

STATE OF VERMONT  
PUBLIC SERVICE BOARD

Petition of Vermont Gas Systems, Inc., requesting	)	Public Service Board
a Certificate of Public Good pursuant to 30 V.S.A.	)	Docket No. 8180
§ 248, authorizing the construction of the	)	
"Addison Rutland Natural Gas Project Phase 2	)	
(ARNGP Phase 2)" to extend natural gas	)	
transmission facilities in Franklin and Addison	)	
Counties, for service to the Ticonderoga mill in	)	
New York, and construction of two Community	)	
Gate Stations for distribution service in the towns	)	
of Cornwall and Shoreham, Vermont	)	

PREFILED TESTIMONY OF ERIC SORENSON

On Behalf of the Vermont Agency of Natural Resources,  
Fish and Wildlife Department

Summary of Testimony

Mr. Sorenson is the Community Ecologist with the Vermont Fish and Wildlife Department (VFWD) of the Vermont Agency of Natural Resources (ANR). The purpose of his testimony is to provide the Department's review of the potential effects of the Vermont Gas Systems, Inc. (VTGas) project on significant natural communities.

1 **Q1. Please state your name, place of employment, your current position, and any other**  
2 **position you have held with the Department.**

3  
4 A1. My name is Eric Sorenson. I am the Community Ecologist with the Vermont Fish and  
5 Wildlife Department (VFWD) of the Vermont Agency of Natural Resources (VANR). I  
6 have been in this position since 1996.

7  
8 **Q2. Please describe your educational background and any relevant experience.**

9  
10 A2. I have a B.S. degree from the University of Michigan in Natural Resources and Wildlife  
11 Ecology. I have an M.S. degree from the University of Maine in Botany and Plant  
12 Ecology. Prior to my current position I worked from 1989 until 1996 as a wetland  
13 ecologist with Vermont Department of Environmental Conservation implementing the  
14 Vermont Wetland Rules. I also worked as a wetland consultant in Massachusetts for two  
15 years and as an ecologist in Maine for one year. I have included a copy of my resume  
16 with my testimony (Exhibit ANR-ES-1).

17  
18 **Q3. Have you previously provided testimony to the Public Service Board?**

19  
20 A3. Yes, I provided written testimony on behalf of VFWD regarding Docket 7373, the  
21 VELCO Southern Loop project. I also provided written and oral testimony regarding

1 Docket 7508 Georgia Mountain Community Wind, LLC; Docket 7628 Kingdom  
2 Community Wind in Lowell; and Docket 7970 Vermont Gas Systems, Inc. Addison  
3 Natural Gas Project.

4  
5 **Q4. Please describe a few examples of the types of issues related to evaluating impacts to**  
6 **significant natural communities that you have participated in during your time with**  
7 **the Department.**

8  
9 A4. In my position as ecologist with the Department, I am responsible for the identification  
10 and classification of Vermont's upland and wetland natural communities. I am the co-  
11 author of a book on Vermont's natural communities. The majority of my work is to  
12 inventory, map, and evaluate significant natural communities across Vermont and to  
13 work with landowners on appropriate management and conservation. Both working with  
14 the Fish and Wildlife Department and in my previous position with the Department of  
15 Environmental Conservation, I have been responsible for evaluating the significance of  
16 wetland and upland natural communities associated with the regulatory process,  
17 including the Vermont Wetland Rules CUD, wetland reclassification, Act 250, Section  
18 248, and 401 Water Quality Certification. I have developed the Agency of Natural  
19 Resources position and testified before District Environmental Commissions, the  
20 Environmental Board, the Natural Resources Board (former Water Resources Board), in  
21 civil court settings, and have provided testimony to the Public Service Board. Typically,  
22 the goal of my work in the regulatory arena is to identify significant natural communities

1 and to work with applicants to avoid and/or minimize adverse effects on these natural  
2 areas.

3  
4 **Q5. What is the purpose of your testimony in this proceeding?**

5  
6 A5. The purpose of my testimony is to provide the Department's review of the potential  
7 effects of the Vermont Gas Systems, Inc. (VT Gas) Addison Rutland Natural Gas Project,  
8 Phase 2 project on significant natural communities. State-significant natural  
9 communities are addressed as Rare and Irreplaceable Natural Areas under Act 248  
10 Criterion 8 and relating to the overall project effect on the natural environment under 30  
11 V.S.A. § 248 (b)(5).

12  
13 In addition, the purpose of my testimony is to identify opportunities to avoid or minimize  
14 negative impacts to state-significant natural communities.

15  
16 **Q6. Describe the concept of natural communities and how they are ranked by VFWD.**

17  
18 A6. Natural communities are interacting assemblages of plants and animals, their physical  
19 environment, and the natural processes that affect the organisms and the environment.  
20 These assemblages of plants, animals, and other organisms found in natural communities  
21 repeat wherever certain environmental conditions (such as soil, hydrology, and climate)  
22 are found. Whereas a natural community refers to an actual occurrence on the ground, a

1 natural community type is a composite description summarizing the characteristics of all  
2 known examples of that type. The concept of a natural community type is very useful in  
3 classifying the complex patterns in the landscape. In Vermont we have developed a  
4 classification of more than 80 natural community types<sup>1</sup>. Each natural community type is  
5 ranked according to its relative rarity in Vermont. The following State Rarity Rank  
6 system is used by the VFWD, and is based on the known number of occurrences of a  
7 natural community type, the total area occupied by the type, and the quality or condition  
8 of most occurrences:

9 **S1:** very rare in the state, generally with fewer than five high quality occurrences;

10 **S2:** rare in the state, occurring at a small number of sites or occupying a small  
11 total area in the state;

12 **S3:** high quality examples are uncommon in the state, but not rare; the community  
13 is restricted in distribution for reasons of climate, geology, soils, or other physical  
14 factors, or many examples have been severely altered;

15 **S4:** widespread in the state, but the number of high quality examples is low or the  
16 total acreage occupied by the community type is relatively small;

17 **S5:** common and widespread in the state, with high quality examples more  
18 common.

