Appendix D Previously Issued Route Permit Example

STATE OF MINNESOTA PUBLIC UTILITIES COMMISSION

ROUTE PERMIT FOR CONSTRUCTION OF A HIGH-VOLTAGE TRANSMISSION LINE AND ASSOCIATED FACILITIES

IN
COTTONWOOD, JACKSON AND MARTIN COUNTIES

ISSUED TO
ODELL WIND FARM, LLC

PUC DOCKET NUMBER IP-6914/TL-13-591

In accordance with the requirements of Minnesota Statutes Chapter 216E and Minnesota Rules Chapter 7850 this route permit is hereby issued to:

ODELL WIND FARM, LLC

Odell Wind Farm, LLC is authorized by this route permit to construct 9.5 miles of single circuit overhead 115 kilovolt (kV) High Voltage Transmission Line, up to 1,500 feet of a single 345 kV High Voltage Transmission Line, the Woad Hill Substation in Martin County, and associated facilities.

The transmission line and associated facilities shall be built within the route identified in this permit and as portrayed on the official route maps, and in compliance with the conditions specified in this permit.

Approved and adopted this 29th day of October, 2014

BY ORDER OF THE COMMISSION

Burl W. Haar,
Executive Secretary

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EXAMPLE

1.0 ROUTE PERMIT

The Minnesota Public Utilities Commission (Commission) hereby issues this route permit to Odell Wind Farm, LLC (Permittee) pursuant to Minnesota Statutes Chapter 216E and Minnesota Rules Chapter 7850. This permit authorizes the Odell Wind Farm, LLC to construct up to 9.5 miles of single circuit overhead 115 kilovolt (kV) High Voltage Transmission Line (HVTL) and up to 1,500 feet of a single 345 kV High Voltage Transmission Line, and as identified in the attached route permit maps, hereby incorporated into this permit.

1.1 Pre-emption

Pursuant to Minn. Stat. § 216E.10, this route permit shall be the sole approval required to be obtained by the Permittee for construction of the transmission facilities and this permit shall supersede and preempt all zoning, building, or land use rules, regulations, or ordinances promulgated by regional, county, local and special purpose governments.

2.0 PROJECT DESCRIPTION

The Project includes construction of approximately 9.5 miles of 115 kV high voltage transmission line, and associated facilities, including a 1,500-foot 345 kV HVTL, in Cottonwood, Jackson, and Martin counties, Minnesota, beginning at the planned Odell Wind Farm Substation in Cottonwood County to the proposed Woad Hill Substation in Martin County (the Project). The Project will provide interconnection to the 200-megawatt (MW) Odell Wind Farm located in Cottonwood, Jackson, Watonwan, and Martin Counties.

2.1 Project Location

The Project area includes the following locations:

County	Township Name	Township	Range	Section
Cottonwood	Mountain Lake	105N	34W	32,33,34,35,36
Jackson	Kimball	104N	34W	1,2,3,4,5,11,12
Martin	Cedar	104N	34W	4,5,6,7,8,9,16,17

2.2 Associated Facilities

The transmission line and associated facilities shall be designed to meet or exceed all relevant local and state codes, the National Electric Safety Code (NESC), and North American Electric Reliability Corporation (NERC) requirements.

EXAMPLE

This includes standards relating to clearances to ground, clearance to crossing utilities, clearance to buildings, strength of materials, clearances over roadways, right-of-way widths, and permit requirements. The transmission line shall be equipped with protective devices to safeguard the public if an accident occurs.

2.2.1 Substations

The new Woad Hill Substation will be constructed either in the NW or SE quadrant of 30th Avenue and south of 230th Street in Section 8 or Section 16 of Cedar Township in Martin County. The substation will consist of supporting structures for high voltage electrical structures, breakers, transformers, lightning protection, and control equipment. The area around the substation will be fenced with driveway access from the east and north. The ground within the substation will be graded and secondary containment areas for the transformer will be installed as necessary. Gravel will be placed on the surface of the ground in and around the substation to assist with weed control. The Woad Hill Substation will take up approximately 10 acres of land.

