Appendix B: Public Input

Jewett Public Opinion Survey

In February, 2001, approximately 1500 surveys were sent to taxpayers in the Town. Returns came in over several months and 503 were ultimately received and included in the results. This represents a 34% participation rate. Given that good response rate, the Committee felt that the survey was very valid to elicit informative responses that represent the community. During development of this Comprehensive Plan, the survey results were also compared to the Workshop results to see how they correlated to each other. A copy of the survey can be found in Appendix A.

Analysis of Survey

1. The quality of public services (roads, snow removal, ambulance, police, fire, and 911) were examined. All these services were rated as satisfactory to excellent by the vast majority of participants. Less then 10% rated any as poor. Snow removal had the highest percent of "excellent" ratings (60%). All other services had "satisfactory" ratings from about 53% to 64% of participants. More people addressed road services than the emergency services. This was most likely because they were not familiar enough to rate the quality of emergency services.

Conclusion: Participants are satisfied with most of these public services, and are especially happy with the quality of snow removal.

2. The majority of participants did not want to see municipal-funded trash removal (59%) with about 18% saying they would like that and 23% saying "maybe".

Conclusion: There was not strong support for municipally funded trash removal.

3. The majority of participants did not want tax dollars (along with grant monies) to be put towards more recreational facilities (community center, picnic area, ball field, park, basketball court, ice skating rink). About 20% to 30% supported this idea, but well over 50% indicated they would not support this. About 16% to 20% of participants said "maybe". For those people who supported use of tax dollars for these recreational facilities, the most favored use was for a park, followed by an ice skating rink, and a community center.

Conclusion: Although there is some support for tax and grant dollar funding for additional recreational facilities, more people did not favor this. However, some additional support could be raised depending on the level of tax funding and activity. Since 2001, an ice skating facility has been built at Windham Ski area. Therefore, any future recreational facilities should concentrate on park and community center activities.

4. There was a very low response rate (40% of participants answered) to the question about whether people would attend or volunteer at a community event. For those that did answer, attendance at events was more preferable than volunteering. The most volunteer interest was with a Town-clean up day. For those that did answer, there was a high level of interest in these

activities. In order of interest were: Annual Town Meeting, Meet the Candidates Day, Town Wide Garage Sale, and Annual Town picnic, Town Wide Clean-up Day.

Conclusion: It may be difficult to get large numbers of residents to volunteer for these town activities. A look at the numbers indicates that there were about 40 people interested in volunteering. Although that number is small in relation to the whole Town, that level of volunteerism may be enough to adequately carry out these events. About 40% of participants said they would be interested in attending community events.

5 and 6. Over ½ of participants were not familiar with the Town's zoning. Of these who were, most (74%) felt the regulations were sufficient to guide future land use and development in the Town.

Conclusion: There were high levels of satisfaction with the zoning regulations.

7. This question asked about different development opportunities. The majority of participants indicated they wanted to discourage light industry and encourage tourism, arts and culture, and businesses that adaptively re-used farm buildings and preserved farmlands. A slight majority of participants felt that all of the other development activities should be allowed, but not to be encouraged (about 45% to 50%). A sizeable percentage of participants did want to encourage these activities as well (about 40%). Slightly more people wanted to encourage small retail uses (48%).

Conclusion: Overall, the only use not favored by participants was light industrial uses. The Town should find ways to actively encourage arts and culture, agricultural uses, and tourism. Second home ownership, and small retail/service businesses home occupations and senior citizen/retirement housing should at least be allowed, and many would support encouragement of these activities.

8. People do not want to see less regulation. There was a great deal of support for more regulations of debris and junk. All other topics (commercial signs/lights, noise, home occupations, commercial development, and timber harvesting) had more people in favor of keeping regulations about the same as now.

Conclusion: Develop additional regulations pertaining to debris/junk, and maintain about the same level of regulation for other areas.

9. There was overwhelming support for regulating rental properties in regard to occupancy limits, parking requirements, and trash (50% to 70%).

Conclusion: The Town should develop rental property regulations.

10. All aspects of the environment explored in this question were considered to be "very important" by a strong majority of participants (64% to 90%). Less than 8% of participants indicated these features were not important. Drinking water and surface water quality were the most favored, followed by scenic views, forest lands, stream erosion and sedimentation,

compatibility of buildings to rural and small character of Jewett, historic buildings, open space, and farmland.

Conclusion: Support for these environmental features can be translated into the need to ensure that Town policies and regulations address and protect these features.

Many written comments were received. When asked what suggestions people had for additional retail businesses, food related and small retail shops were the most frequent. Food related uses were restaurants, grocery store, and ag-business/ag-product businesses. The following list is a summary of comments received directly from survey participants and organized into strengths and weaknesses.

Strengths of Jewett included:

- Beauty and rural character
- Quietness
- Cleanliness
- Friendliness
- Presence of planning and zoning
- Low crime
- Privacy
- Trails
- Forests
- Wild animals
- Fresh air and water
- Mountains and views
- Sporting opportunities
- Limited government
- Low or reasonable taxes
- Resort and recreational facilities
- Accessibility to New York City

Weaknesses of Jewett included:

- High taxes
- Junk cars
- Litter
- Lack of nearby shopping
- Unleashed dogs
- Noise
- Lack of contractors
- Burning of garbage
- Poorly maintained properties
- Low quality schools
- Derelict houses and properties
- Lack of regulations regarding timber harvesting

Planning and Visioning Workshop

In October, 2006, a public planning and visioning workshop was held at Town Hall. About 20 people attended. The purpose of this workshop was to identify positive and negative features about Jewett. Further, it was important to evaluate how people feel about current conditions in Town since the survey was about 5 years old. Finally, the workshop was designed so that participants could develop a vision statement. This vision statement will set the tone and direction for this Comprehensive Plan. Participants worked at tables in small groups to identify positive and negative features as well as a vision. The details of this work are as follows:

Positive Features of the Town of Jewett: Positive features were identified, prioritized (those that received priority stickers should be considered the most important features) and ideas were generated to help Jewett maintain or enhance these positive features in the future.

Positive Features

Characteristic Mentioned	**# Priority Stickers**	**# Times Mentioned**	**Ideas to Maintain these Characteristics of Jewett**
Nature	4	3	
Beauty	3	3	Large trash day Adopt and road program Flowers (signal)
Lucky enough to have zoning, zoning keeps town beautiful	2	4	Keeping zoning, town park, adopt zoning as needed to preserve more mountains, partner in creation of management plan for streams
Good snow plowing, good road repair,	2	3	Keep employees and equipment and competitive, recognize good work, new roads meet town standards,
Unspoiled viewshed	2	2	Change zoning to limit building height, create land trust
Website	1	2	
Stable government, responsive town board, dedicated town staff members	1	2	
Individuals can participate in government, strong voter turnout and community participation	1	2	
Rural character	1		
Outdoor recreation activities	1		Create access, parking, trail system, trail maps, make agreements with land owners for row's

Characteristic Mentioned	# Priority Stickers	# Times Mentioned	Ideas to Maintain these Characteristics of Jewett
Lack of industrial development	1		
Financially sound-tax rate lower than in the past	1		
Bedroom community friendly	1		
Water course and quality			
Trust in other residents			
Town reputation that help create and maintain a pleasant appearance			To keep this way you need a committed town board who care about the kind of town we live in
Small town			
Quilting group			
Quiet			
People in community warm/friendly			Boy scouts – picnic
No industrial air pollution			
No gambling in town			
No commercial center			
No airplane noise			
Lack of population-privacy			
Lack of descriptive factors			
Lack of congesting traffic			
Good stable churches, fire dept. organization			
Farms located in town			
Facility for senior citizens meals			
Cleanliness			

Negative Features of the Town of Jewett: Negative features were identified, prioritized (those that received priority stickers should be considered the most critical problems) and ideas were generated to help Jewett improve and eliminate these negative features in the future.

