

TECHNICAL REVIEW MEMORANDUM

Division of Land Resource Regulation

TO: Dan Courtemanch – Project Manager, Division of Land Resource Regulation

FROM: Art McGlaulin – Engineer, Division of Land Resource Regulation

DATE: October 4, 2013

SUBJECT: L-25973-24-A-N/L-25973-TG-B-N, Bingham Wind Project, Bingham et al.

I have reviewed the additional information from Firstwind for the proposed Bingham Wind Project in Bingham, Moscow, Abbot, Parkman, Mayfield Township, and Kingsbury Plantation. This information satisfactorily addresses my remaining concerns about the project's stormwater management plan. I have provided a summary of this plan below. Please, see me if you have any questions about the plan or any concerns about my review of this project.

STORMWATER MANAGEMENT SUMMARY

APPLICANT: Blue Sky West, LLC and Blue Sky West II, LLC

DEP LICENSE #: L-25973-24-A-N/L-25973-TG-B-N

TOWNS: Bingham, Moscow, Abbot, Parkman, Mayfield Township, and Kingsbury Plantation

ENGINEER: Steve Blake of Fay, Spofford, & Thorndike and Nicholas Porell of SGC Engineering

SITE DESCRIPTION: managed forest lands with substantial areas in early regeneration

PROJECT DESCRIPTION: 62 wind turbines, 17-mile transmission corridor, and access roads

IMPERVIOUS AREA: 83.78 acres

DEVELOPED AREA: 88.61 acres

DISTURBED AREA: about 260 acres

WATERSHEDS: Fall Brook, Gulf Stream, Withee Pond, Rift Brook, Smith Pond, Mayfield Pond (via Bigelow Brook), Kingsbury Pond, Baker Flowage, Thorn Brook, Kingsbury Stream (direct and via Bottle Brook and Bear Brook), Hilton Pond #1, Gales Brook, Carlton Stream, and the Piscataquis River

WATERSHED TYPES: no designations under Chapter 502

Blue Sky West and Blue Sky West II, wholly-owned subsidiaries of Firstwind, propose to develop a 62-turbine wind energy facility on lands in Bingham, Moscow, Abbot, Parkman, Mayfield Township, and Kingsbury Plantation. Development under this license will include the following facilities:

- 24.3 miles of new or upgraded roadways,

- 62 turbine pads,
- five permanent meteorological tower pads,
- an operations & maintenance facility in Mayfield Township,
- a substation in Mayfield Township,
- a DRD enclosure in Mayfield Township,
- 8.5 miles of 34.5kV connector corridor, and
- 17 miles of 115kV transmission corridor.

Together, these will add or redevelop 83.78 acres of impervious area and 88.61 acres of developed area in the watersheds of Gulf Stream, Fall Brook, Kingsbury Stream, Rift Brook, Baker Flowage, Thorn Brook, Withee Pond, Smith Pond, Hilton Pond #1, Kingsbury Pond, Mayfield Pond, Gales Brook, Carlton Stream, and the Piscataquis River. This requires the project to include measures to meet the basic, general, phosphorus, and flooding standards of the state's stormwater management rules.

BASIC STANDARD

The construction phase of the Bingham Wind Project will have, by far, the greatest potential to harm water resources during the project's lifetime. Because of the project's size and the need to make frequent field adjustments during construction, an erosion control plan providing the precise location of each control necessary during construction has not been developed. Instead, as on past wind power and pipeline projects, the project utilizes a "tool kit" of methods for controlling erosion, trapping sediments, managing drainage, and stabilizing soils for the numerous conditions likely to be encountered. The applicant's environmental inspectors and project engineers will determine where and when to employ measures as work along the north turbine series, south turbine series, and generator lead projects proceed. I recommend third-party inspectors be employed to ensure appropriate measures are implemented prior to soil disturbance, measures are maintained, and areas are stabilized expeditiously. These inspectors must be experienced at identifying protected resources, assessing drainage conditions, and evaluating whether or not each measure implemented is appropriate for the situation.

