.0	509.2	4,062	2,295
<b>TOTAL</b>		<b>12,346</b>	<b>5,966</b>

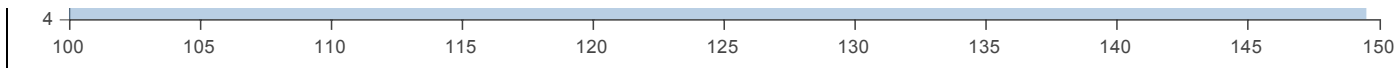
† Source: U.S. Census Bureau (Census Tract).

‡ Source: Oak Ridge National Laboratory (Population Density (LandScan)).

## Elevation Profiles

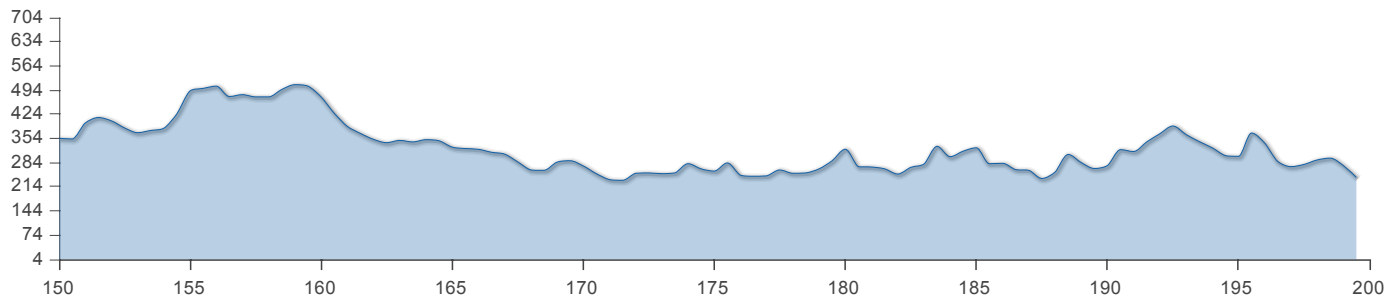
Min Elevation : 4.0 - Max elevation: 659.0





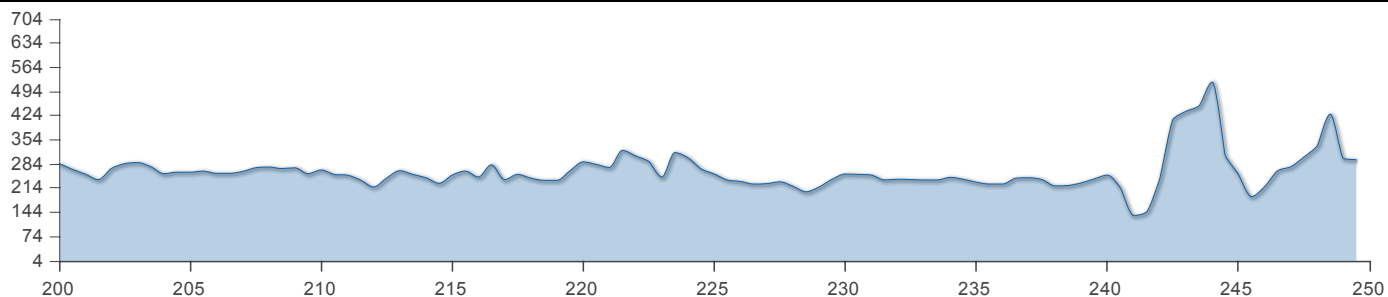
**From Milepost 150.0 to Milepost 200.0**

**Elevation (ft): Min = 218.0, Max = 477.0 | Topographic Slope (percent): Min = 1.0 , Mean = 4.53, Max = 30.0**



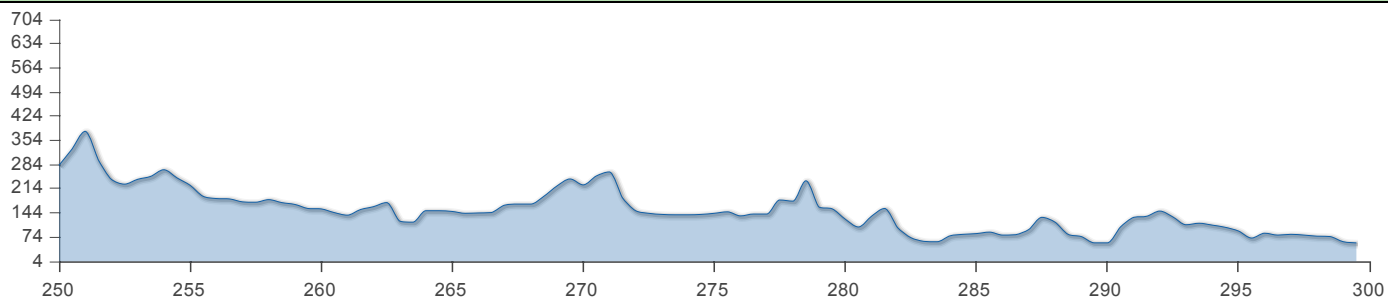
**From Milepost 200.0 to Milepost 250.0**

**Elevation (ft): Min = 127.0, Max = 488.0 | Topographic Slope (percent): Min = 1.0 , Mean = 4.97, Max = 42.0**



**From Milepost 250.0 to Milepost 300.0**

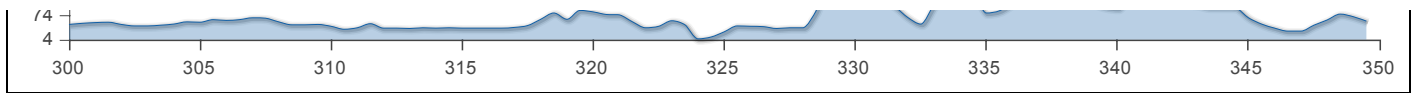
**Elevation (ft): Min = 54.0, Max = 356.0 | Topographic Slope (percent): Min = 1.0 , Mean = 4.26, Max = 25.0**



**From Milepost 300.0 to Milepost 350.0**

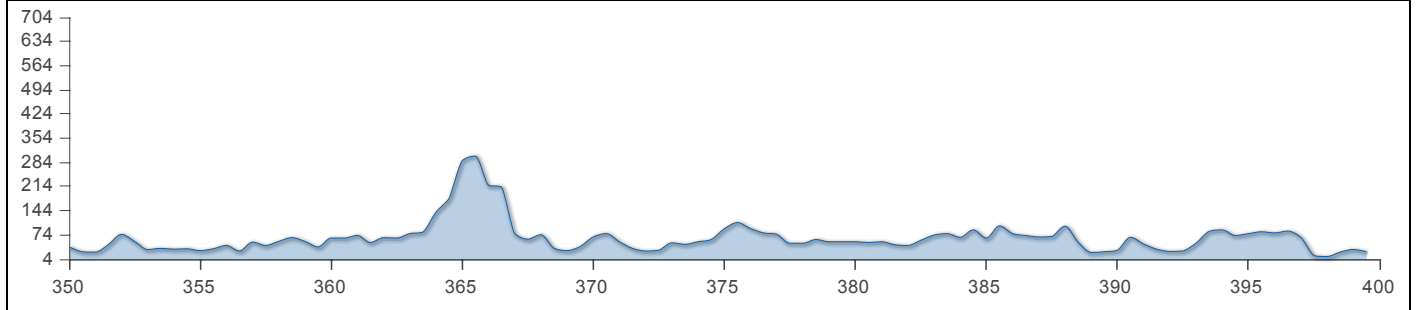
**Elevation (ft): Min = 6.0, Max = 190.0 | Topographic Slope (percent): Min = 1.0 , Mean = 4.06, Max = 26.0**





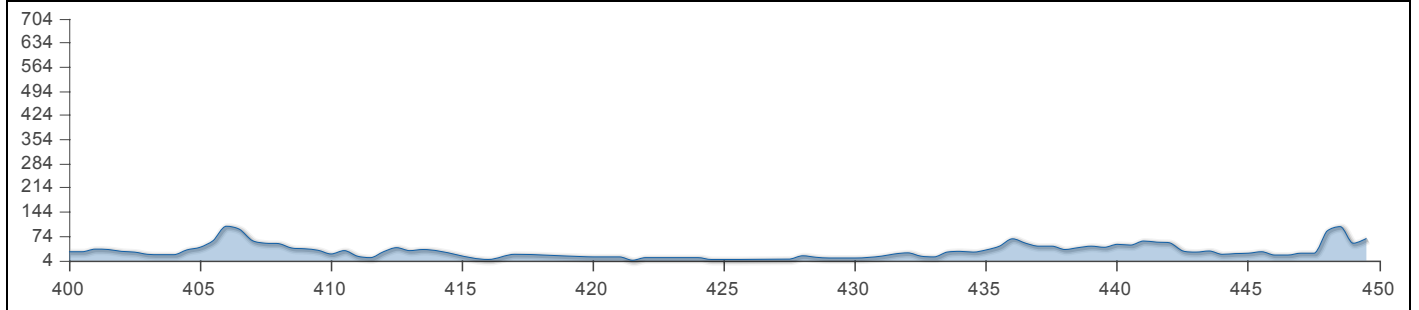
**From Milepost 350.0 to Milepost 400.0**