Negatives

Characteristic Mentioned	# Priority Stickers	# Times Mentioned	Ideas to Improve these Characteristics of Jewett
No medical center, no medical personnel-emergency response rising, poor emergency response time, lack of volunteer fireman	4	5	Get a doctor to come, examine other options and work with other mountaintop communities, offer incentives to doctors to come into area

Characteristic Mentioned	# Priority Stickers	# Times Mentioned	Ideas to Improve these Characteristics of Jewett
Limited communications, telecommunications and infrastructure	4	4	Town could run a utility/work with other mountaintop communities, expand WiFi and cable and broadband
No neighborhood gathering places, activities for kids, lack of community recreational facilities, limited community facilities	2	6	Expand size of post office, have a town park?, place for picnics, gathering place, pavilion, swings, barbecue, picnic tables, walking paths
Roads: No speed limits on roads, road maintenance, trash along roads, poor road salt quality	2	4	Post speed limits, request study by traffic safety consultant, get better materials
Fewer young people, absence of young people	2	3	Encourage affordable housing. Developing a low income community through an affordable developer-not federal/county. Jobs-home occupation??
Affordable housing for seniors and young couples or singles	2		
Lack of safety on roads and intersections, truck traffic on roads is noisy/fast/dangerous	1	2	Request study
Lack of affordable housing, no $-can't afford to buy a house	1	2	Affordability?
Assessment and taxes	1		School taxes-outside relief. Star. Senior citizen break.
Lack of employment opportunities, benefits, $, etc.		3	
Colgate Lake: Mismanagement of Colgate lake, lake usages, traffic at lake		3	
Police-no law enforcement, no control over policing in town		2	Hire a town constable
NYC: buying large tracts of land-holding property?, constantly changing regulations, have too much power		2	
Limited public service, ie garbage etc., police, ambulance		2	County take it out of their budget. Better arrangements and quicker access

Characteristic Mentioned	# Priority Stickers	# Times Mentioned	Ideas to Improve these Characteristics of Jewett
So many of the houses are unoccupied so much of the time			
Smowmobilers/4wheelers are a nuisance			
Simplify the rules and enforce what you have			
Outdoor wood burning furnaces			
No sewer treatment plant			
No Public transportation			
No local animal shelter			
Maintain smaller roads			
Lack of stores			
Children are split into 2 different school systems leading to a lack of town identity			

Vision Statements

The following represent the vision participants have for the Town of Jewett. The topics in bold represent the major focus identified for the future vision and the elements below each topic provide more detail and direction about that topic. The details below are the exact words used by participants.

In 15 years, Jewett will …

Maintain the beauty and serenity of Jewett
- Pristine forests and streams
- Beautiful quiet, not overdeveloped
- Not too much different from what it is now. I like it.

Have Broadband-people working out of their homes.

Maintain a Stable Government

Have Commercial Development: should be on route 23A and 296
- Basic needs satisfied
- 234 and 296 commercial but not major enterprises. Mom and pop store and some lines
- LTD community bus routes 23A and 296

Have cottage-type industries that ring income and services to community and utilized natural resources.

Small agriculturally-based businesses: wild flower fields “cut your own”, organic small farms, ginseng.
Small forest related businesses: fire wood, maple syrup, blueberries
Small businesses: country store with food basics and local crafts dotted along the town for convenience

Have a diversity of housing configuration

Development is small scale and visually pleasing
More high end homes
Lower income apartments
Houses dotted here and there

Have community recreation and services

Town recreation area
Town activity, picnics, good sprite
There is a place on the roads to ride bikes and walk safely-bike path??

Have development that is controlled to maintain a small town environment and feeling

Updated expanded town hall
Mainly forested with some fields and houses
Small town feels still here
Visually, the town has not changed
A mix of housing-large and small lots and buildings
No development
A residential community
Ridges and mountaintops still pristine-no houses built
More fulltime residents, but slight increase in totally member of houses

Minimize traffic impacts by enforcement of laws

Minimized traffic

Have recreational activities should not be damaging to the natural environment

More conservation easements with hiking trails
No increase in snowmobile and ATV use

Have business development but that is unobtrusive

More at home professional businesses
A few small organic farms where there are now abandoned fields
Small, local businesses still the big attention
No obvious commercial activities

Have be visually appealing, charming, have wildlife, be rustic and environmentally pure

Fresh water
Healthy trees
Clean air
Scenic roadways and viewsheds
Wildlife
No large signage
Agriculture areas still exist
Town Park and walking paths
Stayed a bedroom community

Be a Cultural and Social community with recreation and a friendly neighborly community which employs and offers social activities

Access to skiing
Art community
Friendly people
Active churches
Social/cultural gatherings
Social activities for youth and seniors and community
Good neighbors
Social meeting place for community get-togethers

Be a well-planned rural safe, predominantly residential town with solid infrastructure encouraging small business

Beautiful small town charm has been retained small businesses flourish
New jobs flourish due to influx of internet based jobs incentive to bring in business
Small businesses: bookstore, coffee shop, small grocery store in hamlet districts
Crime free
Grants have made it possible for people to renovate/paint/repair existing housing
Local police and ambulance
Limited additional development
No large industrial/commercial development
Strong zoning/subdivision regulations for rural residential/small commercial uses
Good community leadership
Communications: internet, phone, cable

Retain its rural natural beauty

No mcmansions or walmarts
Rural character maintained
Restrain growths
Natural beauty maintained
Open space development (no clusters)
Speed bumps on Colgate road
Outdoor activities in area
Continue well thought out zoning to prolong natural beauty

Have community involvement

Recreation center and town hall
Town park meeting area
Friendly
Active participation in government
Complete community

Have controlled economic growth

Small business flourishes
Thriving organic farming community
Still rural, quiet, peaceful. Small town with big city modern conveniences like broadband, internet, heath care centers

Improve public services

Health services
Social services
Health clinics

Be a Town that has responsive government

Representative responsive government
All are made to feel welcome cooperative-open, friendly government, responsive to all citizens

Be a Town has good demographic mix

Town has mix of ages
Town is a balanced mix of fulltime residents and part-time, though predominantly full time

Be a Town that has a great community center, spirit of connectiveness and a welcoming atmosphere

A town center
Town park
Town is connected by paths
Jewett has a great community spirit with friendly, helpful, caring neighbors

Preserve the rural nature

Rural environment
Environmental conservation hunting-free zone
Has preserved forest and woodland
Less control of land by NYC
Town as protected important resources and views
Maintains rural look
Underground utilities
Town has growth clustered in certain areas and not spread out

Offer many good services and amenities

Enlightened social services network
Network of services that allows elderly to stay in their homes
Nearby emergency/medical center
Free garbage collection
Town housing in a mix of single family and cluster in all income ranges
Development has been planned perfectly-plenty of homes-but open spaces preserved

Appendix C: Watershed Concepts

Watersheds

Watersheds are important to our communities because they create a sense of place in the landscape and their waters are important in our daily life. A watershed is any land area that contributes runoff water to a particular point along a waterway. A basin-wide watershed (such as the Schoharie Creek) can be broken down into subwatersheds. Within subwatersheds, catchments are the smallest unit. A catchment is defined as the area that drains an individual development site to its first intersection with a stream.

