

Appendices

Appendix A – Analysis Phase Report

H. E. Bergeron Engineers

•Civil•Structural•Land Surveying

P.O. Box 440
2605 White Mountain Highway
North Conway, NH 03860

(603) 356-6936
(603) 356-7715 (fax)
www.hebcivil.com



November 4, 2008

Northern Community Investment Corporation
347 Portland Street
Saint Johnsbury, VT 05819

Attn: Cathy Furtek Conway, P.E.

**Re: Northumberland Industrial Park Feasibility Study
Phase One – Analysis Report
HEB Project #2008-115**

H.E. Bergeron Engineers, Inc. (HEB), in conjunction with John Wacker & Associates (JWA), have prepared the following summary and attached drawing to present the efforts to date related to the preliminary findings of the analysis phase of the feasibility study. In general, the attached drawing indicates:

- Proposed sites identified at the committee meeting on October 6, 2008. (Sites 1 thru 5)
- Additional sites adjacent to the proposed sites that should be evaluated as part of the feasibility study. (Sites 1a, 1b, 1c, & 4a)
- Other possible sites that appear developable from a strictly land-use planning perspective, with access, topography and floodplain restrictions taken into account (Sites P1 thru P6). Property ownership within these sites was disregarded for purposes of this analysis.
- We also analyzed all parcels of land that were close to or greater than 100 acres in size with access off Rt. 3 or Rt. 110. There are a total of twenty-six (26) sites that matched these criteria. However, there were only three (3) that have reasonable topography and are not within the 100-year floodplain. Interestingly, those parcels fall within three (3) of the 'other possible sites' (P1, P3 & P4) previously identified.

General Assumptions:

We offer this drawing as a first step in the selection process for the Industrial Park Feasibility Study for the Town of Northumberland. This plan suggests that for reasons of size, topography, and access, a number of sites may be eliminated from further consideration. For example, it is our opinion that this study should focus on sites that are of sufficient size with gentle topography and with access off either Rt. 3 or Rt. 110. Sites with access off Lost Nation Road or other remote areas were not considered in this selection process.

A review of other similar developments suggests that we should consider sites between 100 to 200 acres in size. This is due to the fact that with wetlands, buffers, roads, topography, and setbacks, we may lose as much as 50% of the



available land to find the necessary actual buildable land area. Then, with 5 to 10 acres of buildable land recommended per site parcel, we may have a reasonable number of parcels for development. This will provide the density and the diversity that will be needed to stimulate new growth and interest in the community.

Excluded Sites From Study:

While sites P4, P5 & P6 along Rt. 3 seem possible and may or may not be available, they do not present an opportunity in our opinion. We do not feel that these sites will be able to create a sense of community and a park image and character because of their size and surrounding floodplain that limit future expansion. All of these sites include a separate road & railroad network and associated right-of-ways that will, along with adjacent floodplain areas, limit available space for development. It is possible, however, to develop and market these sites for new business and industrial growth. These potential sites could be much like the Industrial/Business Park development in the Town of Littleton along Industrial Park Road & Mount Eustis Road. This development is more 'linear' with individual lots accessed off the main road rather than a 'park-like' development with a common internal access and features.

Site 2 (Thomas) & Site 3 (Larson) off Rt. 3 & Spaulding Hill Road, while large in size, have extreme slopes ranging between 10% and 20%. This creates grades that are very costly to develop and difficult to access in all seasons. Perhaps the highest and best use for tax base return is residential development, after considerations of forest management and/or recreation.

Site 5 (Wemyss) is accessed near and largely surrounds an existing residential development. Above the residential development are slopes of 10% to 15%. These are probably too steep for 'park' sites and there does not appear to be easy access to railroad. We feel this site can be removed from the feasibility study as well.

For these reasons, we suggest the removal of Sites 2 (Thomas), 3 (Larsen), & 5 (Wemyss), as well as potential sites P4, P5, & P6 along Route 3 to the south of the Town core.