- **North Turbine Series & South Turbine Series Project** – The north and south turbine series include the development of the 62 wind turbine pads, five meteorological tower pads, 22.3 miles of new or upgraded access roadways, and the connector line corridor over flat to moderately steep terrain. Fay, Spofford, & Thorndike has developed an erosion and sediment control plan for the project to limit the erosion of soils, prevent sediment discharges to downstream resources, and stabilize the site. This plan includes measures and methods for the winter construction period. Because of the size and duration of the project, the applicant's engineers and environmental inspectors will determine when and where to implement control measures. For this reason, the north series project area and the south series project area will

each need an experienced third-party inspector to ensure resource areas are properly protected, erosion problems are identified early, and corrective actions are done quickly.

- **Roadway, met tower pad, and turbine pad grading plans** – plan sheets C-S1.01 through C-S1.25 (as revised 04.09.13, except C-S1.19 revised 09.03.13) and plan sheets C-N1.01 through C-N1.30 (as revised 04.09.13, except C-N1.01 through C-N1.04 revised 08.02.13, C-N1.10 revised 09.03.13, and C-N1.21 revised 09.03.13)
- **Erosion control standards** – section 14.0 of the site location application, as submitted by Firstwind on September 12, 2013
- **Erosion control details and specifications** – plan sheet C-5.0 entitled “Roadway and Pad Section Details” (as revised 08.02.13), plan sheet C-6.0 entitled “Back Slope Details” (as revised 08.02.13), plan sheet C-7.0 entitled “Ditch and Culvert Details” (as revised 09.03.13), plan sheet C-8.0 entitled “Soil Hydrology Preservation Details” (as revised 04.09.13), plan sheet C-9.0 entitled “Erosion Control Details” (as revised 08.02.13), plan sheet C-9.1 entitled “Erosion Control Details” (as revised 09.03.13), and plan sheet C-9.02 entitled “Erosion Control Notes” (as revised 09.03.13)
- **Generator Lead Project** – The generator lead project includes the development of 17 miles of transmission corridor and construction of about two miles of access roadways. SGC Engineering has developed an erosion and sediment control plan for the project to limit the erosion of soils during construction, prevent sediment discharges to downstream resources during construction, and stabilize the site. This plan includes measures and methods for the winter construction period. Because of the size and duration of the project, the applicant’s engineers and environmental inspectors will determine when and where to implement control measures. For this reason, an experienced third-party inspector will be necessary for the generator lead project to ensure resource areas are properly protected, erosion problems are identified early, and corrective action are done quickly.
- **Access roadway grading plans and erosion control locations** – drawing AR-01 entitled “Access Road AR-120 (B & C)” (as revised 03/29/13), drawing AR-02 entitled “Access Road AR-212” (as revised 03/29/13), drawing AR-03 entitled “Access Road AR-230 (STA 0+00 to 20+50)” (as revised 07/03/13), drawing AR-04 entitled “Access Road AR-230 (STA 20+50 to 34+65)” (as revised 07/03/2013), drawing AR-05 entitled “Access Road AR-300” (as revised 03/29/13), drawing AR-06 entitled “Access Road AR-355” (as revised 03/29/13), drawing AR-07 entitled “Access Road AR-390” (as revised 07/03/13), and drawing AR-08 entitled “Access Road AR-460-B” (as revised 03/29/13)
- **Erosion control details and specifications** – drawing DET-01 entitled “Erosion and Sedimentation Control Details” (as revised 07/03/13), Drawing DET-02 entitled “Stormwater Details” (as revised 03/29/13), and plan sheet DET-03 entitled “Roadway Details” (as revised 07/03/13)
- **Substation & DRD Enclosure** – The substation and DRD Enclosure will be built on the north side of Access Road 4 in Mayfield Township. Construction will disturb about three acres of upland soil on moderately sloping land. Methods and standards developed by Fay, Spofford, & Thorndike for the Bingham Wind Project will also be utilized for the substation’s and DRD enclosure’s construction. For the most part, sediment control can be accomplished using sediment barriers west of the substation and west, north, and east of the DRD enclosure. The applicant’s engineers and environmental inspectors will locate these measures in the field prior