**Elevation (ft): Min = 11.0, Max = 283.0 | Topographic Slope (percent): Min = 1.0 , Mean = 5.05, Max = 42.0**



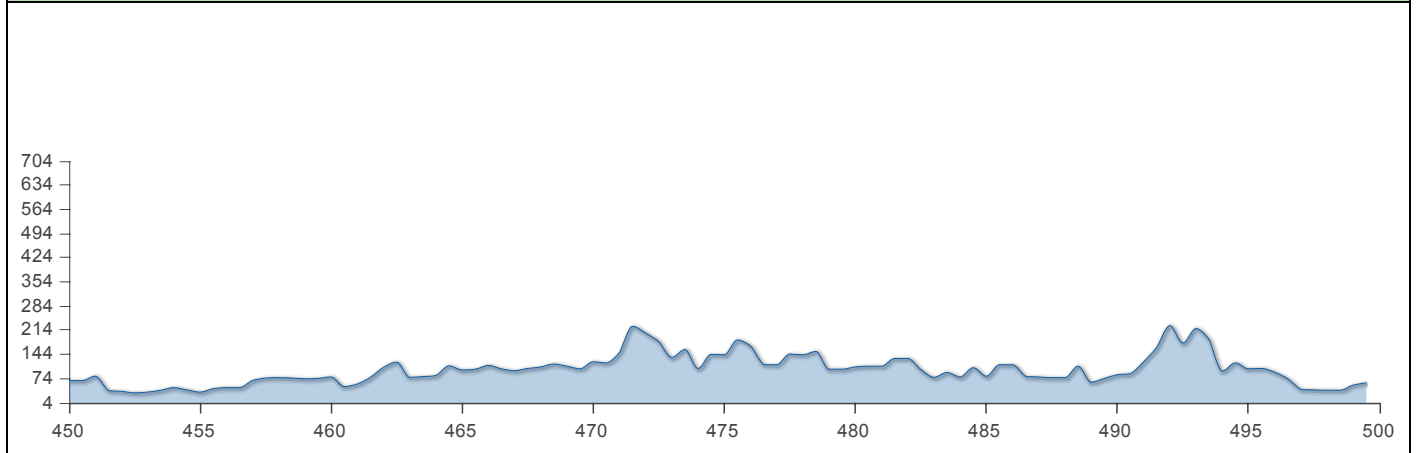
**From Milepost 400.0 to Milepost 450.0**

**Elevation (ft): Min = 0.0, Max = 97.0 | Topographic Slope (percent): Min = 1.0 , Mean = 3.99, Max = 22.0**



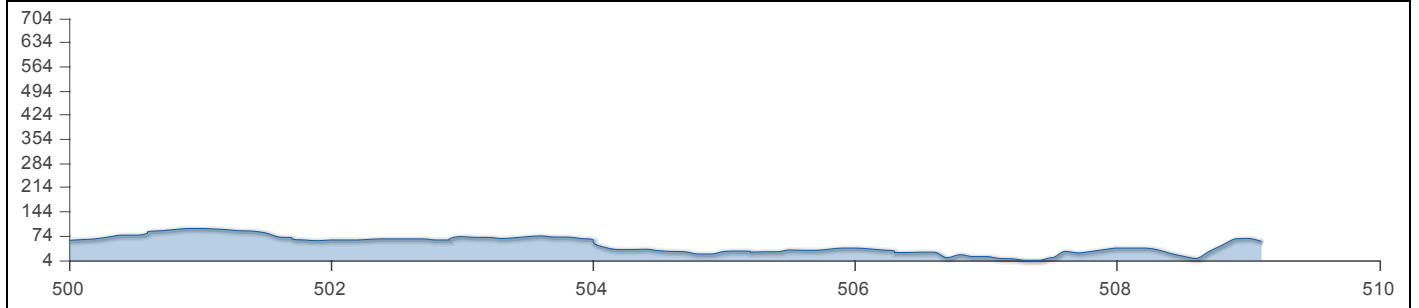
**From Milepost 450.0 to Milepost 500.0**

**Elevation (ft): Min = 31.0, Max = 213.0 | Topographic Slope (percent): Min = 1.0 , Mean = 4.73, Max = 28.0**



**From Milepost 500.0 to Milepost 509.20**

**Elevation (ft): Min = 4.0, Max = 90.0 | Topographic Slope (percent): Min = 1.0 , Mean = 3.67, Max = 19.0**





Source: Metadata not available.

## Topographic Slope

From Milepost (mi)	To Milepost (mi)	Slope (percent)		
		Min	Max	Mean
0.00	50.00	1.0	16.0	3.48
50.00	100.00	1.0	55.0	8.89
100.00	150.00	1.0	39.0	5.80
150.00	200.00	1.0	30.0	4.53
200.00	250.00	1.0	42.0	4.97
250.00	300.00	1.0	25.0	4.26
300.00	350.00	1.0	26.0	4.06
350.00	400.00	1.0	42.0	5.05
400.00	450.00	1.0	22.0	3.99
450.00	500.00	1.0	28.0	4.73
500.00	509.20	1.0	19.0	3.67

## Major Roads

Milepost (mi)	Name	Number of Lanes
0.19	Interstate 95	4
0.82	Union St	4
1.12 *	Maine Ave	2
1.31	Godfrey Blvd	4
1.33 *	Godfrey Blvd	4
24.68	State Hwy 7	2
44.85	State Hwy 150	0
52.05	US Hwy 201	2
53.76	US Hwy 201 A	0
83.54	US Hwy 201	2
110.69	State Hwy 6	2
159.86	East Rd	0
230.81	Grand Lake Rd	0
264.29	State Hwy 157	0
293.19	State Hwy 6	2
304.51	State Hwy 16	0
321.21	Broadway	4
322.83	Union St	2
323.79	Main St	2
323.80	Summer St	4
323.80 *	Main St	4
324.19	S Main St	0
325.24	Interstate 395	4
345.76	US Hwy 1 A	2
347.57	US Hwy 1 A	2
400.76	State Hwy 191	0
412.73	US Hwy 1	2
420.74	Old Eastport Rd	2
473.71	State Hwy 9	2
483.12	State Hwy 9	2
486.25	State Hwy 179	0
492.62	State Hwy 9	2
496.37	State Hwy 9	2
501.11	State Hwy 9	2

506.98	N Main St	2
508.28	Broadway	0
508.28 *	Broadway	0
508.28 *	Hammond St	2
508.40 *	Central St	0

\* Nearest centerline milepost. Overlaps the corridor width, but not the centerline.

Source: [Federal Highway Administration](#); et al ([Major Road](#)).

## Railroads

Milepost (mi)	Owner Name
3.18	MMA
23.90	
53.94	
111.66	MMA
263.46	MMA
263.57	MMA
283.86	EMRY
323.90 *	ST
323.91	ST
323.92	ST
323.94	ST
324.43	ST
324.79	DSRX
347.68	DSRX
353.00	MDTT
400.47	MDTT
507.64	ST

\* Nearest centerline milepost. Overlaps the corridor width, but not the centerline.

Source: [Federal Railroad Administration \(Railroad\)](#).

## Rivers with at least 30,000 GPM Flow

Milepost (mi)	Name	Flow (GPM)
23.12	East Branch Sebasticook River	51,845.82
32.17 *	Indian Stream	30,499.55
33.55		191,585.99
44.09	Wesserunsett Stream	48,557.02
53.36	Kennebec River	2,191,117.90
62.93		60,064.70
62.94 *		81,692.82
76.73	Sandy Stream	38,502.10
83.40	Kennebec River	2,042,729.81
95.59		61,798.41
120.05		51,999.31
126.05	Roach River	83,987.09
141.73		64,056.78
145.28	West Branch Penobscot River	1,056,604.01
168.94	Webster Brook	207,213.20
171.56	East Branch Penobscot River	34,615.94
182.17	Munsungan Stream	83,397.36
187.50	Mooseleuk Stream	96,811.10
187.50 *	Mooseleuk Stream	95,297.74
199.38	Machias River	137,769.93

201.49 *	Machias River	138,204.82
201.52	Machias River	138,238.48
212.11	Aroostook River	321,359.20
228.37	Sawtelle Brook	41,712.37
241.14 *	East Branch Penobscot River	415,929.44
241.16	East Branch Penobscot River	416,457.23
245.58 *	Wassataquoik Stream	106,416.76
245.58	Wassataquoik Stream	106,646.55
261.26 *	Millinocket Stream	115,699.29
261.28	Millinocket Stream	115,904.84
265.50 *	West Branch Penobscot River	1,539,421.25
265.57	West Branch Penobscot River	1,544,323.49
283.18	West Branch Seboeis Stream	90,708.31
289.57	Piscataquis River	1,224,914.33
310.58	Pushaw Stream	165,017.48
322.23	Kenduskeag Stream	127,704.24
324.00	Penobscot River	6,755,731.65
346.51 *	Union River	396,505.82
369.04	West Branch Narraguagus River	58,687.78
371.93	Narraguagus River	120,488.44
377.77	Pleasant River	53,973.59
377.84 *	Pleasant River	49,089.30
392.16 *	Machias River	389,488.84
392.19	Machias River	390,807.41
445.90	East Machias River	186,299.12
454.96	Old Stream	51,782.99
455.02 *	Old Stream	57,341.38
460.66	Machias River	181,972.69
473.94	Narraguagus River	71,094.41
507.52	Penobscot River	6,628,688.04

\* Nearest centerline milepost. Overlaps the corridor width, but not the centerline.

