

**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
JASON RINGLER**

(JUNE 30, 2017)

SUMMARY

Jason Ringler is a senior scientist for ESS Group, Inc. and testifies regarding the analysis conducted by Invenergy Thermal Development LLC (“Invenergy”) and ESS Group, Inc. with regard to areas of the Project identified as wetlands and the data regarding habitat and species related to the Project location. Mr. Ringler testifies regarding the existing wetland habitat and the analysis provided in the application, the Wetlands Addendum filed with the Energy Facility Siting Board and the Wetlands Permit Application pending review at the Rhode Island Department of Environmental Management (“RIDEM”). Mr. Ringler testifies regarding the environmental impacts of the Project with regard to wetlands and other habitat concerns and describes Invenergy’s wetlands mitigation efforts and the Clear River Energy Center’s (“CREC’s”) consistency with the RIDEM Rules and Regulations governing freshwater wetlands. Mr. Ringler also provides a fragmentation analysis with regard to connectivity and wildlife corridors. Mr. Ringler, relying on his experience and expertise, the materials provided in support of the Application, relevant rules and regulations and Invenergy’s Application to Alter Freshwater Wetlands, opines that CREC will produce the fewest possible adverse effects on wildlife and wetland resources and thereby not cause unacceptable harm to the environment.

LIST OF EXHIBITS

JR-1 Figures 1 through 5 from the Nature Conservancy Resilient Land Mapping Tool

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I. INTRODUCTION

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

A. My name is Jason R. Ringler. I am a Senior Scientist for Ecological Science and Environmental Permitting Services at ESS Group, Inc. ("ESS"), located at 10 Hemingway Drive, Riverside, RI 02915.

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" or "the Project").

Q. PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A. I received my bachelors in science in wildlife biology and management from the University of Rhode Island. I have more than eighteen (18) years of experience in wildlife assessments, environmental compliance monitoring and wetland and terrestrial ecology. I am a Professional Wetland Scientist (#1953) and a Certified Wildlife Biologist. A detailed description of my educational background and professional experience is included in my CV, filed with the Board on September 12, 2016.

1 **Q. PLEASE DESCRIBE YOUR EXPERIENCE PROVIDING TESTIMONY TO**
2 **REGULATORY COMMISSIONS, BOARDS, AGENCIES OR AS AN EXPERT**
3 **WITNESS.**

4
5 **A.** As a consultant, I have successfully managed and prepared local, state and federal
6 environmental permitting documentation for public and private sector clients for transportation,
7 aviation, infrastructure and ecological restoration projects. In doing so, I have represented project
8 proponents before numerous municipal, state and federal regulatory agencies.

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

10
11 **A.** I will address CREC’s environmental impact, focusing on (1) wetlands and mitigation; (2)
12 habitat and (3) fragmentation. My testimony supports Section 6.0 of the Application, as
13 supplemented, the Wetlands Addendum and wetlands information submitted to Rhode Island
14 Department of Environmental Management (“RIDEM”) in the application to alter Freshwater
15 Wetlands Alteration Permit. I am also available to testify regarding any data responses in which I
16 am listed as a respondent.

17 **Q. PLEASE DESCRIBE YOUR FAMILIARITY WITH CREC.**

18 **A.** I have worked with the design team to develop a preliminary design for the proposed
19 Project which avoids and minimizes impacts to jurisdictional wetlands.

20 **Q. WHAT MATERIALS DID YOU REVIEW AND RELY ON WHEN ANALYZING**
21 **CREC’S ENVIRONMENTAL IMPACTS?**

22
23 **A.** I reviewed the following materials when analyzing CREC’s impacts: (1) Rhode Island
24 Freshwater Wetlands Regulations; (2) Rhode Island Soil Erosion and Sediment Control
25 Handbook; (3) The Rhode Island Resource Protection Project; (4) The Rhode Island Forest
26 Resources Assessment and Strategies: “A Path to Tomorrow’s Forests,” (June 2010); (5) Rhode
27 Island Conservation Opportunities; (6) The Rhode Island Wildlife Action Plan (“WAP”)
28 Conservation Area Mapper and (7) The Rhode Island WAP.

1 **II. WETLANDS ANALYSIS**

2
3 **Q. PLEASE EXPLAIN YOUR METHODOLOGY.**

4
5 A. The following methodology was implemented as part of the wetland analysis:

6 Desktop data sources were reviewed. These included: National Wetlands Inventory (“NWI”) maps
7 from the U.S. Fish and Wildlife Service (“USFWS”), RIDEM mapped wetlands, Natural
8 Resources Conservation Service (“NRCS”) soils maps, and Federal Emergency Management
9 Agency (“FEMA”) flood mapping data. A delineation of wetlands and streams at the proposed
10 Project site was prepared by ESS in the fall of 2014 and spring of 2015. I reviewed the RIDEM
11 Edge Verification (No.15-0239) issued on January 28, 2016. I also reviewed: United States Army
12 Core of Engineers (“USACE”) Highway Methodology Workbook Supplement functional
13 assessment of delineated wetlands was completed by ESS to identify key wetland functions and
14 values that exist within the Project limits; “Clear River Energy Center – Rhode Island Energy
15 Facility Siting Board Application – Addendum – Wetlands,” dated August 29, 2016, filed with the
16 EFSB on August 30, 2016; and RIDEM Application to Alter Freshwater Wetlands, dated March
17 2017, was filed with RIDEM on April 26, 2017.

18 **Q. DID YOU MAKE ANY FINDINGS REGARDING CREC’S ENVIRONMENTAL**
19 **IMPACT ON THE WETLANDS? IF SO, PLEASE DESCRIBE.**

20
21 A. Yes. Four state regulated wetlands have been identified and delineated within the Project
22 Site. The wetland boundaries were mapped by ESS and have been used in the planning and design
23 of the facility. Wetland types present include swamps, special aquatic sites, streams, rivers and
24 floodplains. The Project has been designed to minimize both temporary and permanent
25 disturbance of wetlands. Temporary disturbances associated with access to construction staging
26 areas has been kept to a minimum by avoidance and minimization measures wherever possible. In
27 addition, temporarily disturbed areas will be revegetated with endemic species. The details

1 concerning the impact to wetlands are explained in Section 6 of the Application, the wetlands
2 addendum and the Freshwater Wetlands Permit application filed with RIDEM for the Project.
3 Further, Invenergy has provided answers to questions related to wetlands in several data requests
4 from the Town of Burrillville and RIDEM.

5 **Q. HAVE YOU REVIEWED THE TOWN OF BURRILLVILLE BUILDING**
6 **INSPECTOR’S ADVISORY OPINION REGARDING WETLANDS?**
7

8 **A.** Yes.
9

10 **Q. DO YOU HAVE AN OPINION REGARDING THE BUILDING INSPECTOR’S**
11 **ADVISORY OPINION REGARDING WETLANDS? PLEASE EXPLAIN.**
12

13 **A.** I do. On page 7, third paragraph, the last sentence states “there has been no wetland
14 verification by RIDEM as to the wetlands and setbacks identified on the site”. However, the
15 RIDEM issued an Edge Verification (No.15-0239) on January 28, 2016.