2.2.2 Structures

The Permittee will use wood and/or T steel structures capable of handling a single-circuit load by constructing the single-circuit transmission line on wood and/or steel monopole structures, direct-embedded in approximately 3-foot diameter holes augured to a depth of approximately fourteen percent of the total structure height, or approximately 9 to 14 feet. Pole structures will be located approximately 350 to 400 feet apart.

Final design and geotechnical investigations may warrant the use of special structures to avoid sensitive areas or to accommodate special engineering circumstances. Structure installations may require special engineering techniques in some locations, due to hydric soils, near and above surface bedrock, and other subsurface conditions. The near and above surface bedrock design and construction would typically involve using specialized drilling equipment to bore a hole directly into the bedrock. The need for self-supporting angle and dead-end or atypical structures will be determined during final design.

The table below identifies the structure types as presented in the route permit application.

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Line Type	Conductor	Structure		Foundation	Approximate Height	Approximate Span
		Type	Material			
115 kV	1272 kcmil ACSR	Monopole	Wood	Direct embed	65-70 feet	400 feet
		Self-Supporting	Steel	Drilled Pier Concrete Foundation[1]		

2.2.3 Conductors

The conductor for each of the three phases of the 115 kV line will be 1272 kcmil (one thousand circular mils) ACSR (Aluminum Conductor Steel Reinforced) "Bittern" transmission line.

3.0 DESIGNATED ROUTE

The route designated by the Commission in this permit is the route described below and shown on the route maps attached to this permit. The route is generally described as follows:

The Project will connect the Odell Wind Farm Substation, extend approximately four miles to the east adjacent to County Highway 17, turn south and extend south into Jackson County for approximately one mile adjacent to County Road 85, then extend east for approximately three miles adjacent to 240th Street in Martin County, and turn south adjacent to 30th Avenue for approximately 1.5 miles ultimately terminating at the proposed Woad Hill Substation in Section 8 or Section 16 of Cedar Township in Martin County. The proposed Woad Hill Substation will be a new 345/115 kV substation on Northern States Power's Lakefield Junction-Wilmarth 345 kV transmission line.

The Project will utilize a variable 150 to 600 foot route width. The majority of the Route will be 150 feet wide extending from the road centerline. The route width in Sections 1 and 12 of Kimball Township in Jackson County will be 300 feet, extending 150 feet on both sides of the road centerline in order to provide flexibility to accommodate distances from home. The route width in Sections 6 and 7 of Cedar Township in Martin County will be 600 feet to allow flexibility to work around a known easement title issues.

[1] Drilled pier concrete foundations will be used for steel corner/dead-end structures if guying is not possible.

EXAMPLE

The identified route widths will provide the Permittee with flexibility for minor adjustments of the specific alignment or right-of-way to accommodate landowner requests and unforeseen conditions. The final alignment (i.e., permanent and maintained rights-of-way) will be located within this designated route unless otherwise authorized below.

3.1 Right-of-Way

The approved right-of-way for the project is up to 130 feet. The transmission easements for the Project include a strip of land that is 80 feet wide parallel and adjacent to the existing road right-of-way, and a strip of land comprising one-half of the existing road right-of-way. The road rights-of-way are generally 66 feet for township roads or 100 feet for county roads. The total easement width is 113 feet along township roads and 130 feet along county roads.

This permit anticipates that the right-of-way will generally conform to the anticipated alignment as noted on the attached route permit maps unless changes are requested by individual landowners and agreed to by Permittee or for unforeseen conditions that are encountered or are otherwise provided for by this permit.

Any right-of-way modifications within the designated route shall be located so as to have comparable overall impacts relative to the factors in Minn. R. 7850.4100, as does the right-of-way identified in this permit, and shall be specifically identified and documented in and approved as part of the plan and profile submitted pursuant to Section 8.1 of this permit.