Recommended Sites For Study:

Given the previous discussion, we recommend the following sites be part of the next phase which includes a more detailed study of each site:

- Site 1 (School Site) with additional sites 1a, 1b, & 1c
- Site 4 (Rainbow Connection) with additional site 4a
- Potential sites P1, P2, & P3

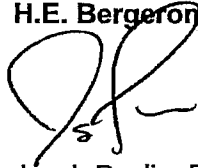
HEB

Although Sites 4 & 4a, in total, do not meet the size requirements identified above, we feel these sites should be included in further analysis due to their proximity and potential connections with other suitable sites 1 & P2.

In addition, the above-recommended scope of study does not include any sites identified in the North Country Council build-out analysis or Rt. 3 corridor study. Should either of these reports indicate a desirable area for future development, we will revise our study to incorporate these into the feasibility study.

Please let us know if you have any questions regarding these recommendations or if any other sites you would like to include in the feasibility study. We appreciate your cooperation.

Sincerely,
H.E. Bergeron Engineers, Inc.



Jay J. Poulin, P.E.
Senior Project Engineer

Enclosure: Site location drawing

Appendix B – Soil Descriptions

**Soil Development Potential Index (SPI)
Groveton Industrial Sites**

The soil potential index is a mathematical expression of a soil's range of development potential from good to poor. A soil with an SPI of 100 has the highest development potential, 0 the lowest. The SPI takes into account the expected performance of each soil if measures are taken to overcome its limitations, the cost of such measures, and the magnitude of the limitations that remain after corrective measures have been applied. For example, the Madawaska soil on a 0-3 % slope (28A) has a seasonal high watertable of about 2 feet so it will require costs to overcome the watertable (underdrains or fill) and potential continuing costs of maintaining a drainage system. Thus a soil with a higher SPI should cost less to develop and have fewer continuing limitations.

The table below provides composite SPIs for septic systems, buildings with basements, and roads for the soil mapping units in all of the Groveton sites. They are ranked from highest to lowest SPI. Hydric, or wetland, soils are assumed to have a 0 development potential due to the environmental impact and permitting requirements. However, the crossing of wetlands for road access to developable areas is possible. The 400 unit is not rated since it is a disturbed area and needs onsite analysis.

**Ranking of Soil Mapping Units from Highest to Lowest
Composite Development Potential
Groveton Sites**

| Soil Mapping Unit | Composite SPI |
|-------------------|---------------|
| 36A | 100* |
| 27A | 99 |
| 27B | 98 |
| 73C | 92 |
| 14B | 86 |
| 28A | 86 |
| 613B | 86* |
| 169B | 70 |
| 470B | 69 |
| 143D | 69 |
| 73D | 68 |
| 169C | 64 |
| 400 | Not Rated |
| All others | 0 |

*High infiltration rate-too rapid for treatment per AoT

Attachment A breaks down the rankings into the 3 components. It also provides an estimated relative cost increase for overcoming a soil's limitations compared to a referenced or best soil condition. For example, constructing a road on a flat, well drained soil may cost X dollars but building the same road on a soil with a steep slope and seasonal high water table may Y percent more.

PROPERTY 1 - School Site

SOIL DESCRIPTION

| TOTAL AREA = 46.7 Ac | | SOIL LIMITATIONS | | | |
|----------------------|---------|------------------------------------|------------------------------------|------------------------------------|---|
| SOIL | AREA | BUILDING SITE DEVELOPMENT | | | SANITARY FACILITIES |
| | | SMALL COMMERCIAL BUILDINGS | LOCAL ROADS AND STREETS | LAWNS AND LANDSCAPING | |
| 15A-Searsport | 6 Ac | Severe; ponding | Moderate; frost action | Moderate; small stones | Septic Tank Absorption Fields Severe; ponding; poor filter |
| 27B-Groveton | 28.3 Ac | Moderate; slope | Slight; | Slight; | Slight; |
| 28A-Madawaska | 0.8 Ac | Severe; wetness | Moderate; wetness; frost action | Moderate; wetness; droughty | Severe; wetness; poor filter |
| 992A-Pondicherry | 11.6 Ac | Very Poorly Drained standing water | Very Poorly Drained standing water | Very Poorly Drained standing water | Very Poorly Drained high water table |

PROPERTY 1A - Marshall Site
SOIL DESCRIPTION

| TOTAL AREA = | | SOIL LIMITATIONS | | | |
|---------------|--------------|-------------------------------|--------------------------------------|--------------------------------------|---|
| SOIL | 5 Ac AREA | BUILDING SITE DEVELOPMENT | | | SANITARY FACILITIES |
| | | SMALL COMMERCIAL BUILDINGS | LOCAL ROADS AND STREETS | LAWNS AND LANDSCAPING | |
| 15A-Searsport | 0.1 Ac | Severe; ponding Slight; | Moderate; frost action Slight; | Moderate; small stones Slight; | Septic Tank Absorption Fields Severe; ponding; poor filter Slight; |
| 27A-Groveton | 1.9 Ac | | | | |
| 28A-Madawaska | 3 Ac | Severe; wetness | Moderate; wetness; frost action | Moderate; wetness; droughty | Severe; wetness; poor filter |

PROPERTY 1B - Gray Site
SOIL DESCRIPTION

| TOTAL AREA = | 71.3 Ac | SOIL LIMITATIONS | | | |
|------------------|---------|------------------------------------|------------------------------------|------------------------------------|--------------------------------------|
| | | SOIL | AREA | BUILDING SITE DEVELOPMENT | SANITARY FACILITIES |
| | | SMALL COMMERCIAL BUILDINGS | LOCAL ROADS AND STREETS | LAWNS AND LANDSCAPING | Septic Tank Absorption Fields |
| 27A-Groveton | 27.8 Ac | Slight; | Slight; | Slight; | Slight; |
| 27B-Groveton | 4.6 Ac | Moderate; slope | Slight; | Slight; | Slight; |
| 28A-Madawaska | 11.4 Ac | Severe; wetness | Moderate; wetness; frost action | Moderate; wetness; droughty | Severe; wetness; poor filter |
| 400-Udorthents | 7.5 Ac | Excessively Drained | Excessively Drained | Excessively Drained | Excessively Drained deep water table |
| 992A-Pondicherry | 20 Ac | Very Poorly Drained standing water | Very Poorly Drained standing water | Very Poorly Drained standing water | Very Poorly Drained high water table |

PROPERTY 1C - Gray Site

SOIL DESCRIPTION

| TOTAL AREA = 15 Ac | | SOIL LIMITATIONS | | | |
|--------------------|---------|----------------------------|-------------------------|-----------------------|--|
| SOIL | AREA | BUILDING SITE DEVELOPMENT | | | SANITARY FACILITIES |
| | | SMALL COMMERCIAL BUILDINGS | LOCAL ROADS AND STREETS | LAWNS AND LANDSCAPING | |
| 27A-Groveton | 10.4 Ac | Slight; | Slight; | Slight; | Septic Tank Absorption Fields Slight; |
| 27B-Groveton | 4.6 Ac | Moderate; slope | Slight; | Slight; | Slight; |