16 **Q. HAVE YOU REVIEWED RIDEM’S ADVISORY OPINION?**
17

18 **A.** Yes.
19

20 **Q. DO YOU HAVE ANY COMMENTS REGARDING RIDEM’S ANALYSIS OF**
21 **CREC’S IMPACT ON THE WETLANDS AND MITIGATION PLANS? PLEASE**
22 **EXPLAIN.**
23

24 **A.** RIDEM’s opinion on impacts to wetlands is mostly consistent with the information
25 provided in the Application – Addendum – Wetlands,” dated August 29, 2016, filed with the EFSB
26 on August 30, 2016. The Project design and incorporates measures which avoid and minimize
27 impacts to wetland and water resources. The details are described in the Freshwater Wetlands
28 Permit application, filed with RIDEM.

29 If compensatory mitigation is required and deemed appropriate by the U.S. Army Corps of
30 Engineers (“USACE”)-New England District Regulatory Division, it will be completed pursuant
31 to the New England District Compensatory Mitigation Guidance (09/07/16). Mitigation could

1 include wetland/habitat enhancement, restoration and/or preservation. Invenenergy is willing to
2 investigate and propose mitigation in direct coordination with regulatory agencies, which is
3 consistent with conservation priorities and plans to offset impacts to jurisdictional wetlands as well
4 as non-jurisdictional upland forest. It is my understanding that Invenenergy is also investigating the
5 potential for purchasing properties for conservation enhancement. I understand that John Niland
6 can answer questions on the status of this effort.

7 **III. HABITAT ANALYSIS**

8 **Q. PLEASE EXPLAIN YOUR METHODOLOGY.**

9 **A.** Initially, the utilization of available scientific literature and mapping data, coupled with the
10 incidental observations, was used to identify the assemblage of species and habitats potentially
11 present on-site. Further details of the methodology are described in the Application, at Section 6.

12 In response to comments from RIDEM in its Advisory Opinion, a further inventory of the
13 flora and fauna in the study area is being conducted for the purpose of gathering site-specific data
14 on the faunal and floral communities present at the Project site to supplement the scientific
15 literature, GIS data review, and incidental observations which were included in the Clear River
16 Energy Center –Application – Addendum – Wetlands, dated August 29, 2016, filed with the EFSB
17 on August 30, 2016 and the Application to Alter Freshwater Wetlands - Clear River Energy Center
18 and Burrillville Interconnection Project, dated April 2017, filed with the RIDEM on April 26,
19 2017.

20 Invenenergy sought input from RIDEM on numerous occasions, starting in early March 2017
21 when the site-specific flora and fauna survey protocols were provided to RIDEM. RIDEM
22 tendered a letter on June 13, 2017; however, this input was received well after the survey had been
23 underway for an extended period of time. The field programs listed below, which comprise this

1 flora and fauna inventory, have been designed to inform an evaluation of the species richness,
2 abundance, and diversity of the study area, and, when possible, document evidence of breeding
3 activity at the site. The following survey programs are being conducted:

- 4 • Winter track survey
- 5 • Remote field camera deployment
- 6 • Avian point counts
- 7 • Anuran call count surveys
- 8 • Owl broadcast surveys
- 9 • Small mammal trapping
- 10 • Pit fall trapping
- 11 • Cover board monitoring
- 12 • Amphibian and reptile time-constrained searches
- 13 • Diurnal insect survey
- 14 • Moth survey
- 15 • Benthic macroinvertebrate sampling
- 16 • Plant survey

17 **Q. DID YOU MAKE ANY FINDINGS REGARDING CREC'S ENVIRONMENTAL**
18 **IMPACT ON HABITAT? IF SO, PLEASE DESCRIBE.**

19
20 **A.** The majority of ecological impacts from the Facility will occur in upland areas outside the
21 scope the wetlands permit, and outside of the jurisdiction of RIDEM's Office of Water Resources,
22 US Army Corps of Engineers, and the US Environmental Protection Agency.

23 Clearing and construction associated with the Facility Site will result in the loss of habitat
24 currently used by a variety of bird, mammal, reptile, and amphibian species. The proposed CREC
25 site is located on private property within a semi-contiguous forest patch greater than 500 acres (as

1 designated in the 2015 Rhode Island WAP). Despite the fact that most of these impacts are outside
2 of the RIDEM's wetlands jurisdiction, Invenenergy has designed this Project so as to minimize
3 impacts to habitat and wildlife as much as reasonably possible, to provide for greatest possible
4 amount of protection of existing habitat.

5 Specifically, the design proposes improvements of the existing woods road to serve as the
6 Facility roadway to avoid wetland and habitat impacts that would otherwise occur due to the
7 development of an entirely new road crossing through wetlands. The design includes retaining
8 walls that will considerably reduce its overall width and impacts by reducing the total width of the
9 roadway infrastructure. In addition, the design proposes six natural bottom, box-type culverts to
10 allow unimpeded flow of water, aquatic habitat connectivity, and access for wildlife movement
11 under the proposed roadway. Each culvert will have a minimum height of approximately four feet
12 and a minimum width of nine feet. The culvert conveying the tributary to Iron Mine Brook, as well
13 as Wildlife Crossing #5 (closest to the CREC Facility) will have a minimum height of
14 approximately six feet and a minimum width of 12 feet. The provisions for a natural bottom culvert
15 will accommodate a naturalized stream channel within the culvert while the retaining walls along
16 the length of the roadway will effectively guide wildlife to the proposed natural bottom, three-
17 sided box. Each culvert crossing will include two grate openings to promote light within the
18 interior of the culvert. For large wildlife (i.e. white-tailed deer) that may be discouraged from
19 utilizing the culvert crossings, an at-grade ramp is proposed along the midpoint of the roadway.

20 During construction, several measures will be implemented to minimize impacts to the
21 environment. These include the use of the existing woods road, installation of soil erosion and
22 sediment controls, supervision and inspection of construction activities within resource areas by
23 an environmental monitor and minimization of impacted areas. The environmental monitor will

1 oversee construction activities including the installation and maintenance of soil erosion and
2 sediment controls, on a routine basis to ensure compliance with all federal, state, and local permit
3 commitments. Time of year restrictions to avoid tree clearing during the June-July timeframe is
4 proposed. As noted, flora and fauna surveys are on-going and are expected to extend through the
5 end of June 2017, with the findings being memorialized in a technical report in July 2017. These
6 findings will be made available to RIDEM. Invenergy reaffirms its willingness to work with
7 RIDEM to revisit the proposed time of year restrictions to minimize site impacts following the
8 completion of on-going surveys.

9 Following the completion of construction, restoration efforts, including final grading and
10 installation of permanent soil erosion control devices, and restoration of temporarily impacted
11 areas, will be completed.

12 A Compensatory Wetland Mitigation Plan following the New England District
13 Compensatory Mitigation Guidance in cooperation with resource agencies will be developed.
14 Based on an inventory of parcels of conservation interest developed by RIDEM and provided to
15 the IRP proponents as well as a GIS overlay of elements in the Rhode Island Conservation
16 Opportunities and local Assessors Maps, Invenergy has generated a confidential comprehensive
17 list of parcels potentially suitable for preservation. Invenergy is currently investigating the
18 willingness of current land owners to sell their property. Once completed, Invenergy intends to
19 work with RIDEM and the USACE to determine which parcel(s) appear best suited to offset
20 Project related wetland impacts. It is anticipated the Compensatory Wetland Mitigation Plan will
21 include a description of Project impacts, objectives, mitigation site selection procedures, site
22 protection information, and monitoring standards in addition to all required graphics and
23 information. It is anticipated that the final mitigation package will primarily consist of land

1 preservation and possibly some restoration should a viable project be identified. Invenergy is
2 working to supply the mitigation package prior to RIDEM's supplemental advisory opinion
3 deadline, which is expected to be in the month of July.

4 **Q. WOULD THE PROPOSED DISTURBANCE RESULT IN THE GROWTH OF**
5 **INVASIVE SPECIES ON SITE?**

6
7 **A.** As noted in Invenergy's Responses to RIDEM's 4th Set of Data Requests, the Application
8 and Wetlands Addendum and the Application to Alter Freshwater Wetlands - Clear River Energy
9 Center and Burrillville Interconnection Project (Section 3.1.7.5), edge effects may contribute to a
10 decrease in species dependent on core and/or undisturbed habitat or the spread of invasive species.
11 Viewed as harmful to native plant and animal species population and composition, habitat
12 fragmentation increases the amount of edge relative to the amount of interior habitat. A potential
13 indirect effect is the introduction of non-native invasive plant species along the perimeter of
14 disturbed land. Accordingly, Invenergy will work with RIDEM and has proposed a multi-year
15 monitoring and management plan for both wetland and upland restoration activities to address
16 invasive species encroachment in a timely manner. A detailed plan to maintain a low occurrence
17 of non-native, invasive species (as defined in the New England District Compensatory Mitigation
18 Guidance) will include typical upland and wetland invasive species monitoring and identification
19 methods, species specific management techniques which typically includes biocontrol, manual
20 removal and systemic herbicide control.

21 The federal government and the State of Rhode Island maintain information regarding
22 invasive wetland plants. For example, RIDEM maintains lists of invasive wetland species.
23 Similarly, the NRCS also maintains a list of noxious plants, by state. Based on a review of these
24 lists and the characteristics of the existing CREC Facility Site (as determined by field
25 investigations), the most abundant invasive species located in wetlands include multiflora rose,

1 reed canary grass, purple loosestrife, common reed, Japanese barberry, and tartarian honeysuckle.
2 Where there is an ample seed stock or a system of rhizomes of these invasive species, communities
3 of these plants will tend to be the first “pioneer” species to populate and colonize areas that have
4 been disturbed and left exposed.

5 During the implementation of the Project, Invenergy will adopt the previously approved
6 (by RIDEM) Wetland Invasive Species Control Plan (“WISCP”) to minimize the potential for the
7 spread of invasive species along the ROWs as a result of construction activities (see Appendix P
8 of Application to Alter). The proposed WISCP will identify the wetlands within the Facility Site
9 that presently contain invasive species, and assign a comparative value to each wetland (“high,”
10 “moderate”, and “low”) based on wetland functions and quality. The overall goal of the WISCP
11 will be to preserve the value of wetlands along the ROWs and in the vicinity of the Facility Site
12 that are not presently dominated with invasive plant species, and to minimize the spread of invasive
13 plant species. The WISCP will include measures that the Applicant proposes to implement during
14 construction including to achieve this goal.

15 **Q. COULD THE PROPOSED PROJECT RESULT IN INCREASE NEST**
16 **PREDATION?**

17
18 **A.** As noted in the Wetlands Addendum and the Application to Alter Freshwater Wetlands -
19 Clear River Energy Center and Burrillville Interconnection Project, opportunistic predators may
20 increase as clearing and construction results in the loss of forest habitat currently on-site.

21 **Q. WOULD THE PROPOSED PROJECT’S LIGHTING IMPACT WILDLIFE?**
22

23 **A.** Not based on the proposed lighting plan. It is known that living organisms depend on daily,
24 monthly, and seasonal patterns of light and dark. Predictable light, such as solar and lunar patterns,

1 dictate circadian, circannual, and circalunar rhythms of nearly all living organisms (NPS 2016¹).
2 When anthropogenic night lighting is introduced, natural rhythms may be disrupted. Approaches
3 implemented to mitigate artificial night lighting vary depending on location and include: avoid use
4 of lighting and keeping lighting at a minimum. The proposed Project lighting design will control
5 the lighting color spectrum to include narrow spectrum lights while avoiding ultraviolet lights and
6 blue and shorter wavelength lights. The proposed lighting design would limit light intensity to
7 achieve the desired function and manage the direction of light by light shielding, projecting light
8 on only intended surfaces and preventing light from emanating above the horizontal plane. In
9 addition, when possible the proposed design would limit the duration of light output, only lighting
10 areas where activity is taking place and include timers and sensors.

11 Other expert witnesses are speaking to noise and light impacts

12 **Q. WOULD THE PROPOSED PROJECT IMPACTS STOP AT THE PROPOSED**
13 **LIMIT OF CLEARING?**

14
15 **A.** No. To obtain a clear understanding of the RI WAP and its associated data layers, a data
16 inquiry was sent to RIDEM seeking clarification regarding the GIS-based Conservation
17 Opportunities Tool. Specifically, two questions were posed as follows:

- 18 1. Are all unfragmented forest blocks offset from developed areas by 30 meters?
19 2. Are utility ROWs, regardless of size, not considered developed areas and therefore
20 do not interrupt unfragmented forest blocks?

21 The following written responses were provided to each of the questions on July 16, 2016:

¹ NPS. 2016. Artificial Night Lighting and Protected Lands - Ecological Effects and Management Approaches. Natural Resources Report, Fort Collins: U.S. Department of the Interior.

1 1. F&W biologists had a strong opinion about the impacts of development spreading
2 beyond the actual building foot print or backyard. So Invenergy did buffer development by
3 30 meters and used that as a mask.

4 2. Utility ROWs are not considered developed nor forest since the vegetation is
5 managed regularly. Where they are mapped as brush or ROW they break up the forest.

6 Based on RIDEM's response to question 1 above, it is our understanding that the 30 meter
7 or approximately 100-foot buffer is not limited to roads and accurately represents how the RI WAP
8 project team assessed indirect impacts from roads as well as other land uses. Using these publicly
9 available GIS data layers, an unfragmented forest impact analysis was conducted for the proposed
10 Facility Site, as well as an additional indirect impact extending 100 feet further beyond the
11 anticipated limits of disturbance within jurisdictional wetlands. Unfragmented forest blocks of 500
12 acres or more from the RIGIS data layer (available from RIDEM) was used for this analysis. The
13 results of the analysis indicate that the limit of disturbance associated with only the CREC Facility
14 and roadway (approximately 35 acres), is located within an unfragmented forest block of 500 acres
15 or greater. Of these 35 acres only approximately 2.4 acres of disturbance is within State
16 jurisdictional wetlands (biological, perimeter, and riverbank). An additional 14 acres of
17 unfragmented forest (within State jurisdictional freshwater wetlands) within 100 feet of the limit
18 of disturbance may be impacted indirectly due to the removal of tree canopy within the limits of
19 disturbance.

20 While the WAP assesses indirect impacts 100 feet from the nearest disturbance, existing
21 scientific literature suggests indirect impacts may extend beyond 100 feet. Specifically,
22 Rosenberg, *et al.* (1999²), suggest the effects of an edge can extend from 150 to 300 feet (45 to 90

² Rosenberg, K.V., Lowe, J.D., Dhondt, A.A., 1999. Effects of forest fragmentation on breeding tanagers: a continental perspective. *Conservation Biology* 13, 568-583.

1 m) into the forest interior from the nearest disturbance that would cause a break in the forest
2 canopy. Consequently, we also conducted a forest interior impact analysis assuming indirect
3 impacts extending 300 feet beyond the anticipated limit of work. The results of this more
4 conservative analysis indicate that, beyond the approximately 2.4 acres of direct unfragmented
5 forest jurisdictional wetland habitat by the CREC's limit of disturbance, an additional 68 acres of
6 unfragmented forest (within State jurisdictional freshwater wetlands) may be impacted indirectly
7 due to the removal of tree canopy within the limits of disturbance.

8 **IV. FRAGMENTATION ANALYSIS**

9 **Q. DID YOU ANALYZE WHETHER THE CREC PROJECT WOULD RESULT IN**
10 **FRAGMENTATION OF HABITAT AND/OR ECOLOGICAL CONNECTIVITY?**

11
12 **A.** Yes

13 **Q. PLEASE EXPLAIN YOUR METHODOLOGY.**

14 **A.** The 2015 WAP's goal is to provide direction of wildlife conservation efforts for the next
15 decade. The WAP clearly states that, while its focus is on Rhode Island, it must also be seen within
16 a regional and even a global context. The WAP includes corridors identified in the Statewide
17 Planning (RhodeMap) process which connect the core natural areas in addition to river corridors
18 and other pathways identified by The Nature Conservancy regional connectivity analysis.

19 **Q. DID YOU MAKE ANY FINDINGS REGARDING CREC'S ENVIRONMENTAL**
20 **IMPACT ON HABITAT FRAGMENTATION BASED ON THE WAP? IF SO,**
21 **PLEASE DESCRIBE.**

22
23 **A.** Yes, clearing and construction associated with the Facility Site will result in the loss of
24 habitat currently used by a variety of bird, mammal, reptile, and amphibian species. The proposed
25 CREC site is located on private property within a semi-contiguous forest patch greater than 500
26 acres (as designated in the 2015 WAP). However, a broader review and analysis of the
27 unfragmented forest blocks of 500 acres or more in Burrillville, Gloucester, Foster, Scituate and

1 Coventry, shows there is approximately 15,178, 17,011, 15,280, 12,376, and 15,175 acres of this
2 habitat, respectively. The proposed CREC is situated on a privately-owned parcel in Burrillville.
3 The Project would result in the clearing of approximately 35 acres of existing forested habitat.
4 This proposed impact to unfragmented forest represents 0.23% and 0.045% of the total
5 unfragmented forest location in Burrillville and the Western Forest (Burrillville, Gloucester,
6 Foster, Scituate and Coventry), respectively. It is assumed that the proposed 0.8 mile of ROW
7 would not represent a break in the WAP Unfragmented Forest Block because existing utility
8 corridors are not excluded from existing areas of mapped Unfragmented Forest.

9 **Q. ARE THERE OTHER METHODS TO ASSESS REGIONAL CONNECTIVITY? IF**
10 **SO, PLEASE DESCRIBE.**

11
12 **A.** Yes. Circuitscape, which was developed by the Nature Conservancy, is a program based
13 on an electric circuit theory that models wildlife population movements as if they were an electric
14 current flowing through a landscape of variable resistance. This regional program was developed
15 for Eastern North America, which includes three Canadian Provinces (NS, NB, and PEI), a portion
16 of Quebec, twenty-two states in their entirety (ME, NH, VT, MA, RI, CT, NY, PA, NJ, DE, MD,
17 WV, VA, KY, TN, NC, SC, GA, FL, AL, TN, MS), as well as portions of Ohio, Indiana, Illinois
18 and Louisiana. Conceptually, circuit modeling promotes the idea of regional landscape
19 permeability as it recognizes movement through a landscape is affected by a variety of
20 impediments. An output of the program is a “flow” map which highlights estimated concentration
21 areas on a regional scale that is relative to the setting and ecoregion. The program was developed
22 as a tool land managers and conservationists could use to prioritize strategic land conservation as
23 species adjust and move due to climate change and the capacity of a site to adapt specifically to
24 climate change.

1 **Q. DID YOU MAKE ANY FINDINGS REGARDING CREC'S IMPACT ON**
2 **REGIONAL CONNECTIVITY BASED ON THE CIRCUITSCAPE PROGRAM? IF**
3 **SO, PLEASE DESCRIBE.**
4

5 **A.** I did. The Project footprint was uploaded into The Nature Conservancy Resilient Land
6 Mapping Tool. Per the Resilient Land Mapping Tool, the current Project footprint is situated in an
7 area of Average-Resilience (**Exhibit JR-1**, Figure 1), Slightly Below Average-Landscape
8 Diversity (**Exhibit JR-1**, Figure 2), and Slightly Above Average-Local Connectedness (**Exhibit**
9 **JR-1**, Figure 3) and two geophysical settings (**Exhibit JR-1**, Figure 4).

10 **Q. HOW DO THE RESULTS OF YOUR CIRCUITSCAPE ASSESSMENT COMPARE**
11 **TO WAP? PLEASE DESCRIBE.**
12

13 **A.** **Exhibit JR-1**, Figure 5, represents unfragmented Forest Blocks (500 acres or more) from
14 the RIDEM WAP and Protected Conservation Land data from The Nature Conservancy Eastern
15 Division Conservation Science. The TNC Mapping Tool may provide land managers and
16 conservationists a way to generally prioritize strategic land conservation at a regional level for
17 species to adapt to climate change. When compared with other data to get a fuller picture of
18 ecological status of the Project area, it appears that portions of Borderlands Landscape
19 immediately adjacent to the Project have sustained anthropogenic impacts disrupting connectivity.
20 Specifically, when the TNC Mapping Tool data layers depicting connectivity are overlaid with
21 RIDEM Conservation Opportunities; Unfragmented Forest Blocks (500 acres or more) and
22 Corridor data layers, differences are noted. The first noted difference is identified west of the
23 proposed property. This approximate 2,000 acres found west of the proposed CREC site are
24 classified as Unfragmented Forest Blocks (500 acres or more) and Unfragmented Forest Blocks
25 (250 acres to 500 acres). Based on the WAP classification, there is no difference between the
26 classification of this area, the proposed Project site, George Washington Management Areas to the
27 to south or the Unfragmented Forest Blocks (500 acres or more) found north of the proposed

1 Project area. However, the TNC Mapping Tool excludes this area as an area of high concentrated
2 flow. The second noted difference is found generally between Buck Hill Road (north), Wallum
3 Lake Road (east) and the National Grid Utility Corridor (south). This approximately 880 acres of
4 existing anthropogenic disturbance is located between two areas the WAP has identified as
5 Unfragmented Forest Blocks (500 acres or more). When the 880 acre area of disturbance is
6 compared to those areas identified as having high Concentrated Connectivity Flow in the TNC
7 regional Mapping Tool, an apparent break in flow already exists, with a pinch point being where
8 Buck Hill and Wallum Lake Roads intersect.

9 **Q. HAVE YOU REVIEWED RIDEM'S SEPTEMBER 12, 2016 ADVISORY OPINION**
10 **AND ITS ANALYSIS REGARDING FRAGMENTATION.**

11
12 **A.** Yes.

13
14 **Q. DO YOU HAVE AN OPINION REGARDING RIDEM'S ADVISORY OPINION?**
15 **IF YES, PLEASE EXPLAIN.**

16
17 **A.** I agree that the proposed CREC is adjacent to state holdings. However, the Project is being
18 proposed on private property where local zoning allows for the proposed use. Furthermore, as
19 previously noted, the majority of ecological impacts from the Facility will occur in upland areas
20 outside the scope the wetlands permit, and outside of the jurisdiction of RIDEM's Office of Water
21 Resources, USACE, and the US Environmental Protection Agency. As I described previously,
22 flora and fauna surveys are on-going and are expected to extend through the end of June 2017 with
23 the findings being memorialized in a technical report in July 2017. As indicated in Invenergy's
24 Response to RIDEM's 4th Set of Data Requests, No. 4-26, these findings will be made available
25 to the RIDEM. Invenergy reaffirms its willingness to work with RIDEM to revisit the proposed
26 time of year restrictions to further minimize site impacts following the completion of on-going
27 surveys.

1 **Q. HAVE YOU REVIEWED THE NATURE CONSERVANCY TESTIMONY OF MR.**
2 **SCOTT COMMINGS?**

3
4 **A.** Yes.

5 **Q. DID HIS OPINION CHANGE YOUR OPINION REGARDING YOUR**
6 **FRAGMENTATION ANALYSIS? PLEASE EXPLAIN.**

7
8 **A.** No. As discussed above, in my professional opinion, when the analysis developed by The
9 Nature Conservancy for Eastern North America is compared to the WAP analysis that focuses on
10 Rhode Island, within a regional and global context, an existing break in flow or connectivity
11 already exists near where Buck Hill and Wallum Lake Roads intersect. The Nature Conservancy
12 Resilient Land Mapping Tool and Mr. Commings testimony does not account for this existing
13 break in connectivity near the Project site.

14 Furthermore, areas identified as Unfragmented Forest Blocks (500 acres or more) and
15 Unfragmented Forest Blocks (250 acres to 500 acres) exist north and west of the proposed Project
16 area. Therefore, the Project will not, in my opinion, create a barrier for wildlife species across the
17 landscape.

18 **V. CONCLUSIONS**

19 **Q. DO YOU HAVE AN OPINION, TO A REASONABLE DEGREE OF SCIENTIFIC**
20 **CERTAINTY, REGARDING CREC'S IMPACT ON WETLANDS?**

21
22 **A.** I do. It is my opinion that the Project, as currently designed, has taken reasonable steps to
23 avoid and minimize impacts to jurisdictional wetlands and maintain consistency with the Rules
24 and Regulations Governing the Administration and Enforcement of the Freshwater Wetlands Act.
25 Furthermore, the Project will investigate and propose mitigation to offset impacts to jurisdictional
26 wetlands consistent with the New England District Compensatory Mitigation Guidance.

27
28 **Q. DO YOU HAVE AN OPINION, TO A REASONABLE DEGREE OF SCIENTIFIC**
29 **CERTAINTY, REGARDING CREC'S IMPACT ON HABITAT?**

1
2 **A.** I do. Clearing and construction associated with the Facility Site will result in the loss of
3 habitat currently used by a variety of bird, mammal, reptile, and amphibian species. As previously
4 noted the proposed CREC site is located on private property within a semi-contiguous forest patch
5 greater than 500 acres (as designated in the 2015 Rhode Island WAP). However, Invenenergy has
6 designed this Project to minimize impacts to habitat and wildlife as much as reasonably possible,
7 to provide as much protection as reasonably possible to existing habitat.

8 **Q. DO YOU HAVE AN OPINION, TO A REASONABLE DEGREE OF SCIENTIFIC**
9 **CERTAINTY, REGARDING CREC'S IMPACT ON HABITAT**
10 **FRAGMENTATION AND REGIONAL CONNECTIVITY?**
11

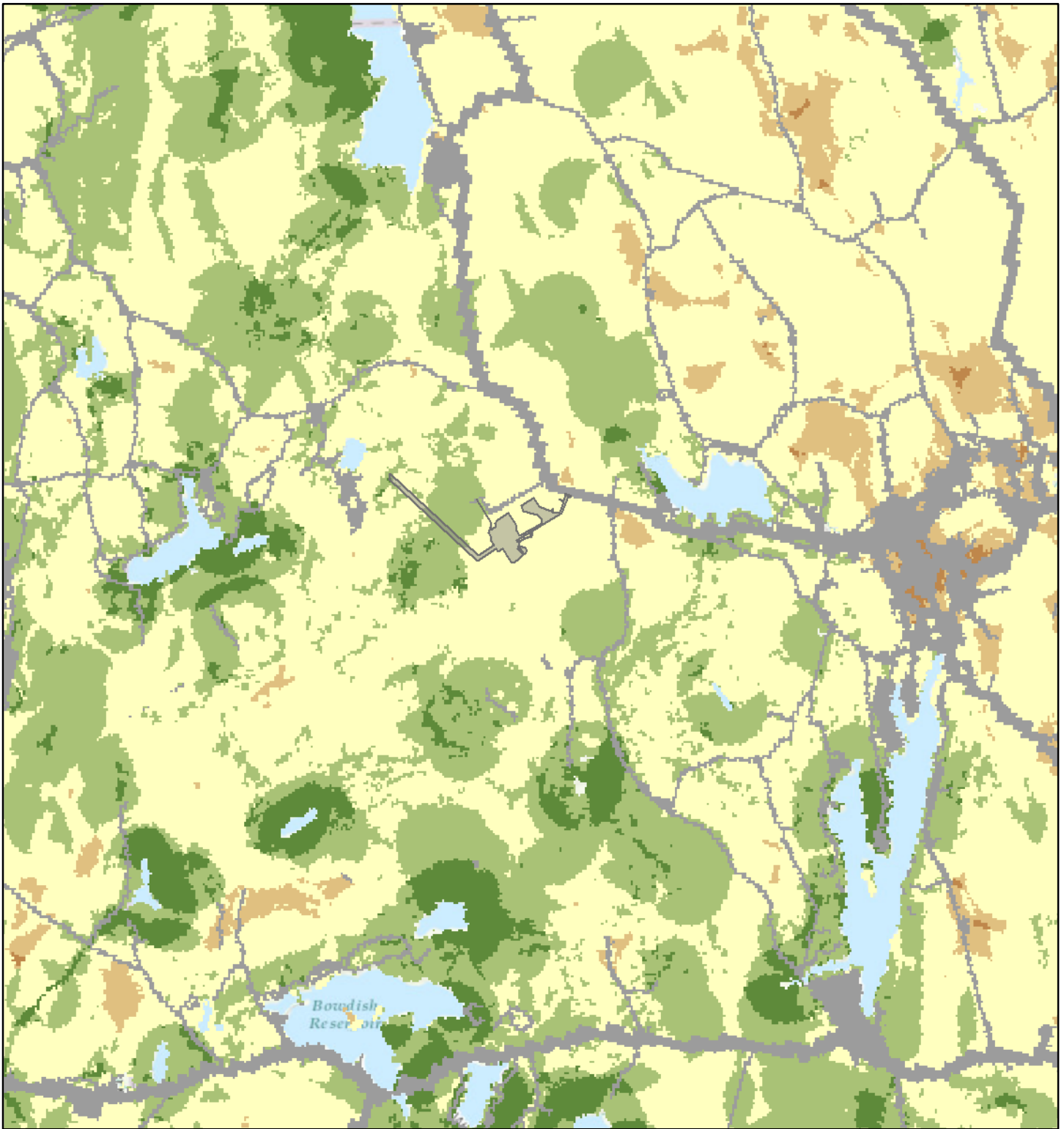
12 **A.** I do. As previously noted, the proposed CREC site is located on private property within a
13 semi-contiguous forest patch greater than 500 acres (as designated in the 2015 Rhode Island
14 WAP). However, a broader review and analysis of the unfragmented forest blocks of 500 acres or
15 more in Burrillville, Gloucester, Foster, Scituate and Coventry, shows there is approximately
16 15,178, 17,011, 15,280, 12,376, and 15,175 acres of this habitat, respectively. The proposed CREC
17 is situated on a privately-owned parcel in Burrillville which would result in the clearing of
18 approximately 35 acres of existing forested habitat. This proposed impact to unfragmented forest
19 represents 0.23% and 0.045% of the total unfragmented forest location in Burrillville and the
20 Western Forest (Burrillville, Gloucester, Foster, Scituate and Coventry), respectively. In addition,
21 existing breaks in flow or connectivity already exists near where Buck Hill and Wallum Lake
22 Roads intersect and Unfragmented Forest Blocks (500 acres or more) and Unfragmented Forest
23 Blocks (250 acres to 500 acres) exist north and west of the proposed project area; therefore, the
24 project would not create a barrier for wildlife species across the landscape.

25 **Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?**

26
27 **A.** Yes.

EXHIBIT JR-1

Figure 1 - Resilience

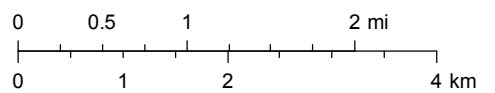


December 7, 2016

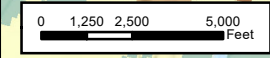
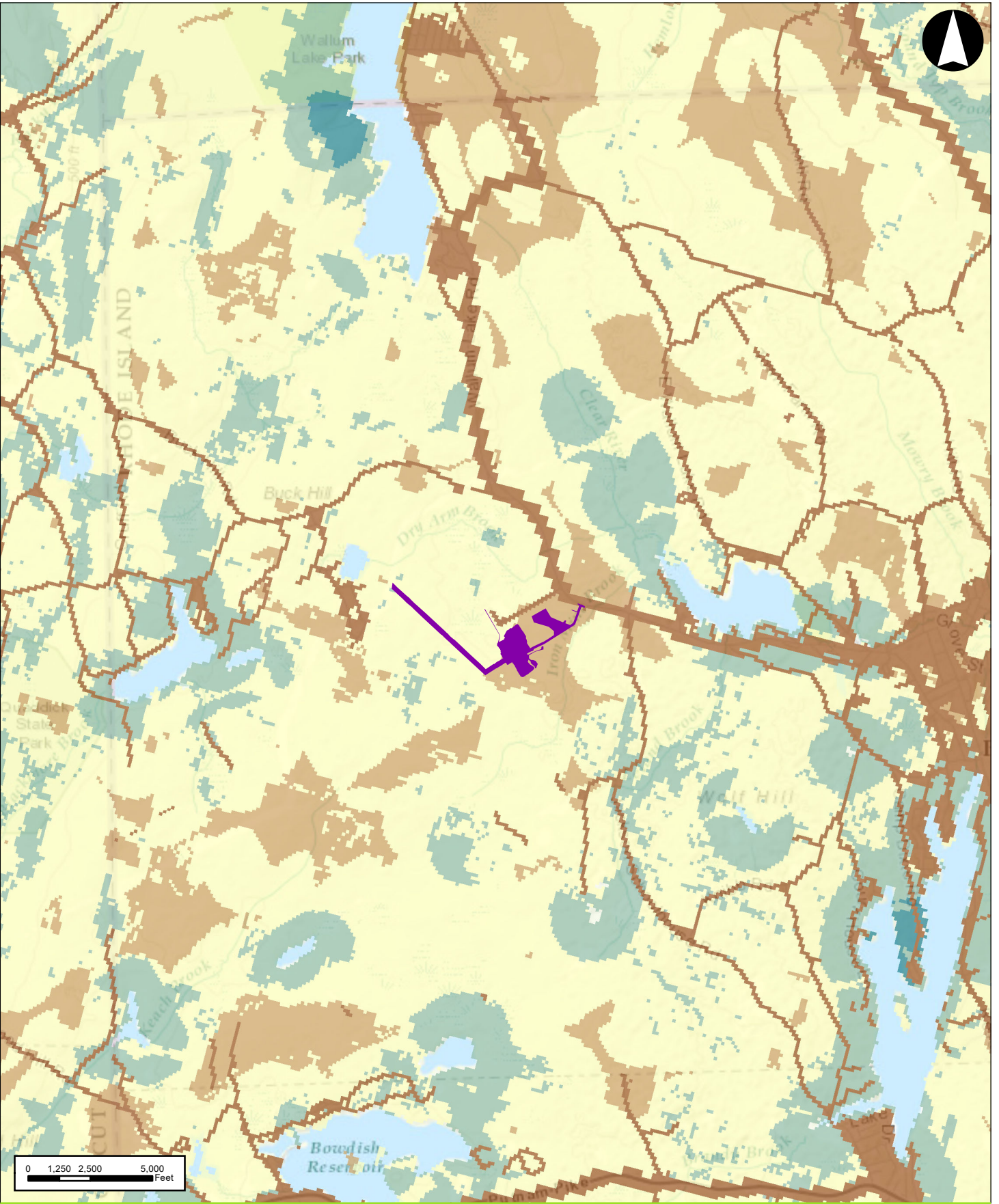
1:72,224