to soil disturbance. The presence of a wetland and headwater stream southwest of the site will make rapid stabilization of the substation's high, fill slope critical to avoid potential sediment impacts to the stream. Inspection of the substation and DRD enclosure construction can be done as part of the third-party inspection for the north turbine series project.

- **Substation and DRD enclosure grading plan** – plan sheet C-N1.15 entitled “Access Road 4 Plan and Profile” (as revised 04.09.13)
- **Erosion control standards** – section 14.0 of the site location application, as submitted by Firstwind on September 12, 2013
- **Erosion control details and specifications** – plan sheet C-5.0 entitled “Roadway and Pad Section Details” (as revised 08.02.13), plan sheet C-6.0 entitled “Back Slope Details” (as revised 08.02.13), plan sheet C-7.0 entitled “Ditch and Culvert Details” (as revised 09.03.13), plan sheet C-8.0 entitled “Soil Hydrology Preservation Details” (as revised 04.09.13), plan sheet C-9.0 entitled “Erosion Control Details” (as revised 08.02.13), plan sheet C-9.1 entitled “Erosion Control Details” (as revised 09.03.13), and plan sheet C-9.02 entitled “Erosion Control Notes” (as revised 09.03.13)
- **Operations & Maintenance Facility** – The operations and maintenance facility will be constructed on the south side of Route 16 in Mayfield Township. Construction will disturb about 2.8 acres of well-drained soils on a moderately sloping site. Methods and standards developed by Fay, Spofford, & Thorndike for the Bingham Wind Project will also be utilized for the operations and maintenance facility's construction. The applicant's engineers and environmental inspectors will locate the erosion and sediment control measures in the field prior to soil disturbance. Inspection of the operations and maintenance facility construction can be done as part of the third-party inspection for the south turbine series project.
 - **Operations & maintenance facility grading plan** – plan sheet C-SW3.0 entitled “O & M Building Site Plan and Water Quality Plan” (as revised 08.02.13)
 - **Erosion control standards** – section 14.0 of the site location application, as submitted by Firstwind on September 12, 2013
 - **Erosion control details and specifications** – plan sheet C-5.0 entitled “Roadway and Pad Section Details” (as revised 08.02.13), plan sheet C-6.0 entitled “Back Slope Details” (as revised 08.02.13), plan sheet C-7.0 entitled “Ditch and Culvert Details” (as revised 09.03.13), plan sheet C-8.0 entitled “Soil Hydrology Preservation Details” (as revised 04.09.13), plan sheet C-9.0 entitled “Erosion Control Details” (as revised 08.02.13), plan sheet C-9.1 entitled “Erosion Control Details” (as revised 09.03.13), and plan sheet C-9.02 entitled “Erosion Control Notes” (as revised 09.03.13)

GENERAL STANDARD

Post-construction runoff from the project areas has the potential to harm headwater brooks and streams due to increased sediment loads, increased frequency of channel-altering flows, and increased runoff temperature. Much of these impacts will be avoided by the applicant performing monthly inspections to identify and correct erosion of the roadway surface, ditches, culvert outfalls, and side slopes. The remaining impacts will be prevented by the use of 64 ditch

turn-outs, 39 level spreaders, roadway crowning, and crane pad grading to divert runoff into 192 stormwater management buffers. Stream impacts due to runoff from the substation, DRD enclosure, and operation & maintenance facility will be prevented by the use of a man-made pervious surface (substation), a wetpond (DRD enclosure), and two underdrained soil filter basins (O&M facility).

