STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
ENERGY FACILITY SITING BOARD

IN RE: INVENERGY THERMAL DEVELOPMENT LLC's APPLICATION TO CONSTRUCT THE CLEAR RIVER ENERGY CENTER IN BURRILLVILLE, RHODE ISLAND

DOCKET No. SB-2015-06

PRE-FILED DIRECT TESTIMONY OF CHAD JACOBS

(JUNE 30, 2017)

SUMMARY

Chad Jacobs is a Project Manager for HDR, Inc. and testifies regarding his analysis of Clear River Energy Center's ("CREC's") environmental impacts, focusing on stormwater and soil erosion. Mr. Jacobs describes the stormwater plans for the Project and the existing geology, soils and topography of the Project's location. He describes his preparation and analysis of CREC's Stormwater Management System and the RIDEM permitting process. Mr. Jacobs further describes the analysis described in the CREC's Soil and Sediment Control Plan. Mr. Jacobs, relying on his experience and expertise, the application as supplemented, and the analysis prepared for the stormwater and soil/sediment control plans as filed with RIDEM, opines that Invenergy's stormwater management plans and the soil erosion and sediment control plans will be in conformance with applicable laws and regulations and will thereby not cause unacceptable harm to the environment.

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INVENERGY THERMAL DEVELOPMENT LLC'S PRE-FILED DIRECT TESTIMONY OF CHAD JACOBS, HDR, INC.

I. INTRODUCTION

Q. PLEASE STATE YOUR NAME, BUSINESS TITLE AND BUSINESS ADDRESS.

A. My name is Chad Jacobs. I am Project Manager at HDR, Inc. ("HDR"), located at 11 Stanwix St. Pittsburgh, PA. 15222

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. My testimony is on behalf of the applicant, Invenergy Thermal Development LLC ("Invenergy"), in support of its application (the "Application") for a license from the Rhode Island Energy Facility Siting Board ("EFSB" or "Board") to construct the Clear River Energy Center project in Burrillville, Rhode Island ("Clear River" or "CREC").

Q. PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A. I received a bachelor's degree in civil engineering from the Georgia Institute of Technology. I am a Registered Professional Engineer in the states of Florida, Louisiana, Ohio, Pennsylvania and West Virginia. I have performed numerous stormwater and erosion sediment control designs at industrial facilities, including power generation plants, ports and gas transmission facilities. A detailed description of my educational background and professional experience was filed with the Board on September 12, 2016.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. The purpose is to explain CREC's environmental impact, focusing on stormwater and soil erosion analysis. I will testify regarding Section 6.4 (Stormwater) and Section 6.6.3 (Geology and Soils) of the Application, as updated in the permit filings.

Q. PLEASE DESCRIBE YOUR FAMILIARITY WITH CREC.

A. My first engagement with CREC was to help evaluate general arrangements of the facility to avoid and minimize wetland impacts. I met with Rhode Island Department of Environmental Management ("RIDEM") and the United States Army Core of Engineers ("USACE") to review preliminary layouts and receive initial feedback regarding stormwater facility concepts and the general arrangement of buildings. Utilizing the initial feedback, we refined the general arrangement, minimizing the wetland impacts.

Using the final general arrangement, I oversaw the design team responsible for developing the stormwater management plan and soil and erosion control plan.

Q. WHAT MATERIALS DID YOU REVIEW AND RELY ON WHEN ANALYZING CREC'S ENVIRONMENTAL IMPACTS?

A. I reviewed the following:

(1) Wetland delineation prepared by ESS Group, Inc.: (Wetland Edge Verification Application dated October 28. 2015; delineations performed Fall 2014 and Spring 2015): The wetland delineation report identifies the extent and quality of the wetlands associated with the site.

(2) Geotechnical Report prepared by GZA: GeoEnvironmental, Inc. (December 2015): Specifically, the portions of the geotechnical report that pertained to the Stormwater Management Plan and the soil type and groundwater elevation.

(3) Rhode Island Soil Erosion and Sediment Control Handbook 2014 edition: This handbook establishes design criteria and guidance for the management and control of sediment and erosion for the State of Rhode Island.