🔪 Table truncated. 7 records not displayed. Run report with shorter and/or narrower corridor to see all records.

Source: [Horizon Systems Corporation; et al \(Surface Water Flow - NHDPlus Version 2\).](#)

## Water Bodies

From Milepost (mi)	To Milepost (mi)	Name	Type	Area Within Corridor (sq mi)
19.99	23.71	Sebasticook Lake	Lake	0.09
57.20	58.00	Embden Pond	Lake	0.02
58.95	59.16	Hancock Pond	Lake	0.01
95.82	96.60	Moxie Pond	Lake	0.02
111.92	117.73	Moosehead Lake	Lake	0.18
119.03	120.36	Moosehead Lake	Lake	
136.61	137.65	Ragged Lake	Lake	0.03
141.06	142.71	Caribou Lake	Lake	0.04
144.38	146.03	Chesuncook Lake	Lake	0.04
176.10	178.05	Millinocket Lake	Lake	0.05
217.30	219.06	Grand Lake Seboeis	Lake	0.05
272.71	274.15	East Branch Lake	Lake	0.04
314.25	316.15	Pushaw Lake	Lake	0.05
335.25	335.51	Phillips Lake	Lake	0.01
397.71	398.62	Hadley Lake	Lake	0.02
403.10	404.07	Second Lake	Lake	0.03
443.40	444.58	Rocky Lake	Lake	0.03
449.10	449.29	Long Lake	Lake	0.00

476.55	476.89	Upper Lead Mountain Pond	Lake	0.01
497.96	498.59	Chemo Pond	Lake	0.02

Source: [U.S. Geological Survey \(Water Body\)](#).

## Electrical Transmission

Milepost (mi)	Primary Owner Name	Rated Voltage	Number of Circuits	Type	Positional Reliability
3.18	Unknown	69.00	1.00	OH	Within 40 feet
26.33	Unknown	34.50	1.00	OH	Within 165 feet
26.35	Central Maine Power Co.	115.00	1.00	OH	Within 40 feet
40.10	Central Maine Power Co.	115.00	1.00	OH	Within 40 feet
43.18	Unknown	69.00	1.00	OH	Within 165 feet
45.71	Central Maine Power Co.	115.00	1.00	OH	Within 40 feet
54.61	Maine Electric Power Co., Inc.	115.00	1.00	OH	Within 40 feet
79.00	Central Maine Power Co.	115.00	1.00	OH	Within 40 feet
95.29	Central Maine Power Co.	115.00	1.00	OH	Within 40 feet
264.38	Unknown	138.00	1.00	OH	Within 165 feet
317.49	Unknown	115.00	1.00	OH	Within 40 feet
320.56	Unknown	115.00	1.00	OH	Within 40 feet
325.77	Unknown	69.00	1.00	OH	Within 40 feet
326.47	Bangor Hydro-Electric Co.	115.00	1.00	OH	Within 40 feet
326.48	Bangor Hydro-Electric Co.	115.00	1.00	OH	Within 40 feet
326.49	Bangor Hydro-Electric Co.	115.00	1.00	OH	Within 40 feet
326.50	Unknown	69.00	1.00	OH	Within 40 feet
326.50	Unknown	69.00	1.00	OH	Within 40 feet
326.74	Maine Electric Power Co., Inc.	345.00	1.00	OH	Within 165 feet
326.74	New Brunswick Power Corp.	345.00	1.00	OH	Within 40 feet
337.78	Bangor Hydro-Electric Co.	115.00	1.00	OH	Within 165 feet
345.77	Bangor Hydro-Electric Co.	115.00	1.00	OH	Within 165 feet
346.21	Bangor Hydro-Electric Co.	115.00	1.00	OH	Within 165 feet
346.21	Bangor Hydro-Electric Co.	115.00	1.00	OH	Within 165 feet
348.62	Bangor Hydro-Electric Co.	34.50	1.00	OH	Within 165 feet
375.44	Bangor Hydro-Electric Co.	115.00	1.00	OH	Within 40 feet
501.58	Bangor Hydro-Electric Co.	115.00	1.00	OH	Within 40 feet
505.64	Unknown	69.00	1.00	OH	Within 40 feet

Source: [Platts/Bentek Energy \(Transmission Line\)](#).

## Electrical Substations

Milepost (mi)	Owner Name	Voltage of Largest Connected Transmission Line (kV)	Number of Circuits	Positional Reliability	Intersects Centerline
345.77	Unknown	115.0	3	Within 40 feet	false
420.58		0.0	0	Not verified to be within 1 mile	false

Source: [Platts/Bentek Energy \(Substation\)](#).

## Pipelines

Milepost (mi)	Owner Name	Diameter (in)	Product	Positional Reliability
326.51	Maritimes & Northeast Pipeline, LLC	30.0	Natural Gas	Within 40 feet
504.86	Maritimes & Northeast Pipeline, LLC	30.0	Natural Gas	Within 40 feet

Source (Natural Gas Pipelines): [Platts/Bentek Energy \(Natural Gas Pipeline\)](#).

## Military Installations within 3 Miles of Corridor Edge

Milepost (mi)	Name	Component
2.08	Bangor IAP	AF Guard

Source: [Office of the Deputy Under Secretary of Defense for Installations and Environment \(Military Installation\)](#).

## Airports within 4 Miles of Corridor Edge

Milepost (mi)	Name	Location Id	Type	Facility Use
1.97	BANGOR INTL	BGR	AIRPORT	PU
9.85	GRIFFIN FIELD	PG1	AIRPORT	PR
21.97	NEWPORT SKY PARK	ME68	AIRPORT	PR
32.91	PAYNE FIELD	ME47	AIRPORT	PR
111.31	CURRIER'S	21M	SEAPLANE BASE	PU
111.50	GREENVILLE	52B	SEAPLANE BASE	PU
144.94	CHESUNCOOK FORESTRY DISTRICT	ME18	HELIPORT	PR
179.71	LIBBY CAMPS	ME86	SEAPLANE BASE	PR
264.43	MILLINOCKET MUNI	MLT	AIRPORT	PU
315.86	LUCKY LANDING MARINA AND SPB	06B	SEAPLANE BASE	PU
316.28	DOUBLE A	ME27	SEAPLANE BASE	PR
325.54	BREWER	0B2	AIRPORT	PU
336.53	PHILBRICK MOUNTAIN	72ME	AIRPORT	PR
421.91	EASTPORT MUNI	EPM	AIRPORT	PU
507.50	EASTERN MAINE MEDICAL CENTER	ME02	HELIPORT	PR

Source: [Federal Aviation Administration \(Airport\)](#).

## Estimated Peak Horizontal Ground Acceleration with 10% Probability of Exceedance in 50 Years

From Milepost (mi)	To Milepost (mi)	Minimum Peak Horizontal Acceleration (%g)
0.00	164.57	3 - 4
164.57	218.88	4 - 5
218.88	322.94	3 - 4
322.94	413.94	3 - 4
415.07	415.46	3 - 4
415.84	416.05	3 - 4
416.56	417.23	3 - 4
419.30	420.08	3 - 4
420.95	421.23	3 - 4
421.92	422.19	3 - 4
423.62	424.55	3 - 4
426.83	427.06	3 - 4
427.53	427.61	3 - 4
427.84	427.88	3 - 4
427.92	428.59	3 - 4
428.97	429.23	3 - 4
430.06	430.32	3 - 4
430.89	322.94	3 - 4

Source: [U.S. Geological Survey \(Seismic Hazard\)](#).