Resilience (Stratified by Setting and Ecoregion with Regional Override)

- Far Above Average (>2 SD)
- Above Average (1 SD to 2 SD)
- Slightly Above Average (0.5 to 1 SD)
- Average (-0.5 to 0.5 SD)
- Slightly Below Average (-0.5 to -1 SD)
- Below Average (-1 to -2 SD)
- Far Below Average (<-2 SD)
- Developed









Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
The Nature Conservancy



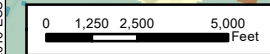
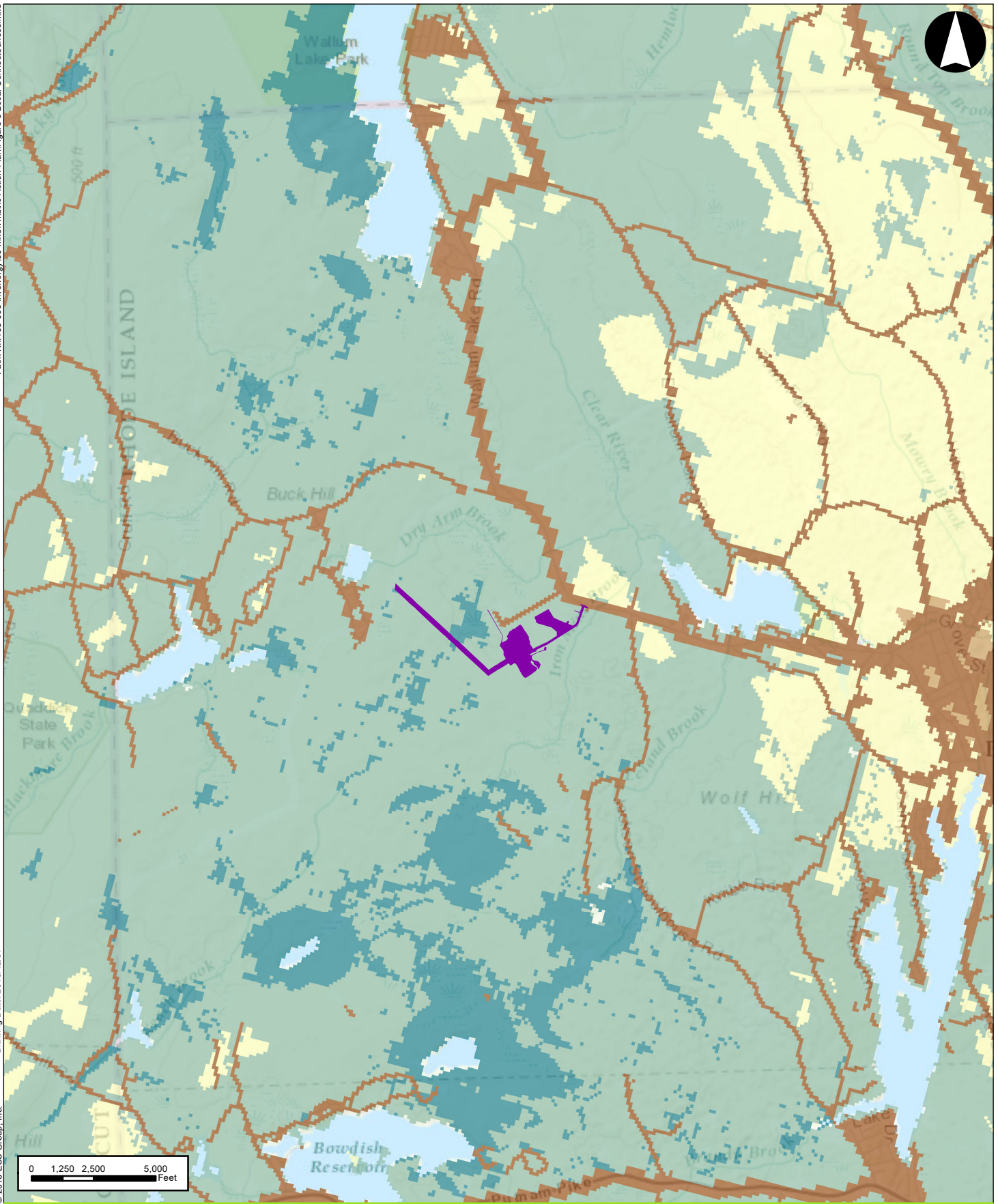
Inverney
 Burrillville, Rhode Island
 1 inch = 5,280 feet
 Source: 1) Nature Conservancy, 2016

Legend

	Project Area		Developed
	Below Average		Average
	Above Average		Far Above Average

Landscape Diversity

Figure 2



Invenergy
 Burrillville, Rhode Island
 1 inch = 5,280 feet
 Source: 1) Nature Conservancy, 2016