PROPERTY P1 - Potential Site #1

SOIL DESCRIPTION

| TOTAL AREA = 92.5 Ac | | SOIL LIMITATIONS | | | |
|----------------------|---------|--------------------------------------|--------------------------------------|--------------------------------------|--|
| SOIL | AREA | BUILDING SITE DEVELOPMENT | | | SANITARY FACILITIES |
| | | SMALL COMMERCIAL BUILDINGS | LOCAL ROADS AND STREETS | LAWNS AND LANDSCAPING | |
| 15A-Searsport | 25 Ac | Severe; ponding Slight; | Moderate; frost action Slight; | Moderate; small stones Slight; | Septic Tank Absorption Fields Severe; ponding; poor filter Slight; |
| 27A-Groveton | 12.3 Ac | | | | |
| 27B-Groveton | 16 Ac | Moderate; slope | Slight; | Slight; | Slight; |
| 28A-Madawaska | 21.1 Ac | Severe; wetness | Moderate; wetness; frost action | Moderate; wetness; droughty | Severe; wetness; poor filter |
| 214A-Naumburg | 6.4 Ac | Severe; high water table | Severe; high water table | Severe; high water table | Severe; high water table |
| 992A-Pondicherry | 11.4 Ac | Very Poorly Drained standing water | Very Poorly Drained standing water | Very Poorly Drained standing water | Very Poorly Drained high water table |
| 995A-Wonsqueak | 0.3 Ac | Very Poorly Drained high water table | Very Poorly Drained high water table | Very Poorly Drained high water table | Very Poorly Drained high water table |

PROPERTY P2 - Potential Site #2

SOIL DESCRIPTION

| TOTAL AREA = 74.2 Ac | | SOIL LIMITATIONS | | | |
|-----------------------------|---------|--------------------------------------|--------------------------------------|--------------------------------------|---|
| SOIL | AREA | BUILDING SITE DEVELOPMENT | | | SANITARY FACILITIES |
| | | SMALL COMMERCIAL BUILDINGS | LOCAL ROADS AND STREETS | LAWNS AND LANDSCAPING | |
| 36E-Adams | 18.7 Ac | Severe; slope | Severe; slope | Severe; slope; droughty | Septic Tank Absorption Fields Severe; slope; poor filter |
| 143E-Monadhock | 0.3 Ac | Severe; slope | Severe; slope | Severe; slope | Severe; ponding; poor filter |
| 214B-Naumburg | 14.8 Ac | Severe; high water table | Severe; high water table | Severe; high water table | Severe; high water table |
| 433A-Grange | 13.9 Ac | Poorly Drained high water table | Poorly Drained high water table | Poorly Drained high water table | Poorly Drained high water table |
| 470B-Tunbridge-Peru Complex | 13.9 Ac | Severe; high water table | Severe; high water table | Severe; high water table | Severe; high water table |
| 613B-Croghan | 11.2 Ac | Moderate; wetness | Moderate; wetness; frost action | Severe; droughty | Severe; wetness; poor filter |
| 995A-Wonsqueak | 1.4 Ac | Very Poorly Drained high water table | Very Poorly Drained high water table | Very Poorly Drained high water table | Very Poorly Drained high water table |

PROPERTY 4 - Rainbow Connection, LLC Site

SOIL DESCRIPTION

| TOTAL AREA = 7.3 Ac | | SOIL LIMITATIONS | | | |
|---------------------|--------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| SOIL | AREA | BUILDING SITE DEVELOPMENT | | | SANITARY FACILITIES |
| | | SMALL COMMERCIAL BUILDINGS | LOCAL ROADS AND STREETS | LAWNS AND LANDSCAPING | Septic Tank Absorption Fields |
| 28A-Madawaska | 2.3 Ac | Severe; wetness | Moderate; wetness; frost action | Moderate; wetness; droughty | Severe; wetness; poor filter |
| 995A-Wonsqueak | 5 Ac | Very Poorly Drained high water table | Very Poorly Drained high water table | Very Poorly Drained high water table | Very Poorly Drained high water table |