• **North Turbine Series & South Turbine Series Project** – The north and south turbine series will create or redevelop 62.97 acres of new impervious area and 62.97 acres of developed area within tributary headwaters of Gulf Stream, Fall Brook, Kingsbury Stream, Rift Brook, Baker Flowage, and Thorn Brook. This project will include the following measures to treat roadway and turbine pad runoff to remove runoff pollutants, reduce runoff temperatures, and protect stream channel morphology:

- preservation of 43 roadside buffers along the access roadways,
- construction of 39 level lip spreaders to discharge runoff into 39 forested buffers,
- construction of 51 ditch turn-outs to discharge runoff into 51 forested buffers, and
- establishment of 37 meadow buffers on 37 turbine pads.

Together, these 39 level spreaders, 51 ditch turn-outs, and 170 buffers will treat runoff from 47.36 acres (75%) of the impervious area and 47.36 acres (75%) of the developed area. All buffers not located on the turbine pads will be maintained (or allowed to regenerate) to forest, with future clearing prohibited and tree removal limited. Buffers established on the turbine pads will be maintained as a meadow-brush cover. This meets the linear project exception to the general standard.

▪ ***Level spreader, ditch turn-out, and buffer locations*** – plan sheets C-S1.01 through C-S1.25 (as revised 04.09.13, except C-S1.19 revised 09.03.13) and plan sheets C-N1.01 through C-N1.30 (as revised 04.09.13, except C-N1.01 through C-N1.04 revised 08.02.13, C-N1.10 revised 09.03.13, and C-N1.21 revised 09.03.13)

▪ ***Level spreader and ditch turn-out details and specifications*** – plan sheets C-9.0 and C-9.1 entitled “Erosion Control Details” (both revised 08.02.13)

▪ ***Inspection & maintenance plan*** – “Bingham Wind Project Stormwater Management System Inspection & Maintenance Log”, included as Appendix 12-4 of the site location application

• **Generator Lead Project** – The generator lead project will create or redevelop 2.92 acres of new impervious area and 2.92 acres of developed area within the watersheds of Gales Brook, Carlton Stream, Kingsbury Stream, and the Piscataquis River. This project will include the following measures to treat roadway and turbine pad runoff to remove runoff pollutants, reduce runoff temperatures, and protect stream channel morphology:

- preservation of nine roadside buffers (4 forested, 1 meadow, and four mixed) along the access roadways and

- construction of thirteen ditch-turnouts to discharge runoff into thirteen buffers (12 forested and one meadow).

Together, these 13 ditch turn-outs and 22 buffers will treat runoff from 2.23 acres (76%) of the impervious area and 2.23 acres (76%) of the developed area. Each buffer will be maintained in its current condition as meadow or forest (although meadow areas may be allowed to revert to forest cover). This meets the linear project exception to the general standard.

- **Ditch turn-out and buffer locations** – drawing AR-01 entitled “Access Road AR-120 (B & C)” (as revised 03/29/13), drawing AR-02 entitled “Access Road AR-212” (as revised 03/29/13), drawing AR-03 entitled “Access Road AR-230 (STA 0+00 to 20+50)” (as revised 07/03/13), drawing AR-04 entitled “Access Road AR-230 (STA 20+50 to 34+65)” (as revised 07/03/2013), drawing AR-05 entitled “Access Road AR-300” (as revised 03/29/13), drawing AR-06 entitled “Access Road AR-355” (as revised 03/29/13), drawing AR-07 entitled “Access Road AR-390” (as revised 07/03/13), and drawing AR-08 entitled “Access Road AR-460-B” (as revised 03/29/13)
- **Ditch turn-out details and specifications** – plan sheet DET-02 entitled “Access Road details” (as revised 03/2013)
- **Inspection & maintenance plan** – “Bingham Wind Project Stormwater Management System Inspection & Maintenance Log”, included as Appendix 12-4 of the site location application
- **Substation & DRD Enclosure** – The substation and DRD enclosure will create 1.66 acre of new impervious area and 2.94 acre of new developed area in the watershed of the Baker Flowage. This project will include the following measures to remove runoff pollutants, reduce runoff temperatures, and protect stream channel morphology:
 - a wetpond will be constructed to treat runoff from the DRD enclosure and
 - the substation yard will be finished with six inches of crushed stone over Type A gravel to allow rapid infiltration of precipitation.