Where the transmission line route parallels existing highway and other road rights-of-way, the transmission line right-of-way shall occupy and utilize the existing right-of-way to the maximum extent possible, consistent with the criteria in Minn. R. 7850.4100, the other requirements of this permit, and for highways under the jurisdiction of the Minnesota Department of Transportation (Mn/DOT) rules, policies, and procedures for accommodating utilities in trunk highway rights-of-way.

4.0 GENERAL CONDITIONS

The Permittee shall comply with the following conditions during construction of the transmission line and associated facilities over the life of this permit.

4.1 Notification to Landowners

The Permittee shall provide all affected landowners with a copy of this permit and, as a separate information piece, the complaint procedures at the time of the first contact with the landowners after issuance of this permit.

EXAMPLE

The Permittee shall contact landowners prior to entering the property or conducting maintenance along the route.

The Permittee shall work with landowners to locate the high-voltage transmission line to minimize the loss of agricultural land, forest, and wetlands, and to avoid homes and farmsteads.

4.2 Construction Practices

The Permittee shall follow those specific construction practices and material specifications described in the Odell Wind Farm, LLC Application to the Commission for a route permit for the Odell Wind Farm, dated December 12, 2013, as amended by the June 6, 2014 Request for Route Width Expansion unless this permit establishes a different requirement in which case this permit shall prevail.

4.2.1 Field Representative

At least 14 days prior to commencing construction, the Permittee shall advise the Commission in writing of the person or persons designated to be the field representative for the Permittee with the responsibility to oversee compliance with the conditions of this permit during construction. This person shall be accessible by telephone during normal business hours throughout right-of-way preparation, construction, cleanup, and restoration.

The field representative's address, phone number, emergency phone number, and email shall be provided to the Commission and to affected landowners, residents, public officials and other interested persons. The Permittee may change the field representative at any time upon notice to landowners and the Commission.

4.2.2 Employee Training and Education of Permit Terms and Conditions

The Permittee shall inform all employees, contractors, and other persons involved in the transmission line construction of the terms and conditions of this permit.

4.2.3 Public Services, Public Utilities, and Existing Easements

During construction, the Permittee shall minimize any disruption to public services or public utilities. To the extent disruptions to public services or public utilities occur these would be temporary and the Permittee will restore service promptly. Where any impacts to utilities have the potential to occur the Permittee will work with both landowners and local agencies to determine the most appropriate transmission structure placement.

EXAMPLE

The Permittee shall work with the landowners, townships, cities, and counties along the route to accommodate concerns regarding tree clearing, distance from existing structures, drain tiles, pole depth and placement in relationship to existing roads and road expansion plans.

The Permittee shall cooperate with county and city road authorities to develop appropriate signage and traffic management during construction.

4.2.4 Temporary Work Space

The Permittee shall limit temporary easements to special construction access needs and additional staging or lay-down areas required outside of the authorized right-of-way. Temporary space shall be selected to limit the removal and impacts to vegetation. Temporary easements outside of the authorized transmission line right-of-way will be obtained from affected landowners through rental agreements and are not provided for in this permit.

Temporary driveways may be constructed between the roadway and the structures to minimize impact using the shortest route possible. Construction mats should also be used to minimize impacts on access paths and construction areas.

4.2.5 Noise

Construction and routine maintenance activities shall be limited to daytime working hours, as defined in Minn. R. 7030.0200, to ensure nighttime noise level standards will not be exceeded.

4.2.6 Aesthetics

The Permittee shall consider input pertaining to visual impacts from landowners or land management agencies prior to final location of structures, rights-of-way, and other areas with the potential for visual disturbance. Care shall be used to preserve the natural landscape, minimize tree removal and prevent any unnecessary destruction of the natural surroundings in the vicinity of the project during construction and maintenance.

Structures shall be placed at a distance, consistent with sound engineering principles and system reliability criteria, from intersecting roads, highway, or trail crossings and could cross roads to minimize or avoid impacts.