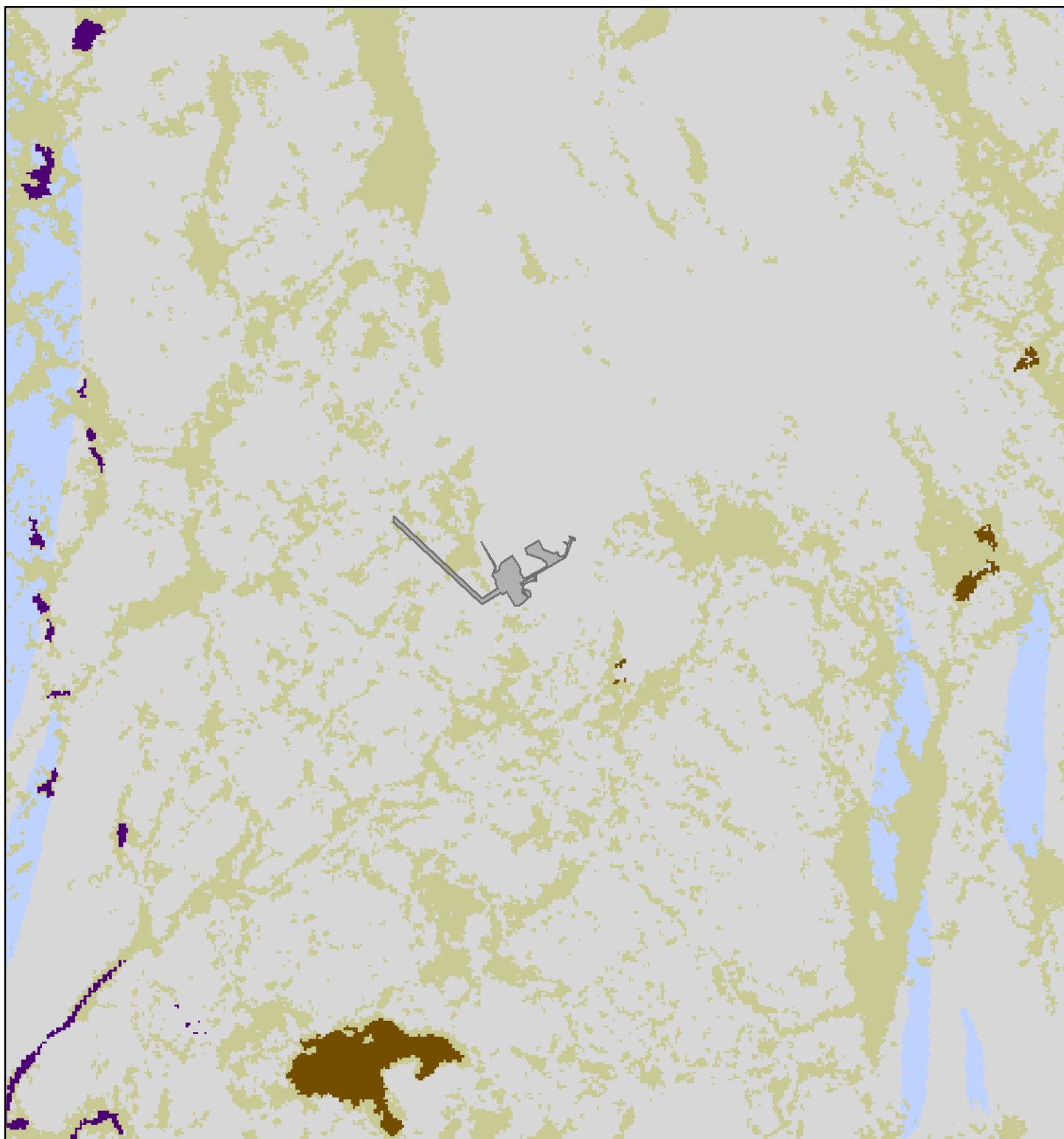
Legend

- Project Area
- Developed
- Below Average
- Average
- Slightly Above Average
- Above Average

Local Connectedness

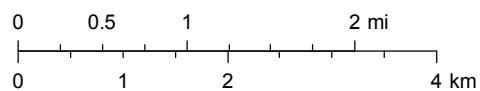
Figure 3

Figure 4 - Geophysical Setting








December 7, 2016

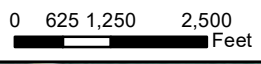
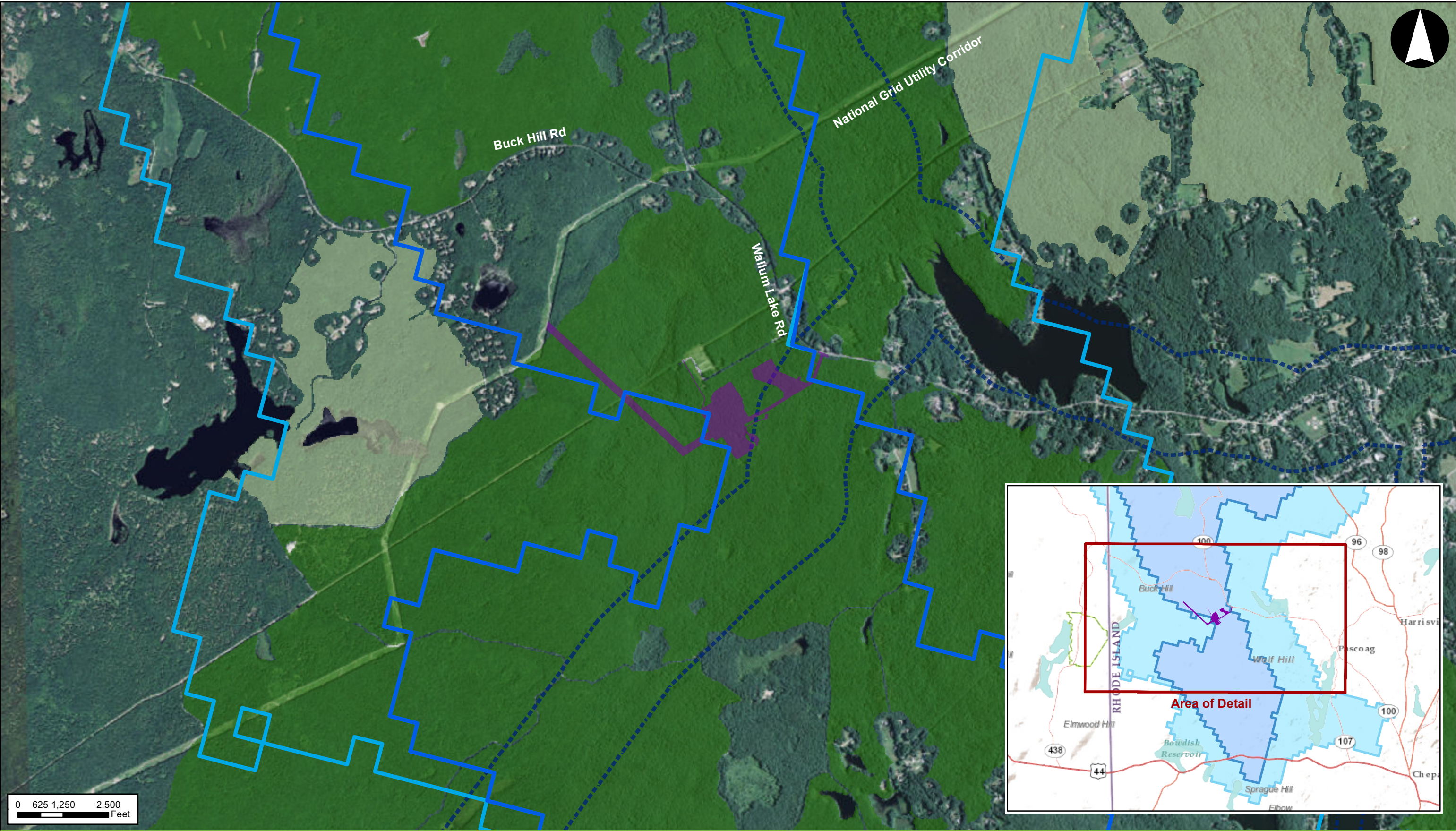
1:72,224



Geophysical Setting

-  Very Low: Acidic granitic
-  Very Low: Loam
-  Very Low: Sand
-  Very Low: Silt/Clay
-  Very Low: Mafic

Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
The Nature Conservancy



Invenery

Burrillville, Rhode Island

1 inch = 2,500 feet

Source: 1) USDA FSA 2014 NAIP imagery
 2) RIDEM Concentrated Flows, WAP Corridor, Unfragmented Forest Blocks, 2016

Legend

- High Concentrated Flow
- Moderate Concentrated Flow
- Revised Project Area
- RI WAP Corridor
- Unfragmented Forest Blocks (250 < 500 Acres)
- Unfragmented Forest Blocks (>= 500 Acres)

Wildlife Action Plan and Regional Flows

Figure 5