Together, these measures will treat 1.64 acres (99%) of the new impervious area and 2.45 acres (83%) of the new developed area. Treated runoff from the wetpond’s underdrained gravel trench outlet and the substation pad will be discharged to the surrounding woodland. This meets the general standard.

- **Wetpond location** – plan sheet C-SW3.0 entitled “O & M Building Site Plan and Water Quality Plan” (as revised 04.09.13)
- **Wetpond details and specifications** – plan sheet C-SW3.0 entitled “O & M Building Site Plan and Water Quality Plan” (as revised 04.09.13)
- **Substation pad surfacing specification** – plan sheet C-5.0 entitled “Roadway and Pad Section Details” (as revised 08.02.13)
- **Inspection & maintenance plan** – “Bingham Wind Project Stormwater Management System Inspection & Maintenance Log”, included as Appendix 12-4 of the site location application

- **Operations & Maintenance Facility** – The operations and maintenance facility will create 0.91 acre of new impervious area and 1.90 acres of new developed area in the watershed of Rift Brook. This facility’s development will include construction of two underdrained soil filter basins to treat runoff from 0.87 acre (95%) of new impervious area and 1.52 acres (80%) of the new developed area. Treated runoff from the two basins will discharge via underdrain pipes to drainage ways adjacent Route 16. This meets the general standard.
 - **USF locations** – *plan sheet C-SW3.0 entitled “O & M Building Site Plan and Water Quality Plan” (as revised 08.02.13)*
 - **USF details and specifications** – *plan sheet C-SW3.0 entitled “O & M Building Site Plan and Water Quality Plan” (as revised 08.02.13)*
 - **Inspection & maintenance plan** – *“Bingham Wind Project Stormwater Management System Inspection & Maintenance Log”, included as Appendix 12-4 of the site location application*

PHOSPHORUS STANDARD

The north turbine series and south turbine series project will include development within the watersheds of five lakes: Withee Pond, Smith Pond, Hilton Pond #1, Kingsbury Pond, and Mayfield Pond. This development has the potential to raise phosphorus concentrations within each pond, particularly Kingsbury Pond and Mayfield Pond. Much of the potential phosphorus load to each lake will be eliminated by the applicant performing monthly inspections to identify and correct erosion of the roadway surface, ditches, culvert outfalls, and side slopes. The remaining phosphorus load due to sediments washing off the roadways and crane pads will be reduced by utilizing vegetated buffers to absorb and bind phosphorus in the soil, surface litter, and vegetation. The phosphorus control measures employed to protect lake water quality will also provide headwater stream protection by cooling runoff and reducing the frequency of channel-altering flows.

- **Withee Pond** – Development of Crane Road 6 and turbine pad 74 as part of the south turbine series will add 0.54 acre of new impervious area on 13.32 acres of project area within the Withee Pond watershed. Under the phosphorus standard, the project development has an allowable phosphorus export of 0.380 pounds of phosphorus per year to the pond. The project will export 0.945 pounds per year without treatment. To reduce the export to acceptable levels, the project will include the construction of a level lip spreader to spread runoff from 474 linear feet of roadway and the turbine crane pad into a forested treatment buffer. This will reduce the project’s phosphorus export to 0.189 pounds per year. As this is less than allowable export, the plan meets the phosphorus standard.
 - **Level spreader and buffer locations** – *plan sheets C-S1.01 through C-S1.25 (as revised 04.09.13, except C-S1.19 revised 09.03.13) and plan sheets C-N1.01 through C-N1.30 (as revised 04.09.13, except C-N1.01 through C-N1.04 revised 08.02.13, C-N1.10 revised 09.03.13, and C-N1.21 revised 09.03.13)*