(4) Rhode Island Stormwater Design and Installation Standards Manual 2015 Edition: This manual establishes design criteria and guidance for the management and control of stormwater runoff for the State of Rhode Island.

(5) RIDEM Water Quality website: This website lists the physical condition and classification of water bodies in the State of Rhode Island. The condition of the receiving water bodies can impact the criteria used to design stormwater controls and associated facilities.

(6) Burrillville Soil Erosion and Sediment Control Ordinance (Article II, sec. 12-31 et. seq.).

II. STORMWATER ANALYSIS

Q. PLEASE DESCRIBE ALL RELEVANT STANDARDS AND REGULATIONS THAT YOU REVIEWED WHEN ANALYZING CREC'S STORMWATER IMPACT.

A. I reviewed the Rhode Island Soil Erosion and Sediment Control Handbook 2014 edition. This handbook establishes design criteria and guidance for the management and control of sediment and erosion for the State of Rhode Island. I also reviewed the Rhode Island Stormwater Design and Installation Standards Manual 2015 Edition. This manual establishes design criteria and guidance for the management and control of stormwater runoff for the State of Rhode Island. I also reviewed the Burrillville Soil Erosion and Sediment Control Ordinance (Article II, sec. 12-31 et. seq.).

Q. PLEASE EXPLAIN YOUR METHODOLOGY.

A. We followed the following steps in design of the Stormwater Management System. First, we reviewed the applicable regulations and identified the applicable regulatory and design criteria. Next, we collected data. Specifically, we reviewed the following: wetland survey, civil survey (Lidar), geotechnical testing, aerial photography, agency water quality data, and the United States Geological Survey soil data. Next, we determined the required sizing criteria. These criteria include recharge, water quality, channel protection and overbank flood protection. The criteria for both stormwater quantity and quality controls are established at this stage. Using the guidelines provided in the Rhode Island Stormwater and Installations Manual (2015 Edition), we evaluated ways to avoid, reduce and manage impacts in order to establish a design that would achieve the Lowest Impact Development ("LID") Approach.

Based on the above, we developed a conceptual approach and met with RIDEM on February 22, 2016 to explain the overall approach and to solicit input from RIDEM. A conceptual design and methodology were developed. Additionally, Invenergy engaged their local environmental consultant ESS Group Inc's Water and Coastal Engineering Department manager Jim Riordan, who also reviewed the design approach. Mr Riordan will explain his review and findings in his testimony. This design was then presented at a high level to RIDEM for discussion. We developed final designs for the Erosion and Sediment Control Plan, the Operation and Maintenance ("O&M") Plan and a Final Stormwater Management Plan, which were submitted to RIDEM for review and approval. The designs meet the design criteria and guidance as outlined in the Soil Erosion and Sediment Control Handbook and the RI Stormwater Management Control Manual.

Q. WERE YOU INVOLVED WITH INVENERGY'S STORMWATER PERMITTING?

A. I have been involved at two separate RIDEM meetings, one in which the USACE was also present. We have prepared the Stormwater Management Plan for CREC. I oversee and direct the group of engineers that are responsible for preparing the Stormwater Management Plan. HDR is the engineer of record for the design.

Q. DID YOU MAKE ANY DETERMINATION REGARDING CREC'S ENVIRONMENTAL STORMWATER IMPACT? IF SO, PLEASE DESCRIBE.

A. I did. The proposed CREC is situated on existing gently sloping, forested property in northeast Providence County, Rhode Island. The proposed conceptual Limits of Disturbance ("LOD") and permanent improvement limits span the drainage divide of two sub-watersheds to Clear River: Iron Mine Brook and an unnamed tributary to Dry Arm Brook. Improvement of the site will result in increased impervious area and changes to existing land use cover types and, as such, will require the implementation of a stormwater management program in accordance with the RIDEM Rhode Island Stormwater Design and Installation Standards Manual ("RIDEM Manual"), last amended March 2015.