19 The Agency considers S1 and S2 natural community types to be rare in Vermont. The  
20 Agency considers those natural community occurrences that meet a combination of

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<sup>1</sup> Wetland, Woodland, Wildland: A Guide to the Natural Communities of Vermont. E.H. Thompson and E.R. Sorenson. 2000 and 2005. Published by The Nature Conservancy and Vermont Department of Fish and Wildlife, distributed by University Press of New England.

1 Rarity Rank (for the type) and quality (Element Occurrence Rank) to be state-significant  
2 natural communities. Almost all examples of rare natural community types are  
3 considered state-significant, whereas only the very best examples of common (S5)  
4 community types are considered state-significant. For uncommon (S3) and widespread  
5 (S4) types, those examples that are excellent to good are considered state-significant.  
6 Examples of state-significant natural communities are tracked by the VFWD in the  
7 database maintained by the Natural Heritage Inventory. This database currently includes  
8 information on approximately 2,100 examples of state-significant natural communities in  
9 Vermont.

10  
11 Q7. Are there state significant natural communities associated with the VT Gas Phase 2  
12 project alignment and do you and the Vermont Fish and Wildlife Department  
13 recommends these should be considered rare and irreplaceable natural areas?  
14

15 A7. Yes. The following natural communities along the project alignment are considered state  
16 significant using VFWD ranking specifications. I have also indicated which of these  
17 state significant natural communities and wetland complexes I and VFWD recommend  
18 be considered Rare and Irreplaceable Natural Areas (RINA) by the Public Service Board.  
19 I will explain the basis for my recommendation for each natural community and wetland  
20 complex later in my testimony.

- 21 • Mesic Maple-Ash-Hickory-Oak Forest on Chipman Hill in Middlebury is state-  
22 significant but is not recommended as a RINA.

- 1           • Mesic Maple-Ash-Hickory-Oak Forest on unnamed hill between Washington  
2           Street Extension and Seminary Street in Middlebury is not a state-significant  
3           example of this community and is not recommended as a RINA.
- 4           • Farmingdale Swamp in Middlebury includes state-significant examples of rare  
5           Wet Clayplain Forest and uncommon Red or Silver Maple-Green Ash Swamp. It  
6           is recommended that Farmingdale Swamp be considered a RINA.
- 7           • Cornwall Swamp in Cornwall and Middlebury includes many state significant  
8           wetland natural communities and many rare species and it is recommended that it  
9           be considered a RINA.
- 10          • Young Silver Maple-Sensitive Fern Riverine Floodplain Forest along the Lemon  
11          Fair River in Shoreham may be a state-significant example but is not  
12          recommended as a RINA.
- 13          • Dry Oak-Hickory-Hophornbeam Forest on Mutton Hill in Shoreham is likely  
14          state-significant but is not recommended as a RINA.
- 15          • Shoreham Swamp in Shoreham includes state significant examples of Red or  
16          Silver Maple-Green Ash Swamp, Red Maple-Black Ash Seepage Swamp, and  
17          Red Maple-Northern White Cedar Swamp. It is recommended that this wetland  
18          complex be considered a RINA.

19          The determination that a particular example of a natural community is state-significant is  
20          made by the Department of Fish and Wildlife Department based on established  
21          Department guidelines. A RINA, is a creation of Act 250 and is a determination made

1 by the regulator, the District Commission, or the Public Service Board, under 10 V.S.A.  
2 § 6086(a)(8).

3  
4 Natural communities have been the most common feature identified as rare and  
5 irreplaceable natural areas in Section 248 and Act 250 proceedings. Other features that  
6 could be considered rare and irreplaceable natural areas include rare geologic features,  
7 rare aquatic habitats, and rare physical landscapes. The Vermont Fish and Wildlife  
8 Department considers the following factors when making recommendations to the Public  
9 Service Board based on the following factors:

- 10 • Whether the feature is shown to be natural; where natural conditions predominate  
11 over human influences,
- 12 • Whether the feature is rare in the state or landscape (for natural communities or  
13 associations of natural communities this means a rare natural community type or  
14 an exceptional example of a more common natural community type), and
- 15 • Whether the feature is irreplaceable in the foreseeable future.

16  
17 **Q8. Have you reviewed the Petitioner's prefiled testimony and exhibits?**

18  
19 A8. Yes I have. In particular I have reviewed: The "Section 248 Natural Resources Report"  
20 prepared by Vanasse Hangen Brustlin, Inc. (VHB) and dated November 15, 2013  
21 (Exhibit Petitioner JAN-2); the five appendices to this report, including the "Rare,  
22 Threatened, and Endangered Species and Significant Natural Communities" report by

1 Gilman and Briggs Environmental dated November 11, 2013; the “Natural Resources  
2 Series” maps for the project by VHB dated November 14, 2013; several other reports and  
3 maps submitted as Exhibit Petitioner JAN-3, JAN-4, and JAN-5; the Alternatives  
4 Analysis for Section 404 / Section 10 Review and maps (Exhibit Petitioner JAN-7); and  
5 the “Vegetation Management Protocol” dated November 13, 2013 (Exhibit Petitioner  
6 JAN-8). I have reviewed the prefiled testimony of Jeff Nelson and John Heintz and the  
7 engineering plans submitted as Exhibit Petitioner JH-3 and JH-4. I have also reviewed  
8 the Partial Response of Petitioner to the Agency of Natural Resources First Set of  
9 Information Requests on Petitioner dated May 19, 2014 and the corresponding revised  
10 site plans (Attachment A.ANR.VGS.1-9a-5-16-2014) and table (Attachment  
11 A.ANR.VGS.1-35).