- **Level spreader details and specifications** – plan sheets C-9.0 and C-9.1 entitled “Erosion Control Details” (both revised 08.02.13)
- **Smith Pond** – Development of turbine pad 15 as part of the south turbine series will add 0.23 acre of new impervious area on 4.40 acres of project area within the Smith Pond watershed. Under the phosphorus standard, the project development has an allowable phosphorus export of 0.211 pounds of phosphorus per year to the pond. The project will export 0.403 pounds per year without treatment. To reduce the export to acceptable levels, the project will include the establishment of a meadow buffer on turbine pad 15 to treat runoff from the crane pad. This will reduce the project’s phosphorus export to 0.121 pounds per year. As this is less than allowable export, the plan meets the phosphorus standard.
- **Turbine pad surfacing specifications** – plan sheet C-5.0 entitled “Roadway and Pad Section Details” (as revised 08.02.13)
- **Hilton Pond #1** – Development of Crane Road 18, turbine pad 48, and turbine pad 58 as part of the north turbine series will add 0.67 acre of new impervious area on 22.48 acres of project area within the watershed of Hilton Pond #1. Under the phosphorus standard, the project development has an allowable phosphorus export of 0.944 pounds of phosphorus per year to the pond. The project will export 1.173 pounds per year without treatment. To reduce the export to acceptable levels, the project will include the following measures:
 - construction of a level lip spreader to spread runoff from 950 linear feet of roadway into a forested buffer and
 - establishment of a meadow buffer on turbine pad 48 to treat runoff from the crane pad.

These measures will reduce the project’s phosphorus export to 0.770 pounds per year. As this is less than allowable export, the plan meets the phosphorus standard.

- **Level spreader and buffer locations** – plan sheets C-S1.01 through C-S1.25 (as revised 04.09.13, except C-S1.19 revised 09.03.13) and plan sheets C-N1.01 through C-N1.30 (as revised 04.09.13, except C-N1.01 through C-N1.04 revised 08.02.13, C-N1.10 revised 09.03.13, and C-N1.21 revised 09.03.13)
- **Level spreader details and specifications** – plan sheets C-9.0 and C-9.1 entitled “Erosion Control Details” (both revised 08.02.13)
- **Turbine pad surfacing specifications** – plan sheet C-5.0 entitled “Roadway and Pad Section Details” (as revised 08.02.13)
- **Kingsbury Pond** – Development of Crane Road 11, Crane Road 22, Access Road 3, and turbine pad 28 as part of the north turbine series will add 3.81 acres of new impervious area on 72.3 acres of project area within the watershed of Kingsbury Pond. Under the phosphorus standard, the project development has an allowable phosphorus export of 3.398 pounds of phosphorus per year to the pond. The project will export 6.668 pounds per year without treatment. To reduce the export to acceptable levels, the project will include the following measures:

- construction of two level lip spreaders and one ditch turn-out to spread runoff from 1975 linear feet of roadway into three forested buffers,
- preservation of two roadside buffers adjacent Crane Road 11 to treat runoff from 2300 linear feet of the roadway, and
- establishment of a meadow buffer on turbine pad 28 to treat runoff from the crane pad.

These measures will reduce the project's phosphorus export to 3.236 pounds per year. As this is less than allowable export, the plan meets the phosphorus standard.