Mapping Color	Recommendation
Red	Exclude from development
Orange	Develop with extreme caution
Yellow	Develop with caution

## Protected Lands

From Milepost (mi)	To Milepost (mi)	Recommendation	Percent
0.0	50.0	No issues identified in data	99.17%
		Develop with extreme caution	0.77%
		Exclude from development	0.06%



50.0	100.0	No issues identified in data	90.59%
		Develop with caution	7.89%
		Develop with extreme caution	0.25%
		Exclude from development	1.27%
100.0	150.0	No issues identified in data	75.31%
		Develop with caution	2.24%
		Develop with extreme caution	10.45%
		Exclude from development	12.00%
150.0	200.0	No issues identified in data	50.91%
		Develop with extreme caution	32.00%
		Exclude from development	17.09%
200.0	250.0	No issues identified in data	60.91%
		Develop with caution	1.72%
		Develop with extreme caution	33.39%
		Exclude from development	3.98%
250.0	300.0	No issues identified in data	91.56%
		Develop with caution	1.44%
		Develop with extreme caution	0.19%
		Exclude from development	6.82%
300.0	350.0	No issues identified in data	96.90%
		Develop with caution	0.51%
		Develop with extreme caution	0.25%
		Exclude from development	2.34%
350.0	400.0	No issues identified in data	79.30%
		Develop with caution	8.32%
		Develop with extreme caution	0.84%
		Exclude from development	11.54%
400.0	450.0	No issues identified in data	88.44%
		Develop with caution	0.78%
		Exclude from development	10.78%
450.0	500.0	No issues identified in data	94.75%
		Develop with caution	0.19%
		Develop with extreme caution	2.43%
		Exclude from development	2.62%
500.0	509.20	No issues identified in data	100.00%

## Habitat

From Milepost (mi)	To Milepost (mi)	Recommendation	Percent
0.0	50.0	No issues identified in data	65.58%
		Develop with caution	25.02%
		Develop with extreme caution	9.40%
50.0	100.0	No issues identified in data	0.76%
		Develop with caution	30.66%
		Develop with extreme caution	68.58%
100.0	150.0	Develop with caution	12.56%
		Develop with extreme caution	87.44%
150.0	200.0	Develop with extreme caution	100.00%
200.0	250.0	Develop with caution	3.98%
		Develop with extreme caution	96.02%
250.0	300.0	No issues identified in data	2.88%
		Develop with caution	6.94%
		Develop with extreme caution	90.18%
300.0	350.0	No issues identified in data	45.01%
		Develop with caution	11.19%

		Develop with extreme caution	43.81%
350.0	400.0	Develop with caution	6.13%
		Develop with extreme caution	93.87%
400.0	450.0	No issues identified in data	1.04%
		Develop with caution	28.44%
		Develop with extreme caution	70.52%
450.0	500.0	No issues identified in data	1.15%
		Develop with caution	15.75%
		Develop with extreme caution	83.10%
500.0	509.20	No issues identified in data	59.86%
		Develop with caution	4.23%
		Develop with extreme caution	35.92%

## Imperiled Species

From Milepost (mi)	To Milepost (mi)	Recommendation	Percent
0.0	50.0	No issues identified in data	100.00%
50.0	100.0	No issues identified in data	100.00%
100.0	150.0	No issues identified in data	100.00%
150.0	200.0	No issues identified in data	100.00%
200.0	250.0	No issues identified in data	100.00%
250.0	300.0	No issues identified in data	99.94%
		Develop with extreme caution	0.06%
300.0	350.0	No issues identified in data	99.62%
		Develop with caution	0.25%
		Develop with extreme caution	0.13%
350.0	400.0	No issues identified in data	99.87%
		Develop with caution	0.06%
		Develop with extreme caution	0.06%
400.0	450.0	No issues identified in data	99.94%
		Develop with caution	0.06%
450.0	500.0	No issues identified in data	99.87%
		Develop with caution	0.06%
		Develop with extreme caution	0.06%
500.0	509.20	No issues identified in data	100.00%

Disclaimer: This report was prepared as part of work sponsored by an agency of the United States Government. Neither the United States Government, nor any agency thereof, nor the University of Chicago, nor any of their employees or officers, makes any warrantee, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product or process disclosed, or represents that its use would not infringe on privately owned rights. Reference herein to any specific commercial product, process, or service, by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The view and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

## B.4 Report on Case 19 (Revised New England Loop)

## EISPC EZ Mapping Tool

Generated by the EISPC Energy Zone Mapping Tool  
<https://eispctools.anl.gov>  
 09-08-2014

## Corridor Report

## Corridor Analyzed: NewEngland\_Loop\_revise2

The corridor starts at **44° 48' 41.615" N, 68° 47' 11.424" W**, and ends at **44° 48' 13.555" N, 68° 47' 11.424" N**.

The centerline length is 536.49 miles long.

The 1000 foot (0.189 mile) width results in a total area of 101.50 square miles.

## States and Counties Crossed, by Milepost

From Milepost (mi)	To Milepost (mi)	State Name	County Name	Area Within Corridor (sq mi)
0.00	338.38	Maine	Penobscot	4.17
25.16	65.77	Maine	Somerset	1.85
65.77	70.14	Maine	Franklin	0.11
70.14	104.13	Maine	Somerset	**
104.13	197.73	Maine	Piscataquis	2.38
197.73	198.08	Maine	Penobscot	**
198.08	226.15	Maine	Aroostook	0.73
226.15	338.38	Maine	Penobscot	**
338.38	25.16	Maine	Penobscot	**
338.38	338.92	Maine	Penobscot	**
338.92	349.25	Maine	Penobscot	**
349.25	388.38	Maine	Hancock	1.47
388.38	441.82	Maine	Washington	2.65
451.35	501.27	Maine	Washington	**
501.27	520.35	Maine	Hancock	**
520.35	338.92	Maine	Penobscot	**
TOTAL				13.35

\*\* Area previously reported for this feature includes total area crossed by the corridor.

Source: U.S. Census Bureau; et al (County Boundary (Generalized)) not available.

## Populated Places

From Milepost (mi)	To Milepost (mi)	Name	Type	Area Within Corridor (sq mi)
0.00	338.38	Bangor	city	0.26
32.65	33.60	Hartland	CDP	0.03
34.14	34.63	Hartland	CDP	**
115.35	117.44	Greenville	CDP	0.05
278.38	280.51	Millinocket	CDP	0.05
326.39	332.00	Old Town	city	0.14
334.05	338.38	Bangor	city	**
338.38	3.02	Bangor	city	**
338.38	338.92	Bangor	city	**
338.92	340.02	Bangor	city	**
340.02	343.38	Brewer	city	0.16
355.03	366.88	Ellsworth	city	0.30
444.46	447.52	Eastport	city	0.08
531.68	534.82	Brewer	city	**
534.82	338.92	Bangor	city	**
TOTAL				1.08

\*\* Area previously reported for this feature includes total area crossed by the corridor.

Source: U.S. Census Bureau (U.S. Populated Place).

## Population

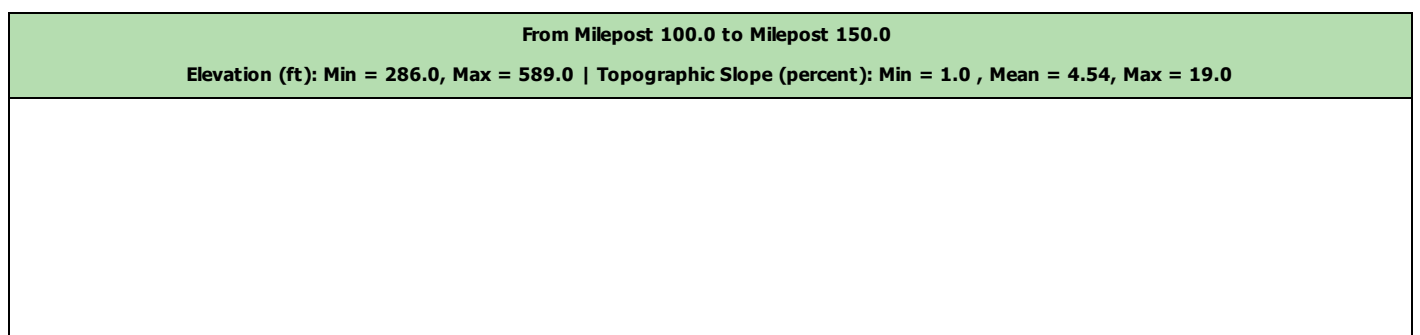
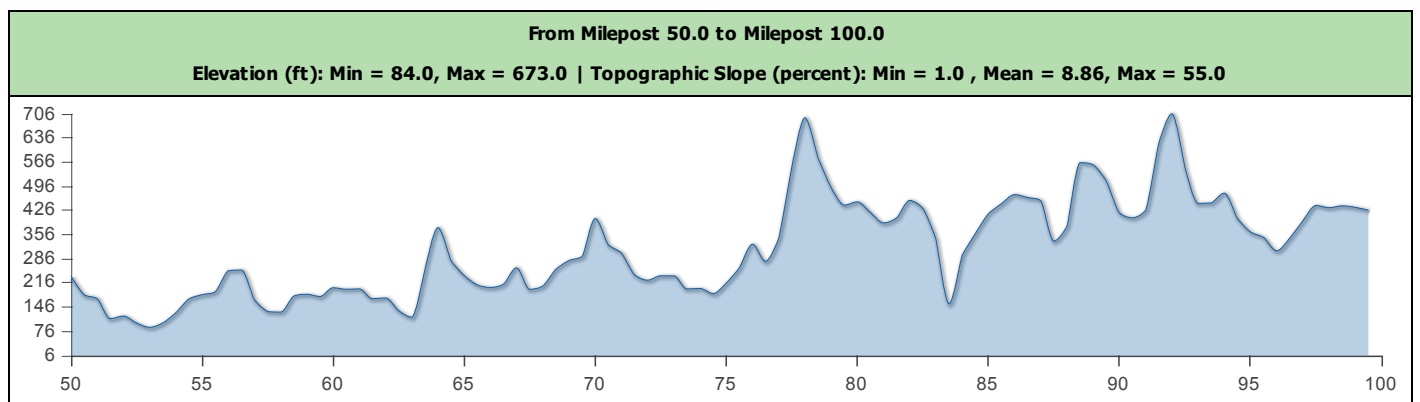
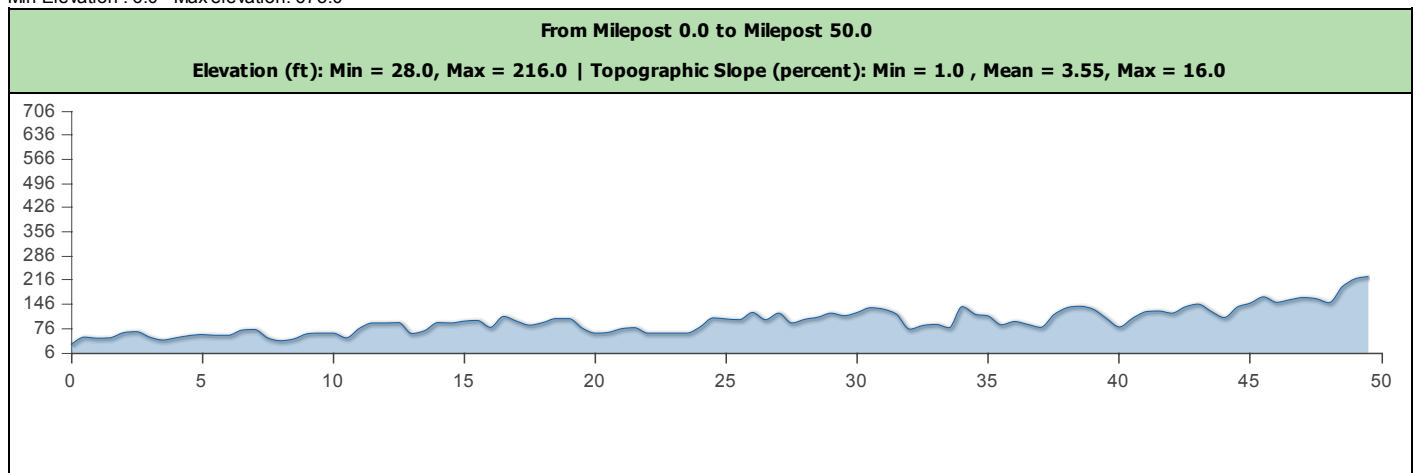
From Milepost (mi)	To Milepost (mi)	Estimated Daytime Population <sup>†</sup>	Estimated Ambient (24-hour average) Population <sup>‡</sup>
0.0	50.0	524	1,019
50.0	100.0	0	67
100.0	150.0	0	25
150.0	200.0	0	0
200.0	250.0	0	3
250.0	300.0	43	905
300.0	350.0	5,984	3,775
350.0	400.0	17	509
400.0	450.0	13	75
450.0	500.0	0	69
500.0	536.5	3,939	2,244
TOTAL		10,520	8,691

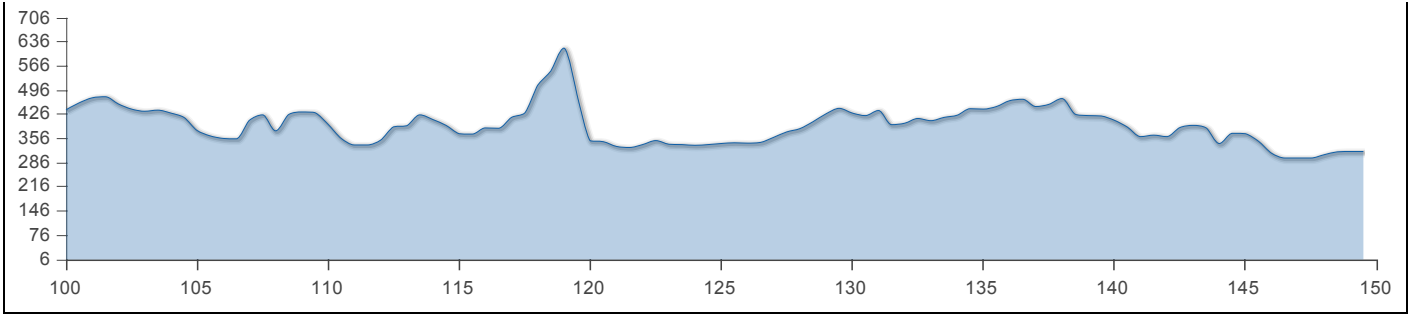
<sup>†</sup> Source: U.S. Census Bureau (Census Tract).

<sup>‡</sup> Source: Oak Ridge National Laboratory (Population Density (LandScan)).

## Elevation Profiles

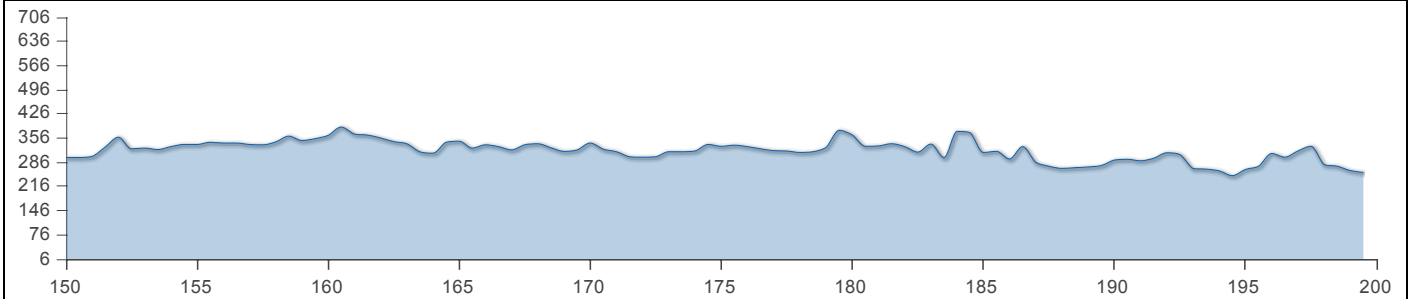
Min Elevation : 6.0 - Max elevation: 673.0





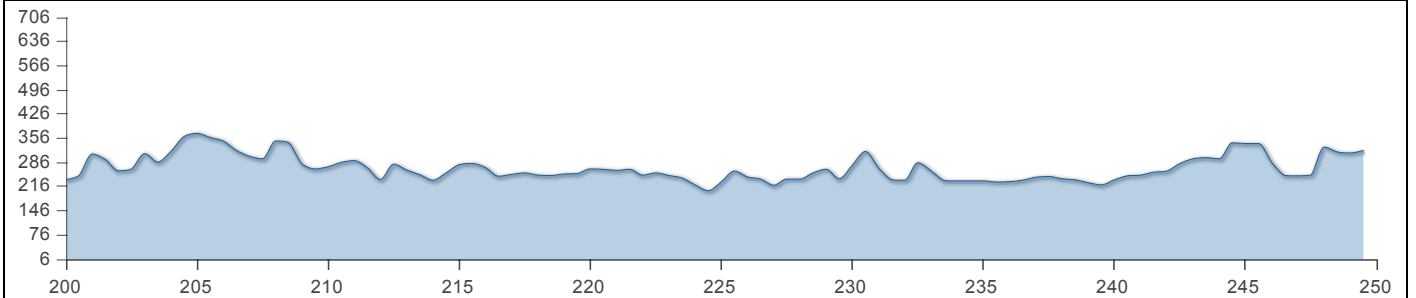
**From Milepost 150.0 to Milepost 200.0**

**Elevation (ft): Min = 236.0, Max = 370.0 | Topographic Slope (percent): Min = 1.0 , Mean = 3.76, Max = 28.0**



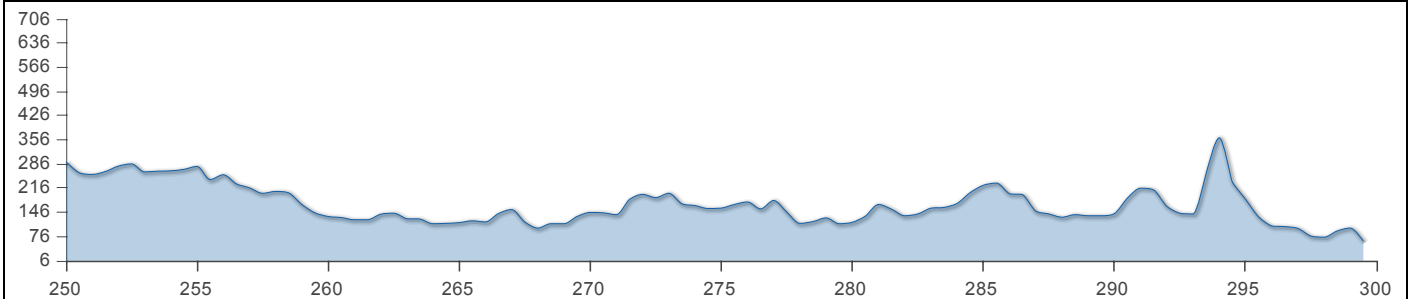
**From Milepost 200.0 to Milepost 250.0**

**Elevation (ft): Min = 195.0, Max = 353.0 | Topographic Slope (percent): Min = 1.0 , Mean = 4.42, Max = 30.0**



**From Milepost 250.0 to Milepost 300.0**

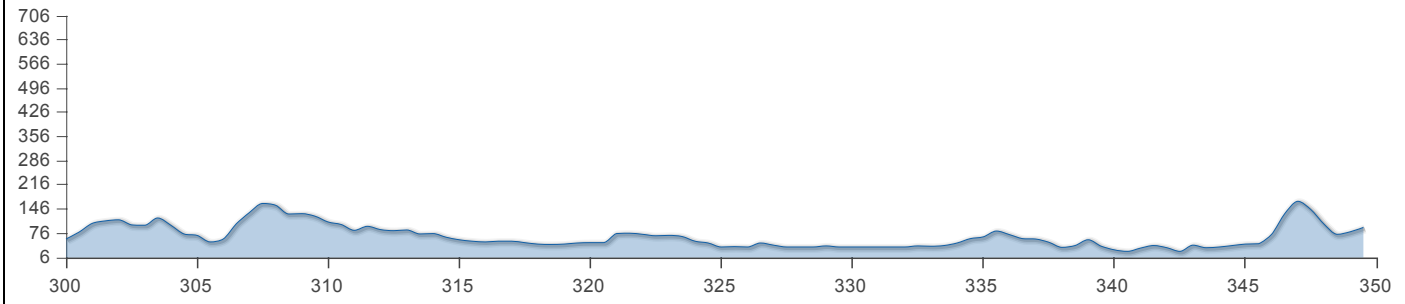
**Elevation (ft): Min = 60.0, Max = 345.0 | Topographic Slope (percent): Min = 1.0 , Mean = 4.11, Max = 28.0**



**From Milepost 300.0 to Milepost 350.0**

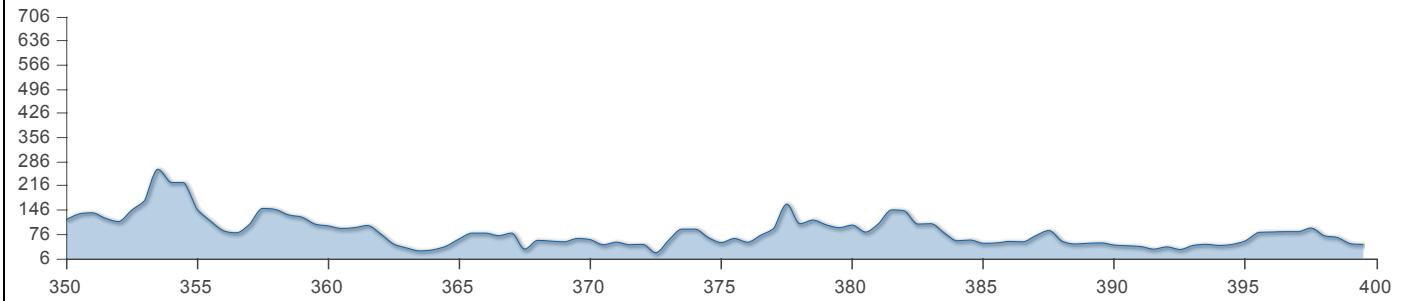
**Elevation (ft): Min = 3.0, Max = 161.0 | Topographic Slope (percent): Min = 1.0 , Mean = 2.95, Max = 20.0**





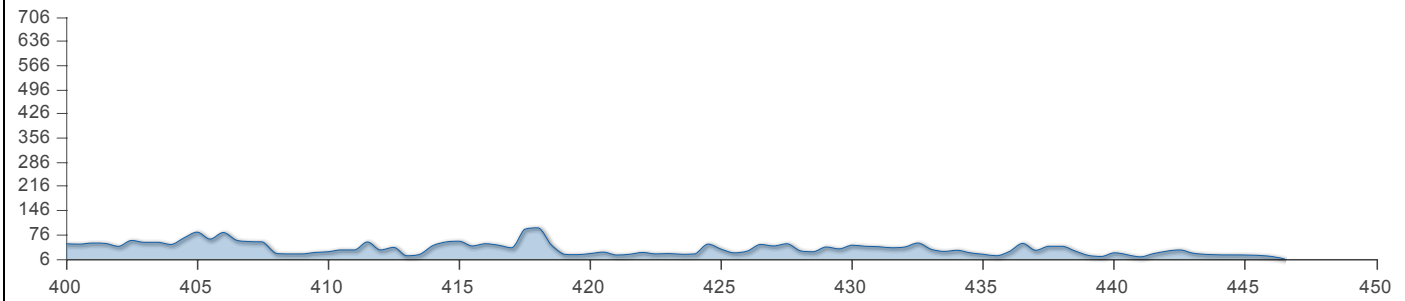
**From Milepost 350.0 to Milepost 400.0**

**Elevation (ft): Min = 22.0, Max = 252.0 | Topographic Slope (percent): Min = 1.0 , Mean = 4.09, Max = 29.0**



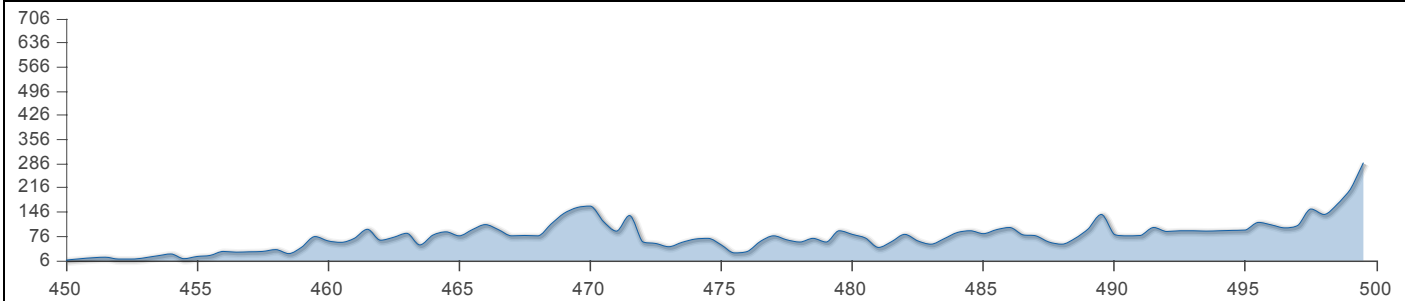
**From Milepost 400.0 to Milepost 450.0**

**Elevation (ft): Min = 2.0, Max = 92.0 | Topographic Slope (percent): Min = 1.0 , Mean = 4.20, Max = 25.0**



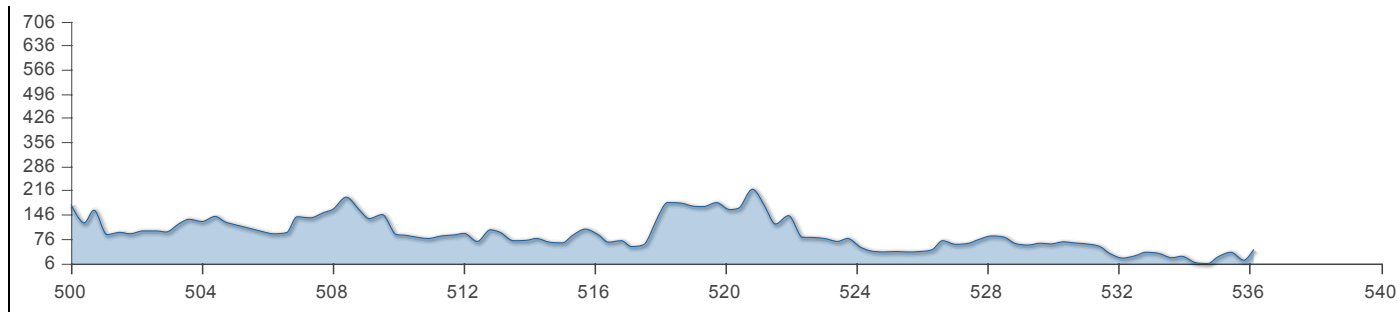
**From Milepost 450.0 to Milepost 500.0**

**Elevation (ft): Min = 0.0, Max = 276.0 | Topographic Slope (percent): Min = 1.0 , Mean = 4.01, Max = 19.0**



**From Milepost 500.0 to Milepost 536.49**

**Elevation (ft): Min = 6.0, Max = 211.0 | Topographic Slope (percent): Min = 1.0 , Mean = 5.36, Max = 27.0**



Source: Metadata not available.