12  
13 **Q9. Have you conducted site visits to evaluate the potential impacts of the VT Gas**  
14 **pipeline on natural communities and the environment? Are there additional**  
15 **locations that you need to visit in or to make a full assessment?**

16  
17 A9. Yes, I conducted site visits to the Phase VII Looping project in Georgia on November 14,  
18 2013 with Art Gilman, Charlie Pughe, and Jeff Nelson; and to the Addison County  
19 portion of the project in Middlebury, Cornwall, and Shoreham on October 17, 2013,  
20 November 22, 2013, and April 22, 2014 with staff from VHB, the Agency of Natural  
21 Resources, and Briggs and Gilman Environmental. My site visits focused on visiting  
22 forested portions of the project alignment where there are potential impacts to forested

1 state-significant natural communities and to the Cornwall and Shoreham Swamps where  
2 impacts are proposed by the VT Gas project.

3  
4 Many landowners have not given permission for VT Gas to visit their properties and  
5 assess natural communities, wetlands, rare species, and other features. For these locations  
6 the actual impacts of the proposed VT Gas pipeline cannot be accurately evaluated.  
7 From a natural community perspective, there are several locations at Cornwall and  
8 Shoreham Swamps where additional inventory is needed. However, all areas for which  
9 landowner permission has not been granted need to be evaluated for all natural resource  
10 concerns before final assessments can be made.

11  
12 **Q10. Are there other tools that you have used to assess the potential environmental**  
13 **impacts from the project and to identify and evaluate potentially significant natural**  
14 **communities?**

15  
16 A10. Yes, I have used and viewed data layers in ArcMAP (ESRI Geographic Information  
17 Systems software) that are generally available from the Vermont Center for Geographic  
18 Information (<http://vcgi.vermont.gov/>) or the Agency of Natural Resources. These  
19 include existing records of state-significant natural communities and rare species (VT  
20 Fish and Wildlife Department, Natural Heritage Inventory), soils maps by the Natural  
21 Resources Conservation Service, wetland maps, habitat blocks as mapped by VT Fish

1 and Wildlife Department, and aerial photographs from various dates that show land cover  
2 and land use.

3  
4 **Q11. Please provide an overview of the potential ecological effects of the proposed VT**  
5 **Gas pipeline on natural communities.**

6  
7 A11. The potential adverse ecological effects on natural communities and the environment  
8 associated with the installation and corridor maintenance of the VT Gas pipeline can be  
9 summarized into two categories or scales. At the largest scale, installation of the pipeline  
10 and maintenance of a permanently open (no forest canopy) corridor in areas that currently  
11 are forested will result in new habitat fragmentation. Habitat fragmentation (breaking  
12 contiguous habitat into smaller and smaller pieces by development) is considered one of  
13 Vermont's most significant threats to biological diversity, along with habitat loss, climate  
14 change, and invasive species. Co-locating the pipeline along existing powerline corridors  
15 or roads reduces the extent of landscape-scale habitat fragmentation but can still result in  
16 fragmentation or alteration of specific natural communities or other habitats adjacent to  
17 the powerline or road. At the natural community scale, potential impacts include  
18 alteration of wetland hydrology, permanent removal of forest canopy, and introduction of  
19 non-native, invasive plant species. Utility corridors are generally known as vectors for  
20 the spread of invasive species, as there is typically soil disturbance during construction,  
21 followed by long term vegetation management to exclude overstory trees using  
22 equipment that moves along the corridor and spreads seeds.

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Pipeline construction that results in landscape scale habitat fragmentation is considered an adverse effect on the natural environment. Pipeline construction that results in alteration of a state-significant natural community may also be considered an adverse effect on the natural environment but also may be an adverse effect on a rare and irreplaceable natural area.

**Q12. Explain how you will present your assessment of natural communities and potential impacts to these natural communities in your testimony.**

A12. For each important natural community along the VT Gas pipeline alignment I will describe the natural community and its location, provide a summary of its importance and whether it qualifies as a rare and irreplaceable natural area, describe what the proposed and potential impacts are to the natural community or the natural environment, and recommend what steps could be taken to avoid or further minimize impacts. I will begin with the Phase VII Looping project in Georgia and then the Addison portion of the project from Middlebury to Lake Champlain.

**Q13. Are there any state-significant natural communities or do you have any concerns regarding the Phase VII Looping project in Georgia?**

1 A13. I have not identified any state-significant natural communities along the Phase VII  
2 Looping project in Georgia. The project passes through Northern Hardwood Forest and  
3 Hemlock Forest and through and adjacent to several small but important wetlands. My  
4 concern along this section of the project relates to non-native invasive plant species along  
5 the southern, forested end. The Phase VII alignment follows an existing cleared corridor  
6 that is regularly mowed. Although there are practically no invasive plant species in the  
7 adjacent forest, and recent mowing meant that identification of invasive species in the  
8 open corridor was not possible, large individual shrubs of European Buckthorn (*Rhamnus*  
9 *cathartica*) occur just outside the mowed corridor in the edge of the adjacent forest. This  
10 species is a particularly significant invasive threat and these large shrubs provide  
11 abundant fruit for the continued spread of the species along the corridor. This is a good  
12 example of the need to control invasive plant species not just in the mowed open corridor,  
13 but also in the edge of the adjacent forest where additional light from the cleared corridor  
14 allows for these species to become established. It also demonstrates the need for long-  
15 term monitoring and control of invasive plant species along the corridor. These existing  
16 European buckthorns should be removed and long term monitoring and control should  
17 extend into the forest for 100 feet adjacent to the corridor. Although this may include  
18 work on private property, landowners adjacent to the VT Gas pipeline corridor may  
19 support measures to protect against degradation of their forest quality by the spread of  
20 invasive species originating along the corridor. This issue is not currently addressed in  
21 the Vegetation Management Protocol and should be.