- **Level spreader, ditch turn-out, and buffer locations** – plan sheets C-S1.01 through C-S1.25 (as revised 04.09.13, except C-S1.19 revised 09.03.13) and plan sheets C-N1.01 through C-N1.30 (as revised 04.09.13, except C-N1.01 through C-N1.04 revised 08.02.13, C-N1.10 revised 09.03.13, and C-N1.21 revised 09.03.13)
- **Level spreader and ditch turn-out details and specifications** – plan sheets C-9.0 and C-9.1 entitled "Erosion Control Details" (both revised 08.02.13)
- **Turbine pad surfacing specifications** – plan sheet C-5.0 entitled "Roadway and Pad Section Details" (as revised 08.02.13)
- **Mayfield Pond** – Development of Crane Road 8, Crane Road 9, meteorological tower road 2, and three turbine pads as part of the south turbine series and development of Crane Road 10, Crane Road 22, meteorological tower road 3, a portion of the substation, and nine turbine pads as part of the north turbine series will add 10.06 acres of new impervious area on 183.25 acres of project area within the watershed of Mayfield Pond. Under the phosphorus standard, the project development has an allowable phosphorus export of 5.165 pounds of phosphorus per year to the pond. The project will export 16.605 pounds per year without treatment. To help reduce the export to acceptable levels, the project will include the following measures:
 - construction of seven level spreaders and five ditch turn-outs to spread runoff from 5473 linear feet of roadway and one turbine pad into twelve forested buffers,
 - preservation of six roadside buffers to treat runoff from 6175 linear feet of roadway,
 - establishment of meadow buffers on 11 turbine pads to treat crane pad runoff, and
 - installation of a man-made pervious surface on the substation yard.

These measures will reduce the project's phosphorus export to 5.480 pounds per year. As this is more than the allowable export, the applicant will also remove 0.41 acre of existing roadway within the watershed and return the area to a meadow/brush cover for a phosphorus mitigation credit of 0.359 pounds per year. This reduces the phosphorus export to 5.121 pounds per year. As this is less than the allowable export, the plan meets the phosphorus standard.

- **Level spreader, ditch turn-out, and buffer locations** – plan sheets C-S1.01 through C-S1.25 (as revised 04.09.13, except C-S1.19 revised 09.03.13) and plan sheets C-N1.01 through C-N1.30 (as revised 04.09.13, except C-N1.01 through C-N1.04 revised 08.02.13, C-N1.10 revised 09.03.13, and C-N1.21 revised 09.03.13)
- **Level spreader and ditch turn-out details and specifications** – plan sheets C-9.0 and C-9.1 entitled “Erosion Control Details” (both revised 08.02.13)
- **Substation yard and turbine pad surfacing specifications** – plan sheet C-5.0 entitled “Roadway and Pad Section Details” (as revised 08.02.13)

FLOODING STANDARD

The Bingham Wind Project will add (or redevelop) 83.78 acres of impervious area and 4.83 acres of landscaped area within fourteen, relatively undeveloped watersheds having an aggregate area of over 5,000 acres. Runoff from the impervious and landscaped areas will be spread over roadway alignments totaling 24.3 miles in length using 70 ditch turn-outs, 50 level spreaders, roadway crowning, and crane pad grading to divert flows into 231 stormwater management buffers. Due to the low amount of impervious cover (<3% for all watersheds) and the dispersal of flows into 231 buffers, peak flow rate impacts to off-site properties and infrastructure due to the north turbine series, south turbine series, and generator lead projects will be insignificant. Peak flow rate control for the more-densely developed substation and DRD enclosure site and for the operation and maintenance facility site will be done using a wetpond (for the substation and DRD enclosure) and two underdrained soil filter basins (for the O&M facility).

- **North Turbine Series & South Turbine Series Project** – The north turbine series and south turbine series project will add or redevelop 72.28 acres of impervious area within tributary headwaters draining to Gulf Stream, Fall Brook, Kingsbury Stream¹, Rift Brook², Baker Flowage³, Thorn Brook, Withee Pond, Smith Pond, Hilton Pond #1, Kingsbury Pond, and Mayfield Pond⁴. Fay, Spofford, and Thorndike has analyzed the cover changes to each of these watersheds. These analyses indicate that the potential runoff increases due to the addition of impervious surface in each watershed are insignificant (i.e., less than the TR-20 model can evaluate). Also, runoff from the impervious areas will be dispersed into 209 buffers to prevent excessive concentration of flows into any natural or man-made drainage. For these reasons, I recommend the north turbine series and south turbine series project be approved under the insignificant increase variance to the flooding standard.