## Topographic Slope

From Milepost (mi)	To Milepost (mi)	Slope (percent)		
		Min	Max	Mean
0.00	50.00	1.0	16.0	3.55
50.00	100.00	1.0	55.0	8.86
100.00	150.00	1.0	19.0	4.54
150.00	200.00	1.0	28.0	3.76
200.00	250.00	1.0	30.0	4.42
250.00	300.00	1.0	28.0	4.11
300.00	350.00	1.0	20.0	2.95
350.00	400.00	1.0	29.0	4.09
400.00	450.00	1.0	25.0	4.20
450.00	500.00	1.0	19.0	4.01
500.00	536.49	1.0	27.0	5.36

## Major Roads

Milepost (mi)	Name	Number of Lanes
0.19	Interstate 95	4
0.85	Union St	4
1.12 *	Maine Ave	2
1.31	Godfrey Blvd	4
1.33 *	Godfrey Blvd	4
24.69	State Hwy 7	2
44.74	State Hwy 150	0
52.11	US Hwy 201	2
53.81	US Hwy 201 A	0
83.79	US Hwy 201	2
114.73	State Hwy 6	0
131.49	Greenville Rd	0
175.81	Telos Rd	0
244.35	Grand Lake Rd	0
279.58	State Hwy 157	0
309.23	State Hwy 6	2
319.52	State Hwy 16	0
336.92	Broadway	4
338.80	Union St	2
339.39 *	Union St	0
339.67	Cross St	2
339.68 *	Main St	2
339.68 *	Union St	0
340.15 *	Penobscot Sq	0
340.16	Center St	0

340.17 *	State St	2
340.21 *	N Main St	2
340.23	State St	2
340.24 *	N Main St	2
340.24	N Main St	2
345.88	US Hwy 1 A	2
362.41	US Hwy 1 A	2
364.55	US Hwy 1 A	2
420.94	State Hwy 191	0
428.97	US Hwy 1	2
439.27	State Hwy 189	0
444.12 *	Unknown	0
444.23	Old Eastport Rd	2
454.82	US Hwy 1	2
501.60	State Hwy 9	2
504.49	State Hwy 9	2
513.49	State Hwy 179	0
520.05	State Hwy 9	2
523.99	State Hwy 9	2
528.17	State Hwy 9	2
535.56 *	Broadway	0
535.56 *	Hammond St	2
535.56	Broadway	0
535.68 *	Central St	0

\* Nearest centerline milepost. Overlaps the corridor width, but not the centerline.

Source: [Federal Highway Administration](#); et al (Major Road).

## Railroads

Milepost (mi)	Owner Name
3.17	MMA
23.94	
53.94	
115.35 *	MMA
115.35 *	MMA
115.35	MMA
278.33	MMA
278.35	MMA
280.16	MMA
299.98	EMRY
339.92	ST
340.24	ST
344.80	DSRX
364.64	DSRX
421.03	MDTT
458.79 *	
458.79 *	
458.79 *	MDTT
458.83	MDTT
534.96	ST

\* Nearest centerline milepost. Overlaps the corridor width, but not the centerline.

Source: [Federal Railroad Administration](#) (Railroad).

## Rivers with at least 30,000 GPM Flow

--	--	--

Milepost (mi)	Name	Flow (GPM)
23.34	East Branch Sebasticook River	51,845.82
33.63		191,585.99
44.14	Wesserunsett Stream	48,557.02
53.70	Kennebec River	2,191,117.90
62.93		60,064.70
62.94 *		81,692.82
76.56	Sandy Stream	38,502.10
83.63 *	Kennebec River	2,042,729.81
83.64	Kennebec River	2,043,271.96
95.97		61,798.41
131.75	Roach River	66,902.62
146.53		64,056.78
150.29	West Branch Penobscot River	1,056,604.01
172.07		128,186.26
194.62	Munsungan Stream	83,397.36
200.10	Mooseleuk Stream	95,297.74
211.89	Machias River	137,769.93
214.04	Machias River	138,238.48
224.27	Aroostook River	325,870.99
224.33 *	Aroostook River	321,359.20
234.74 *		30,462.30
234.74		30,506.73
236.07	Seboeis River	35,356.02
239.52 *	Seboeis River	74,763.35
239.54	Seboeis River	70,773.52
239.57 *	Seboeis River	75,597.67
268.05	East Branch Penobscot River	754,144.67
278.44 *	Millinocket Stream	117,067.68
279.42	Millinocket Stream	124,546.04
279.42 *	Millinocket Stream	123,871.49
282.12	West Branch Penobscot River	1,544,323.49
299.82	Seboeis Stream	126,556.21
305.50	Piscataquis River	1,224,914.33
325.98 *	Pushaw Stream	161,481.83
325.98 *	Pushaw Stream	161,387.58
325.98	Pushaw Stream	161,387.58
326.01 *	Dead Stream	76,795.96
326.03 *	Pushaw Stream	85,264.37
338.18	Kenduskeag Stream	127,704.24
339.83 *	Kenduskeag Stream	127,716.36
339.88 *	Kenduskeag Stream	127,722.20
340.01	Penobscot River	6,628,688.04
399.43	Pleasant River	55,033.65
399.43 *	Pleasant River	54,586.20
400.68	Pleasant River	59,295.46
413.16	Machias River	405,200.43
421.12	East Machias River	230,746.48
475.55	East Machias River	102,679.61
482.74	Old Stream	48,819.57
487.74	Machias River	180,311.68

\* Nearest centerline milepost. Overlaps the corridor width, but not the centerline.

🔪 Table truncated. 13 records not displayed. Run report with shorter and/or narrower corridor to see all records.

Source: [Horizon Systems Corporation; et al \(Surface Water Flow - NHDPlus Version 2\)](#).

## Water Bodies

From Milepost (mi)	To Milepost (mi)	Name	Type	Area Within Corridor (sq mi)
19.89	23.78	Sebastcook Lake	Lake	0.09
57.20	58.01	Embden Pond	Lake	0.02
58.93	59.21	Hancock Pond	Lake	0.01
96.16	96.88	Moxie Pond	Lake	0.02
106.19	106.70	West Shirley Bog	Lake	0.01
140.97	142.13	Ragged Lake	Lake	0.03
145.60	147.43	Caribou Lake	Lake	0.05
149.39	151.08	Chesuncook Lake	Lake	0.04
171.54	172.79	Chamberlain Lake	Lake	0.03
180.39	181.69	Carpenter Pond	Lake	0.03
231.37	232.31	Grand Lake Seboeis	Lake	0.06
233.10	234.27	Grand Lake Seboeis	Lake	
235.71 *	235.71	Snowshoe Lake	Lake	0.00
288.47	288.50	East Branch Lake	Lake	0.01
328.79	332.11	Pushaw Lake	Lake	0.08
422.70	424.01	Gardner Lake	Lake	0.03
467.72	467.94	Lake Cathance	Lake	0.01
525.29	525.75	Chemo Pond	Lake	0.01

\* Nearest centerline milepost. Overlaps the corridor width, but not the centerline.

Source: [U.S. Geological Survey \(Water Body\)](#).

## Electrical Transmission

Milepost (mi)	Primary Owner Name	Rated Voltage	Number of Circuits	Type	Positional Reliability
3.26	Unknown	69.00	1.00	OH	Within 40 feet
26.34	Unknown	34.50	1.00	OH	Within 165 feet
26.35	Central Maine Power Co.	115.00	1.00	OH	Within 40 feet
40.27	Central Maine Power Co.	115.00	1.00	OH	Within 40 feet
43.13	Unknown	69.00	1.00	OH	Within 165 feet
45.74	Central Maine Power Co.	115.00	1.00	OH	Within 40 feet
54.62	Maine Electric Power Co., Inc.	115.00	1.00	OH	Within 40 feet
79.19	Central Maine Power Co.	115.00	1.00	OH	Within 40 feet
95.70	Central Maine Power Co.	115.00	1.00	OH	Within 40 feet
115.37	Unknown	46.00	1.00	OH	Within 165 feet
115.38 *	Unknown	46.00	1.00	OH	Within 165 feet
279.75 *	Unknown	138.00	1.00	OH	Within 165 feet
280.52	Unknown	138.00	1.00	OH	Within 165 feet
280.55 *	Unknown	10.00	1.00	OH	Within 40 feet
280.55 *	Unknown	115.00	1.00	OH	Within 165 feet
280.55 *	Unknown	115.00	1.00	OH	Within 165 feet
333.58	Unknown	115.00	1.00	OH	Within 40 feet
336.21	Unknown	115.00	1.00	OH	Within 40 feet
341.68	Unknown	69.00	1.00	OH	Within 40 feet
342.42	Bangor Hydro-Electric Co.	115.00	1.00	OH	Within 40 feet
342.43	Bangor Hydro-Electric Co.	115.00	1.00	OH	Within 40 feet
342.44	Bangor Hydro-Electric Co.	115.00	1.00	OH	Within 40 feet
342.45	Unknown	69.00	1.00	OH	Within 40 feet
342.45	Unknown	69.00	1.00	OH	Within 40 feet
343.39	Maine Electric Power Co., Inc.	345.00	1.00	OH	Within 165 feet
343.39	New Brunswick Power Corp.	345.00	1.00	OH	Within 40 feet
354.49	Bangor Hydro-Electric Co.	115.00	1.00	OH	Within 165 feet
362.75 *	Bangor Hydro-Electric Co.	115.00	1.00	OH	Within 165 feet
363.26	Bangor Hydro-Electric Co.	115.00	1.00	OH	Within 165 feet

363.26	Bangor Hydro-Electric Co.	115.00	1.00	OH	Within 165 feet
365.86	Bangor Hydro-Electric Co.	34.50	1.00	OH	Within 165 feet
396.74	Bangor Hydro-Electric Co.	115.00	1.00	OH	Within 40 feet
528.58	Bangor Hydro-Electric Co.	115.00	1.00	OH	Within 40 feet

\* Nearest centerline milepost. Overlaps the corridor width, but not the centerline.