Stream Order

An important concept central to watershed management is the spatial connection between a stream and its full watershed. Because a network of streams drains each watershed, one subwatershed such as those feeding the Schoharie or East Kill creeks are a part of, and has an ecological role in the larger system. There are different kinds of streams within a sub-watershed, or even sometimes within a catchment area. The kind of stream within the watershed is an important feature in watershed management as well.

Streams can be classified according to their "order" in that network. A stream that has no tributaries or branches is called a first-order stream. When two first-order streams combine, a second-order stream is created, and so on. Headwater streams (or the start of a drainage area) can be both first- and second-order streams. They are the smallest streams, but they are crucial because they dominate the landscape through their shear number and length. First order streams are very vulnerable to watershed changes, and are heavily influenced by the amount of impervious surface area within the subwatershed or catchment.

What happens to first order streams is directly translated to third order and higher streams, and therefore affects major receiving waters in turn. Thus, a watershed approach is important both locally and regionally.

Impervious Cover

The conversion of natural vegetation to rooftops, roads, parking lots, and lawns creates a layer of impervious surface in our landscape. Impervious cover directly influences urban streams in many ways. When an impervious surface is present, it can dramatically increase surface runoff during storm events. In urbanized areas, less rainfall is infiltrated through the soil and therefore more volume of water runs off. Runoff volume becomes greater, occurs more frequently and at higher magnitudes. As a result, less water is available to streams during dry periods and more during storms.

This fluctuation itself causes many ecological and biological changes in the stream. Years of research has shown that water fluctuation is inversely correlated with plant and amphibian density in urban wetlands. Declines in plant and amphibian density have been noted when more than 10% of a watershed becomes impervious. Research has shown that even above a 3.4% total

impervious cover, significant increases in water level fluctuation, conductivity, fecal coliform bacteria and total phosphorus in urban wetlands results.

A variety of other changes happen in urban streams when there is an increase in impervious cover. These changes can include stream channel enlargement, increased sediment loading due to more upstream erosion, dry weather water flow declines, a decline in the wetted perimeter of the stream at low flow, habitat loss, decline of water quality, reduction of aquatic diversity, and a decrease in wetland water quality and habitats.

Impervious Cover and Subwatershed Quality

As noted, stream research generally indicates that at about 10% impervious cover, sensitive stream elements are lost from the system. A second threshold appears to exist at around 25% to 30% impervious cover, where most indicators of stream quality consistently shift to a "poor" condition. "Sensitive streams" are defined to have a subwatershed impervious cover of zero to 10%.

These streams are high quality, stable, with excellent habitat structure, good to excellent water quality, and have diverse communities of fish and aquatic insects. "Impacted streams" have a watershed impervious cover ranging from 11% to 25% and show signs of degradation from erosion, channel widening, shifting stream water quality, and declining stream biodiversity.

Watershed Protection Techniques

In order to comprehensively protect and manage subwatersheds in the face of growth, there are eight generally accepted tools of watershed protection that could be put to work. Watershed protection is about making choices about what tools to apply, and in what combination. These eight tools can be applied throughout the subwatershed and in summary are:

Watershed Planning: Involves decisions on the amount and location of development and impervious cover, and involves choices about land use management techniques.

Land Conservation: Involves decisions about the types of land that should be conserved to protect a subwatershed.

Aquatic Buffers: Involves decisions on how to maintain the integrity of streams, shorelines, and wetlands, and to provide protection from disturbance.

Better Site Design: Involves decisions to help design individual development projects with less impervious cover which will reduce impacts to the streams and wetlands.

Erosion and Sediment Control: Involves decisions related to the clearing and grading stage in development and long term maintenance after development.

Stormwater Best Management Practices: Involves decisions about who, when, and where to provide stormwater management within a subwatershed or catchment area and which best management practices can best meet community and landowner objectives.

Non-stormwater Discharges: Involves decisions on how to control discharges from wastewater disposal systems and reduce pollution from household and industrial products. (For the Woodland Pond project, these tools are going to be less important.)

Watershed Stewardship Programs: Involves decisions and choices about how to promote private and public stewardship to sustain watershed management.

More Information on Low Impact Development Concepts

Low Impact Development (LID) is an innovative stormwater management approach with a basic principle that is modeled after nature: manage rainfall at the source using uniformly distributed decentralized micro-scale controls. LID's goal is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to its source. Techniques are based on the premise that stormwater management should not be seen as stormwater disposal. Instead of conveying and managing / treating stormwater in large, costly end-of-pipe facilities located at the bottom of drainage areas, LID addresses stormwater through small, cost-effective landscape features located at the lot level. These landscape features, known as Integrated Management Practices (IMPs), are the building blocks of LID. Almost all components of the urban environment have the potential to serve as an IMP. This includes not only open space, but also rooftops, streetscapes, parking lots, sidewalks, and medians. LID is a versatile approach that can be applied equally well to new development, urban retrofits, and redevelopment / revitalization projects.

LID has numerous benefits and advantages over conventional stormwater management approaches. In short, it is a more environmentally sound technology and a more economically sustainable approach to addressing the adverse impacts of urbanization. By managing runoff close to its source though intelligent site design, LID can enhance the local environment, protect public health, and improve community livability - all while saving developers and local governments money. The need for such an approach has never been greater. Stormwater programs require that a wide array of complex and challenging ecosystem and human health protection goals be addressed. Many of these goals are not being met by conventional stormwater management technology, and communities are struggling with the economic reality of funding aging and ever-expanding stormwater infrastructure. The challenge of how to restore stream quality in watersheds that have already been densely developed is even more daunting. Simply relying on impervious reduction and/or conventional detention ponds to address these issues is not feasible, practical or sustainable. LID provides the key in its emphasis on controlling or at least minimizing the changes to the local hydrologic cycle or regime.