Each of the 131 culverts on the north and south turbine series project is sized to convey the peak flow rate due to the 25-year peak rainfall intensity. Sizing was done using the “Rational Method” and the intensity-duration-frequency curves for Rangeley. This sizing methodology is consistent with MDOT’s culvert design recommendations for rural drainage areas less than 200 acres in size. The maximum drainage area to a culvert on the north turbine series and south turbine series is 54 acres.

¹ Kingsbury Stream also receives flow from the generator lead project. ² Rift Brook also receives flow from the operations and maintenance facility site. ³ The Baker Flowage also receives flow from the substation and DRD enclosure. ⁴ Mayfield Pond also receives flow from the substation.

- **Generator Lead Project** – This 17-mile transmission corridor project will add or redevelop 2.92 acres of impervious area due to the construction of six access roads totaling two miles in length within the watersheds of Gales Brook, Carlton Stream, Kingsbury Stream, and the Piscataquis River. SGC Engineering has analyzed the impervious area change to each of these watersheds. These analyses indicate that the potential runoff increases due to the addition of impervious surface in each watershed are insignificant. Also, the access roads whose runoff could have potentially impacted drainage infrastructure – AR-390 adjacent Route 16 and AR-300 adjacent Pease Bridge Road – have been designed to divert water through treatment buffers to nearby streams (Bear Brook and Kingsbury Stream) without utilizing existing road ditches and culverts. For these reasons, I recommend the generator lead project be approved under the insignificant increase variance to the flooding standard.

Each of the seven culverts on the generator lead project is sized to convey the peak flow rate due to the 25-year peak rainfall intensity. Sizing was done using the “Rational Method” and the intensity-duration-frequency curves for Newport. This sizing methodology is consistent with MDOT’s culvert design recommendations for rural drainage areas less than 200 acres in size. The maximum drainage area to a culvert on the generator lead project is 17 acres.

- **Substation & DRD Enclosure** – The substation and DRD Enclosure will be built on the north side of Access Road 4 in Mayfield Township. These will create 1.66 acre of new impervious area and 2.94 acre of new developed area in the drainage area of a culvert crossing under a woods road to the west. To protect this culvert and roadway from wash-outs, the DRD enclosure will include the construction of a stormwater management pond to capture and slowly release runoff from the project site. Also, the substation yard will be finished with a crushed stone pervious surface to increase the infiltration and storage of precipitation falling on the yard. Together, these measures will keep peak flow rates from the site below predevelopment rates for the 2-year, 10-year, and 25-year storms. This meets the flooding standard.
 - *Pre-development drainage plan – Figure 4 entitled “Substation/DRD Pre Development Watershed Map” (dated April 2013)*
 - *Post-development drainage plan – Figure 5 entitled “Substation/DRD Post Development Watershed Map” (dated April 2013)*
- **Operations & Maintenance Facility** – The operations and maintenance facility will be constructed on the south side of Route 16 in Mayfield Township. The facility will create 0.91 acre of new impervious area and 1.90 acres of new developed area within drainages crossing under Route 16 to Rift Brook. To prevent potential impacts to these drainage crossings, the facility will include the construction of two underdrained soil filter basins to capture and slowly release runoff from the project. Together, these measures will keep peak flow rates from the developed site at pre-development rates for the 2-year, 10-year, and 25-year storms. This meets the flooding standard.
 - *Pre-development drainage plan – Figure 2 entitled “O&M Watershed Map” (dated April 2013)*
 - *Post-development drainage plan – Figure 2 entitled “O&M Watershed Map” (dated April 2013)*