22

1 **Q14. What is the first natural community along the Middlebury to Shoreham section of**  
2 **the project that you will address?**

3  
4 A14. There is a state-significant Mesic Maple-Ash-Hickory-Oak Forest on Chipman Hill in  
5 Middlebury (approximately from MP 0.7 to MP 1.0). Chipman Hill is rocky hill with  
6 calcium-rich bedrock. The approximately 300 acres of forest is an important forest  
7 fragment in the otherwise developed area. The Mesic Maple-Ash-Hickory-Oak Forest  
8 occupies only about 60 acres and is made up of sugar maple, shagbark hickory, red and  
9 white oaks, white ash, black cherry, and numerous herbs indicative of the rich, rocky  
10 conditions. The project has been described to me as resulting in no more than 25 feet of  
11 forest clearing along the western side of the existing utility corridor; however this is not  
12 clearly depicted on the project engineering plans and should be revised to reflect this  
13 maximum 25 feet of forest clearing. From its impact on the natural community, this  
14 clearing does not result in an undue adverse impact. Regarding its impact on bat habitat,  
15 however, I understand that Scott Darling has identified concerns regarding this additional  
16 clearing on bat habitat and Scott Darling has requested no forest clearing. Avoiding  
17 clearing of the 25 foot wide band of forest would further reduce impacts to the Mesic  
18 Maple-Ash-Hickory-Oak Forest.

19  
20 **Q15. What is the next natural community along the Middlebury to Shoreham section of**  
21 **the project that you will address?**

22

1 A15. There is a small Mesic Maple-Ash-Hickory-Oak Forest on the unnamed hill south of  
2 Washington Street Extension in Middlebury (approximately MP 1.9 to MP 2.2). This  
3 forest has a similar species composition to the forest on Chipman Hill but is dominated  
4 by sugar maple as it is managed as a sugar bush. Although important for local wildlife  
5 and as an example of this community, it is not considered state significant and is not  
6 recommended as a RINA. From a natural community perspective, this maximum 25 foot  
7 clearing of the upland forest along the existing corridor will not result in an undue  
8 adverse impact. I understand, however, that there are bat habitat issues associated with  
9 this clearing and Scott Darling has requested no additional forest clearing.

10

11 **Q16. What is the next natural community along the Middlebury to Shoreham section of**  
12 **the project that you will address?**

13

14 A16. Farmingdale Swamp is an approximately 520 acre wetland complex that includes state-  
15 significant examples of rare Wet Clayplain Forest and uncommon Red or Silver Maple-  
16 Green Ash Swamp. The wetland is closely associated with the Otter Creek floodplain  
17 and it is very wet, with some areas of sedge meadow and marsh mixed with the swamp  
18 forests. There is evidence of old river meanders through the swamp. The natural  
19 communities are in very good condition even though the swamp is bordered by  
20 agricultural lands to the north, west, and south. Farmingdale Swamp is the northern-most  
21 portion of the larger, landscape scale complex of Otter Creek swamps, including  
22 Middlebury Swamp, Cornwall Swamp, Whiting Swamp, Leicester Junction Swamp,

1 Brandon Swamp, Salisbury Swamp, and the southern-most Long Swamp in Brandon.  
2 Prior to European settlement all of these named swamps and other unnamed wetlands  
3 formed one large wetland complex of over 20,000 acres. Farmingdale Swamp with its  
4 significant natural communities and contribution to this largest wetland complex in  
5 Vermont is recommended as a RINA.

6  
7 As proposed in the November 2013 filing with the PSB and shown on the November 14,  
8 2013 site plans, the pipeline would be located within 300 feet of the forested north end of  
9 Farmingdale Swamp in a portion of the wetland that has been cleared in the past for  
10 agricultural use. The pipeline in this location would preclude potential future restoration  
11 of the northern end of Farmingdale Swamp to natural forested conditions if the wet  
12 hayfields were abandoned as there would be long term vegetation management of the  
13 corridor. ANR is also concerned with potential hydrologic impacts to the wetland natural  
14 communities from the trenched pipeline intercepting and redirecting surface and shallow  
15 ground water flows to the swamp from the north and northeast.

16  
17 Based on these concerns, VT Gas revised its site plans on May 16, 2014, and the pipeline  
18 alignment has been moved to the north about 800 feet reducing the area of wet hayfield  
19 crossed by trenching, providing the potential for a much greater area of forested wetland  
20 restoration in the future, and reducing ANR's concerns about hydrologic impacts to  
21 Farmingdale Swamp. With these revisions under the May 16, 2014 alignment, there is

1 expected to be some adverse impact on the natural communities and RINA, but it is not  
2 expected to be undue.

3  
4 **Q17. What is the next natural community along the Middlebury to Shoreham section of**  
5 **the project that you will address?**

6  
7 A17. Cornwall Swamp is one of the most significant natural areas in Vermont. It is an  
8 approximately 4,500 acre wetland complex made up of state-significant examples of Red  
9 Maple-Northern White Cedar Swamp, Red Maple-Black Ash Seepage Swamp, Red or  
10 Silver Maple-Green Ash Swamp, Red Maple-White Pine-Huckleberry Swamp, Northern  
11 White Cedar Swamp, and Silver Maple-Ostrich Fern Riverine Floodplain Forest. The  
12 wetland complex is likely over 10,000 years old, having originated after the retreat of the  
13 last glaciers. Peat depths have been measured at up to 26 feet in central portions of the  
14 wetland, some of the deepest peat soils recorded in Vermont. Eastern portions of the  
15 wetland complex are flooded annually by Otter Creek, while western and central portions  
16 of the swamp receive surface and ground water influence. There are populations of at  
17 least 17 state-threatened, rare, and uncommon plant species and at least 3 rare animals in  
18 Cornwall Swamp. Vermont Fish and Wildlife Department owns 1,566 acres and  
19 manages Cornwall Swamp Wildlife Management Area for wildlife habitat, natural  
20 features, and public access. Cornwall Swamp has been designated as a National Natural  
21 Landmark by the U.S. National Park Service (<http://www.nature.nps.gov/nnl/state.cfm?State=VT>). It

1 is recommended that the entire Cornwall Swamp wetland complex be considered a  
2 RINA.

3  
4 The proposed VT Gas Phase 2 project passes through or adjacent to Cornwall Swamp at  
5 three locations: along Morse Road, south of Peet Road, and east of Route 30. I will  
6 discuss each of these locations.

7  
8 Morse Road crosses two lobes of Cornwall Swamp near the northern end of the swamp.  
9 The pipeline is proposed to be constructed entirely in the road bed and is not expected to  
10 have an adverse effect on the wetland here. Red or Silver Maple-Green Ash Swamp  
11 occurs both north and south of Morse Road. The road and associated beaver activity at  
12 the limited number of road culverts has resulted in hydrologic alteration of the swamp  
13 north of Morse Road with greater duration of standing water, some tree mortality, and an  
14 increase in shrub species. This hydrologic alteration of the wetland is the result of  
15 existing conditions at Morse Road. VT Gas has agreed to investigate installation of  
16 additional culverts in Morse Road to improve water movement through the road bed to  
17 more closely simulate natural water movement.

18  
19 From Peet Road (about MP 4.7) south to a west turn at the south end of the airstrip (about  
20 MP 5.4), the pipeline as proposed on the November 14, 2013 plans would be installed by  
21 trenching in fields, wetlands, and at the edge of the forested portion of Cornwall Swamp.  
22 ANR has consistently told VT Gas that this alignment would be expected to result in an

1 undue adverse effect on the wetland as a result of potential hydrologic alteration and loss  
2 of future ability to restore the forested wetland as a result of a permanent maintained  
3 corridor. This November 14, 2013 alignment is also considered undue in that the  
4 alignment results in unnecessary adverse effects and there are clear alternatives to  
5 locating the pipeline at the edge of the forested wetland. The resulting alignment  
6 revisions shown on the May 16, 2014 site plans move the pipeline to the edge of Peet  
7 Road, next to the airplane tie-down area, and directly adjacent to the air strip. This  
8 revision reduces wetland and buffer impacts and allows for potential future restoration of  
9 the forested wetland. By locating the pipeline at the edge of the existing road and air  
10 strip (features that already alter surface and shallow ground water movement) potential  
11 impacts to wetland hydrology are minimized.

12  
13 From approximately MP 5.8 to MP 6.6, the November 14, 2013 proposed pipeline  
14 alignment (November 14, 2013) would use trenching to install the pipeline at the edge of  
15 a wet forested arm of Cornwall Swamp that extends northwest from the main swamp, in  
16 wetland buffers, and in wet fields adjacent to the swamp. As with the pipeline section  
17 near Cornwall Swamp to the north, ANR has told VT Gas that this alignment would be  
18 expected to result in an undue adverse effect on the wetland as a result of potential  
19 hydrologic alteration, loss of future ability to restore the forested wetland as a result of a  
20 permanent maintained corridor, and because clear alternatives are available. This portion  
21 of the pipeline has not been visited due to lack of landowner permission and this makes  
22 full environmental assessment impossible.

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The resulting alignment revisions shown on the May 16, 2014 site plans have a straight line pipeline from approximately MP 5.85 to Route 30 and propose using horizontal directional drilling (HDD) for about 1,900 feet under the forested arm of Cornwall Swamp. This revision reduces wetland impacts and potential hydrologic alteration of Cornwall Swamp, but is still expected to result in an undue adverse effect. To further reduce adverse impacts, HDD should be used from where the May 16, 2014 alignment diverts from the November 14, 2013 alignment (about MP 5.85) south to Route 30, and the HDD pullback should be located in the upland fields to the north of MP 5.85. In addition, any HDD used under the Cornwall Swamp arm should be located in mineral soils (or bedrock if present) at least 25 feet below the depth of peat in the swamp arm. Since landowners in this area have not granted permission for VT Gas to visit their properties and assess conditions, it will be critical to obtain information on peat depths before proceeding with engineering plans. The proposed vegetation management protocol for HDD used under significant natural communities (VMT B2) that restricts any vegetation clearing or management will be important for minimizing impacts, as will a condition that the pipeline be abandoned in place and replaced with another HDD if there are failures along the HDD section.

**Q18. What is the next natural community along the Middlebury to Shoreham section of the project that you will address?**

1 A18. There is a young Silver Maple-Sensitive Fern Riverine Floodplain Forest and other marsh  
2 and shrub wetlands associated with the Lemon Fair River at the proposed VT Gas  
3 pipeline crossing. This young floodplain forest has not been fully assessed but is likely to  
4 be a state-significant natural community. In addition, the wetlands along the Lemon Fare  
5 River are very important for mink, otter, beaver, and other wetland-dependent wildlife.  
6 Although highly significant, it is not recommended that these wetlands be considered a  
7 RINA at this time.

8  
9 The November 14, 2013 natural resource plans and November 19, 2013 engineering  
10 plans propose use of HDD under the Lemon Fare River along the unused portion of  
11 Wooster Road (TH 23) with the HDD pull back proposed in wetlands on the west side of  
12 the river. These wetlands have not been inventoried due to lack of landowner permission  
13 for VT Gas to visit the property. In response to ANR's concerns for wetland impact and  
14 proximity of the HDD to a meander of the Lemon Fare River, the May 16, 2014 natural  
15 resources plans now show the alignment of the HDD shifted to cross the Lemon Fare  
16 River and floodplain at a more perpendicular orientation and the HDD pull back is  
17 proposed for mostly upland fields to the west of the river (although engineering details  
18 have not yet been provided). This May 16, 2014 revision is an improvement and reduces  
19 impacts to this important wetland and wildlife corridor. The proposed vegetation  
20 management protocol for HDD used under significant natural communities and riparian  
21 areas (VMT B2) that restricts any vegetation clearing or management will be important

1 for minimizing impacts, as will a condition that the pipeline be abandoned in place and  
2 replaced with another HDD if there are failures along the HDD section.