The proposed improvements are divided into two general areas, the power block area and the access road. The powerblock area is classified as a Land Use with Higher Potential Pollutant Load ("LUHPPL") and drains to a lined stormwater basin. The stormwater basin south of the powerblock area is divided into three distinct compartments to meet the requirements of the RIDEM Manual: a sediment forebay, a water quality basin consisting of a Gravel Wet Vegetated Treatment System ("GWVTS"), and a peak attenuation basin. (Refer to sheet 01C300 of Stormwater Management Plan, dated March 2017 prepared by HDR, Inc. – "Stormwater Management Plan" – which was filed with the Board as part of Invenergy's Freshwater Wetland's Application). In post-development conditions, the powerblock area will drain into the sediment forebay and then into the GWVTS in accordance with Section 5.2 of the RIDEM Manual. The

first 1 inch of surface runoff or 1.2 inches of rainfall over proposed impervious surfaces in accordance with Section 3.3.3 of the RIDEM Manual, will flow to the GWVTS for treatment. For larger storm events, the excess runoff will bypass the GWVTS and flow into the attenuation basin directly to the east. The attenuation basin then discharges into a storm sewer system which in turn will gravity drain to a level spreader discharge structure to the north.

The proposed attenuation basin is lined with an impermeable material meeting the requirements of Page 5-11 of the RIDEM Manual. The peak attenuation basin will feature an outlet structure including grated orifices to control the peak flowrate from the proposed Project so that there is no increase in outflow.

The site access road is proposed to drain to a dry swale paralleling the road to the north. The dry swale will provide water quality treatment, and flow into a proposed detention pond (refer to 01C300 of the Stormwater Management Plan) situated north of the road. The site access road is not considered a LUHPPL and, as such, the access road detention pond is not proposed to be lined.

The site access road is proposed to be constructed using a variable height retaining wall. Refer to Sheets 01C600 and 01C601 of the Stormwater Management Plan for the road profile and associated wall heights. For a more detailed analysis please refer to the Stormwater Management Plan.

It is my finding that the Project has been planned and designed to meet local and state stormwater management standards and that the stormwater impacts from this project will be minimal and insignificant to a reasonable degree of certainty.

Q. WHAT IS THE STATUS OF RIDEM'S REVIEW OF THE STORMWATER MANAGEMENT PLAN?

A. It is under review with RIDEM at this time.

III. SOIL EROSION AND SEDIMENT CONTROL

Q. PLEASE DESCRIBE ALL RELEVANT STANDARDS AND REGULATIONS THAT YOU REVIEWED WHEN ANALYZING CREC'S SOIL EROSION AND SEDIMENT CONTROL IMPACT.

A. I reviewed the Rhode Island Soil Erosion and Sediment Control Handbook 2014 edition and Rhode Island Stormwater Design and Installation Standards Manual 2015 Edition. I also reviewed the Burrillville Soil Erosion and Sediment Control Ordinance (Article II, sec. 12-31 et. seq.).

Q. PLEASE EXPLAIN YOUR METHODOLOGY.

A. We developed the Soil and Sediment Control Plan utilizing RIDEM Control measure flow chart as guidance. The four main steps are planning, developing control measures, developing soil erosion and sediment control plans, and establishing phasing and sequencing for the work. During the planning and design work, the team evaluates site management practices, minimizing disturbed area, protecting vegetated buffers, adjusting limits of work and site access as well as minimizing unnecessary clearing.

Q. DID YOU MAKE ANY DETERMINATION REGARDING CREC'S ENVIRONMENTAL IMPACT ON SOIL EROSION AND SEDIMENT CONTROL? IF SO, PLEASE DESCRIBE.

A. I did. The site plan has been developed to maximize the protection of natural drainage areas, streams, surface waters, and jurisdictional wetland buffers to the extent practicable. The site plan has been designed to avoid impacts, requiring the preservation of buffers and floodplains by delineating and preserving naturally vegetated riparian buffers and floodplains and implementing measures to ensure that buffers and native vegetation are protected. These measures

consist of limiting grading and disturbance limits to the minimum amount needed to construct the Project.