PROPERTY 4A - Keddy Site
SOIL DESCRIPTION

| TOTAL AREA = | | SOIL LIMITATIONS | | | |
|----------------|----------------|---|---|---|--|
| SOIL | 4.9 Ac AREA | BUILDING SITE DEVELOPMENT | | | SANITARY FACILITIES |
| | | SMALL COMMERCIAL BUILDINGS | LOCAL ROADS AND STREETS | LAWNS AND LANDSCAPING | Septic Tank Absorption Fields |
| 28A-Madawaska | 4.7 Ac | Severe; wetness Very Poorly Drained standing water | Moderate; wetness; frost action Very Poorly Drained standing water | Moderate; wetness; droughty Very Poorly Drained standing water | Severe; wetness; poor filter Very Poorly Drained high water table |
| 995A-Wonsqueak | 0.2 Ac | | | | |

PROPERTY P3 - Potential Site #3
SOIL DESCRIPTION

| TOTAL AREA = 135.2 AC | | SOIL LIMITATIONS | | | |
|-----------------------|---------|--------------------------------------|--|--------------------------------------|---|
| SOIL | AREA | BUILDING SITE DEVELOPMENT | | | SANITARY FACILITIES |
| | | SMALL COMMERCIAL BUILDINGS | LOCAL ROADS AND STREETS | LAWNS AND LANDSCAPING | |
| 14B-Sheepscot | 2.6 Ac | Moderate; wetness; slope | Moderate; wetness | Severe; droughty | Septic Tank Absorption Fields Severe; wetness; poor filter |
| 143E-Monadhock | 59.6 Ac | Severe; slope | Severe; slope | Severe; slope | Severe; ponding; poor filter |
| 73C-Berkshire | 1.2 Ac | Severe; slope | Moderate; slope; frost action | Moderate; slope; large stones | Moderate; slope |
| 169C-Sunapee | 15.8 Ac | Severe; slope | Moderate; wetness; slope; frost action | Moderate; wetness; stones | Severe; wetness |
| 247B-Lyme | 30 Ac | Severe; wetness | Severe; wetness; frost action | Severe; wetness | Severe; wetness |
| 549A-Peacham | 26 Ac | Very Poorly Drained high water table | Very Poorly Drained high water table | Very Poorly Drained high water table | Very Poorly Drained high water table |

PROPERTY 5 - Wemyss Site
SOIL DESCRIPTION

| TOTAL AREA = 73 Ac | | SOIL LIMITATIONS | | | |
|--------------------|---------|----------------------------|---------------------------------|-------------------------------|---|
| SOIL | AREA | BUILDING SITE DEVELOPMENT | | | SANITARY FACILITIES |
| | | SMALL COMMERCIAL BUILDINGS | LOCAL ROADS AND STREETS | LAWNS AND LANDSCAPING | |
| 14B-Sheepscot | 0.5 Ac | Moderate; wetness; slope | Moderate; wetness | Severe; droughty | Septic Tank Absorption Fields Severe; wetness; poor filter |
| 73C-Berkshire | 27.7 Ac | Severe; slope | Moderate; slope; frost action | Moderate; slope; large stones | Moderate; slope |
| 73D-Berkshire | 2.6 Ac | Severe; slope | Severe; slope | Severe; slope | Severe; slope |
| 143D-Monadhock | 4.8 Ac | Severe; slope | Severe; slope | Severe; slope | Severe; ponding; poor filter |
| 143E-Monadhock | 1.9 Ac | Severe; slope | Severe; slope | Severe; slope | Severe; slope |
| 169B-Sunapee | 27.2 Ac | Moderate; wetness; slope | Moderate; wetness; frost action | Moderate; wetness; stones | Severe; wetness |
| 169C-Sunapee | 8.3 Ac | Severe; slope | Moderate; wetness; frost action | Moderate; wetness; stones | Severe; wetness |

Soil Limitation Definitions

Building Site Development

The degree and kind of soil limitations affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. A high water table, depth to bedrock or a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local Roads and Streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table effect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to

a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation. Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, and hillside seepage, can affect public health. Groundwater can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

*Information taken from Soil Survey of Rockingham County, New Hampshire by U.S. Department of Agriculture Soil Conservation Service ©1985