EXAMPLE

4.2.7 Vegetation Removal and Protection

The Permittee shall minimize the number of trees to be removed in selecting the right-of-way specifically preserving to the maximum extent practicable windbreaks, shelterbelts, living snow fences, and vegetation in areas such as trail and stream crossings where vegetative screening may minimize aesthetic impacts, to the extent that such actions do not violate sound engineering principles or system reliability criteria.

Tall growing species located within the transmission line right-of-way that endanger the safe and reliable operation of the transmission facility will be removed by the Permittee.

The Permittee shall leave undisturbed, to the extent possible, existing low growing species in the right-of-way or replant such species in the right-of-way to blend the difference between the right-of-way and adjacent areas, to the extent that the low growing vegetation that will not pose a threat to the transmission facility or impede construction.

4.2.8 Application of Herbicides

The Permittee shall restrict herbicide use to those herbicides and methods of application approved by the Minnesota Department of Agriculture and the U.S. Environmental Protection Agency. Selective foliage or basal application shall be used when practicable. The Permittee shall contact the landowner or his designee to obtain approval for the use of herbicide prior to any application on their property. The landowner may request that there be no application of herbicides on any part of the right-of-way within the landowner's property. All herbicides shall be applied in a safe and cautious manner so as not to damage crops, orchards, tree farms, or gardens.

4.2.9 Noxious Weeds

The Permittee shall take all reasonable precautions against the spread of noxious weeds during all phases of construction. When utilizing seed to establish temporary and permanent vegetative cover on exposed soil, the Permittee shall select site appropriate seed certified to be free of noxious weeds. To the extent possible, the Permittee shall use native seed mixes. The Permittee shall consult with landowners on the selection and use of seed for replanting.

4.2.10 Site Sediment and Erosion Control

The Permittee shall implement those erosion prevention and sediment control practices recommended by the Minnesota Pollution Control Agency (MPCA) Construction Stormwater Program.

EXAMPLE

The Permittee shall implement reasonable measures to minimize erosion and sedimentation during construction and shall employ perimeter sediment controls, protect exposed soil by promptly planting, seeding, using erosion control blankets and turf reinforcement mats, stabilizing slopes, protecting storm drain inlets, protecting soil stockpiles, and controlling vehicle tracking. Contours shall be graded as required so that all surfaces provide for proper drainage, blend with the natural terrain, and are left in a condition that will facilitate re-vegetation and prevent erosion. All areas disturbed during construction of the facilities shall be returned to pre-construction conditions.

Where larger areas of one acre or more are disturbed or other areas designated by the MPCA, the Permittee shall obtain a National Pollutant Discharge Elimination System (NPDES)/State Disposal System (SDS) Construction Stormwater permit from the MPCA.

4.2.11 Wetlands and Water Resources

Wetland impact avoidance measures that shall be implemented during design and construction of the transmission line will include spacing and placing the power poles at variable distances to span and avoid wetlands, watercourses, and floodplains. Unavoidable wetland impacts as a result of the placement of poles shall be limited to the immediate area around the poles. To minimize impacts, construction in wetland areas shall occur during frozen ground conditions. When construction during winter is not possible, wooden or composite mats shall be used to protect wetland vegetation. Soil excavated from the wetlands and riparian areas shall be contained and not placed back into the wetland or riparian area.

Wetlands and riparian areas shall be accessed using the shortest route possible in order to minimize travel through wetland areas and prevent unnecessary impacts. No staging or stringing set up areas shall be placed within or adjacent to wetlands or water resources, as practicable. Power pole structures shall be assembled on upland areas before they are brought to the site for installation.

Areas disturbed by construction activities shall be restored to pre-construction conditions. Restoration of the wetlands will be performed by Permittee in accordance with the requirements of applicable state and federal permits or laws and landowner agreements.

All requirements of the U.S. Army Corps of Engineers (wetlands under federal jurisdiction), Minnesota Department of Natural Resources (Public Waters/Wetlands), and County (wetlands under the jurisdiction of the Minnesota Wetland Conservation Act) shall be met.

EXAMPLE

4.2.12 Archaeological and Historic Resources

The Permittee shall make every effort to avoid impacts to identified archaeological and historic resources when installing the high-voltage transmission line on the approved route. The Permittee shall consult with the Minnesota State Historic Preservation Office (SHPO) prior to commencing construction to determine whether an archaeological survey will be necessary for any length of the transmission line route.

In the event that a resource is encountered, the Permittee shall contact and consult with SHPO. The Permittee shall not excavate at such locations until authorization is provided by SHPO. Where feasible, avoidance of the resource is required. Where not feasible, mitigation must include an effort to minimize project impacts on the resource consistent with SHPO and State Archaeologist requirements. If human remains are encountered during construction, the Permittee shall immediately halt construction at that location and promptly notify local law enforcement authorities and the State Archaeologist.

Prior to construction, workers shall be trained about the need to avoid cultural properties, how to identify cultural properties, and procedures to follow if undocumented cultural properties, including gravesites, are found during construction.

4.2.13 Avian Mitigation

The Permittee's standard transmission design shall incorporate adequate spacing of conductors and grounding devices in accordance with Avian Power Line Interaction Committee standards to eliminate the risk of electrocution to raptors with larger wingspans that may simultaneously come in contact with a conductor and grounding devices. The Permittee will consult with the Minnesota Department of Natural Resources regarding type and placement of bird diverters.

4.2.14 Restoration

The Permittee shall restore the right-of-way, temporary work spaces, access roads, abandoned right-of-way, and other public or private lands affected by construction of the transmission line. Restoration within the right-of-way must be compatible with the safe operation, maintenance, and inspection of the transmission line. Within 60 days after completion of all restoration activities, the Permittee shall advise the Commission in writing of the completion of such activities.

EXAMPLE

4.2.15 Cleanup

All waste and scrap that is the product of construction shall be removed from the right-of-way and all premises on which construction activities were conducted and properly disposed of upon completion of each task. Personal litter, including bottles, cans, and paper from construction activities shall be removed on a daily basis.

4.2.16 Pollution and Hazardous Wastes

All appropriate precautions to protect against pollution of the environment must be taken by the Permittee. The Permittee shall be responsible for compliance with all laws applicable to the generation, storage, transportation, clean up and disposal of all wastes generated during construction and restoration of the right-of-way.

4.2.17 Damages

The Permittee shall fairly compensate landowners for damage to crops, fences, private roads and lanes, landscaping, drain tile, or other damages sustained during construction.

4.3 Electrical Performance Standards

4.3.1 Grounding

The Permittee shall design, construct, and operate the transmission line in a manner so that the maximum induced steady-state short-circuit current shall be limited to five milliamperes root mean square (rms) alternating current between the ground and any non-stationary object within the right-of-way, including but not limited to large motor vehicles and agricultural equipment. All fixed metallic objects on or off the right-of-way, except electric fences that parallel or cross the right-of-way, shall be grounded to the extent necessary to limit the induced short-circuit current between ground and the object so as not to exceed one milliampere rms under steady state conditions of the transmission line and to comply with the ground fault conditions specified in the NESC. The Permittee shall address and rectify any induced current problems that arise during transmission line operation.

4.3.2 Electric Field

The transmission line shall be designed, constructed, and operated in such a manner that the electric field measured one meter above ground level immediately below the transmission line shall not exceed 8.0 kV/m rms.

EXAMPLE

4.3.3 Interference with Communication Devices

If interference with radio or television, satellite, wireless internet, GPS-based agriculture navigation systems or other communication devices is caused by the presence or operation of the transmission line, the Permittee shall take whatever action is feasible to restore or provide reception equivalent to reception levels in the immediate area just prior to the construction of the line.

4.4 Other Requirements

4.4.1 Applicable Codes

The Permittee shall comply with applicable NERC planning standards and requirements of the NESC including clearances to ground, clearance to crossing utilities, clearance to buildings, right-of way widths, erecting power poles, and stringing of transmission line conductors.

4.4.2 Other Permits and Regulations

The Permittee shall comply with all applicable state rules and statutes. The Permittee shall obtain all required permits for the project and comply with the conditions of these permits. A list of the permits known to be required is included in the permit application. The Permittee shall submit a copy of such permits to the Commission upon request.

5.0 SPECIAL CONDITIONS

The Permittee shall provide a report to the Commission as part of the plan and profile submission that describes the actions taken and mitigative measures developed regarding the project and the following special conditions. Special conditions shall take precedence over other conditions of this permit should there be a conflict.

5.1 Wildlife-Friendly Erosion Control Materials

The Permittee, in cooperation with the Minnesota Department of Natural Resources, shall use wildlife-friendly erosion control materials in areas known to be inhabited by wildlife species (birds, small mammals, reptiles, and amphibians) susceptible to entanglement in plastic netting.[2]

EXAMPLE

[2] http://files.dnr.state.mn.us/eco/nongame/wildlife-friendly-erosion-control.pdf

5.2 Rare and Unique Resources

The Permittee shall follow measures and recommendations for avoiding and minimizing impacts to Blanding's turtle populations as outlined in the Minnesota Department of Natural Resources Environmental Review Fact Sheet Series for the Blanding's Turtle.[3] Construction and maintenance personnel will be made aware of rare resources and plant communities during pre-construction meetings to minimize potential disturbance. The Permittee shall avoid impacts to State-listed endangered, threatened, and special concern species in all areas of the project including temporary workspaces associated with the project.

6.0 DELAY IN CONSTRUCTION

If the Permittee has not commenced construction or improvement of the route within four years after the date of issuance of this permit the Permittee shall file a report on the failure to construct and the Commission shall consider suspension of the permit in accordance with Minn. R. 7850.4700.

7.0 COMPLAINT PROCEDURES

Prior to the start of construction, the Permittee shall submit to the Commission the procedures that will be used to receive and respond to complaints. The procedures shall be in accordance with the requirements of Minn. R. 7829.1500 or Minn. R. 7829.1700, and as set forth in the complaint procedures attached to this permit.

Upon request, the Permittee shall assist the Commission with the disposition of unresolved or longstanding complaints. This assistance shall include, but is not limited to, the submittal of complaint correspondence and complaint resolution efforts.

8.0 COMPLIANCE REQUIREMENTS

Failure to timely and properly make compliance filings required by this permit is a failure to comply with the conditions of this permit. Compliance filings must be electronically filed with the Commission.

EXAMPLE

[3] http://files.dnr.state.mn.us/natural_resources/animals/reptiles_amphibians/turtles/blandings_turtle/factsheet.pdf

8.1 Plan and Profile

At least 30 calendar days before right-of-way preparation for construction begins on any segment or portion of the project, the Permittee shall provide the Commission with a plan and profile of the right-of-way and the specifications and drawings for right-of-way preparation, construction, structure specifications and locations, cleanup, and restoration for the transmission line.
The documentation shall include maps depicting the plan and profile including the right-of-way, alignment, and structures in relation to the route and alignment approved per this permit.
The Permittee may not commence construction until the 30 days has expired or until the Commission has advised the Permittee in writing that it has completed its review of the documents and determined that the planned construction is consistent with this permit. If the Permittee intends to make any significant changes in its plan and profile or the specifications and drawings after submission to the Commission, the Permittee shall notify the Commission at least five days before implementing the changes. No changes shall be made that would be in violation of any of the terms of this permit.

8.2 Periodic Status Reports

The Permittee shall report to the Commission on progress regarding finalization of the route, design of structures, and construction of the transmission line. The Permittee need not report more frequently than monthly.

8.3 Completion of Construction

8.3.1 Notification to Commission

At least three days before the line is to be placed into service, the Permittee shall notify the Commission of the date on which the line will be placed into service and the date on which construction was complete.

8.3.2 As-Built Plans and Specifications

Within 60 days after completion of construction, the Permittee shall submit copies of all final as-built plans and specifications developed during the project.

EXAMPLE

8.3.3 GPS Data

Within 60 days after completion of construction, the Permittee shall submit to the Commission, in the format requested by the Commission, geo-spatial information (e.g., ArcGIS compatible map files, GPS coordinates, associated database of characteristics) for all structures associated with the transmission line and each substation connected.

9.0 PERMIT AMENDMENT

This permit may be amended at any time by the Commission. Any person may request an amendment of the conditions of this permit by submitting a request to the Commission in writing describing the amendment sought and the reasons for the amendment. The Commission will mail notice of receipt of the request to the Permittee. The Commission may amend the conditions after affording the Permittee and interested persons such process as is required.

10.0 TRANSFER OF PERMIT

The Permittee may request at any time that the Commission transfer this permit to another person or entity. The Permittee shall provide the name and description of the person or entity to whom the permit is requested to be transferred, the reasons for the transfer, a description of the facilities affected, and the proposed effective date of the transfer.

The person to whom the permit is to be transferred shall provide the Commission with such information as the Commission shall require to determine whether the new Permittee can comply with the conditions of the permit. The Commission may authorize transfer of the permit after affording the Permittee, the new Permittee, and interested persons such process as is required.

11.0 REVOCATION OR SUSPENSION OF PERMIT

The Commission may initiate action to revoke or suspend this permit at any time. The Commission shall act in accordance with the requirements of Minn. R. 7850.5100, to revoke or suspend the permit.

EXAMPLE

Appendix E National Land Cover Database

NLCD Classification	Description
Open Water	All areas of open water, generally with less than 25 percent cover or vegetation or soil.
Developed, Open Space	Includes areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20 percent of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.
Developed, Low Intensity	Areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20-49 percent of total cover. These areas most commonly include single-family housing units.
Developed, Medium Intensity	Areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50-79 percent of the total cover. These areas most commonly include single-family housing units.
Developed, High Intensity	Highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80 to 100 percent of the total cover.
Barren Land	Barren areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits and other accumulations of earthen material. Generally, vegetation accounts for less than 15% of total cover.
Deciduous Forest	Areas dominated by trees generally greater than 5 meters tall, and greater than 20 percent of total vegetation cover. More than 75 percent of the tree species shed foliage simultaneously in response to seasonal change.
Evergreen Forest	Areas dominated by trees generally greater than 5 meters tall, and greater than 20 percent of total vegetation cover. More than 75 percent of the tree species maintain their leaves all year. Canopy is never without green foliage.
Mixed Forest	Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. Neither deciduous nor evergreen species are greater than 75 percent of total tree cover.
Shrub/Scrub	Areas dominated by shrubs; less than 5 meters tall with shrub canopy typically greater than 20 percent of total vegetation. This class includes true shrubs, young trees in an early successional stage or trees stunted from environments.
Grassland/Herbaceous	Areas dominated by grammanoid or herbaceous vegetation, generally greater than 80 percent of total vegetation. These areas are not subject to intensive management such as tilling, but can be utilized for grazing.
Pasture/Hay	Areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20 percent of total vegetation.
Cultivated Crops	Areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, and also perennial woody crops such as orchards and vineyards. Crop vegetation accounts for greater than 20 percent of total vegetation. This class also includes all land being tilled.
Woody Wetlands	Areas where forest or shrub land vegetation accounts for greater than 20 percent of vegetative cover and the soil or substrate is periodically saturated with or covered with water.
Emergent Herbaceous Wetlands	Areas where perennial herbaceous vegetation accounts for greater than 80 percent of vegetative cover and the soil or substrate is periodically saturated with or covered with water.