Source: [Platts/Bentek Energy \(Transmission Line\)](#).

## Electrical Substations

Milepost (mi)	Owner Name	Voltage of Largest Connected Transmission Line (kV)	Number of Circuits	Positional Reliability	Intersects Centerline
279.75		138.0	1	Within 40 feet	false
280.55	Unknown	138.0	4	Within 40 feet	false
339.48		0.0	0	Not verified to be within 1 mile	false
362.75	Unknown	115.0	3	Within 40 feet	false

Source: [Platts/Bentek Energy \(Substation\)](#).

## Pipelines

Milepost (mi)	Owner Name	Diameter (in)	Product	Positional Reliability
342.46	Maritimes & Northeast Pipeline, LLC	30.0	Natural Gas	Within 40 feet
532.26	Maritimes & Northeast Pipeline, LLC	30.0	Natural Gas	Within 40 feet

Source (Natural Gas Pipelines): [Platts/Bentek Energy \(Natural Gas Pipeline\)](#).

## Military Installations within 3 Miles of Corridor Edge

Milepost (mi)	Name	Component
2.08	Bangor IAP	AF Guard

Source: [Office of the Deputy Under Secretary of Defense for Installations and Environment \(Military Installation\)](#).

## Airports within 4 Miles of Corridor Edge

Milepost (mi)	Name	Location Id	Type	Facility Use
1.96	BANGOR INTL	BGR	AIRPORT	PU
9.89	GRIFFIN FIELD	PG1	AIRPORT	PR
32.93	PAYNE FIELD	ME47	AIRPORT	PR
115.97	GREENVILLE FORESTRY	ME30	SEAPLANE BASE	PR
116.27	CURRIER'S	21M	SEAPLANE BASE	PU
116.37	GREENVILLE	52B	SEAPLANE BASE	PU
116.72	GREENVILLE MUNI	3B1	AIRPORT	PU
149.84	CHESUNCOOK FORESTRY DISTRICT	ME18	HELIPORT	PR
172.08	NUGENT CHAMBERLAIN LAKE	39B	SEAPLANE BASE	PU
192.83	LIBBY CAMPS	ME86	SEAPLANE BASE	PR
246.06	SHIN POND	85B	SEAPLANE BASE	PU
280.08	MILLINOCKET MUNI	MLT	AIRPORT	PU
331.75	LUCKY LANDING MARINA AND SPB	06B	SEAPLANE BASE	PU
332.18	DOUBLE A	ME27	SEAPLANE BASE	PR
340.75	BREWER	0B2	AIRPORT	PU
353.41	PHILBRICK MOUNTAIN	72ME	AIRPORT	PR
390.00	DEBLOIS FLIGHT STRIP	43B	AIRPORT	PU
416.52	MACHIAS VALLEY	MVM	AIRPORT	PU
440.80	LUBEC MUNI	65B	AIRPORT	PU
446.15	EASTPORT MUNI	EPM	AIRPORT	PU
534.80	EASTERN MAINE MEDICAL CENTER	ME02	HELIPORT	PR

Source: [Federal Aviation Administration \(Airport\)](#).

## Estimated Peak Horizontal Ground Acceleration



## with 10% Probability of Exceedance in 50 Years

From Milepost (mi)	To Milepost (mi)	Minimum Peak Horizontal Acceleration (%g)
0.00	338.38	3 - 4
161.50	230.82	4 - 5
230.82	338.38	3 - 4
338.38	161.50	3 - 4
338.38	338.92	3 - 4
338.92	440.25	3 - 4
440.57	440.87	3 - 4
440.95	441.78	3 - 4
442.35	443.08	3 - 4
443.09	443.10	3 - 4
445.64	446.63	3 - 4
450.02	450.20	3 - 4
451.47	451.86	3 - 4
451.95	452.24	3 - 4
452.38	452.51	3 - 4
452.53	452.79	3 - 4
453.22	453.46	3 - 4
453.51	454.40	3 - 4
454.42	338.92	3 - 4

Source: U.S. Geological Survey (Seismic Hazard).

Mapping Color	Recommendation
Red	Exclude from development
Orange	Develop with extreme caution
Yellow	Develop with caution

## Protected Lands

From Milepost (mi)	To Milepost (mi)	Recommendation	Percent
0.0	50.0	No issues identified in data	99.10%
		Develop with extreme caution	0.90%
50.0	100.0	No issues identified in data	90.03%
		Develop with caution	9.28%
		Develop with extreme caution	0.06%
		Exclude from development	0.64%
100.0	150.0	No issues identified in data	94.02%
		Develop with caution	0.25%
		Develop with extreme caution	5.73%
150.0	200.0	No issues identified in data	71.61%
		Develop with extreme caution	27.72%
		Exclude from development	0.67%
200.0	250.0	No issues identified in data	54.07%
		Develop with caution	4.56%
		Develop with extreme caution	41.37%
250.0	300.0	No issues identified in data	100.00%
300.0	350.0	No issues identified in data	96.88%
		Develop with extreme caution	3.12%
350.0	400.0	No issues identified in data	100.00%
400.0	450.0	No issues identified in data	98.83%
		Develop with caution	0.19%
		Develop with extreme caution	0.97%

450.0	500.0	No issues identified in data	97.25%
		Develop with caution	0.06%
		Develop with extreme caution	2.68%
500.0	536.49	No issues identified in data	100.00%

## Habitat

From Milepost (mi)	To Milepost (mi)	Recommendation	Percent
0.0	50.0	No issues identified in data	64.62%
		Develop with caution	25.72%
		Develop with extreme caution	9.66%
50.0	100.0	No issues identified in data	0.76%
		Develop with caution	31.26%
		Develop with extreme caution	67.98%
100.0	150.0	No issues identified in data	5.11%
		Develop with caution	12.34%
		Develop with extreme caution	82.55%
150.0	200.0	Develop with caution	3.24%
		Develop with extreme caution	96.76%
200.0	250.0	Develop with caution	3.77%
		Develop with extreme caution	96.23%
250.0	300.0	No issues identified in data	0.87%
		Develop with caution	6.83%
		Develop with extreme caution	92.30%
300.0	350.0	No issues identified in data	25.99%
		Develop with caution	2.36%
		Develop with extreme caution	71.66%
350.0	400.0	No issues identified in data	18.87%
		Develop with caution	16.61%
		Develop with extreme caution	64.52%
400.0	450.0	No issues identified in data	2.92%
		Develop with caution	9.85%
		Develop with extreme caution	87.23%
450.0	500.0	No issues identified in data	4.28%
		Develop with caution	22.17%
		Develop with extreme caution	73.55%
500.0	536.49	No issues identified in data	15.27%
		Develop with caution	21.62%
		Develop with extreme caution	63.11%

## Imperiled Species

From Milepost (mi)	To Milepost (mi)	Recommendation	Percent
0.0	50.0	No issues identified in data	100.00%
50.0	100.0	No issues identified in data	100.00%
100.0	150.0	No issues identified in data	100.00%
150.0	200.0	No issues identified in data	100.00%
200.0	250.0	No issues identified in data	100.00%
250.0	300.0	No issues identified in data	100.00%
300.0	350.0	No issues identified in data	99.94%
		Develop with extreme caution	0.06%
350.0	400.0	No issues identified in data	99.87%
		Develop with caution	0.06%
		Develop with extreme caution	0.06%

400.0	450.0	No issues identified in data	100.00%
450.0	500.0	No issues identified in data	100.00%
500.0	536.49	No issues identified in data	99.91%
		Develop with extreme caution	0.09%

Disclaimer: This report was prepared as part of work sponsored by an agency of the United States Government. Neither the United States Government, nor any agency thereof, nor the University of Chicago, nor any of their employees or officers, makes any warrantee, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product or process disclosed, or represents that its use would not infringe on privately owned rights. Reference herein to any specific commercial product, process, or service, by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The view and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.