The LID approach includes five basic tools:

1. encourage conservation measures
2. promote impact minimization techniques such as impervious surface reduction

3. provide for strategic runoff timing by slowing flow using the landscape
4. use an array of integrated management practices to reduce and cleanse runoff
5. advocate pollution prevention measures to reduce the introduction of pollutants to the environment

See more information on this at www.lowimpactdevelopment.org or http://www.epa.gov/owow/nps/urban.html

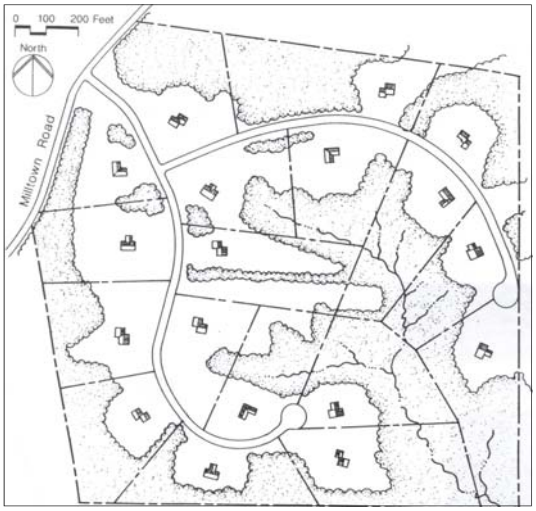
Appendix D: Conservation Subdivisions

An Illustration of Conservation Subdivision

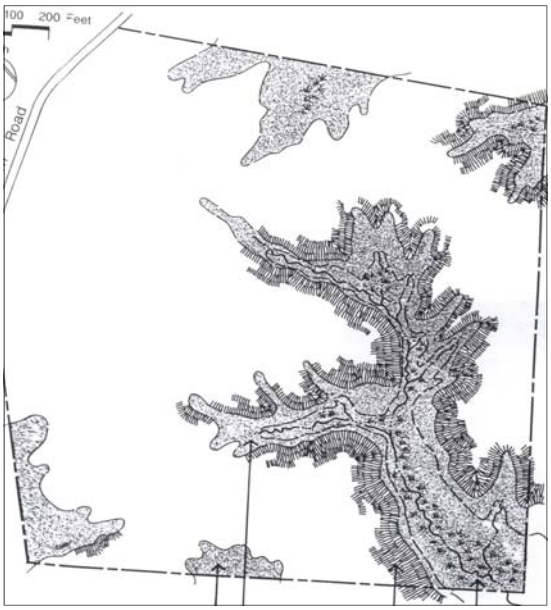
Example of a conservation subdivision (all illustrations from *Growing Greener*, by Randall Arendt, published by National Landmark Trust, 1999)

This lot layout yields 18 sites for building. The following figures illustrate how this site could be developed under a conservation design. Using the flexibility of the tool, there are numerous ways the site could be developed.

Four Steps of Conventional Subdivision Design

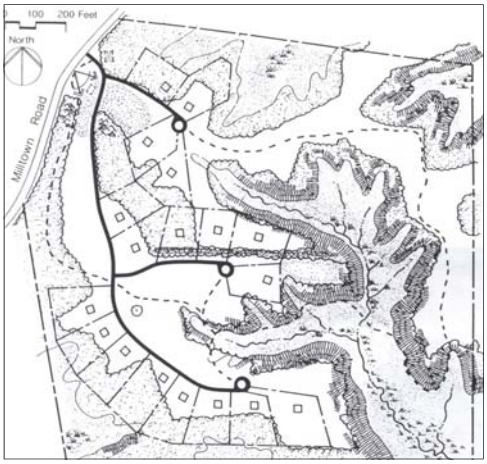


Lot layout of a site showing a typical subdivision where no open space is preserved.



Step 1 of Conservation Subdivision design: identify areas to be conserved. In this example, wetlands, steep slopes over 25% and a 100-year floodplain are identified as critical areas to be preserved on this parcel.

Step 2 of Conservation Subdivision design: <u>locate house sites to maximize the number of homes with a view or direct access to the preserved areas of the parcel.</u> Building envelopes or areas of disturbance are typically set.



Step 3 and 4 of Conservation Subdivision design: <u>align streets and trails, and draw in lot lines.</u> Streets should minimize new curb cuts from the access road. The last step is to draw in the lot lines. In this technique, lot lines are the least important task compared to a conventional subdivision where lot lines are drawn in first. Note that there are still 18 lots created in this subdivision at the same time that at least 50% of the site is preserved in an unbuilt condition.

Appendix E. Groundwater Study

GROUND WATER RESOURCE ASSESSMENT
Phase 1
Town of Jewett, New York

Prepared for:

The Town of Jewett, New York

Prepared by:

Alpha Geoscience
679 Plank Road
Clifton Park, New York 12065

May 7, 2007

TABLE OF CONTENTS

1.0 INTRODUCTION

This report presents the results of the first phase of a ground water resource assessment for the Town of Jewett (Town), Greene County, New York, conducted by Alpha Geoscience (Alpha). The assessment is being conducted as part of the Town's Comprehensive Plan. It is our understanding that the information is intended for the Town to use as a guide for the planning of residential development within the Town and that the ground water resources will be tapped by individual wells at primary and seasonal residences. This first phase consisted of identifying and mapping the aquifers throughout the Town, evaluating the potential yield to individual wells within each aquifer and evaluating the recharge per unit area of each aquifer type. The evaluation was based on a review of published regional hydrogeologic data, well drilling reports from drillers, and our own experience in the Town and neighboring towns within the Catskill Mountains. The second phase of the assessment, if necessary, consists of the drilling and testing of a well, or wells, to further evaluate the Town's ground water resources.

Alpha obtained water supply well data for 75 wells within the Town. The sources of well data include USGS Bulletin GW-34 (Berdan, 1954), NYSDEC Well Completion Reports obtained via FOIL request, Titan Well Drilling, and Alpha's own project experience in the area. Yield was reported for all but six of these wells (Table 1). Other useful information obtained from the well logs included depth to bedrock and the nature of the unconsolidated deposits above bedrock.

2.0 GEOLOGY

The geology of the Town can be subdivided into the two basic categories of bedrock and surficial deposits. Bedrock is hard rock and surficial deposits are comprised of the soil, sand and gravel, clay, silt, and rocky mixtures of these that lie on top of the bedrock. Bedrock geology and surficial geology maps of the Town were provided to Alpha by Community Planning & Environmental Associates. These maps are based on the general geology from the Bedrock Geology Map of New York and the Surficial Geology Map of New York (Fisher et al., 1970, and Cadwell and Dineen, 1987, respectively). Alpha has made some minor revisions to the surficial geology map of the Town based on the well data reviewed for this study

2.1 Bedrock

Bedrock is hard rock and surficial deposits are comprised of the soil, sand and gravel, clay, silt, and rocky mixtures of these that lie on top of the bedrock. The bedrock geology within the Town consists of interbedded shale, siltstone, sandstone and conglomerate of the Oneonta Formation, the Lower Walton Formation and the Upper Walton Formation (Figure 1). The rock types are interbedded and resemble a layer cake with each layer appearing as one of these different sedimentary rock types. Shale and siltstone are comprised solely of very fine-grained particles such as clay and silt. The sandstone consists of sand-sized grains that have been cemented together to form

a rock and the conglomerate is sand and gravel that likewise has been cemented to form a hard rock. Bedrock is at the ground surface, or within approximately four feet of the ground surface, within roughly 34% of the Town area.

2.2 Surficial Deposits

The surficial geology within the Town primarily consists of sand and gravel, areas where bedrock is within several feet of the surface, and glacial till (Figure 2). The sand and gravel deposits primarily consist of glacial outwash sand and gravel, recent alluvial sediments and glacial kame deposits. Glacial outwash consists of stratified and well sorted material rich in sand and gravel that was washed out from the glaciers during their retreat at the end of the last ice age. Alluvial sediments consist of stratified silt, sand and gravel that currently are being deposited in the two larger valleys associated with Schoharie Creek and the East Kill. Kames consist of well sorted sand and gravel that was deposited against the side of a glacier. The kame deposits are typically found at higher elevations on the flanks of the valleys because the glaciers occupied the valleys. Drillers' well logs indicate that sand and gravel deposits may be up to 85 feet thick and are located primarily along the valley axes, except for the kame deposits.

Bedrock is found near the surface along the ridge tops, and glacial till covers the remaining area between the valley floors and the ridgetops. Glacial till is a mixture of clay, silt, sand, gravel and boulders that was deposited and compacted by overlying ice during the last glaciation. Glacial till has not been reworked and sorted by water. Well records indicate that glacial till may be as much as 169 feet thick within the Town.

3.0 AQUIFERS

An aquifer is a geologic formation that is saturated and permeable enough to yield sufficient quantities of ground water to wells and springs. All of the geologic units described in Section 2.0 contain saturated intervals that are permeable enough to yield water to wells within the Town; consequently, the geological units depicted in Figures 1 and 2 also represent the aquifers in the Town. The individual aquifers in the Town consist of bedrock, surficial deposits of sand and gravel, and surficial deposits of till. Each of these is discussed in the following sections.

3.1 Bedrock Aquifer

The current information indicates that bedrock is the aquifer most widely relied on within the Town. All but one of the 75 wells on Table 1 are completed in sedimentary rocks of the Oneonta Formation. The bedrock aquifer is the predominant aquifer within the Town, regardless of location or the type and thickness of surficial deposits above the bedrock, and despite the fact that 66% of the Town area is covered by surficial deposits thicker than four feet. Bedrock can be reached, and has been reached, by drilled wells nearly everywhere within the Town.

Ground water within the bedrock is generally contained within horizontal fractures concentrated along the contacts between the interbeds of shale, siltstone, sandstone and conglomerate, or within roughly vertical fractures that can cut through one or more of the interbeds. The ability of individual fractures to store or pass water depends on their

size. The best water-producing fractures in the Catskills generally occur within the upper 200 to 300 feet of the land surface and are more prevalent within the valleys than on the hillsides. The variability of bedrock fractures and the apparent random manner that they are encountered by residential wells provides the explanation for the variability in yields that is discussed within the "Well Yields" section of this report.

3.2 Surficial Glacial Till Aquifer

Approximately 55% of the Town is covered with glacial till. Glacial till has a high percentage of silt and/or clay and it is very compact because it was deposited beneath immense ice sheets; consequently, glacial till typically cannot store and transmit water at fast enough rates to supply reasonable amounts of water to a well. Only one of the 75 wells available for this analysis (well #145, Table 1) was completed in the glacial till aquifer. This well was reportedly a seven-foot deep, dug well completed in till sometime prior to 1954. The yield and status of this dug well is unknown.

3.3 Surficial Sand and Gravel Aquifer

Sand and gravel deposits in the Town comprise 11% of the Town area. Sand and gravel deposits, especially in stream valleys, commonly make good aquifers if there is a sufficient saturated thickness of the deposit. Sand and gravel aquifers have a high amount of interconnected pore space between grains and can store and transmit water readily. Although several well logs indicate that water was present in the sand and gravel, none of the wells in Table 1 were completed in sand and gravel deposits. There is not enough information currently available to assess the productivity of the sand and gravel aquifer within the Town. Shallow sand and gravel aquifers can be affected by surficial sources of contamination such as gasoline tanks or septic leach fields.

4.0 WELL YIELDS

The term well yield is a measure of how much water a well can be expected to produce for an extended period of time. The reported well yields that are provided in Table 1 range from 0.25 gallons per minute (gpm) to 100 gpm. Of the 69 wells for which yield was reported, 19% had yields less than 5 gpm, 49% had yields between 5 and 10 gpm, and 32% had yields greater than 10 gpm. There does not seem to be a pattern in the distribution of well yields amongst these 69 wells that would indicate that wells drilled in a particular physiographic setting have greater yields than another setting (Figure 2). Surficial cover type (till, sand and gravel, or thin soil above bedrock) is apparently not a strong factor in determining the yield of a bedrock well within the Town.

Well elevation also does not appear to be a controlling factor in determining well yield. Elevations within the Town range from approximately 1400 feet above mean sea level (amsl) in the Schoharie Creek valley at the western end of the Town to over 3000 feet amsl along the ridgetops. Approximately half the wells that yield greater than, or equal to, 10 gpm were drilled at elevations greater than 1900 feet amsl and half were drilled at elevations below 1900 feet amsl. A relief map, zoned by slope, is provided as Figure 3.

In general, it appears that bedrock wells in the Schoharie Creek valley have better yields than other physiographic areas of the Town; however, the information is far from conclusive. The sand and gravel deposits in the Schoharie Creek and East Kill valleys have not been explored sufficiently to ascertain the yield potential of these deposits. Well logs from the two valleys indicate that as much as 124 feet of sand and gravel may be present in some locations. The surficial kame sand and gravel deposit along Route 296 appears to be too thin (<10 feet) to be of any consequence as an aquifer (Figure 2).

5.0 AQUIFER RECHARGE

Aquifer recharge is the replenishment of ground water within the aquifer. The ability of the aquifer to be recharged can vary significantly as the result of a variety of factors that can be evaluated using a water budget analysis. A water budget analysis was performed by Alpha to identify differences in recharge within the Town. The Town was divided into different recharge zones based on this analysis.

The water budget is a method used to estimate the average quantity of water that recharges the ground water system on a per-year and per-minute basis. The premise of a water budget analysis is that precipitation falling on the land surface either percolates into the ground water system, enters the surface water system as runoff, or is evapotranspirated. Evapo-transpiration is the combination of evaporation from the land surface and transpiration by plants. The volume of ground water recharge, runoff, and evapotranspiration in the Town depends on a variety of factors that include the average monthly temperature, average monthly precipitation, surface slope, vegetation cover, and specific soil properties. All of these factors were taken into consideration in estimating the average recharge, in inches per year, to the ground water system upon which the residential water supply wells in the Town rely. The average monthly precipitation and temperature normals (Table 2) were obtained from the Northeast Regional Climate Center for the National Oceanographic and Atmospheric Administration monitoring station in East Jewett (Station 302366). Soil properties were obtained from the Soil Survey of Greene County (Soil Survey) (Broad, 1993).

The water budget analysis performed by Alpha focused on three soil associations present within the Town (Figure 4). The goal of the analysis was to evaluate the amount of percolation that can be expected to recharge the bedrock aquifer system within each soil association. Each soil association is comprised of a different combination of soil types and each soil type has its own characteristics as described in the Soil Survey. The characteristics of the individual soil types that comprise the three soil associations were combined using a weighted-average approach to determine specific values, such as the soil moisture capacity and runoff coefficient, which are needed to complete a water budget analysis.

The water budget analysis resulted in different recharge values for each soil association (Figure 4), which represents a different recharge zone within the town. The recharge zones roughly are equivalent to the valley sand and gravels

(17.24 inches per year recharge), the ridgetops (12.44 inches per year recharge), and the till-covered slopes between the ridgetops and valley floors (10.86 inches per year recharge).

6.0 SUSTAINABLE WELL SPACING

The spacing of wells is an important consideration in managing the water resources in a region. The spacing of wells is often controlled by planning and zoning requirements for minimum lot sizes. The Town's existing zoning districts, with minimum lot sizes, are: Hamlet Residential, 1.5 acres; Rural Residential, 2.5 acres; Rural Conservation, 3 acres; and Conservation, 5 acres. Many factors must be considered in determining an appropriate minimum lot size with respect to water resource management. These factors include, but are not necessarily limited to, the following:

- The availability and variability of recharge to the aquifer(s) in the area, based on geologic, hydrogeologic, and climatic factors.
- The productivity and variability of the aquifer(s).
- The distance to the next nearest well and the type of well(s) in the area (i.e., residential, commercial, etc.).
- Existing and future land use and water use within an area.
- Seasonal increases in water usage due to landscaping, car washing, and gardening
- Setback requirements (leachfields, property boundaries, other wells, etc.).

The results of the water budget analysis provide some useful information for consideration with the other factors that influence the minimum lot size. The three Recharge Zones defined by the water budget analysis can be used to assess the lot sizes needed to sustain the ground water demands of a typical three-bedroom residence within each zone. A typical home requires approximately 110 gallons per day (gpd) per bedroom, or 330 gpd for a typical three bedroom home.

Most of the recent residential development within the Town is located within Recharge Zone 1, based on the location of the wells drilled in the Town since 2000, the year when well drillers were required by NYSDEC to begin submitting well completion logs. Recharge Zone 1 has an aquifer recharge rate of 10.86 inches per year (807.88 gpd per acre). Recharge Zone 1 roughly corresponds to the area covered by glacial till on the slopes between the valley floors and the ridgetop areas. An area of approximately 0.4 acres is needed in Recharge Zone 1 to sustain the typical residential demand of 330 gpd during an average year of precipitation. Recharge Zone 2 (12.44 inches per year; 925.41 gpd per acre) and Recharge Zone 3 (17.24 inches per year; 1282.49 gpd per acre) have higher recharge rates than Recharge Zone 1 and accordingly require less acreage to sustain typical residential water demands. Recharge Zone 2 and Recharge Zone 3 require approximately 0.36 acres and 0.26 acres, respectively, if recharge rates were the only criteria considered in determining the minimum lot size. The minimum lot sizes within the Town's current

Zoning Districts are all large enough to provide aquifer recharge at a rate that exceeds the daily demand of the typical three-bedroom residence.

Minimum lot sizes within each Recharge Zone need to be larger than just the minimum acreage necessary to provide sufficient recharge to the aquifer system. In addition to the above bullet list of factors, the known variability in well yields within the Town (0.25 gpm to 100 gpm), regardless of physiographic setting, is an indication that larger lot sizes then those indicated based solely on recharge rates, are appropriate. It is Alpha's opinion that a minimum lot size of five acres is sufficient to accommodate all of these concerns. The existing minimum lot size restrictions for the Town's zoning districts are likely sufficient to accommodate most of the above concerns; however, it is Alpha's recommendation that for lot sizes under five acres, one or more wells be drilled and tested to show that a sufficient water supply is present prior to initiation of construction.

Alpha also recommends that the Town adopt a policy that more extensive hydrogeologic testing be required in areas of high-density or large water-use development. Examples of such development include large subdivisions with numerous wells or commercial development with large water supply needs. The hydrogeologic testing requirements should be determined on a case-by-case basis and should consider the size (acreage), number of wells, anticipated average daily water demand, daily variation in water demand, water quality requirements, and the geologic and hydrogeologic setting of the project.

The Town may wish to adjust well spacing and lot sizes for new development surrounding high-quantity ground water users such as commercial enterprises, municipal buildings, schools, and health care facilities. Alpha recommends that site specific hydrogeologic analyses be performed for new, higher-demand ground water users to ensure that water resources are sufficient for the new facility and existing ground water users.

7.0 DRILLING RECOMMENDATIONS

The results of the first phase of the water resources evaluation performed by Alpha indicate that there is no need to conduct phase two drilling and testing of bedrock wells. The variability of bedrock well yields does not appear to correspond with any particular physiographic or stratigraphic setting within the Town. The existing well records indicate that new wells completed in bedrock will likely yield 5 gpm or greater throughout the Town. The actual yield in a particular well may be larger or smaller depending on site-specific factors. For example, 19% of the wells with reported yields in Table 1 had yields less than 5 gpm.

The available well records indicate that the yield potential of the sand and gravel aquifers within the East Kill and Schoharie valleys is unknown. Drilling logs for several wells listed on Table 1 indicate that a significant thickness of saturated sand and gravel exists within the two valleys. It is often easier and less costly for drillers to install bedrock wells, and disregard the yield potential of the sand and gravel encountered above bedrock. Some drillers are not equipped, or do not have the experience to install the appropriate well screen for an efficient well in sand and

gravel; however, thick sand and gravel deposits often produce abundant supplies of ground water for municipal, commercial, and industrial needs. Figure 2 shows the surficial sand and gravel deposits that exist above bedrock. Alpha recommends that a phase two investigation of those unconsolidated materials within the East Kill and the Schoharie valleys be undertaken to evaluate the water supply potential of these deposits.

8.0 CONCLUSIONS AND RECOMMENDATIONS

Alpha Geoscience performed the first phase of a ground water resource assessment for the Town of Jewett, New York. The first phase of this evaluation consisted of identifying and mapping the aquifers throughout the town, evaluating each aquifer's potential yield to wells and its recharge per unit area. The second phase will consist of the drilling and testing of a well, or wells, to further evaluate the Town's ground water resources. The evaluation was based on a review of published regional hydrogeologic data, well drillers' reports, and our own project experience in the Catskills. Information was obtained from 75 different wells within the Town. Aquifer recharge zones were defined and recharge rates were quantified via water budget analysis. Minimum lot sizes and well spacings were evaluated for each recharge zone. The major findings of the evaluation are listed below.

- Well yields in the Town generally appear to be satisfactory (5 gpm or greater) for residential development.
- Bedrock well yield does not directly correlate with the physiographic or stratigraphic setting in which the well is located.
- Bedrock is the primary source of ground water relied upon within the Town for domestic purposes.
- Well yields in the Town range from 0.25 gpm to 100 gpm.
- Three aquifer recharge zones within the Town were defined, corresponding to the valley floors, the ridge tops, and the intervening hillsides.
- The existing Town minimum lot sizes appear to be of sufficient area to provide adequate recharge for a typical three-bedroom residence. Due to the variability in well yields within the Town, however, Alpha recommends that a well be drilled on lots less than 5 acres, before construction, to demonstrate that an adequate water supply is available for the intended use.
- Alpha also recommends that the Town adopt a policy of requiring more extensive hydrogeologic analysis for new, higher-water demand projects to ensure the adequacy of the water supply and to assess potential impacts on existing ground water users.
- The yield potential of the sand and gravel aquifers in the Schoharie Creek and the East Kill valleys remain unknown. Alpha recommends that the phase two investigation of the Town water resources focus on the sand and gravel aquifers to evaluate the water supply potential of these deposits.

REFERENCES

Berdan, J.M., 1954, The Ground-Water Resources of Greene County, New York; Bulletin GW-34; U.S. Geological Survey; 62 p.

Broad, W.A., 1993, Soil Survey of Greene County, New York; United States Department of Agriculture Soil Conservation Service in Cooperation with Cornell University Agricultural Experiment Station; 349 p.

Cadwell, D.H., and R.J. Dineen, 1987, Surficial Geologic Map of New York, Hudson–Mohawk Sheet, New York State Museum – Geological Survey, Map & Chart Series #40, 1:250,000 scale.

Fisher, D.W., Y.W. Isachsen, and L.V. Rickard, 1970, Geologic Map of New York, Hudson–Mohawk Sheet, New York State Museum and Science Service, Map & Chart Series #15, 1:250,000 scale.

TABLE 1
Water Resources Evaluation

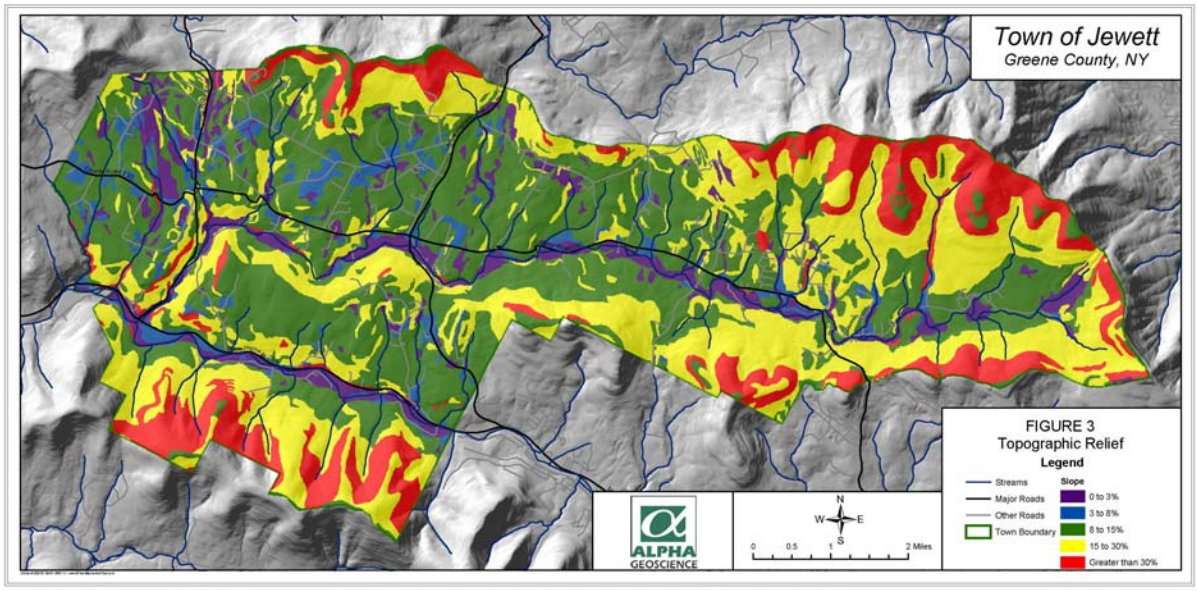
Well ID	Estimated Surface Elevation	Depth to Rock	Unconsolidated or Bedrock	Yield (GPM)	Surficial Geology
G1354	1930	34	Bedrock	100	Till
Hunter Test	1540	47	Bedrock	100	Till
G1466	1680	125	Bedrock	60	Till
CH	2100	70	Bedrock	50	Sand & Gravel
G1991	1680	67	Bedrock	50	Sand & Gravel
G2098	2090	45	Bedrock	50	Till
G1052	1570	90	Bedrock	40	Till
143	1725	16	Bedrock	36	Till
G1409	1790	77	Bedrock	30	Till
G2092	1980	59	Bedrock	30	Till
Bilash	1455	83	Bedrock	30	Sand & Gravel
116	1730	8	Bedrock	20	Sand & Gravel
132	1780	2	Bedrock	20	Thin soil over Bedrock
G2157	1835	60	Bedrock	20	Till
Slutsky	1650	48	Bedrock	20	Till
126	2040	40	Bedrock	15	Till
140	2000	15	Bedrock	15	Till
G1164	2025	24	Bedrock	15	Till
G1741	2240	112	Bedrock	15	Till
G1868	1965	150	Bedrock	15	Till
Merwin	1520	49	Bedrock	15	Till
141	1880	60	Bedrock	11	Till
106	1960	14	Bedrock	10	Till
113	1800	4	Bedrock	10	Thin soil over Bedrock
127	2060	25	Bedrock	10	Till
G1861	1895	14	Bedrock	10	Till
G2079	2100	66	Bedrock	10	Till
125	1940	19	Bedrock	9	Till
G1355	1660	105	Bedrock	8	Sand & Gravel
G1704	1890	49	Bedrock	8	Till
135	2040	107	Bedrock	7	Till
G1185	1670	51	Bedrock	7	Till
G1215	1860	30	Bedrock	7	Till
G1410	2110	25	Bedrock	7	Sand & Gravel
G1817	2210	14	Bedrock	7	Till
G2139	1815	2	Bedrock	7	Thin soil over Bedrock
119	1970	162	Bedrock	6	Till
142	1920	55	Bedrock	6	Till
G1061	1865	6	Bedrock	6	Sand & Gravel
G1077	1490	49	Bedrock	6	Sand & Gravel
G1665	1940	38	Bedrock	6	Till
Cullen	1800	25	Bedrock	6	Till
G2291	1990	18	Bedrock	5.5	Till
111	1535	90	Bedrock	5	Sand & Gravel
G1019	1635	176	Bedrock	5	Till
G1107	1930	37	Bedrock	5	Till
G1115	1765	34	Bedrock	5	Till
G1124	1980	35	Bedrock	5	Till
G1238	2060	56	Bedrock	5	Till
G1319	1935	3	Bedrock	5	Thin soil over Bedrock
G1527	1990	12	Bedrock	5	Till
G1575	1945	25	Bedrock	5	Till
G1764	2200	62	Bedrock	5	Till
G1975	1965	55	Bedrock	5	Till
G1984	1490	83	Bedrock	5	Sand & Gravel
G2257	2100	60	Bedrock	5	Till
G1028	2020	55	Bedrock	4.5	Till
G1188	1745	20	Bedrock	4	Till
G1159	1955	122	Bedrock	3.5	Till
G1685	2085	3	Bedrock	3	Thin soil over Bedrock
G1971	1830	30	Bedrock	3	Till
O'Bryan	1710	9	Bedrock	3	Till
G1251	1780	84	Bedrock	2.5	Till
G2284	1975	4	Bedrock	2.5	Thin soil over Bedrock
G1063	2070	24	Bedrock	2	Till
137	2370	6	Bedrock	1	Thin soil over Bedrock
G1753	2030	36	Bedrock	1	Till
Ragucci	1480	139	Bedrock	1	Sand & Gravel
G2278	1970	83	Bedrock	0.25	Till
131	2080	2	Bedrock	unknown	Thin soil over Bedrock
145	1495	>7	Unconsolidated	unknown	Till
G1491	2060	12	Bedrock	unknown	Till

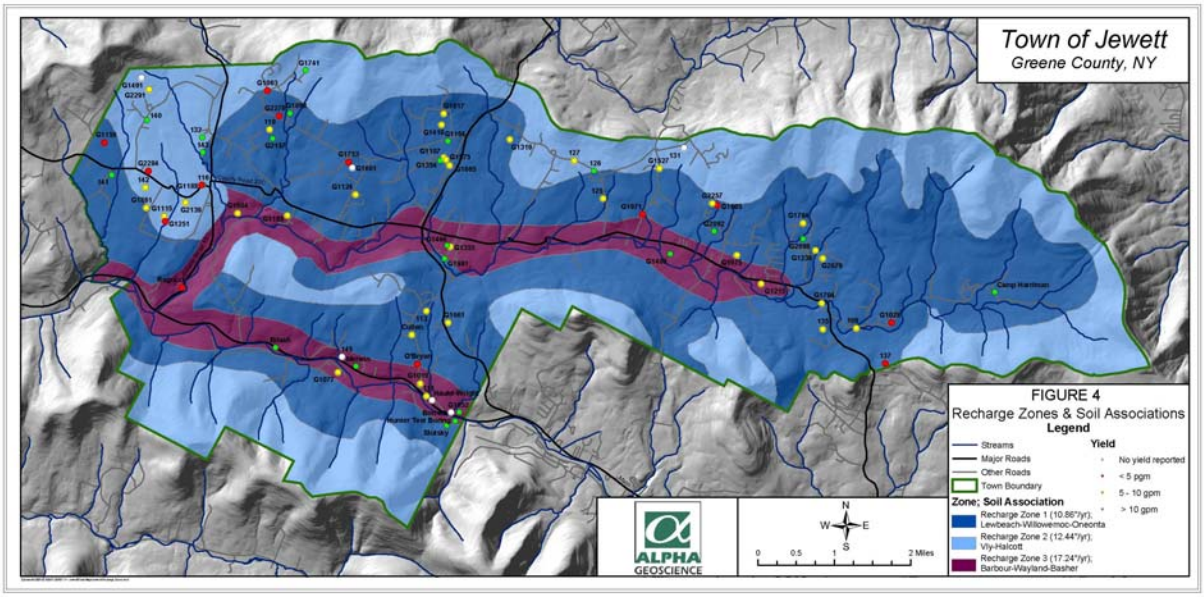
G1661	2030	50	Bedrock	unknown	Till
Borrelli		---	Bedrock	unknown	Sand & Gravel
Hauk/Wright	1535	---	Bedrock	unknown	Sand & Gravel

TABLE 2
Town of Jewett
Temperature and Precipitation Normals 1971-2000
East Jewett - NOAA Station ID 302366

Lattitude = 42° 14'

Month	**Temperature (°F)**	**Precipitation (inches)**
January	19.8	4.29
February	21.2	2.87
March	29.6	4.45
April	40.7	4.67
May	52.1	4.82
June	60.3	4.29
July	64.6	4.18
August	62.7	3.50
September	55.5	4.62
October	45.4	4.46
November	36.1	5.17
December	24.9	4.09
Average	**42.7**	**51.41**


Town of Jewett
Greene County, NY
FIGURE 3
Topographic Relief
Legend
Streams
Major Roads
Other Roads
Town Boundary
Slope
0 to 3%
3 to 8%
8 to 15%
15 to 30%
Greater than 30%
ALPHA GEOSCIENCE
N
W
E
S
0
0.5
1
2 Miles


Town of Jewett
Greene County, NY
FIGURE 4
Recharge Zones & Soil Associations
Legend
Streams
Major Roads
Other Roads
Town Boundary
Zone; Soil Association
Recharge Zone 1 (10.86"/yr); Lewbeach-Willowemoc-Oneonta
Recharge Zone 2 (12.44"/yr); Vly-Halcott
Recharge Zone 3 (17.24"/yr); Barbour-Wayland-Basher
Yield
No yield reported
< 5 gpm
5 - 10 gpm
> 10 gpm
ALPHA GEOSCIENCE
N
W
E
S
0
0.5
1
2 Miles

Appendix F Information on Wireless Networks

While DSL is not widely available, most carriers offer ISDN Basic Rate telephone service, and in some cases an ISDN-like flavor of DSL called ISDL. It can be offered in a lot of situations where DSL will not work, and is generally supported by most telephone switches since ISDN was part of the plan to digitize the telephone network in the 1980s.

A rural telephone cooperative or ad hoc community organization can easily muster the resources to build a broadband wireless network using off the shelf wireless networking gear.

While Wi-Fi networks are limited to a distance of a few hundred feet, this is because they generally use omnidirectonal antennas. By refitting wireless access points and repeaters with directional antennas that throw signals in spot beams akin to flashlights, it is possible to greatly extend their range, sometimes to several miles.

A detailed discussion of wireless community networks can be found in Rob Flickenger's book Building Wireless Community Networks. The general steps include:

1) Identify one or more locations in your community where someone can get reasonably priced broadband service (e.g. T-1, Cable, DS-3), pool resources across the user community to pay for the links.

2) Use directional antennas and repeaters to build a wireless mesh network out from these terrestrial links to sites that wish to share them. For example, by mounting parabolic antennas and repeaters on the sides of homes, one can relay a wireless link, in bucket brigade fashion from house to house, several miles along a sparsely populated valley.

Useful Links

Rural Utilities Service: www.wcai.com/pdf/2003/ts9_purcellR.pdf
FCC: Telecommunications Service for Rural America: www.fcc.gov/cgb/rural/
Rural Utilities Service: www.usda.gov/rus
Rural Broadband Access Loan and Loan Guarantee Program Application Guide and Rural Broadband Access Loan and Loan Guarantee Advance and Construction Procedures Guide: www.usda.gov/rus/telecom/broadband.htm