Source: U.S. Geological Survey

NLCD Classification	Proposed Route Segment					
	Right-of-Way		Route Width		1,500 Feet	
	Acres	Percent	Acres	Percent	Acres	Percent
Open Water	—	—	—	—	2.66	1.11
Developed, Open Space	—	—	—	—	—	—
Deciduous Forest	2.41	94.45	4.50	88.62	202.07	83.89
Evergreen Forest	—	—	—	—	1.26	0.52
Mixed Forest	—	—	—	—	—	—
Shrub/Scrub	0.14	5.55	0.58	11.38	32.12	13.33
Grassland/Herbaceous	—	—	—	—	—	—
Pasture/Hay	—	—	—	—	—	—
Cultivated Crops	—	—	—	—	—	—
Woody Wetlands	—	—	—	—	1.72	0.71
Emergent Herbaceous Wetlands	—	—	—	—	1.03	0.43
Totals	2.55	100.00	5.08	100.00	240.86	100.00

NLCD Classification	Proposed Route (East of Proposed Route Segment)					
	Right-of-Way		Route Width		1,500 Feet	
	Acres	Percent	Acres	Percent	Acres	Percent
Open Water	—	—	—	—	13.25	1.36
Developed, Open Space	—	—	1.40	2.38	8.44	0.87
Deciduous Forest	6.80	24.57	15.59	26.62	435.19	44.71
Evergreen Forest	—	—	—	—	0.88	0.09
Mixed Forest	—	—	—	—	—	—
Shrub/Scrub	6.06	21.88	11.83	20.21	104.57	10.74
Grassland/Herbaceous	—	—	—	—	2.89	0.30
Pasture/Hay	2.69	9.72	5.43	9.27	95.21	9.78
Cultivated Crops	2.58	9.33	6.06	10.34	32.47	3.34
Woody Wetlands	3.54	12.79	7.72	13.18	204.70	21.03
Emergent Herbaceous Wetlands	6.01	21.71	10.54	18.00	75.67	7.78
Totals	27.69	100.00	58.57	100.00	973.27	100.00

NLCD Classification	Alternative Route Segment A					
	Right-of-Way		Route Width		1,500 Feet	
	Acres	Percent	Acres	Percent	Acres	Percent
Open Water	0.52	14.22	0.94	13.09	5.06	1.85
Developed, Open Space	–	–	–	–	–	–
Deciduous Forest	1.96	53.27	4.10	57.11	211.56	77.21
Evergreen Forest	–	–	–	–	6.23	2.27
Mixed Forest	–	–	–	–	–	–
Shrub/Scrub	0.81	21.94	1.60	22.21	47.86	17.47
Grassland/Herbaceous	–	–	–	–	–	–
Pasture/Hay	–	–	–	–	–	–
Cultivated Crops	–	–	–	–	–	–
Woody Wetlands	–	–	–	–	1.67	0.61
Emergent Herbaceous Wetlands	0.39	10.57	0.55	7.59	1.62	0.59
Totals	3.67	100.00	7.19	100.00	274.01	100.00

Desktop Review Land Cover Estimates	Alternative Route Segment A			
	Right-of-Way		Route Width	
	Acres	Percent	Acres	Percent
Open Water	1.70	48.16	3.36	50.37
Developed, Open Space	–	–	–	–
Deciduous Forest	1.65	46.74	1.89	28.34
Evergreen Forest	–	–	–	–
Mixed Forest	–	–	–	–
Shrub/Scrub	0.18	5.10	1.42	21.29
Grassland/Herbaceous	–	–	–	–
Pasture/Hay	–	–	–	–
Cultivated Crops	–	–	–	–
Woody Wetlands	–	–	–	–
Emergent Herbaceous Wetlands	–	–	–	–
Totals	3.53	100.00	6.67	100.00

NLCD Classification	One Mile (Route Segments Combined)	
	Acres	Percent
Open Water	157.53	2.89
Developed, Open Space	59.87	1.10
Deciduous Forest	2,793.28	51.19
Evergreen Forest	28.46	0.52
Mixed Forest	0.97	0.02
Shrub/Scrub	468.59	8.59
Grassland/Herbaceous	90.12	1.65
Pasture/Hay	375.29	6.88
Cultivated Crops	78.17	1.43
Woody Wetlands	942.50	17.27
Emergent Herbaceous Wetlands	461.53	8.46
Totals	5,456.31	100.00

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