3  
4 **Q19. What is the next natural community along the Middlebury to Shoreham section of**  
5 **the project that you will address?**

6  
7 A19. Mutton Hill is an approximately 200 acre forest hill with a north-south oriented ridgeline  
8 located between Route 22A and Route 74. Based on Fish and Wildlife Department  
9 records for rare and uncommon plants on the south end of Mutton Hill, it is expected that  
10 there is a Dry Oak-Hickory-Hophornbeam Forest on the hill that is likely to be state-  
11 significant. Additional field work would be needed to confirm this. Mutton Hill is also  
12 expected to play an important role as a wildlife corridor to Shoreham Swamp (to the  
13 southwest) and wetlands to the north, including the Lemon Fare River floodplain.  
14 Although important natural communities and wildlife habitat, it is not recommended that  
15 Mutton Hill be considered a RINA at this time.

16  
17 The proposed pipeline (November 14, 2013 natural resource plans and November 19,  
18 2013 engineering plans) would use HDD and trenching to cross forest, wetland, wet  
19 fields, and stream on land at the north end of Mutton Hill and east of Route 22A  
20 (approximately MP 13.0 to MP 13.6). The portions of this section where HDD is  
21 proposed have mostly not been inventoried due to lack of landowner permission for VT  
22 Gas to visit the properties. Although the HDD proposal reduces forest fragmentation for

1 this section of pipeline corridor, ANR has expressed concern about the alignment of the  
2 HDD and the HDD pull back in wetlands west of Route 22A. In response to these  
3 concerns, the May 16, 2014 natural resources plans now show the alignment of the HDD  
4 shifted to the north and the trenched portions of the pipeline located mostly outside  
5 wetlands. The location of the revised HDD pull back is not depicted on the plans and  
6 needs to be in order to evaluate potential impacts. The proposed vegetation management  
7 protocol for HDD used under significant natural communities and riparian areas (VMT  
8 B2) that restricts any vegetation clearing or management will be important for  
9 minimizing impacts to this forest, as will a condition that the pipeline be abandoned in  
10 place and replaced with another HDD if there are failures along the HDD section.

11  
12 **Q20. What is the next natural community along the Middlebury to Shoreham section of**  
13 **the project that you will address?**

14  
15 A20. Shoreham Swamp is an approximately 1,100 acre wetland complex made up of state  
16 significant examples of Red or Silver Maple-Green Ash Swamp, Red Maple-Black Ash  
17 Seepage Swamp, and Red Maple-Northern White Cedar Swamp. The Red or Silver  
18 Maple-Green Ash Swamp is one of the best in Vermont. Unlike the Otter Creek swamps  
19 (Cornwall Swamp, Farmingdale Swamp, and others), Shoreham Swamp is not associated  
20 with a large river. Instead it occurs in a wide, shallow, clay-soil basin that is fed by  
21 numerous small streams, surface water runoff, and ground water seepage from the  
22 watershed. Agricultural fields surround the swamp and the wetland margin has become a

1 very wet sedge meadow and marsh community. Shoreham Swamp harbors one of the  
2 state's largest populations of the rare American hazelnut (*Corylus americana*). It is  
3 recommended that Shoreham Swamp be considered a RINA.  
4

5 The proposed pipeline (November 14, 2013 natural resource plans and November 19,  
6 2013 engineering plans) would be trenched along the northern and eastern sides of  
7 Shoreham Swamp for approximately two miles. Much of these two miles of trenching is  
8 in the edge of the wetland or in the upland buffer adjacent to the wetland. More than one  
9 mile of this section has not been evaluated on the ground by VT Gas because landowners  
10 have not granted access. ANR has been clear to VT Gas since the beginning of our  
11 review of the Phase 2 project that this alignment and work in and adjacent to Shoreham  
12 Swamp is expected to result in an undue adverse effect on Shoreham Swamp, the  
13 associated natural communities, and the natural environment and that alternative  
14 alignments should be identified that avoid impacts to Shoreham Swamp. Undue adverse  
15 impacts are expected as a result of hydrologic alterations to the wetland natural  
16 communities and loss of future ability to restore the forested wetland portions of  
17 Shoreham Swamp (as wet agricultural land is abandoned) as a result of the permanently  
18 maintained VT Gas corridor. This November 14, 2013 alignment is also considered  
19 undue in that the alignment results in unnecessary adverse effects and there are clear  
20 alternatives to locating the pipeline at the edge of the forested wetland.  
21

1 In response to ANR's concerns, VT Gas proposed the pipeline alignment shown on the  
2 May 16, 2014 natural resources plans. This alignment moves the pipeline about 600 feet  
3 to the north and 700 feet to the west in order to provide more separation between the  
4 trenched pipeline and the forested edge of Shoreham Swamp. This is an improvement  
5 and reduces direct wetland and buffer zone impacts but ANR still has significant  
6 concerns with this alignment. We remain concerned that the pipeline trench will  
7 intercept surface and shallow ground water flow and redirect this water to other portions  
8 of Shoreham Swamp that do not receive it now – the result being relative drying of the  
9 wetland communities in some locations and increased water in others. The result is likely  
10 to be an alteration of natural community structure and species composition. The ANR is  
11 not convinced by the wetland hydrology study recently prepared by VHB or revision of  
12 this study provided to ANR on June 6, 2014<sup>2</sup>, both of which I will discuss more below.  
13 Because of expected undue adverse effect on Shoreham Swamp, ANR has maintained  
14 that other alternatives should be investigated that avoid impacts to Shoreham Swamp.

15  
16 **Q21. Have you reviewed the analysis of an alternative route that largely avoids the**  
17 **vicinity of Shoreham Swamp that was submitted in response to ANR's discovery as**  
18 **Attachment A ANR VGS 1-11? Do you have any comments and concerns about this**  
19 **alternative route analysis?**

20  

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<sup>2</sup> At the end of the day on June 11, 2014, VHB provided ANR with additional information about the hydrology study. Given the late submission of this information, I have not had an opportunity to fully review this information or incorporate it into my testimony. I hope to review this additional information and may provide comment in my rebuttal testimony.

1 A21. Yes, I along with ANR Wetlands Office staff have reviewed the May 16, 2014  
2 “Shoreham Swamp Pipeline Segment Alternatives Analysis” prepared by VHB  
3 (Attachment A ANR VGS 1-11) and the following represents our response to the  
4 analysis. This analysis compares four possible pipeline alignments. “Alignment 1” is the  
5 pipeline alignment that was presented to the Public Service Board as part the petition for  
6 a Certificate for Public Good – the alignment shown on the November 14, 2013 natural  
7 resources plans. “Alignment 2” shifts the pipeline slightly to the west from “alignment  
8 1”. “Alignment 3” is the pipeline alignment that is shown on the May 16, 2014 natural  
9 resources plans.

10

11 The “alignment 4” of this analysis is the only alignment located away from the Shoreham  
12 Swamp and its contiguous wetlands and “alignment 4” is viewed as the preferred  
13 alternative by ANR<sup>3</sup>. “Alignment 4” crosses only one wetland finger that is contiguous  
14 to Shoreham Swamp and otherwise impacts only small, herbaceous wetlands that are part  
15 of hayfields on the west side of Basin Harbor Road. Although not yet assessed on the  
16 ground, it is expected that these small wetlands provide many fewer functions and are  
17 much less sensitive than Shoreham Swamp and its contiguous wetlands. There are no  
18 natural community concerns with these small wetlands. VHB identifies several  
19 constraints along “alignment 4” including proximity to a residence and a quarry, but these  
20 features could be avoided by minor revisions of the alignment. The analysis identifies

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<sup>3</sup> ANR suggested Alignment 4 conceptually to VT Gas. Although ANR provided a potential alignment, the precise location of where this alternative could be located to maximize distances from houses, the quarry, wetlands, or other features should be part of VT Gas and VHB fully assessing this alternative.

1 “alignment 4” as having the highest cost of the four alternatives, but it is unclear if this  
2 statement is based on the actual cost of “alignment 3” which would likely involve  
3 significant additional costs including those for wetland restoration and land acquisition (a  
4 potential mitigation measure identified in the Shoreham Swamp alternatives study),  
5 hydrology mitigation measures along the pipeline, long term hydrologic monitoring, and  
6 decommissioning costs for filling the abandoned pipeline near the swamp with concrete,  
7 bentonite, or other approved substance (all potential mitigation measures identified in the  
8 VHB-produced wetland hydrology study). The described “disruptions of current  
9 agricultural uses” could be avoided by pipeline construction outside the growing season.  
10 “Alignment 4” is a reasonable and practicable alternative to the other three alignments  
11 that would all be expected to adversely affect Shoreham Swamp. “Alignment 4” should  
12 be pursued further, including on-the-ground investigation of natural resources and  
13 refinements to avoid natural or cultural features of concern.

14  
15 **Q22. Have you reviewed the wetland hydrology study for Farmingdale, Cornwall, and**  
16 **Shoreham Swamps prepared by VHB that was submitted in response to ANR’s**  
17 **discovery as Attachment A. ANR VGS 1-8? Do you have any comments and**  
18 **concerns about this wetland hydrology study?**

19  
20 A22. Yes, although I appreciate VT Gas commissioning this study and the work put into the  
21 study (and the revisions to this study) by VHB, I believe it is important to note that ANR  
22 has been asking since November 2013 for pipeline alignments that avoid Cornwall and

1 Shoreham Swamps and a hydrology study of the potential effects on Farmingdale,  
2 Cornwall, and Shoreham Swamps. The hydrology study was begun in late April 2014  
3 and provided to ANR on May 20, 2014.

4  
5 In response to many questions and concerns from ANR about the May 20, 2014 wetland  
6 hydrology study (Attachment A ANR VGS 1-8), a more detailed version of the  
7 hydrology study was provided to ANR from VHB on June 4, 2014. Although ANR is  
8 still reviewing the content of this revised study, there remain significant concerns about  
9 potential hydrologic impacts to the wetland natural communities in Cornwall and  
10 Shoreham Swamps.

11  
12 My initial primary concerns are with some of the assumptions used that form the baseline  
13 for calculations made in study. For example, it is assumed that the Vergennes,  
14 Livingston, and Covington clay soils can be compacted back to native soil conditions  
15 after installation of the pipe in the trench. Although this assumption seems reasonable if  
16 the pipeline were constructed when the clay soils are saturated with water and therefore  
17 thixotropic (and flow similar to a liquid when agitated), the same clay soils are nearly  
18 brick-like in summer months when they are dry and compaction would be very difficult.  
19 This difference is significant in how it relates to another assumption of the study, namely  
20 that no more than 10 percent of surface flow will be intercepted by the trenches.  
21 However, if compaction of soil in the backfilled trenches is not complete, there will be a  
22 preferential flow of surface water into the trenches and resulting diversion to other

1 portions of the wetland (discharged at low points along the pipeline). Although I and  
2 others at ANR will continue to review the hydrology study, there are many concerns that  
3 remain, and a pipeline realignment to avoid these highly significant wetlands, especially  
4 Shoreham Swamp is warranted. At least one alternative alignment that avoids Shoreham  
5 Swamp has been identified.

6  
7 **Q23. Are there additional concerns that you have with the project and its impacts on**  
8 **natural communities over the long term?**

9  
10 A23. Yes. Although the Vegetation Management Protocol which is based on the VT Gas Phase  
11 1 project provides a good starting point for developing a post construction vegetation  
12 management plan, it lacks the specifics of how each natural feature (natural community,  
13 rare species population forested wetland, etc.) along the VT Gas Phase 2 project will be  
14 monitored and managed. The Vegetation Management Protocol also includes the  
15 framework for a non-native invasive species monitoring and control plan, but based on  
16 our current understanding of long term threat, this monitoring and control plan needs to  
17 be extended for the life of the project in select natural areas along the project corridor,  
18 especially significant natural communities, riparian areas, and wetlands.

19  
20 **Q24. Do you have comments or concerns about the project alternatives analysis (Exhibit**  
21 **Petitioner JAN-7) and the route that was selected relative to significant natural**  
22 **communities and RINAs?**

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A24. Yes. However, before addressing the alternatives analysis presented by VT Gas and VHB I think it is important to note that ANR was not consulted about alternative alignments before the project was submitted to the PSB. ANR was only presented with the alignment shown on the November 14, 2013 natural resource plans. It seems that ANR should be consulted early in the design of landscape-scale projects such as the VT Gas Phase 1 and 2 projects so that resources of critical concern, such as Cornwall and Shoreham Swamps, can be identified and avoided in project development. It is also important to note that the VTGas Stakeholder Engagement Process (Exhibit Petitioner EMS-1), to which ANR was neither invited nor a part, established the route alternatives selected for evaluation under the alternatives analysis. Unfortunately, the stakeholder process did not factor in avoidance of these three swamps as one of the guiding principles for route selection.

The project alternatives analysis (Exhibit Petitioner JAN-7) identifies “permitting” and “the anticipated likelihood that a particular transmission line route will be able to receive necessary state and federal permits” as one of the five criteria for developing alternative routes, but ANR was not consulted about these routes or likely permitting issues, other than the one selected route (Alternative 6). This criterion of “likelihood of obtaining permits” is definitely not the same as a criterion to avoid impacts to critical natural resources such as Shoreham and Cornwall Swamp.

1 The project alternatives analysis (Exhibit Petitioner JAN-7) identifies four factors used to  
2 minimize impacts “by identifying opportunities to:

- 3 • co-locate the Project with existing transportation infrastructure where feasible (i.e.,  
4 roadways and railroads);
- 5 • co-locate the Project within previously established utility rights-of-way (i.e., gas and  
6 electric);
- 7 • route the Project through or along edges of actively-managed farmland in order to  
8 minimize changes in land cover (i.e., forested to open space); and
- 9 • route the Project to avoid significant environmentally-sensitive features such as the  
10 Middlebury-Cornwall Swamp and the Shoreham Swamp.” (page 10 of the analysis)

11  
12 All of these factors seem to be very reasonable approaches to minimizing impacts. Co-  
13 location with transportation infrastructure other utility rights-of-way can significantly  
14 reduce habitat fragmentation. It is also an important goal to avoid the Cornwall and  
15 Shoreham Swamps. Unfortunately, the goal of avoiding these swamps was not achieved.  
16 Of the six alternatives identified, three of them (Alternatives 4, 5, and 6) have significant  
17 impacts to Cornwall and Shoreham Swamps, with Alternative 4 located directly through  
18 approximately two miles of the Shoreham Swamp interior. There are many routes that  
19 can be selected from Middlebury to Ticonderoga (with future access to Rutland) that  
20 avoid these two regionally significant wetland complexes. It is very surprising and  
21 concerning that three of the alternatives do just the opposite, including the selected  
22 Alternative 6 – these three alternatives all run along the margins of these swamps or  
23 through their interior. The explanation for this appears to be that the VT Gas preferred  
24 route was selected first and then environmental evaluations of that route were conducted  
25 after. In his prefiled testimony, John Heintz states on page 15, lines 18-21), “First, the  
26 route selection was informed by community and landowner inputs. Second, we studied

1 environmental, cultural and aesthetic resources within the general area of the route  
2 selected in order further refine the location of the pipeline to avoid or minimize resource  
3 impacts to the extent possible.”  
4

5 **Q25. Do you have any other comments or recommendations regarding potential impacts**  
6 **of the Project?**  
7

8 A25 Yes, I have additional comments about the project and potential effects on grassland birds  
9 based on consultation with my colleague John Buck, wildlife biologist and Nongame  
10 Bird Project Leader with the Vermont Fish and Wildlife Department. He has reviewed  
11 the Gilman and Briggs report and concurs with the recommendations of Mr. Gilman  
12 regarding Upland Sandpipers, Short-eared Owls, and Grasshopper Sparrows. He also  
13 concurs with the recommendation to conduct Whip-poor-will surveys in June. In the  
14 event Whip-poor-will are discovered on or near the construction site, Vermont Fish and  
15 Wildlife Department recommends that construction not commence until after the nesting  
16 season (August 1). Missing from the natural resource report is mention of the Golden-  
17 winged-Warbler. Although not a listed species, they are a species of greatest  
18 conservation need that likely nest and feed in the shrub habitat of reverting farmland and  
19 wooded wetlands of the project location. Golden-winged-Warblers are receiving a lot of  
20 funding attention from the USDA for habitat restoration and maintenance. As with the  
21 Whip-poor-will, if Golden-winged-Warbler is detected along or near the project site,  
22 construction should be restricted to before and after the breeding and nesting season

1 (May 1-August 1). The bird species identified in the report and the Golden-winged-  
2 Warbler are likely to benefit from the residual grassland/shrub habitat in the post-  
3 construction landscape of the project, providing that invasive plant species are carefully  
4 monitored and controlled.

5

6 **Q26. Does this conclude your testimony at this time?**

7

8 A26. Yes it does.