The extent of land area proposed for disturbance has been limited to the minimum amount necessary to accomplish the project objective. Existing vegetation has been left in place as far as practical. The site design has been optimized to result in the minimum area of disturbance needed to construct the project.

Construction activity will be phased to minimize the amount of area that is being actively disturbed at one time. The following distinct phases designed to limit the amount of exposed soil are anticipated:

- Clearing and grubbing;
- Site grading and construction of fill/cut slopes; and
- Facility construction.

Adequate temporary controls will be installed on previous phases prior to initiating the land disturbance in subsequent phases until final site stabilization is achieved and post-construction control measures are brought on-line. Phasing will take into account the requirements to manage temporary changes to runoff volume and peak runoff rates due to changes to runoff characteristics caused by the construction activity.

Upon completion and acceptance of site preparation and initial installation of erosion, runoff, and sediment controls and temporary pollution prevention measures, the contractor shall initiate appropriate stabilization practices during all phases of construction on all disturbed areas as soon as possible and in accordance with applicable measures specified in the Rhode Island Soil Erosion and Sediment Control Handbook ("Handbook").

Due to the existing and proposed grading of the Project site, two sediment basins are proposed. Each sediment basin is anticipated to control the runoff from common drainage locations serving five or more acres.

Sediment basins are proposed in the future location of the two permanent post-construction stormwater basins described above. In the proposed temporary construction laydown areas, temporary sediment basins will be provided where attainable until final stabilization of the site is complete. Temporary sediment basins are designed in accordance with the Handbook.

The volume of wet storage is at least twice the sediment storage volume and has a minimum depth of two feet. Sediment storage volume accommodates a minimum of one year of predicted sediment load as calculated using the sediment volume formula provided in the Measure, Temporary Sediment Basins section of the Handbook.

In addition to sediment storage volume and wet storage volume, the sediment basins provide adequate residence storage volume to provide a minimum 10 hours residence time for a 10-year frequency, 24-hour duration, and Type III distribution storm.

Temporary conveyance practices have been sized to handle the peak flow from the 10-year, 24-hour Type III design storm. Temporary conveyance measures diverting off-site runoff have been sized to handle the 100-year, 24-hour Type III design storm event.

For a more detailed analysis please see final Soil Erosion and Sediment Control Plan, prepared by HDR, Inc., filed with the EFSB on May 16, 2017

Q. HAVE YOU REVIEWED THE BURRILLVILLE BUILDING INSPECTOR'S ADVISORY OPINION?

A. Yes

Q. DO YOU HAVE AN OPINION REGARDING THE INSPECTOR'S COMMENTS REGARDING CREC IMPACT ON SOIL EROSION AND SEDIMENT CONTROL?

A. Yes. The Building Inspector stated that an Erosion and Sediment Control Plan had not been submitted for review. In response to the Building Inspector's comment, Invenergy provided the Building Inspector the Preliminary Soil Erosion and Sediment Control Plan, and on June 9, 2017, Invenergy submitted the final Soil Erosion and Sediment Control Plan to the Building Inspector.

IV. CONCLUSIONS

Q. DO YOU HAVE AN OPINION, TO A REASONABLE DEGREE OF CERTAINTY IN YOUR FIELD, REGARDING CREC'S STORMWATER IMPACT ON THE ENVIRONMENT?

A. I do. We have developed a Stormwater Management Plan that conforms to Federal, State and local regulatory rules and code. It is my professional opinion that implementation of the stormwater plan will not result in unacceptable harm to the environment.

Q. DO YOU HAVE AN OPINION, TO A REASONABLE DEGREE OF SCIENTIFIC CERTAINTY, REGARDING CREC'S IMPACT ON SOIL EROSION AND SEDIMENT CONTROL?

A. I do. We have developed a Soil Erosion and Sediment Control Plan for implementation during construction that conforms to Federal, State and local regulatory rules and code. It is my professional opinion that implementation of the soil and erosion control plan will not result in unacceptable harm to the environment.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes.