Resource Binder:
Natural Gas Exploration & Development

Prepared by Tioga Investigates Natural Gas

Winter 2010

TIOGA INVESTIGATES NATURAL GAS

Resource Binder: Natural Gas Exploration & Development

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PLUS a big THANK YOU to all the volunteers who put in many hours of hard work on the various subcommittees to contribute to this binder.

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Spring 2010

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CHAPTER 1

INTRODUCTION

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Chapter 1: Introduction

Purpose

This Resource Binder is meant to be a reference manual for local officials to aid in preparing for, and managing the public sector impacts of the development of natural gas in Tioga County. Although natural gas development will bring economic opportunities, it will also place new demands on municipalities, agencies, and county departments. It is important that local officials have access to the information they need to manage the issues that will confront them as a result of gas drilling. This Binder will provide local officials with information about the gas drilling process, its potential impacts, and how to manage these impacts.

Tioga Investigates Natural Gas (TING)

History

In March 2009, the Agriculture Resource Group, which includes Soil & Water, County Planning, Cornell Cooperative Extension and Farm Bureau, began discussions on the need for a coordinated county-wide approach to prepare for natural gas development. The Group reached out to multiple departments, agencies, and organizations, and established the TING steering committee.

Mission

- To assess the public sector impacts and opportunities of natural gas development
- To make recommendations to local officials on how to prepare for the gas industry
- To make recommendations to local officials on how to protect county resources and county residents during the development of natural gas

Steering Committee Members

The TING Steering is comprised of representatives from each of the following agencies, departments, organizations:

- Business Representative
- Cornell Cooperative Extension
- Council of Governments (CoG)
- GIS (Mapping)

- Environmental Management Council
- Farm Bureau
- Legislature
- Planning
- Soil & Water Conservation District
- Members at Large

Approach

Natural gas development is underway in many areas of the country. Numerous studies have been conducted on the impacts of gas development in these areas. TING reviewed the reports of these studies, has been in contact with officials in these communities and with representatives of gas companies, and has toured drill sites. TING has also researched the drilling process and the DEC drilling regulations.

As a result, TING identified the following topics to focus on as those having the most impact to Tioga County.

1. Communications
2. Land Use
3. Environment
4. Water Quality
5. Roads
6. Workforce
7. Public Safety
8. Business Opportunities

For each topic, TING created a subcommittee consisting of members with expertise in, responsibility for, and/or authority over the topic. The sub-committees researched these topics in depth, and identified actions that local officials could take to prevent or mitigate gas-related problems and manage gas development activity in our communities. This Resource Binder is a compilation of TING's findings and recommendations, with one exception that follows.

The Business Opportunities Subcommittee was an initial and integral part of early TING actions in order to jump start natural gas economic development planning. After several months and discussions with existing Tioga County Economic Development Organizations including Tioga County Department of Economic Development & Planning and the Tioga County Chamber of Commerce a decision was made to transfer responsibilities to these organizations who have defined mission and responsibility in this area.

Cornell University City and Regional Planning Workshop

Cornell University offers workshop courses that provide an environment that closely replicates what the students will find when they graduate and begin working in a particular field. In the spring semester of 2010, the City and Regional Planning Workshop was formed to partner with TING in researching the impacts of the development of the Marcellus Shale in Tioga County.

The workshop students researched a variety of literature and interviewed experts in numerous fields such as public officials and gas company representatives both within Tioga County and neighboring Bradford County where gas development is underway. The end product of this workshop was a Resource Binder which laid the foundation for this document.

TING'S Recommendations

TING recommends that a county level structure be established to coordinate and manage the municipal activities associated with the operations of the gas industry.

1. A Central Point of Contact (CPOC) should be established to be the focal point and coordinator between the gas companies and the county and municipal departments.
2. A Natural Gas Coordination Team (NGC Team) should be established to coordinate the various county and municipal activities.

Chapter 3 describes the roles of the CPOC and NGC Team, and identifies the members of the NGC Team.

How to use this Resource Binder

Topic Detail: This Resource Binder is divided into chapters covering, in detail, each of the topics that have a public sector impact, as well as other useful information. The user can turn directly to the chapters of interest to them.

Topic Summary: Checklists have been provided that summarize the recommended steps that local officials could take to prepare for a topic. The checklist for a topic can be found in the chapter that covers that topic.

Phase Summary: The following phases are the chronological order in which industry activities will affect the county. The recommended steps to prepare for or manage a phase can be found in the Checklists.

Now

- Preparations that can be made now, before horizontal drilling begins in the county

Meet & Greet Meeting

- When a gas company first makes a presence in the county (typically by acquiring leaseholds) the county CPOC will arrange a "Meet and Greet" meeting between the company and the NGC Team. This meeting is an opportunity to discuss expectations, learn the details of how the company plans to operate, and exchange information.
- Some tasks need to be completed prior to this meeting, and therefore are listed as "**pre**-Meet and Greet Meeting" items
- Some tasks need to be completed after this meeting has been held, and therefore are listed as "**post**-Meet and Greet Meeting" items

Permit Application Meeting

- When a permit to drill has been granted by the DEC, the county CPOC will arrange a "Permit Application Meeting" between the company and the appropriate NGC Team members. This will be the opportunity to again discuss expectations and the details of the operator's plans, and to exchange information
- Some tasks need to be completed after this meeting has been held, and therefore are listed as "**post**-Permit Application Meeting" items

Construction and Drilling

- This phase in when a well is drilled, and includes site preparation, well pad construction, drilling, and hydraulic fracturing.

Production

- This phase is after the well has been drilled, and is in production

Plugging and Abandonment

- When a well has reached the end of its economic life it is plugged and abandoned. Unsuccessful wells are also plugged and abandoned.

The Future

This Resource Binder and the Checklists were created prior to horizontal drilling in Tioga County. As the gas industry moves into the county, and horizontal drilling ramps up, local officials will experience first-hand the impacts of this activity in their communities.

Natural gas development is a dynamic industry. The technologies employed and the processes used continue to undergo change.

Additionally, there are other natural gas drilling-related public sector impacts that TING has not yet studied in-depth for this document such as seismic testing, compressor station construction and operation, etc. Please refer to Chapter 10 Additional Public Sector Impacts for brief descriptions of these topics. Future conditions may warrant more research on these and other gas-related topics.

For these reasons, the information in this Resource Binder and the Checklists will need continual updating over time. The CPOC has the responsibility for maintaining these resource documents, therefore it is requested that local officials continue to work closely with the CPOC and provide input throughout the period of gas development in the county in order to maintain the usefulness of these documents. The CPOC will notify officials when updates need to be secured.

CHAPTER 2

DRILLING PROCESS OVERVIEW

Chapter 2: Drilling Process Overview

Natural Gas Development Timeline

This chapter outlines the different stages of gas drilling and production. It is important to note that the total duration of the drilling process is highly variable as is the duration of each stage. Many factors affect each stage's duration including the decision to drill multiple wells using a single pad, alteration of drilling practices to respond to geologic complexities, and re-stimulation of a well to increase production. Fluctuations in commodity prices, regulatory structures, company operations, and technological innovations further complicate timeline estimates.

Wells will not move through the stages of development simultaneously. Wells in one part of town may be reclaimed even as a well in another part of town will be in the early stages of drilling. Keeping up to date on "where wells are" in the timeline can help mitigate infrastructure and environmental problems.

Contained within this chapter:

- ***Drilling Process***
- ***Marcellus Shale Geography and Geology***

Drilling Process

Reference:

- NYS DEC Generic Environmental Impact Statement (GEIS) http://www.dec.ny.gov/energy/45912.html
- NYS DEC Draft Supplemental Generic Environmental Impact Statement (dSGEIS) http://www.dec.ny.gov/energy/58440.html

Site Construction

Drill sites must be surveyed, and a plan laid out before clearing and construction begins. The next step is to construct the access road and well pad.

Access Road Construction

Access road construction involves clearing the route of trees and other woody growth, and preparing the surface for movement of heavy equipment. Ground surface preparation typically involves placing a layer of crushed stone, gravel or cobble over geotextile fabric. Sedimentation and erosion control feature are also constructed as needed along the access road and culverts may be placed across ditches at the entrance from the main highway or in low spots along the road.

The size of the access road is dictated by the size of equipment to be transported, the distance of the well pad from an existing road and the route dictated by property access right and environmental concerns.

Access roads will also be required for the centralized compression facilities and centralized water storage facilities.

Well Pad Construction

Site preparation activities consist primarily of clearing and leveling an area of adequate size and preparing the surface to support movement of heavy equipment. In many cases, excavation is required to create a level surface. As with access road construction, ground surface preparation typically involves placing a layer of crushed stone, gravel or cobbles over geotextile fabric. Site preparation also includes establishing erosion and sediment control structures around the site, and constructing pits for retention of drilling fluid and fresh water.

An average multi-well pad will be between 4 and 5 acres in size during the drilling and fracturing phase, with well pads over 5 acres possible. Average production pad size, after partial reclamation will average between 1 and 3 acres.

Materials Needed for Access Road and Well Pad Construction: backhoes, bulldozers, and other earth-moving equipment.

Duration: up to 4 weeks per well pad

Drilling

Lined *reserve pits* (also referred to as "drilling pits" or "mud pits") are constructed to hold cuttings (very fine-grained rock fragments removed by the drilling process) and fluids associated with the drilling process.

The development method employed for the Marcellus Shale is horizontal drilling from multi-well pads. Rotary *drill rigs* are used which can be up to over 150 feet in height. Operators may use one large rig or two to three different rigs in sequence. The rig work for a single horizontal well – including drilling, casing and cementing, would last about 4 – 5 weeks.

Drilling fluids must be used when drilling wells with a rotary rig. The fluids are pumped down the drill string, out through holes (jets) in the drill bit and up the wellbore. The moving fluid cools and lubricates the bit and removes the rock cuttings that would otherwise collect at the bottom of the wellbore.

- Wells are first drilled vertically using either compressed air or freshwater mud as the drilling fluid.
- The horizontal portion of the well is drilled using a mud that may be water-based, potassium chloride/polymer-based with a mineral oil lubricant, or synthetic oil-based. The horizontal bore can also be drilled on air.

Casings are installed and cemented. *Casing and cementing* protect groundwater quality and provides well control. Casing is heavy metal pipe that is used to prevent the borehole from caving in. Once the casing is cemented into place it also plays an important role in preventing fluid migration and protecting freshwater aquifers. Three strings of casing are normally set in New York State wells.

1. A short conductor casing at the top of the well keeps soil, sand and gravel from sloughing into the borehole and filling in the well.
2. A small diameter surface casing is set inside the conductor casing and extends beneath the deepest freshwater zone to protect it from contamination. In some instances, an additional casing string, called an intermediate string, is necessary because of a lost circulation zone or other hole problems.
3. The last string, known as "production casing" extends the full length of the well and is used to carry hydrocarbons from the producing horizon to the surface.

Materials Needed: Drilling rig, fuel tank, pipe racks, well control equipment, associated outbuilding, delivery trucks, mud system (pumps, tanks, solids control, gas separator)

Duration: 3 – 8 weeks per well

Hydraulic Fracturing

Hydraulic fracturing is a well stimulation technique which consists of pumping a fluid and a propping agent (“proppant”) such as sand down the wellbore under high pressure to create fractures in the shale.

Frac fluid also typically contains hydrochloric acid and other additives including surfactants, bactericides, clay and iron inhibitors and nitrogen. Additives are transported to the wellsite and remain stored onsite in the containers or trucks in which they were delivered until they are used in the fracturing operation. The additives are blended onsite, and once blended, are immediately mixed with the proppant and water, and pumped in the cased and cemented wellbore.

Source water for use in hydraulic fracturing may be withdrawn from surface or ground water sources or purchased from suppliers. Water may be delivered by truck or pipeline directly from the source, or from centralized water storage or staging facilities. At the well pad, water is typically stored in 500-barrel steel tanks.

Materials Needed: temporary water tanks, generators, pumps, sand trucks, additive delivery trucks and containers, blending unit, personnel vehicles, computerized monitoring equipment

Duration: 2 – 5 days per well, including 40 – 100 hours of actual pumping

Flowback

After the hydraulic fracturing procedure is completed, the direction of fluid flow reverses, allowing water and excess proppant to flow up through the wellbore to the surface. Both the process and the returned water is called flowback. Lined reserve pits can be used to hold flowback water or it can be stored in steel tanks. Also, flowback may be treated onsite and reused, trucked offsite for reuse, or trucked to treatment facilities.

Materials Needed: gas/water separator, flare stack, temporary water tanks, mobile water treatment units, trucks for fluid removal if necessary

Duration: 2 – 8 weeks per well

Well Cleanup and Testing

Wells are typically tested after drilling and stimulation to determine their productivity, economic viability, and design criteria for a pipeline gathering system if one needs to be constructed. If no gathering line exists, well testing necessitates that produced gas be flared.

Materials Needed: well head, flare stack, brine tanks, earth-moving equipment

Duration: 1 – 30 days per well

Production

After drilling and fracturing operations are complete, associated equipment is removed, pits are reclaimed and the site is re-graded and seeded. These activities are known as partial reclamation.

The size of multi-well pads will be 1 – 3 acres during the production phase, after partial reclamation.

Materials Needed: "wellhead", or "Christmas tree" (installed at the top of the well and pressure - control devices and valves), inline heater, gas/water separator, gas metering devices, water metering devices, and brine storage tanks

Duration: wells form the Marcellus shale are expected to produce 20 – 30 years

Additional activities will continue to occur at the well site during its productive life, such as brine disposal and re-fracturing. These activities were not included in the scope of TING's original mission.

Well Plugging

Any unsuccessful well or well whose productive life is over must be properly plugged and abandoned according to DEC regulations.

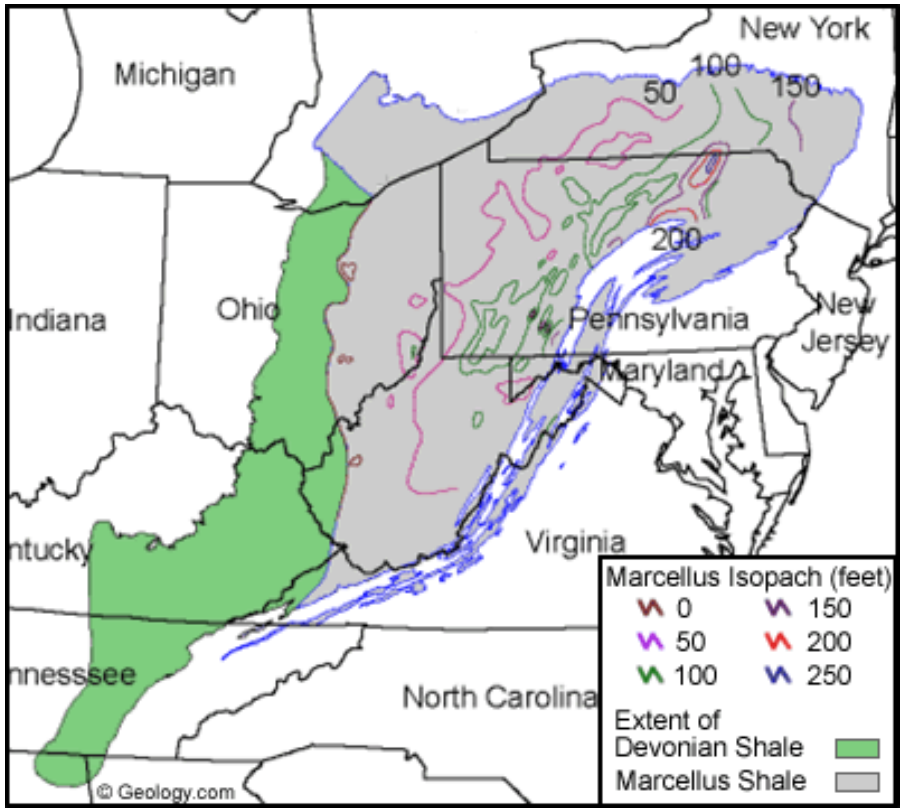
These activities were not included in the scope of TING's original mission.

Marcellus Shale Geography and Geology

Geography

The Marcellus Shale formation extends from West Virginia, through Eastern Ohio, Western and Northern Pennsylvania, and the Southern Tier and Finger Lakes regions of New York State. Its name is derived from an outcrop of the shale by the village of Marcellus, near Syracuse NY. Please see the Map of the Marcellus Shale on the next page.

Map of the Marcellus Shale



Geology

The Marcellus Shale is a black shale. Black shales are sedimentary formations high in organic materials, and are associated with coal, oil, and gas deposits. Thickness of the shale strata varies from approximately 890 feet at the eastern extent near New Jersey to only a few feet in thickness at its most western extent in Ohio. Underneath Tioga County the thickness of the shale strata is on the order of 50 to 100 feet. Although the Marcellus Shale is exposed at the ground surface in some locations in the northern Finger Lakes area, it is as deep as 7,000 feet or more below the ground surface along the Pennsylvania border in the Delaware River valley. Drilling activity is expected to focus on areas where the Marcellus shale is deeper than 2,000 feet.

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Chapter 3: Communications

Chapter 3: Communications

Introduction

Natural gas development can put new demands on communities in terms of both services and infrastructure, especially for communities that have not previously seen more intensive industrial development. Events such as county road problems, spills and other accidents, drilling, and brine and fracturing fluid injection can require action from multiple levels of government starting at the local level. Having means of communication between different levels of government in place can facilitate quick and effective responses to these issues. Larger scale changes such as increasing school sizes and rising housing costs can also be eased with assistance from the county and state. Open and frequent communication will spare municipalities from having to "reinvent the wheel" as dozens of Southern Tier communities confront similar issues. Close relationships between officials will ensure that issues with gas development are dealt with timely and that the community will reap as much benefit as it can from gas drilling. The government will also benefit from these avenues of communication in terms of improved response and efficiency with regard to general municipal functions. In addition, the same avenues developed to deal with gas drilling will be valuable for dealing with future economic or industrial development.

Contained within this chapter:

- ***General Reference***
- ***Regulatory Agencies and Regulations***
- ***Municipal/County Coordination of Gas Drilling Activities***

General Reference

Cornell Cooperative Extension (CCE)

(http://cce.cornell.edu/EnergyClimateChange/NaturalGasDev/Pages/default.aspx)

CCE has periodic task force meetings that are regularly attended by municipal leaders from the Southern Tier. Rod Howe (rlh13@cornell.edu) runs these meetings. The CCE website is regularly maintained and is an expansive source of information. It can be a useful source for information directly, but even if they are not directly in possession of the information needed, CCE can facilitate dialogue with other knowledgeable parties.

Penn State Cooperative Extension

(http://extension.psu.edu/naturalgas**)**

Penn State University Extension also has a natural gas resource page loaded with studies, webinars and other useful information for municipalities and landowners. The website also provides a link to the Marcellus Shale Education and Training Center which is a program specifically targeted to training local citizens to secure jobs in the natural gas drilling industry.

Regulatory Agencies and Regulations

The United States Environmental Protection Agency (EPA), the NYS Department of Environmental Conservation (DEC), and the Susquehanna River Basin Commission (SRBC) are the federal and state agencies charged with regulating ground and surface water quality. The NYS Department of Health (DOH) is also involved in the regulatory structure, cooperating with the DEC and county health departments in its oversight of the operation, design, and quality of public water supplies in New York State. While many agencies have a regulatory role in natural gas exploration and development and hydrofracing, (See Figure 3.2 in this chapter), some key agencies and their regulations that are important for municipal officials to be aware of are highlighted next.

Federal agencies and regulations

United States Environmental Protection Agency

The EPA is a federal agency whose role is to safeguard human and environmental health. The EPA writes and enforces relevant legislation based on laws passed by Congress.

Safe Drinking Water Act

Under this act, the EPA has authority to establish drinking water standards. Some states distinguish between primary and secondary standards. Primary standards set maximum contamination levels (MCLs) on contaminants deemed harmful to human health, and are enforceable by law. Secondary standards set MCLs on contaminants that have known cosmetic effects on humans (ex. cause discoloration of teeth) and are not enforceable by law. New York State does not distinguish between primary and secondary standards. Both primary and secondary contaminants have MCLs enforceable by law. Due to a provision included in the Energy Policy Act of 2005, the EPA does not regulate hydraulic fracturing under the Safe Drinking Water Act. This provision has been termed the Halliburton Loophole (Howell, 2010).

Clean Water Act

The Clean Water Act serves to reduce pollution into waterways by regulating the amount of pollutants discharged by industries, wastewater treatment plans, and construction sites. This is accomplished through a national permitting system known as the National Pollutant Discharge Elimination System (NPDES). Under

the Energy Policy Act of 2005, well site activities that disturb one or more acres are exempted from the Clean Water Act's requirement for NPDES storm water permits for sediment runoff from construction sites (DEC, 2010).

National Environmental Policy Review Act

Under this act, federal agencies are required to consider the environmental impacts of their actions. Federal agencies are obligated to prepare an Environmental Impact Statement (EIS), a document describing the scope of all anticipated environmental consequences, both positive and negative, of a proposed action. In addition, the act established national environmental policies and goals, and established a Council of Environmental Quality (CEQ) in the Executive Office of the President.

The Susquehanna River Basin Commission

http://www.srbc.net/
http://www.srbc.net/programs/projreviewmarcellus.htm

The Susquehanna River Basin Commission (SRBC) is an interstate, federal compact commission including New York, Pennsylvania, Maryland, and the federal government. Its main role is to manage, regulate, and conserve all water resources within the Susquehanna River Basin. It does not directly regulate water quality, although it does play a role in establishing water quality standards. The SRBC recommends modifications to state drinking water standards in an effort to establish uniform water quality standards between the three states in the basin. It maintains certain forms of jurisdiction over natural gas drilling activities that occur within the basin, including regulation of consumptive use of water from public water systems. Consumptive water use is defined as the extraction of water that reduces the supply in locations downstream. Since the Susquehanna River Basin spans multiple states, the federal compact was created for management. The vast majority of Tioga County lies within the upper Susquehanna River Basin [See map of the Susquehanna River Basin, Figure 3.1], and thus consumptive water use associated with industrial natural gas drilling will be subject to SRBC regulations.

According to the Susquehanna River Basin Commission Regulation of Projects (Section 806 of Title 18, CFR), the Commission requires that consumptive uses of water obtain an application to be submitted for the following types of projects that are located at least partially within the Basin:

(i) Any project initiated on or after January 23, 1971, involving a consumptive water use of an average of 20,000 gallons per day (gpd) or more in any consecutive 30-day period.

(ii) With respect to projects previously approved by the Commission for consumptive use, any project that will involve an increase in a consumptive use above that amount which was previously approved.

(iii) With respect to projects that existed prior to January 23, 1971, any project that increases its consumptive use by an average of 20,000 gpd or more in any consecutive 30-day period above its pre-compact consumptive use.

(iv) Any project, regardless of when initiated, involving a consumptive use of an average of 20,000 gpd or more in any 30-day period, and undergoing a change of ownership (SRBC 18 CFR 806.4).

(v) SRBC updated its regulations in January 2010 to require all water withdrawal/consumption projects associated with natural gas well development targeted to the Marcellus and Utica shales, regardless of quantity, go through their review and approval permit process.

The SRBC will maintain an important level of oversight on gas drilling projects. Tioga County and its municipalities are encouraged to involve themselves in the permitting process, especially since these projects are subject to a municipal site plan review ordinance, in order to track the development of water use. SRBC now has on their website a Water Resource Portal to search natural gas-related permit applications and prior approved projects. It can be found at http://www.srbc.net/wrp/. The CPOC (described later in this Chapter) will monitor this website and notify appropriate NGC Team members of both water withdrawal permit applications and approvals.


Susquehanna River Basin
SUBBASINS, COUNTIES and POPULATION CENTERS
Oneida
Herkimer
Onondaga
Madison
Ontario
Upper Susquehanna Subbasin
Schoharie
Livingston
Yates
Cortland
Otsego
Norwich
Chenango
Oneonta
Tompkins
Schuyler
Allegany
Steuben
Chemung Subbasin
Corning
Chemung
Elmira
Tioga
Binghamton
Broome
Delaware
New York
Pennsylvania
McKean
Tioga
Bradford
Towanda
Susquehanna
Middle Susquehanna Subbasin
Wayne
Potter
West Branch Susquehanna Subbasin
Wyoming
Lacka-wanna
Elk
Cameron
Sullivan
Renovo
Lycoming
Scranton
William sport
Wilkes-Barre
Clinton
Luzerne
Jefferson
Clearfield
Columbia
Montour
Centre
Union
Carbon
Clearfield
Sunbury
North-umberland
Snyder
Indiana
Schuylkill
Lewistown
Mifflin
Juniata
Altoona
Blair
Cambria
Perry
Dauphin
Lebanon
Berks
Huntingdon
Harrisburg
Somerset
Juniata Subbasin
Cumberland
Lancaster
York
Lancaster
Bedford
York
Chester
Franklin
Fulton
Adams
Lower Susquehanna Subbasin
Maryland
Cecil
Carroll
Havre de Grace
Harford
Baltimore
0 5 10 20 Miles
SRBC
Susquehanna River Basin Commission
Shaded Relief showing Elevation, Water features: USGS
Disclaimer: Intended for Educational Display Purposes Only
SRBC (1099) 05-31-2006

State agencies and regulations

New York State Department of Health

The Department of Health (DOH) is a New York State governmental body charged with regulating public drinking water systems. Its mandate is to "protect drinking water sources, provide financial assistance to public water supplies, set standards for constructing individual water supplies and waste water systems," as well as being "responsible for certification and monitoring of water operator facilities." To this end, the DOH has identified and mapped primary and principle aquifers in NYS. A primary aquifer is defined as a "highly productive aquifer presently utilized as a water supply source by major municipal water supply systems." A principle aquifer is defined as an "aquifer known to be highly productive or whose geology suggests abundant potential water supply, but which is not intensively used as a water supply source by major municipal systems at the present time." The Department of Health will have a role in reviewing new proposed hydraulic fracturing additives, issues with naturally occurring radioactive materials, and will work with the Tioga County Health Department in conducting water well investigations and fielding complaints (dSGEIS, 2009).

The Department of Environmental Conservation

The Department of Environmental Conservation (DEC) is a New York State agency established by the state Environmental Conservation Law (ECL) whose role is to enforce the ECL through the regulation, management, and protection of natural resources in the State. The DEC is responsible for authorizing gas drilling permits, which are crucial to enforcing environmental and landowner protection during and after the drilling process. DEC's webpage address for Marcellus Shale is http://www.dec.ny.gov/energy/46288.html. During the permitting process, the DEC reviews proposed site locations and well designs in accordance with standards set forth by the State Environmental Quality and Review Act (SEQRA). Under the SEQRA, the commissioner of the DEC is responsible for developing regulations to guide New York State and local governments in their implementation of the statute. During the drilling process, the DEC conducts on-site inspections, enforces remediation responsibilities, and regulates underground transport and storage of natural gas once drilling is complete. Among other responsibilities, the DEC regulates the disposal, transport, and treatment of hazardous and toxic wastes; manages the state program for oil and chemical spills; protects tidal and freshwater wetlands and flood plains; and promotes the wise use of water resources. "The two principle tools used by the DEC to regulate gas wells are its drilling permits and the SEQRA reviews" (Augenstern, 2008). Natural gas wells can be tracked in the New York State Oil & Gas Searchable Database on DEC's website at http://www.dec.ny.gov/cfmx/extapps/GasOil/search/wells/index.cfm. Wells are searchable by a number of attributes including API number, county and town among others.

State Environmental Quality Review Act

New York's State Environmental Quality Review Act (SEQRA), the text of which can be found in Article 8 of the New York Environmental Conservation Law, requires all state and local government agencies to consider environmental, social, and economic impacts before permitting activities that could affect the environment. A preliminary review process must be completed before the proposed activity can take place. During the review process, it may be determined that the environmental impact of certain activities need further study. In this case, an Environmental Impact Statement (EIS) is required. The EIS is to be prepared by either the applicant, or the lead agency in charge of permitting the action. The lead agency is the government entity with approval powers over the project, in this case, the DEC. Whether or not the lead agency actually prepares the EIS, it is responsible for the adequacy and accuracy of the final report, as well as its publication and circulation. SEQRA requires that certain sections appear in the EIS, including an explanation of the project, the environmental impact of the project, mitigation measures that can be taken to reduce the harm from the project, and reasonable alternatives to the project. For more information, please see: <http://www.dec.ny.gov/permits/32521.html>.

Generic Environmental Impact Statement (GEIS)

Due to the diversity of underground drilling activities, including oil, gas, solution mining, disposal, and geothermal pumping, each operation is likely to pose different risks to the environment. Yet there are certain commonalities across all drilling operations that are addressed in the Generic Environmental Impact Statement (GEIS, 1992). This document can be found on DEC's website at http://www.dec.ny.gov/energy/45912.html. The GEIS was created by the DEC (draft in 1988 and final in 1992) to provide relevant information on all of these activities, and to guide the review process for each of them. The GEIS does not necessarily waive a full EIS for horizontal drilling and hydro-fracturing. Therefore it was necessary for NYS DEC to develop supplemental regulations to the original GEIS to cover horizontal drilling and hydro-fracturing.

Draft Supplemental GEIS

NYS DEC prepared the Draft Supplemental Environmental Impact Statement (dSGEIS) in 2009 (http://www.dec.ny.gov/energy/58440.html) to satisfy the requirements of SEQRA for the anticipated permitting and development of the Marcellus Shale formation for horizontal drilling and hydro-fracturing. The dSGEIS was released in September 2009, and was followed by a public comment period. NYS DEC is now incorporating the over 14,000 comments submitted on the dSGEIS during the public comment period to create the final dSGEIS and therefore the regulations covering horizontal drilling and hydro-fracturing. The dSGEIS contains a vast amount of information relating to the new gas drilling process. According to the DEC, the dSGEIS "outlines safety measures, protection standards and mitigation strategies that operators would have to follow to obtain permits" (DEC, 2009). The approval status of this document is very important to the development of the gas industry in Tioga County and New York State. The CPOC will monitor the status of the dSGEIS. The document itself can be used as a resource for information of the impacts of drilling.

Local agencies and regulations

While much of the process of natural gas extraction is regulated and enforced by state and federal agencies, the local governments will also have important roles. Much of this will be in the coordination and communication of issues that arise at the local level.

Municipal Governments

The DEC has preempted local government's ability to directly regulate natural gas drilling. However local government retains jurisdiction over local roads and the right to collect real property taxes. Communities with zoning can control industrial activity to protect the health, safety, morals and general welfare of their residents. Communities without zoning can adopt ordinances that can protect or mitigate their citizens and land from impacts from natural gas drilling such as sensitive environmental areas, land that is important to water quality, and ancillary or incidental businesses to the gas drilling industry. Such ordinances include site plan review, well head protection and noise or light control ordinances.

Tioga County Health Department

The Tioga County Health Department is an important entity for the coordination of water protection efforts. Municipalities are encouraged to communicate with the Health Department to develop well head protection management plans and ordinances to protect their public drinking water supplies. Municipalities must share baseline water tests on their public drinking water systems with the Health Department so they can field concerns and address problems faster and more effectively.

Additionally, the dSGEIS requires sampling and testing of private residential drinking water wells within 1,000 feet of a well pad, or 2,000 feet if there is none closer. Results of the testing must be provided to the property owner and the County Health Department prior to drilling (dSGEIS, pg. 7-38).

The Health Department will help determine potential cases of contamination and help coordinate investigation and remediation for either public or private drinking water suppies. According to the dSGEIS, The NYS Department of Health and the Tioga County Health Department will jointly conduct a site inspection and the initial investigation when a complaint is received while active operations are underway and the contamination is within a specified distance of a well pad.

Municipal / County Coordination of Gas Drilling Activities in the Marcellus Shale

Structure

Central Point of Contact (CPOC)

TING's recommended approach to addressing public sector natural gas development activities within the county, which has been approved by the Tioga County Legislature and the Tioga Council of Governments, is to establish a structure that includes a Central Point of Contact (CPOC) and a Natural Gas Coordination Team (NGC Team) that has both county and municipal representatives.

The Central Point of Contact (CPOC) will be in the Department of Economic Development and Planning. The CPOC will be the primary interface with gas companies when dealing with public sector issues related to natural gas exploration and development. The CPOC will also lead a NGC Team to prepare the county and municipalities for the impacts of gas drilling.

Natural Gas Coordination Team (NGC Team)

At the County level core team members will be: Public Health Director, Public Works Commissioner, Sheriff, Fire Coordinator, Emergency Management Officer, GIS Manager, County Attorney, Soil & Water Conservation District Manager, County Planning Director, and the County Economic Development Director. The following table details contact information for this team:

NAME	POSITION	PHONE	E-MAIL
Doug Barton	CPOC – EDP Director	607-687-8254	bartond@co.tioga.ny.us
Elaine Jardine	CPOC – Planning Director	607-687-8257	jardinee@co.tioga.ny.us
Hans Peeters	Public Health Department Director	607-687-8566	peetersh@co.tioga.ny.us
Ken DelBianco	Public Works Commissioner	607-687-0302	delbiancok@co.tioga.ny.us
Gary Howard	Sheriff	607-687-1010	howardg@co.tioga.ny.us
John Scott	Fire Coordinator	607-687-8466	scottj@co.tioga.ny.us
Dick LeCount	Emergency Management Officer	607-687-2023	tcemo@co.tioga.ny.us
Judy Quigley	County Attorney	607-687-8253	quigleyj@co.tioga.ny.us
Bill Ostrander	GIS Manager	607-687-8294	ostranderw@co.tioga.ny.us
Wendy Walsh	SWCD District Manager	607-687-3553	walshw@co.tioga.ny.us
Barb Crannell	Municipalities Representative	607-699-3171	bcrannell@stny.rr.com

At the municipal level, various town and village officials will be the designated point of contact(s). These may include the supervisor/mayor, highway superintendent, clerk, utilities superintendent, municipal attorney and code enforcement officer. These representatives will be the main liaison between their municipality and the CPOC. They need to bring all the information and action items that pertain to their officials back to them for further action and implementation. These designated contacts are listed in the following table:

MUNICIPAL DESIGNATED CONTACTS

MUNICIPALITY	CONTACT	POSITION
Town of Barton	Jim Marshall	Highway Superintendent
	Joan Richards	Town Clerk
Town of Candor	Kevin Noble	Highway Superintendent
Town of Spencer	Arvo Rautine	Supervisor
	Dick Smith	Highway Superintendent
	Patricia Decker	Town Clerk
Village of Spencer	Kevin Perry	Mayor
Town of Tioga	Lew Zorn	Supervisor
	Frank Catalano	Highway Superintendent
	Brenda Middendorf	Town Clerk
	Jerry Hyatt	Town Council
Town of Nichols	Ron Traue	Highway Superintendent
Town of Newark Valley	Barbara Mock	Town Clerk
Village of Newark Valley	Morgan Inderwies	Village Trustee
Town of Berkshire	Mike Simmons	Town Supervisor
Town of Richford	Judith Thurston	Town Clerk
Town of Owego	John Schumacher	Town Justice
	Don Castellucci	Supervisor
Village of Owego	Ed Arrington	Village Mayor
	Cindy Motter	Village Office
Village of Waverly	Michele Wood	Village Clerk

Other Stakeholders

Other stakeholders that the CPOC will coordinate with as needed include Environmental Health, County Clerk, Tioga Employment Center, Real Property, Department of Social Services as well as Mental Hygiene, Chamber of Commerce, Environmental Management Council, Cornell Cooperative Extension and finally an independent industry representative such as an IOGA NY member.

Duties

CPOC:

Communications

1. Key focal point for communications with and between gas companies (and subcontractors) and appropriate county, municipal, and agency contacts
2. Maintain communications throughout the drilling process to help resolve public sector issues.
3. Arrange and facilitate gas company meetings
   - Now – reach out to the gas companies through "Meet & Greet" meetings
   - When a drill permit is granted – "Permit Application" meetings to work out details
4. Notify public stakeholders of permitting activity
   - Monitor DEC and SRBC website for permit activity
   - Send notifications at key checkpoints (permit application, permit approval, start date)
5. Notify GIS manager of items requiring mapping
6. Record and distribute minutes of gas company meetings to participants and other parties
7. Pass along key information to appropriate municipal officials not in attendance
8. Interface with regulatory agencies as needed (e.g. DEC, SRBC, Ag & Markets)

Documentation

1. Maintain Resource Binder
2. Maintain Checklists
3. Maintain or gather Lists/Forms/Ordinances (see attached) for use at gas company meetings and for distribution
4. Gather maps (see attached) for use at gas company meetings and for distribution
5. Create and maintain agendas (discussion points) for gas company meetings

Training/Education

1. Conduct training sessions with NGC Team members and other municipal stakeholders as required
2. Continue attending gas industry related training sessions, participate in municipal/community workshops, and engage appropriate NGC Team members
3. Maintain knowledge of gas industry related regulations (e.g. GEIS, sGEIS, etc)

NOTE: Duties will change over time:

1. As horizontal drilling ramps up in the county
2. As changes occur in industry cycles, trends, processes, and technology

NGC Team:

The NCG Team will meet with the gas companies at the decision of the CPOC. They meet with them at the Meet and Greet meetings, at Permit Application meetings, or at any other individual meeting as requested by the CPOC or the gas company. They will perform recommended tasks outlined in this Resource Binder.

Communication Process

There are six key "trigger points" of gas development activity which require cross-county communications:

1. Gas company makes an initial presence in the county, most commonly by leasing mineral rights within the county
2. A gas company applies for a drill permit
3. DEC approves a drill permit
4. Gas Company schedules a Drill Start Date
5. Issues arise
6. Periodic Evaluation

1. Gas Company initial presence

The CPOC will arrange a "Meet and Greet" meeting between the Gas Company and the NGC Team.

2. Permit Application
   a. The CPOC continually monitors the Oil & Gas Searchable Database on the DEC's website (http://www.dec.ny.gov/cfmx/extapps/GasOil/search/wells/index.cfm) for drilling permit applications.
   b. For all new permit applications, the CPOC will notify the Municipal Designated Contact(s) in the municipality where the well will be located, as well as other departments, agencies, and officials with a need to know.
   c. The CPOC will arrange a "Permit Application" meeting between the Gas Company and the appropriate NGC Team members.
   d. The CPOC will monitor the Environmental Notice Bulletin (ENB) on-line for notification of a SEQR review associated with well pad construction involving an agricultural district or floodplain
   e. The CPOC continually monitors SRBC's Water Resources Portal on their website for applications for water withdrawal permits

3. Permit Approval

a. The CPOC continually monitors the Oil & Gas Searchable Database on the DEC's website (http://www.dec.ny.gov/cfmx/extapps/GasOil/search/wells/index.cfm) for permit approvals.
b. For all new permits issued, the CPOC will notify the Municipal Designated Contact(s) in the municipality where the well will be located, as well as other departments, agencies, and officials with a need to know.
c. The CPOC will monitor the Environmental Notice Bulletin (ENB) on-line for final SEQR determinations associated with well pad construction involving an agricultural district or floodplain
d. The CPOC continually monitors SRBC's Water Resources Portal on their website for approvals for water withdrawal permits

4. Drill Start Date
   a. The municipality is notified by the Gas Operating Company of a drill start date. Although the DEC website eventually shows the drill start dates, the posting of this information often does not occur until long after the municipality has been notified. In addition, the gas operating companies typically do not notify the county of the start date. Therefore the CPOC must rely on the municipality to be made aware of this information.
   b. The Municipal Designated Contact(s) will notify the CPOC of the start date
   f. The CPOC will notify all other departments, agencies, and officials with a need to know.

5. Issues
   a. Emergencies should first be reported to the appropriate emergency services office
   b. The CPOC is to be notified of any and all issues
   c. The CPOC will notify all other departments, agencies, and officials with a need to know

6. Periodic Evaluation
   a. Hold periodic evaluation meetings to assess how procedures are working and adjust accordingly.

This process can and should be modified to change with whatever needs or conditions dictate. The most important point is to keep communications open between the key municipal and county officials.

Local Contacts

A full listing of local contacts in Tioga County that will be involved in natural gas drilling, including emergency responders, is located in Attachment **3A**.

Recommended Communications Strategy

This chapter outlines several procedures for communications to be undertaken at various times. The following strategy outlines these steps:

1. Designate a municipal point of contact specifically assigned to deal with the natural gas exploration and development issues who:
    a. Who has excellent communications skills
    b. Has access to and regularly uses email
    c. Will stay in contact with CPOC and act as the municipal liaison – will keep lines of communications open between their pertinent municipal officials and the CPOC/NGC Team
    d. Will notify the CPOC of any of the recommended strategies taken
    e. Will notify CPOC of drill start dates when town is notified
    f. Will notify CPOC of any updates needed in this Resource Binder

ATTACHMENT 3A

Tioga County Contacts
Local Directory

FIRE & EMS SERVICES

NAME	TITLE/AFFILIATION	LEVEL	PHONE NUMBER	e-mail
John Scott	Tioga County Fire Coordinator	County	725-4989	scottj@co.tioga.ny.us
Michael Roden	Apalachin Fire Chief	District	765-5605	chiefmjr@yahoo.com
Bret Welch	Berkshire Fire Chief	District	427-0964	bwelch@dos.state.ny.us
Rob Ziemba	Campville Fire Chief	District	972-4245	rob.ziemba@lmco.com
Jon Roman Jr	Candor Fire Chief	District	760-1697	Romanws6@yahoo.com
Ron Frisbie	Halsey Valley Fire Chief	District	589-6985	emtfriz2@aol.com
Ernest Tuetken	Newark Valley Fire Chief	District	221-2479	etuetken@yahoo.com
Truman Kittle	Nichols Fire Chief	District	699-3718	nfdchien71@gmail.com
Ed Bidwell	Owego Fire Chief	District	687-6880	owegofire@stny.rr.com
John Keener	Richford Fire Chief	District	237-7860	n/a
Chris Garland	Spencer Fire Chief	District	351-6663	Chrisgarlin280@yahoo.com
Milt Kemp	Tioga Center Fire Chief	District	699-3743	kemp@pronetisp.net
Don Howard	Waverly/Barton Fire Chief	District	565-4651	pizzaguy96@hotmail.com
Ron Holbrook	Weltonville Fire Chief	District	687-1732	weltonvillefire@yahoo.com
Frank Okrasinski	Southside Fire Chief	District	727-8070	frank.@okrasinski.com
Dave Curtis	Lockwood Fire Chief	District	742-1543	Dcurtis71@Yahoo.com
Connie Fedorowicz	Tioga County Deputy Coordinator - EMS	County	727-8606	federowicz@htva.net
Mike George	Apalachin EMS Captain	Squad	624-8304	mgeorgejr@gmail.com
Robin Shaver	Berkshire EMS Captain	Squad	321-5091	berkshireems@gmail.com
Scott Albrecht	Berkshire Fire Department EMS Captain	Squad	227-3915	Sja4@cornell.edu
Carl Laposky	Campville Captain	Squad	377-9552	Fire62L@yahoo.com
Tom Cotton	Candor Captain	Squad	972-3220	Tcotton23@yahoo.com
Michael Sackett	Halsey Valley Captain	Squad	589-4158	emtsackett@aol.com
Bob Russell	Nichols Captain	Squad	343-5169	Bobrussell23@gmai.com
Paul Cole	Owego Captain	Squad	972-7751	owegoems@stny.rr.com
Andy Hebbard	Spencer Captain	Squad	274-7937	ahebbard@ithaca.edu
Art Mayer	Tioga Center Captain	Squad	759-9292	tcfd@htva.net
Greater Valley EMS	Waverly/Barton area	Squad	570-888-6000	Pam_m@gvems.org
Doreen Holbrook	Weltonville Captain	Squad	761-8019	doreend@stny.rr.com
Karen Rathke	Southside Captain	Squad	237-9912	Karen@rathkeny.com
Judy Curtis	Lockwood Captain	Squad	598-2358	Lockwoodfd@extrope.net
John Emms	Lockheed Martin Captain	Squad	751-2821	John.emms@lmco.com
Ted Baxter	Sanmina Captain	Squad	689-5000	Ted.baxter@sanmina-sci.com

EMERGENCY MANGEMENT SERVICES

NAME	TITLE/AFFILIATION	LEVEL	PHONE NUMBER	e-mail
Richard LeCount	Tioga County Emergency Mgmt Officer	County	687-2023	tcemo@co.tioga.ny.us

LAW ENFORCEMENT

NAME	TITLE/AFFILIATION	LEVEL	PHONE NUMBER	e-mail
Gary Howard	Tioga County Sheriff	County	687-1010	howardg@co.tioga.ny.us
Rick McCulsky	Village of Owego Police Chief	Municipal	687-2234	
Grady Updike	Village of Waverly Police Chief	Municipal	565-2836	
Damir Lazaric	Village of Candor & Spencer Police Chief	Municipal	911	
	State Police Owego	NYS	687-3961	

ROADS

NAME	TITLE/AFFILIATION	LEVEL	PHONE NUMBER	e-mail
Tony Signorelli	NYS DOT Region 9 Traffic & Safety Engineer	State	721-8080	
Ken DelBianco	Tioga County Public Works Commissioner	County	687-0302	delbiancok@co.tioga.ny.us
Kevin Noble	Town of Candor Highway Superintendent	Municipal	659-4256	
Mark Clark	Town of Owego Highway Superintendent	Municipal	687-2641	
Karl Spoonhower	Town of Berkshire Highway Superintendent	Municipal	657-2705	
Charles Meade	Town of Newark Valley Highway Super't	Municipal	642-9927	nvhgwydept@stny.rr.com
William Foster	Village of Newark Valley Super of Public Wks	Municipal	642-8700	
Ron Traue	Town of Nichols Highway Superintendent	Municipal	699-3004	
Jeff Soules	Village of Owego Super of Public Works	Municipal	687-1101	soulsie@hotmail.com
Michael Holt	Town of Richford Highway Superintendent	Municipal	657-8003	
Dick Smith	Town of Spencer Highway Superintendent	Municipal	589-6711	
Frank Catalano	Town of Tioga Highway Superintendent	Municipal	687-4727	
Marvin Roberts	Village of Candor Public Works	Municipal	343-5963	
James Marshall	Town of Barton Highway Superintendent	Municipal	565-9476	

WATER QUALITY

NAME	TITLE/AFFILIATION	LEVEL	PHONE NUMBER	e-mail
Hans Peeters	Tioga County Health Department Director	County	687-8566	peetersh@co.tioga.ny.us
Erica Gifford	Tioga County Public Health Engineer	County	687-8489	gifforde@co.tioga.ny.us

PIPELINES

NAME	TITLE/AFFILIATION	LEVEL	PHONE NUMBER	e-mail
	Federal Energy Regulatory Commission	Federal		
	NYS Public Service Commission	State		
Wendy Walsh	Tioga County Soil & Water Conservation Dist	County	687-3553	walshw@co.tioga.nys.us

CHIEF ELECTED OFFICIALS

NAME	TITLE/AFFILIATION	LEVEL	PHONE NUMBER	e-mail
Dick Carey	Town of Barton	Municipal	565-9265	Barton.code@cyber-quest.com
Kyle McDuffee	Village of Waverly	Municipal	565-8106	mayor@waverlybarton.com
Michael Simmons	Town of Berkshire	Municipal	659-8678	townofberkshire@gmail.com
Steven Sparling	Village of Candor	Municipal	659-7966	ss110@cornell.edu
Darlene Cobler	Town of Candor	Municipal	659-3613	dwcobler@hotmail.com
Jim Tornatore	Village of Newark Valley	Municipal	642-3543	vonvmayor@stny.rr.com
Stu Yetter	Town of Newark Valley	Municipal	642-8746	nvsupervisor@stny.rr.com
Esther Woods	Village of Nichols	Municipal	699-3406	e_woods32667@yahoo.com
Jim Branston	Town of Nichols	Municipal	699-3151	jbranston@stny.rr.com
Ed Arrington	Village of Owego	Municipal	687-1710	mayor-vofowego@stny.r.com
Don Castellucci	Town of Owego	Municipal	687-0123	dcastellucci@townofowego.com
Martin Wilcox	Town of Richford	Municipal	657-8295	martisw51@hotmail.com
Kevin Perry	Village of Spencer	Municipal	589-4210	insemin8r@ao.com
Arvo Rautine	Town of Spencer	Municipal	589-6447	arvo1@htva.net
Lewis Zorn	Town of Tioga	Municipal	687-0241	LZorn@verizon.net
Dale Weston	Tioga County	County	687-8240	westond@co.tioga.ny.us

SOLID WASTE

NAME	TITLE/AFFILIATION	LEVEL	PHONE NUMBER	e-mail
Ellen Pratt	Tioga County Solid Waste Manager	County	1-800-927-2323	pratte@co.tioga.ny.us

E911 ADDRESS CONTACTS

NAME	TITLE / AFFILIATION	MUNICIPALITY	PHONE NUMBER	e-mail
Jim Marshall	Highway Superintendent	Town of Barton	565-9476 343-5573 (c)	
Lee Virtue	Code Enforcement Officer	Town of Berkshire	760-5551	
Jim Douglas	Code Enforcement Officer	Town of Candor	659-3175 x4	candorcodes@cnymail.com
Tom Larson	Code Enforcement Officer	Town of Newark Valley	642-3617	nvcode@stny.rr.com
John Stubecki	Fire Department	Town of Nichols	699-3862	
Debra Standinger	Planning & Zoning Administrator	Town of Owego	687-0123 x5	dstandinger@townofowego.com
Chris Engst	911 Coordinator	Town of Richford	657-2537	
Mike Katchmir	Code Enforcement Officer	Town of Spencer	589-4051	
Brenda Middendorf	Town Clerk	Town of Tioga	687-2292	

ECONOMIC DEVELOPMENT & PLANNING

NAME	TITLE / AFFILIATION	LEVEL	PHONE NUMBER	e-mail
Doug Barton	TC EDP Director	County	687-8255	bartond@co.tioga.ny.us
Elaine Jardine	County Planning Director	County	687-8257	jardinee@co.tioga.ny.us
Martha Saurbrey	Tioga County Chamber of Commerce Director	County	687-2020	business@tiogachamber.com
Debra Standinger	Planning & Zoning Administrator	Town of Owego	687-0123 x6	dstandinger@townofowego.com

Chapter 4: Land Use

Chapter 4: Land Use

Introduction

While NYS DEC through Article 23, Title 3 §23-0303(2.) of the Environmental Conservation Law has mostly exempted oil and gas drilling from local land use control and permitting, there are a few key land use regulations that apply to natural gas non-drilling, or ancillary/incidental, activities at the local level. Ordinances covered in this Chapter that can regulate these types of uses are site plan review, noise control and light control. Incidental or ancillary uses that can be regulated by a municipality include pipe yards, chemical storage and other warehouse facilities, compressor stations, waste disposal facilities and any other service business to the gas drilling companies.

Additionally, the Susquehanna River Basin Commission (SRBC) permit applications for water withdrawal sites for the natural gas industry are subject to a municipal site plan review ordinance.

Most importantly gas companies *must* comply with each municipality's floodplain ordinance. The gas company must apply for a floodplain development permit for all gas well-drilling pads and incidental uses proposed to be located within the 100-year floodplain.

A Municipal Land Use Matrix is located at the end of this chapter in Attachment **4A.** This table shows which municipalities have the ordinances listed in this chapter, as well as other ordinances that are described in other chapters of this binder.

Contained Within This chapter:

- ***Noise Mitigation and Model Noise Ordinance***
- ***Effective Lighting Principles***
- ***Model Light Ordinance***
- ***Site Plan Review Ordinance***
- ***Local Floodplain Permitting***
- ***Fees***

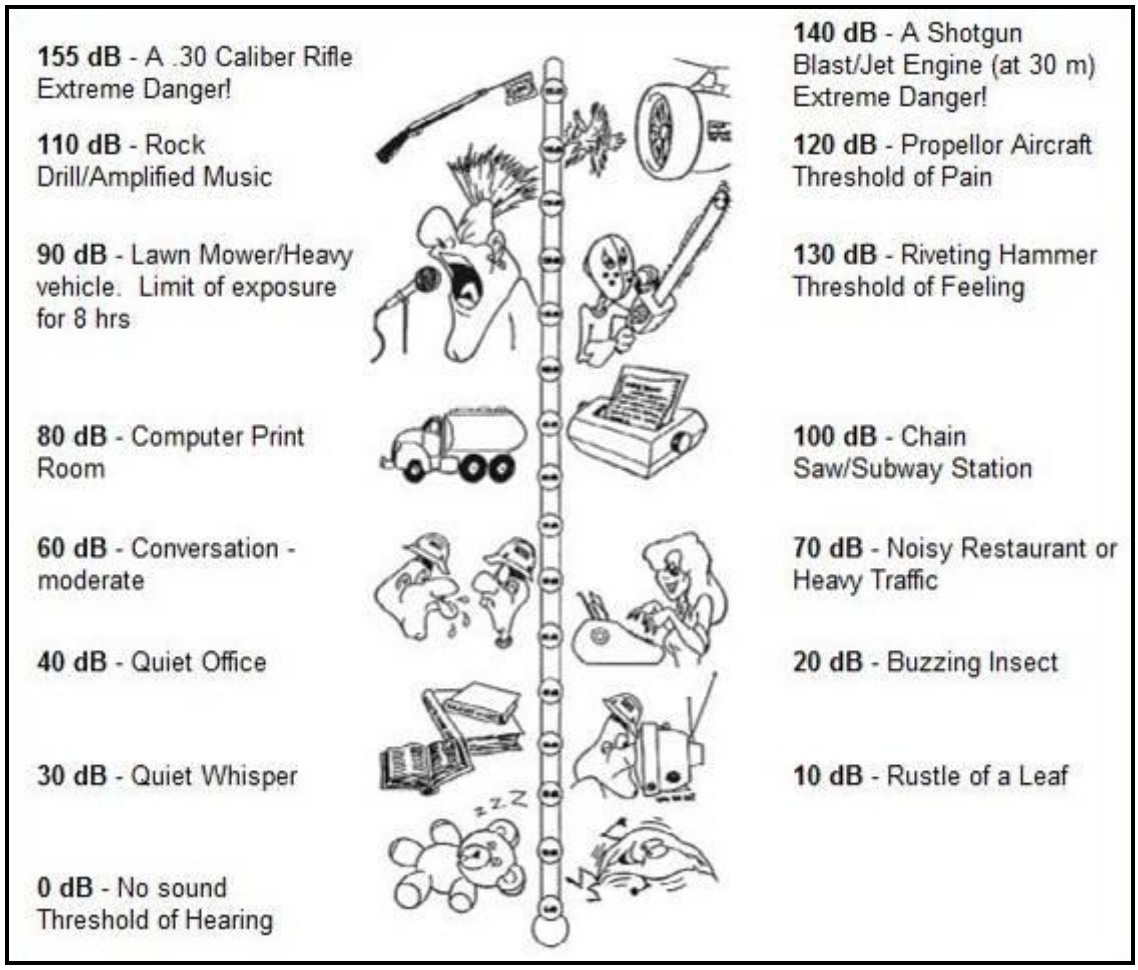
Noise Mitigation

Introduction

Noise impacts human health in a variety of ways. Noise pollution is defined as any sound that is "unwanted when it either interferes with normal activities such as sleeping, conversation, or disrupts or diminishes one's quality of life" (EPA). Noise pollution can result in annoyances and complaints by residents and users in adjacent properties to the noise source, while in extreme cases, it can result in hearing loss, sleep disruption, speech interference, and high blood pressure. A municipality can

therefore develop a noise control ordinance to have measures in place to mitigate the impacts of noise on citizens. This includes noise generated from any industry located within a town or village.

The following are things to consider when crafting a noise control ordinance.



Effects of Noise on Human Hearing:

The figure above shows common noise sources and their associated decibel levels. This information becomes important when enforcing noise control regulations. A noise control ordinance should state clearly what constitutes a violation either in terms of time of day and or decibel levels. And thresholds should be stated as either absolute decibels levels, as illustrated above, or the difference between ambient noise level (with nuisance noise) and background (without nuisance noise) noise level. This sets up the only effective means of enforcing noise control regulations. Some specific information on decibel levels affecting human hearing is:

- Prolonged exposure at 90 dB can result in permanently damaged auditory nerves 120 dB can cause pain and ringing in the ear
- At 140 dB, subject will experience sharp pain and extensive destruction of the auditory nerves

- At 150 – 160 dB the massive destruction of the auditory nerves and persistent ringing in the ears will occur immediately

Again, these thresholds should be kept in mind when setting enforcement criteria in a noise control ordinance.

General Principles for Noise Mitigation:

- Reduce noise frequency
- Reduce noise duration
- Reduce noise sound pressure levels

Suggestions for Noise Mitigation:

- Replace back-up beepers on machinery with strobe lights
- Use appropriate mufflers
- Modify machinery by using noise control covers, plastic liners, dampening plates, and pads on metal surfaces
- Limit and specify the number of hours/days of operation
- Limit industrial activity to normal work day hours
- Increase noise setback distance
- Move processing equipment further from the receptors
- If possible, substitute for quieter equipment
- Ensure equipment is regularly maintained
- Enclose processing equipment in buildings
- Erect sound barriers
- Phase operations to preserve natural barriers (ex. trees)
- Require construction activities and industrial facilities to utilize noise barriers (see below)

Types of Noise Barriers for Industrial Uses:

Gabions, which are wire baskets filled with stones, are quite popular as sound barriers because of their natural appearance. These sound barriers are also quite easy to maintain and durable (http://www.maccaferri-northamerica.com/images/sce/gabion_rw2_l.jpg).

Examples of Industrial Noise Absorbers for Compressor Stations, Pipelines, and Ancillary Facilities:

Industrial quilted fiberglass absorbers prevent noise from "bouncing" up over the enclosure (http://www.soundseal.com/barricade/barricade-community-noise.shtml).

Measurement of Noises from Construction or Industrial Activities:

1) The measurement location and time period for measuring construction/industrial activity noise should be the same as those used in background or pre-construction noise levels.

2) Depending on the ordinance or noise regulation of a particular municipality, noise measurements usually take place in exterior locations and under the following conditions:

i. At the property line closest to the construction or industrial activity;
ii. At a residence or other sensitive receptor; and
iii. At the point of closest frequent human activity.\

3) If there is a high concentration of activity, it would be a good idea to measure the noise levels throughout the entire operation.

4) Noise levels and ranges for stationary and mobile equipment can be found here: http://www.fhwa.dot.gov/environment/noise/handbook/09.htm

Suggested Sound Mitigation References:

These references provide useful information regarding various aspects of noise mitigation that can be used when developing a noise ordinance:

ATCO Structures & Logistics: http://www.atconoise.com/default.html

A review of projects undertaken by ATCO for sound mitigation in the oil and gas industry: http://www.atconoise.com/project_examples/oil_gas.html

Sound Seal: http://www.soundseal.com/barricade/barricade-index.shtml

Useful guide for products associated with different noise problems: http://www.soundseal.com/search-by-noise-problems.shtml

Report on soundproofing an oil/gas site in Tennessee: http://www.soundseal.com/pdfs/TennGas.pdf

Sound Seal is a suggested vender for the city of New York: http://www.soundseal.com/barricade/ny-guidance-sheet.shtml

Ono Sokki: http://www.onosokki.co.jp/English/english.htm

Integrating Sound Level Meter:
http://www.onosokki.co.jp/English/hp_e/products/keisoku/s_v/la1400_4400.html

Model Noise Ordinance

Drawing from existing noise ordinances that are implemented in Tioga County (specifically Newark Valley, Owego, and Barton) and other counties (Tompkins County), a draft model noise ordinance that can be adopted by municipalities countywide is included below. A summary of the sources that have

been consulted on drafting this model noise ordinance can be found in Chapter 12 Resources and References, under sub-heading "Sources Consulted for Model Noise Ordinance" of this Binder.

Title

This chapter shall be known as the "Noise Control Ordinance of **[municipality]**"

Findings

It is found and declared that:

A. The making, creating or maintaining of such loud or unreasonably intrusive noises is a detriment to the health, comfort, convenience, safety, welfare and prosperity of the residents of the **[municipality]**.

B. The purpose of this chapter is to preserve the public health, peace, comfort, repose, welfare, safety and good order by suppressing the making, creating, or maintaining of such loud or unreasonably intrusive noises, which are detrimental to the environment.

C. It is hereby declared as a matter of legislative determination and public policy that the provisions and prohibitions hereinafter contained and enacted are in the public interest and in pursuance of and for the purpose of securing and promoting the health, comfort, convenience, safety, welfare and prosperity of the residents of the **[municipality]**.

Definitions:

DECIBEL (dB) – A unit for measuring the volume of sound, equal to 20 times the logarithm to the base 10 of the ratio of the sound pressure of 20 micronewtons per square meter.

LOUD NOISE - Any sound which produces a sound level of 70 decibels or more as measured on the A scale of a standard sound-level meter having characteristics defined by the American National Standards Institute specifications for sound level meters S1.4-1971, as amended, said sound level being measured by a microphone placed no closer than a distance of 50 feet plus or minus five feet from any property line of the premises on which the sound occurs.

SOUND DEVICE – Any apparatus or device for the making, reproducing or amplification of the human voice or other sounds, including but not limited to **[insert other sound devices]**.

UNREASONABLY INTRUSIVE NOISE – Any sound that either annoys, disturbs, injures or endangers the comfort, repose, health, peace or safety of a reasonable person of normal sensitivities under the circumstances. Any prolonged sound that is excessive, unnecessary, unnatural or unusually loud, in their time, place, and use.

Unreasonably intrusive noise prohibited

A. No person shall intentionally cause public inconvenience, annoyance, alarm, or recklessly create a risk thereof, by making unreasonably intrusive noise or by causing unreasonable intrusive noise to be made.

B. The factors to be considered in determining whether a noise is an unreasonably intrusive noise which constitutes a prohibited noise shall include, but not be limited to, one or more of the following:

1. The volume of the noise.

2. The intensity of the noise.

3. Whether the nature of the noise is usual or unusual.

4. Whether the origin of the noise is natural or unnatural.

5. The volume and intensity of the background noise, if any.

6. The proximity of the noise to residential sleeping facilities.

7. The nature and the zoning district of the area within which the noise emanates.

8. The time of day or night the noise occurs.

9. The time duration of the noise.

10. Whether the noise is temporary.

11. Whether the noise is continuous or impulsive.

12. The existence of complaints concerning the noise from one or more persons who are affected by the noise.

Enumeration of unreasonably intrusive noises

A. Horns, signaling devices, etc: The sounding of any horn or signaling device on any automobile, motorcycle, bus, truck, or other vehicle while stationary except as a danger signal or warning signal; the sounding of any such horn or signaling device for an unnecessary period of time.

B. Yelling: Yelling, shouting, crying, hooting, whistling or singing between the hours of 11:00 p.m. and 9:00 a.m., prevailing time, in, on, near or adjacent to any public street, road, park or residential place in the **[municipality]**, so as to be distinctly audible **[insert decibels]** upon any such street, park or residential place in the **[municipality]**.

C. Sound devices at night: The using or operating of (or permitting to be played, used or operated) any sound device between the hours of 11:00 p.m. and 9:00 a.m., prevailing time, in such a manner as to be **plainly audible at a distance of 50 feet [or can be put in decibels]** from any property line of the premises on which sound occurs.

D. Sound devices in public places: The using or operating of (or permitting to be played, used or operated) any sound device for commercial, business, or industrial purposes at any time or for any purpose between the hours of 11:00 p.m. and 9:00 a.m., prevailing time, in, on, near or adjacent to any

public street, park or residential place in the **[municipality]** so as to be distinctly audible upon any such street, park or residential place in the **[municipality].**

E. Exhausts: The discharge into the open air of the exhaust of any device, including but not limited to any steam engine, motor vehicle engine, or stationary internal combustion engine, except through a muffler or other device which will effectively prevent loud or explosive noises there from.

F. Heavy machinery: The operation of compressors, pumps and generators between the hours of 11:00 p.m. and 9:00 a.m., prevailing time, on private property closer than 200 feet to any residences (except the residence of the owner or operator thereof or any residences to which the owner or operator thereof may be invited).

G. Construction work, including but not limited to building, repairing, blasting, grading, leveling and excavating, during the hours between 11:00 p.m. and 9:00 a.m. every day of the week.

H. Heavy trucks: The operation of loading trucks, forklifts, front end loaders, and heavy trucks between the hours of 11:00 p.m. and 9:00 a.m. on municipal roads is prohibited.

I. Noise in conduct of business: The creation of noise exceeding **[input decibels]** within **[insert appropriate distance]** of schools, institutions or residential areas, in the operation, conduct and/or maintenance of any business, factory, plant, yard or manufacturing establishment, including excavating, blasting (where permitted), grinding, breaking, crushing or processing of any substance or materials.

J .External Industrial Noise: In cases of industrial activities not enclosed within a building, some type of barrier must be erected to mitigate impacts to residential neighbors.

Methods of measurement

The measurement of any sound or noise shall be made with a sound-level meter using an A-scale decibel level.

Prohibition

No person shall make, continue or cause or permit to be made or continued in the **[municipality]** any loud or unreasonably intrusive noise.

Exceptions

[Each town/village should decide on their exceptions to this rule]

A. Sounds created by any government agency or railroad agency by the use of public warning devices are exempted from the limitations of this chapter.

B. Sounds connected with emergency situations are exempted from the limitations of this chapter.

C. Sounds produced by compression release engine brakes on municipal-owned snow removal equipment.

Penalties for offenses

A. Any person violating any provision of this chapter shall, upon conviction, be punished for a violation by a fine not exceeding $250, or by imprisonment for a term not exceeding 15 days, or by both such fine and imprisonment.

B. Each day during which the prohibited activity continues shall constitute a separate violation.

Enforcement

A. The provisions of this chapter shall be enforced by the local policing agency **[insert municipal police]** or other officials designated by the Town Board of the **[municipality]**.

Penalties for offenses by municipalities that have adopted noise ordinances:

Municipality	**Penalty**
Village of Newark Valley	$250, 15 days imprisonment
Town of Barton	$1000, 15 days imprisonment
Village of Owego	$250, 15 days imprisonment

Effective Lighting Principles

Introduction:

Lighting is integral to our everyday activities. It is crucial for providing safety by illuminating dark areas. However, the pollution generated from poorly-designed lighting goes against efforts to conserve energy, protect wildlife in their natural habitat, maintain property values, and preserve the dark night sky.

Specific types of light pollution include:

1) **Light trespass** occurs when unwanted light spills beyond the boundary of the property on which a light is located. Put simply, it is bright lighting on an area that would otherwise be dark. Light trespass is due to high or poorly positioned lights. In this picture, light from the luminaire spills over to the rooms of the building:

(http://www.darkskysociety.org/images/gallery/tenthstreet.jpg).

2) **Over-illumination** occurs when the use of light is well beyond what is required for an activity. For example, many indoor and outdoor areas have lights on when no people are present. Even though security is a reason for lighting areas that have vacated people, the lighting used is often excessive for the stated purpose.

A good lighting ordinance will enable:

- Energy conservation (i.e. money saved)
- Safety
- Natural resource conservation
- Better neighbor relations
- The retention of the community's character
- The preservation of the night sky
- The protection of the ecosystem
- The reduction of health risks

Lighting regulations can be incorporated into either a zoning or site plan review ordinance, or be a stand-alone ordinance. Because of the pre-emption clause in the Oil & Gas Act of 1984, local governments cannot specifically regulate the activities (such as lighting) related to gas development. Adverse effects of gas companies' activities can be considered when drafting the lighting principles and model light ordinance.

The following are general lighting principles. Light mounting principles can guide developers about exterior on-site lighting. Complementing the principles is a series of illustrations showing how light pollution can be mitigated by specific policies that can be implemented by municipalities.

General Principles for Good Lighting

1. Use only the light needed: Identify where and when light is needed. Do not over-light or spill light off your property. The appropriate amount of light is dependent on the activity: if you are walking on a sidewalk, even the light of a full moon is sufficient.

2. Aim lights downward by choosing the correct lighting fixtures: Use "full-cutoff shielded" fixtures that keep light from going uselessly up or sideways. Full-cutoff fixtures produce minimum glare. They increase safety because people see illuminated area instead of dazzling bulbs.

3. Install fixtures carefully: Careful light placement will target the right area and minimize the light's impact elsewhere. Most lights are aimed at too high an angle. Try to install outdoor lighting at night, so you can test to see that it is properly aimed and shielded.

4. Use "shut off" devices such as sensors, timers, and motion detectors: Business lights should turn off after closing time. Home security lights can be on a motion-detector switch, which saves electricity and provides deterrents to intruders.

5. Higher mounting heights can often be more effective in controlling spill light: Floodlights with a narrower beam may be used and aimed in a more downward direction, making it easier to confine the light to the design area.

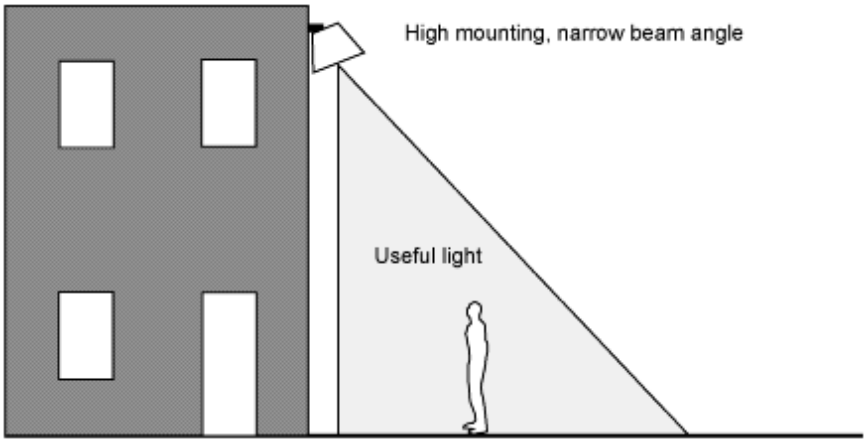
6. Lower mounting heights increase the spill light beyond the property boundaries. To illuminate the space satisfactorily, it is often necessary to use floodlights with a broader beam and to aim the floodlights in directions closer to the horizontal than would occur when using higher mounting heights.

7. Lower mounting heights make bright parts of the floodlights more visible: Low floodlights risk light spill and can increase glare.

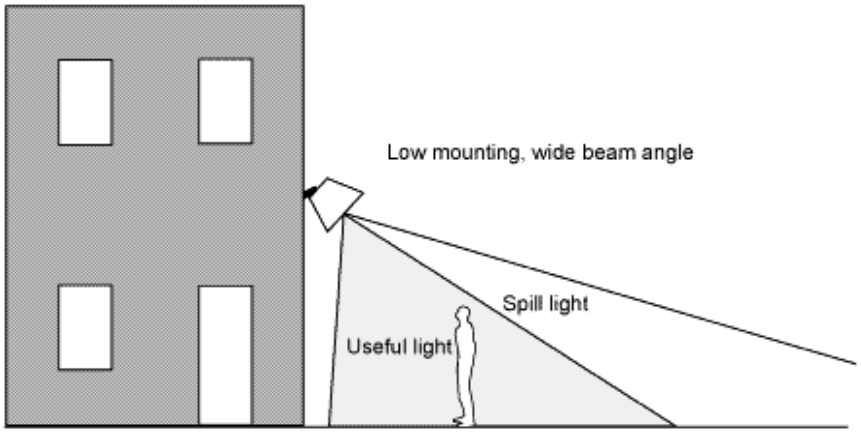
8. Select the appropriate bulb type: Suggested bulb types are compact fluorescent (2300K) or High Pressure Sodium.

Any of these previous principles can be specified in a site plan review ordinance under lighting considerations in lieu of adopting an entire light control ordinance. Illustrations of these principles follow. Again, the main purpose of mitigating lighting impacts is to prevent spill onto adjacent properties. These illustrations show how low-impact lighting should be designed.

"Good" Lighting versus "Bad" Lighting, Part 1

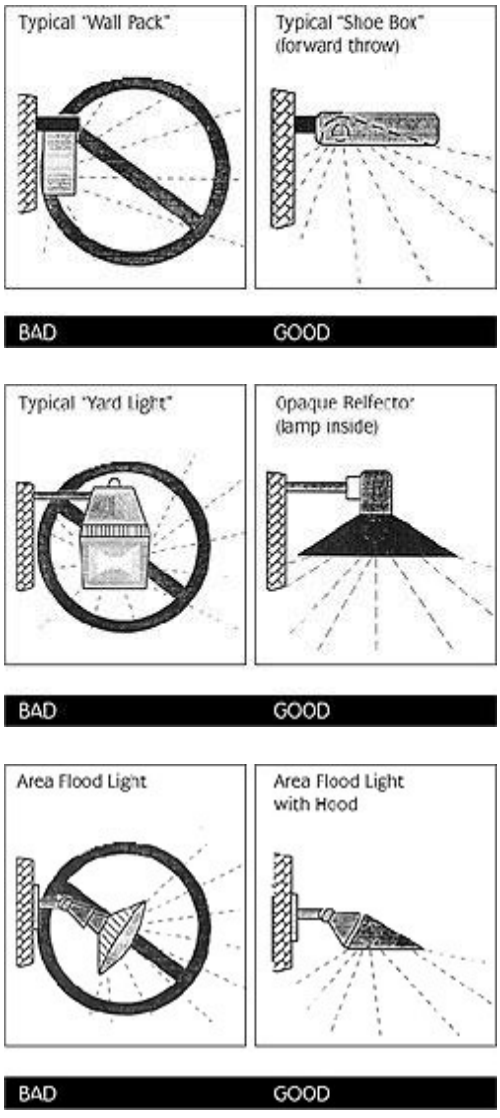


Floodlight at a **higher** mounting height with narrow beam angle, resulting in **less** spill light.



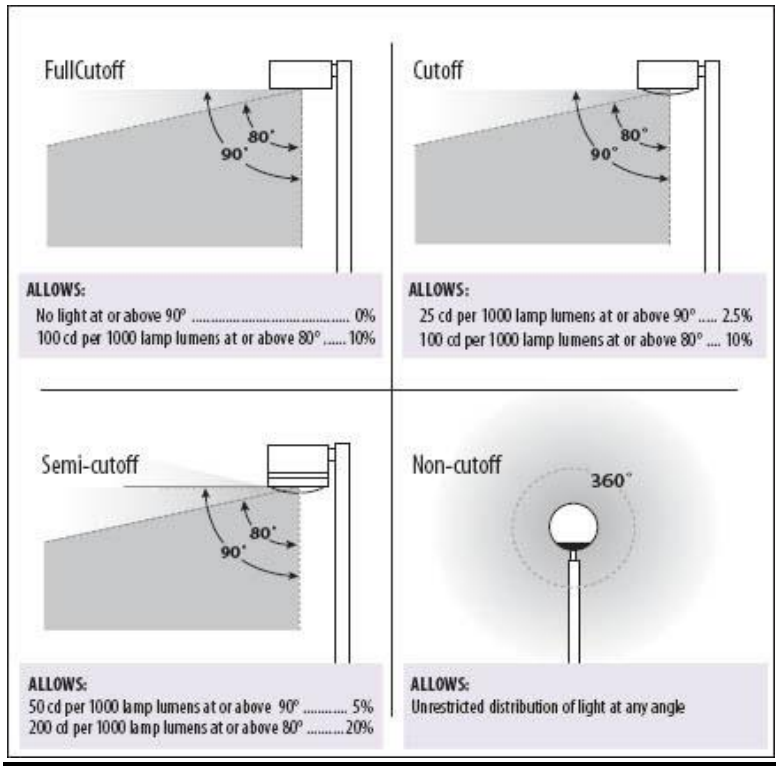
Floodlight at a **lower** mounting height with wider beam angle, resulting in **more** spill light.

"Good" Lighting versus "Bad" Lighting, Part 2



Lights should be shielded to minimize light spill.

How Light Fixture Design Affects Light Spill



Pole-mounted light design and light spill.

Classification	Definition	Benefits	Limitations
Full Cutoff	Zero intensity at or above horizontal (90° above nadir) and limited to a value not exceeding 10% of lamp lumens at or above 80°.	Limits spill light onto adjacent property, reduces glare. No light is emitted directly from the luminaire into the sky.	May reduce pole spacing to maintain uniformity and increase pole and luminaire quantities.
Cutoff	Intensity at or above 90° (horizontal) no more than 2.5% of lamp lumens, and no more than 10% of lamp lumens at or above 80°.	Small increase in high-angle light allows increased pole spacing.	May allow some uplight from luminaire. Typically a small overall impact on sky glow.
Semi-Cutoff	Intensity at or above 90° (horizontal) no more than 5% of lamp lumens and no more than 20% at or above 80°.	High-angle light accents taller vertical surfaces such as buildings. Most light is still directed downward.	Little control of light at property line. Potential for increased glare when using high wattage luminaires. Typically directs more light into the sky than cutoff.
Non-cutoff	No limitations on light distribution at any angle.	Uniform luminous surfaces such as internally illuminated signs or globes. Wattage should be limited. Suitable for sports lighting, facade, landscape or other applications where luminaires are tilted due to limitations in pole or fixture locations.	Location and aiming are critical. Most likely of all categories to produce offensive brightness and sky glow.

Pole-mounted light design and light spill descriptions.

Model Light Ordinance

The municipalities in Tioga County currently have no light ordinances in place. This model ordinance is meant to address two concerns:

1) Different levels of regulation and enforcement between municipalities may complicate compliance with all lighting regulations.

2) Increased commercial and industrial activity in upstate New York may increase the number of lighting conflicts between neighbors. Drawing from existing light ordinances that are implemented in other NY State Counties; a model light ordinance that can be adopted by municipalities county-wide is provided below. A summary of the sources that were consulted on drafting this model light ordinance can be found in Chapter 12 Resources and References, under sub-heading "Sources Consulted for Model Light Ordinance" of this Binder.

Title

This chapter shall be known as the "Light Control Ordinance of the **[municipality]**".

Findings

It is found and declared that:
A. The purpose of this law is to provide specific guidelines for site plan applications and standards in

regards to lighting, in order to maximize the effectiveness of site lighting, to avoid unnecessary upward illumination and illumination of adjacent properties, and to reduce glare.

B. Lighting plans for development activities when unregulated can become obtrusive and impact the character, safety and quality of life of **[municipality]**. Obtrusive aspects such as glare, light trespass, energy waste, and sky glow, can have serious consequences for the public health, safety and welfare.

B. The increase in hazardous road glare and light pollution from private area floodlighting located within the state right-of-way is a detriment to the health, comfort, convenience, safety, welfare and prosperity of the residents of the **[municipality].**

C. It is hereby declared as a matter of legislative determination and public policy that the provisions and prohibitions hereinafter contained and enacted are in the public interest and in pursuance of and for the purpose of securing and promoting the health, comfort, convenience, safety, welfare and prosperity of the residents of the **[municipality].**

D. All previous language in **[municipality]** bylaws and ordinances regarding outdoor lighting is replaced with this ordinance.

Definitions

CUT-OFF LUMINAIRE – A luminaire in which 2.5 percent or less of the lamp lumens are emitted above a horizontal plane through the luminaire's lowest part and ten percent or less of the lamp lumens are emitted at a vertical angle 80 degrees above the luminaire's lowest point.

DIRECT LIGHT – Light that can be seen directly from the light source and other light-emitting or reflecting elements of the luminaire.

GLARE – Direct light emitting from a luminaire that causes reduced vision or momentary blindness.

FLOODLIGHT – Any luminaire fitted with a lamp having an output greater than one thousand eight hundred lumens intended for private area lighting and mounted on a utility pole within the state right-of-way.

FOOTCANDLE (FC) – The American unit of illuminance (the amount of light falling on a surface). One footcandle is approximately equal to the illuminance produced by a light source of one candle, measured on a surface one foot away from the source. Horizontal footcandles measure the illumination striking a horizontal plane. Footcandle values can be measured directly with certain hand-held incident light meters.

IESNA – Illuminating Engineering Society of North America (IES or IESNA), an organization that establishes updated standards and illumination guidelines for the lighting industry.

INDIRECT LIGHT – Direct light that has been reflected or has scattered off of other surfaces.

LAMP – The component of the luminaire that produces the actual light.

LIGHT POLLUTION – Night sky glow caused by the scattering of artificial light in the atmosphere.

LIGHT TRESPASS – Light emitted by a luminaire that shines beyond the boundaries of the property on which the luminaire is located.

LIGHTING – Light produced by man-made sources, including electric lamps, gas lamps, and similar sources.

LIGHTING ZONE – A designation assigned by [municipality] for specified parcels, areas or districts within its jurisdictional boundaries defining allowable ambient lighting levels, operational characteristics and other control criteria.

LUMEN – A unit of luminous flux. One footcandle is one lumen per square foot. For the purposes of this ordinance, the lumen-output values shall be the initial lumen output ratings of a lamp.

LUMINAIRE – The complete lighting unit assembly (fixture), consisting of a lamp, or lamps and ballast(s) (when applicable), together with the parts designed to distribute the light (reflector, lens, diffuser), to position and protect the lamps, and to connect the lamps to the power supply.

NEW LIGHTING – Lighting for areas not previously illuminated; newly installed lighting of any type except for replacement lighting or lighting repairs.

OBTRUSIVE LIGHT – Light that produces sky glow, light trespass, glare or other undesirable environmental impacts.

OUTDOOR LIGHTING FIXTURE –

(a) Any type of fixed or movable lighting equipment that is designed or used for illumination outdoors and includes:

(I) Area lighting; and

(II) Billboard lighting, street lights, searchlights, and other lighting used for advertising purposes.

(b) "Outdoor lighting fixture" does not include lighting equipment that is required by law to be installed on motor vehicles or lighting required for the safe operation of aircraft or watercraft.

PROJECT – Installation of a lighting system under a single electrical permit or for a specific construction or gas drilling project, multiple permits when required for phased construction or drilling.

UPLIGHTING – Any light source that distributes illumination above a 90-degree horizontal plane.

Placement, height of fixtures, and illumination standards for residential and nonresidential exterior lighting

A. All exterior lights and illuminated signs shall be designed, located, installed and directed in such a manner as to prevent objectionable light, direct illumination, or glare across the property lines and glare at any location on or off the property.

B. Adjacent to residential property, no direct light source will be visible at the property line at ground level or above.

C. All building lighting for security or aesthetics will be full cut-off or a shielded type, not allowing any upward distribution of light. Floodlighting is discouraged, and if used, must be shielded to prevent:

1. Glare for drivers or pedestrians

2. Light trespass beyond the property line, and

3. Light above a 90 degree horizontal plane. Wall pack type fixtures are not acceptable.

D. All non-essential lighting will be required to be turned off after business hours, leaving only the necessary lighting for site security. ("Non-essential" can apply to: display, aesthetic, parking and sign lighting).

E. All area exterior lights shall be full cutoff luminaire.

F. Any luminaire with a lamp or lamps rated at a total of more than 1800 lumens, and all flood or spot luminaire with a lamp or lamps rated at a total of more than 900 lumens, shall not emit any direct light above a horizontal plane through the lowest direct-light-emitting part of the luminaire.

G. Any luminaire with a lamp or lamps rate at a total of more than 1800 lumens, and all flood or spot luminaire with a lamp or lamps rated at a total of more than 900 lumens, shall be mounted at a height equal to or less than the value 3 + (D/3), where D is the distance in feet to the nearest property boundary. The maximum height of the luminaire may not exceed **[insert proper height].**

Prohibitions

A. It shall be unlawful for any person, firm, owner, tenant, person in possession, partnership, corporation or other business entity to install, alter, repair, move, equip, use or maintain any exterior lighting in violation of any of the provisions of this article, or to fail in any manner to comply with a notice, directive or order of the Chief Building Inspector of the **[municipality].**

B. Uplighting is prohibited. Externally lit signs, display, building and aesthetic lighting must be lit from the top and shine downward. The lighting must be shielded to prevent direct glare and/or light trespass. The lighting must also be, as much as physically possible, contained to the target area. Internally lighted signs are acceptable.

C. Unshielded wall packs and floodlights are prohibited.

D. The operation of searchlights or strobe lights is prohibited.

E. The installation of any mercury vapor fixture or lamp for use as outdoor lighting is prohibited.

Applicability, Non-conforming fixture, Exceptions

A. All exterior lighting, installed, replaced, altered, changed, repaired or relocated after the effective date of this article shall conform to the provisions established by this article except as provided hereto.

B. No outdoor lighting fixture or use which was lawfully installed on implemented prior to the enactment of this Code shall be required to be removed or modified. However, no modifications or replacement shall be made to a non-conforming fixture unless the fixture thereafter conforms to the provisions of this Code, except that identical lamp replacement is allowed.

C. Vehicular lights and all temporary emergency lighting needed by the fire, ambulance, police departments or other emergency services are exempt.

D. Holiday exterior lighting. Holiday exterior lighting lit between October 15 and January 15 of the following year.

E. Luminaire for municipal playing fields and new municipal streetlights shall be exempt from the height restriction, provided all other provisions of this article are met.

F. Upward flagpole lighting is permitted for federal state and local government flags only, and provided that the maximum lumen output is 1300 lumens. Flags are encouraged to be taken down at sunset to avoid the need for lighting.

Enforcement

A. Any application submitted to any board, department, division or agency of the **[municipality]** shall include exterior lighting plans, luminaire and controls specifications and additional documentation if any exterior lighting is to be used, showing the following, in order to verify that exterior lighting conforms to the provisions of this article:
(1) Location of each current and proposed outdoor exterior lighting fixture indicated on a site plan.
(2) Type of luminaire equipment, including cutoff characteristics, indicating manufacturer and model number.
(3) Lamp source type, lumen output, and wattage.
(4) Mounting height indicated, with distance noted to nearest property line, for each proposed and existing luminaire.
(5) Shielding and all mounting details, including pole foundation description.
(6) Initial illuminance levels as expressed in foot-candle measurements on a grid of the site showing foot-candle readings in every five-foot square. The grid shall include light contributions from all sources (i.e., pole-mounted lights, wall-mounted lights, and signs, including streetlights).
(7) Statement of the proposed hours when each luminaire will be operated.
(8) Total exterior lighting lamp lumens for proposed property.
(9) Lighting manufacturer specifications ("cut sheets") with photographs of the fixtures, indicating the cutoff characteristics of the luminaire.
(10) Detailed IESNA-formatted photometric data for each fixture at mounting height and lumens proposed. (Note: This is computer-generated data which is supplied by all manufacturers, describing the light output of a fixture, upon which lighting plans are based. This will allow the Planning Department to fully assess the suitability of a fixture in a lighting plan, should they wish to double check the submission.)
(11) Types of timing devices used to control on/off.
(12) If necessary, documentation by a licensed lighting engineer showing that the provisions can only be met with a design that does not comply with this article.
B. No exterior lighting shall be installed, replaced, altered, changed, repaired, relocated, enlarged, moved, improved, or converted unless it conforms to a lighting plan approved by the applicable reviewing board, department, division or agency of the **[municipality].**

C. The Chief Building Inspector shall cause a notice of such violation to be served on the owner or person in possession of the building, structure or lot where said exterior lighting is located or the lessee or tenant of the part of or of the entire building, structure or lot where said exterior lighting is located requiring such owner, person in possession, lessee or tenant to remove such illegal exterior lighting within 30 days. Such notice may be served personally or by certified mail, return receipt requested, and shall notify the owner, lessee or tenant that the failure to remove said exterior lighting may result in the issuance of an appearance ticket and/or an action in Supreme Court seeking the removal of said exterior lighting.

Penalties

A. Any person or corporation who shall violate any of the provisions of this article, or fail to comply therewith, or with any of the requirements thereof, or who shall build or alter or use any building or land in violation of any detailed statement or plan submitted and approved hereunder, shall be guilty of a misdemeanor, punishable by a fine not exceed $500 or imprisonment for a period not to exceed 15 days, or both.

B. Each day's continued violation shall constitute a separate additional violation.

C. The owner or owners or lessee of any building or premises, or part thereof, where anything in violation of this article shall be placed, or shall exist, and any architect, builder, contractor, agent, person or corporation employed in connection therewith, and who have assisted in the commission of any such violation, shall each be guilty of a separate offense and upon conviction thereof, shall be fined as herein provided.

Site Plan Review

A site plan is a drawing or sketch prepared to specifics in an ordinance which shows the arrangement, layout and design of a proposed use on a single parcel of land. Site specific review considers elements such as building location, traffic access, internal traffic circulation, parking, signage, lighting, landscaping, impact to adjacent land uses, drainage and grading, and any other elements specified by the governing body. A full site plan review ordinance contains the applicability circumstances, requirements of what should be contained on a site plan any supplemental information required, and specific considerations for review. An application must also be an accompaniment.

Generally a municipality's planning board has the power to review site plans, but a governing board can assign to another existing board or appoint a new board for this power.

Site plan review is invoked in an ordinance by either a new use on a parcel of land or a change in land use. Agricultural uses and single family residences are typically exempted from site plan review. Cases within 500 feet of county or state property must be reviewed first by a county planning board for recommendation prior to a local board's final decision.

Susquehanna River Basin Commission Permitted Water Withdrawal Site

As stated in the previous Communications chapter, the Susquehanna River Basin Commission regulates water withdrawal and consumption over a threshold volume in the Susquehanna River Basin. However, SRBC has recently changed its regulations to be inclusive of all water usage for the natural gas drilling industry within the Susquehanna River Basin. Therefore, all gas-drilling related water withdrawal or consumptive uses must go through the SRBC permitting process, regardless of projected quantity. The SRBC requires gas companies to notify municipalities that the proposed site is located within their municipality when a permit has been applied for. This action is then subject to a municipality's site plan review ordinance, if one exists. The CPOC will monitor SRBC's website for new water withdrawal permit applications and approvals located within Tioga County and notify the Municipal Designated Contacts accordingly.

Ancillary/Incidental Uses

Incidental uses to the gas exploration and development industry include business and uses such as warehousing, pipe yards, compressor stations, scrap yards, staging areas, SRBC water withdrawal sites (as mentioned above) and service businesses. Service businesses that exist in Tioga County today include NOMAC (Chesapeake's drilling division), Superior Well Services, Transload Solutions, Washita Valley Enterprises, and while not in the county but close by, Shlumberger in Horseheads. If applicable, any newly proposed service businesses and other incidental uses will have to be reviewed and permitted at the local/county level.

Model Site Plan Review Ordinance

The following Site Plan Review Ordinance is a basic ordinance that is used in many towns in Tioga County. It is simple, yet covers all review considerations enabled by NYS law.

TOWN OF CANDOR SITE PLAN REVIEW LAW

ARTICLE I

INTRODUCTORY PROVISIONS

SECTION 1.010 ENACTMENT
The Town Board of the Town of Candor, Tioga County, New York, does hereby ordain and enact the Town of Candor Site Plan Review Law pursuant to the authority and provisions of section 10 of the Municipal Home Rule Law and section 274-a of the Town Law of the State of New York.

1.020 SHORT TITLE
This local law shall be known as the "Town of Candor Site Plan Review Law." The Town of Candor is hereinafter referred to as the "town."

1.030 INTENT AND PURPOSE
Through site plan review, it is the intent of this local law to promote the health, safety and general welfare of the town. A clean, wholesome, attractive environment is declared to be of importance to -the health and safety of the inhabitants of the town and, in addition, such an environment is deemed essential to the maintenance and continued development of the economy of the town and the general welfare of its inhabitants.
It is further the intent of this local law to ensure optimum overall conservation, protection, preservation, development and use of the natural and man-related resources of the town, by regulating land use activity within the town through review and approval of site plans. The Town of Candor Comprehensive Plan as adopted by the Candor Town Board on 4/10/01 shall be used as a guide when enforcing the provisions of this law.

1.040 AUTHORIZATION OF PLANNING BOARD TO REVIEW SITE PLANS
The Planning Board is hereby authorized to review and approve or disapprove site plans for land uses within the town as hereinafter designated pursuant to and in accordance with the standards and procedures set forth in this local law.

ARTICLE II

APPLICABILITY AND DEFINITIONS

SECTION 2.010 APPLICABILITY OF REVIEW REQUIREMENTS
All new land use activities within the town shall require site plan review and approval before being undertaken, except the following:
1. Construction or alteration of one- or two-family dwelling and ordinary accessory structures, and related land use activities.
2. Landscaping or grading which is not intended to be used in connection with a land use reviewable under the provisions of this local law.
3. Ordinary repair or maintenance or interior alterations to existing structures or uses.
4. Exterior alterations or additions to existing structures which would not increase the square footage of the existing structure by more than 25%; and having a cost value of less than $5,000.
5. Selective tree harvesting under a proper forest management plan. Harvesting more than 50% of the trees on any parcel of land of one acre or more shall require site plan approval.
6. Signs - Sign Law of the Town of Candor (Local Law No. 4 of 1991).
7. The sale of agricultural produce and temporary structures related to sale of agricultural produce.
8. Garage, lawn and porch sales not exceeding three days. If such sales take place more often than three times in any calendar year, site plan approval will be required.
9. Land use activity that occurs in the course of normal agriculture or timbering operations as pursuant to sections 305-A and 308 of the Agriculture and Markets Law.

Any person uncertain of the applicability of this local law to a given land use activity may

apply in writing to the planning board for a written jurisdictional determination.

2.020 EFFECT ON EXISTING USES

This law does not apply to uses and structures which are lawfully in existence as of the date this local law becomes effective. Any use which would otherwise be subject to this law, that has been discontinued for a period of two years or more shall be subject to review pursuant to the terms of this law before such use' is resumed. Any use or structure shall be considered to be in existence provided the same has been substantially commenced as of the effective date of this local law and fully constructed and completed within one year from the effective date of this local law. A voluntary unofficial review of the plans by the Candor Planning Board is recommended with no fee required.

2.030 RELATIONSHIP OF THIS LAW TO OTHER LAWS AND REGULATIONS

This local law in no way affects the provisions or requirements of any other federal, state, or local law or regulations. Where this local law is in conflict with any other such law or regulation, the more restrictive shall apply. The Planning Board shall comply with the provisions of the State Environmental Quality Review Act (SEQRA) in conjunction with the site review process set forth in this in this local law.

2.040 DEFINITIONS

"Land use activity" means any construction or other activity which changes the use or appearance of land or a structure or the intensity of use of land or a structure.
"Land use activity" shall explicitly include, but not be limited to, the following: new structures, expansions to existing structures, new uses, changes in or expansions of existing uses, roads, driveways, and excavations for the purpose of extracting soil or mineral deposits.

"Parking space" an area 10' X 2.0' minimum

"Streambank" means the mean high water mark of any permanent stream.

"Structure" means any object constructed, installed or placed on land to facilitate land use and development or subdivision of land, such as buildings, sheds, signs, tanks, towers and any fixtures, additions inci ilt.erations thereto.

"Structure, accessory" means any structure designed to accommodate an accessory use but detached from the principal structure, such as, a free standing garage for vehicles accessory to the principal use, a storage shed, garden house or similar facility. .

Any term used in this local law which is not defined hereinabove shall carry its customary meaning unless the context otherwise dictates.

ARTICLE III

SITE PLAN REVIEW

SECTION 3.010 PROCEDURES - GENERALLY

Prior to undertaking any new land use activity other than uses specifically excepted in section 2.010 of this local law, a site plan approval by the Planning Board is required. Applicants for site plan approval shall follow the recommended procedures related to the sketch plan conference as hereinafter set forth. Applicants must comply with all other procedures and requirements of this local law.

3.020 SKETCH PLAN CONFERENCE

The initial step in any application shall be for the applicant to request a sketch plan conference, such request to be made in writing by the applicant at least fourteen (14) days prior to a regularly scheduled meeting of the Planning Board.

A sketch plan conference shall be held between the planning board and the applicant prior to the preparation and submission of a formal site plan. The intent of such a conference is to enable the applicant to inform the Planning Board of his proposal prior to the preparation of a detailed site plan; and for the Planning Board to review the basic site design concept, advise the applicant as to potential problems and concerns and to generally determine the information to be required on the site plan. In order to accomplish these objectives, the applicant shall provide the following:

1. A statement and rough sketch* showing the locations and dimensions of principal and accessory structures, parking areas, access signs (with descriptions), existing and proposed vegetation, and other planned features; anticipated changes in the existing topography and natural features; and, where applicable, measures and features to comply with flood hazard and flood insurance regulations;

2. An area map* showing the parcel under consideration for site plan review, and all properties, subdivisions, streets, rights-of-way, easements and other pertinent features within 200 feet of the boundaries of the parcel; and

3. A topographic or contour map* of adequate scale and detail to show site topography.

* It is preferred that the size of the documents be 11" X 17" or smaller.

3.030 APPLICATION REQUIREMENTS

An application for site plan approval (see Appendix A) shall be made in writing fourteen (14) days prior to the Planning Board's regular monthly meeting and shall be accompanied by information contained on the following checklist as determined necessary by the Planning Board during the sketch plan conference. Application and fees are to be submitted to the Candor Town Clerk who will notify the chairman of the Planning Board.

SITE PLAN CHECKLIST: (See Appendix B)

1. Title of drawing*, includinq name and address of applicant and person responsible for preparation of such drawing;

2. North arrow, scale and date;

3. Boundaries of the property plotted to scale identifying the owners of abutting parcels;

4. Existing buildings on site and within 150 feet of the boundaries of the site;

5. Drainage plan. May include; grading, existing and proposed contours, rock ou' tcrops, depth to bedrock, soil characteristics, and watercourses;

6. Location, design, type of construction, proposed use and exterior dimensions of all buildings;

7. Location, design and type of construction of all parking and truck loading ar~-as, showing access and egress;

8. Provision for pedestrian access;

9. Location of outdoor storage, if any;

10. Location, design and construction materials of all existing or proposed site improvements including drains, culverts, retaining walls and fences;

11. Description of the method of sewage disposal and location, design and construction materials of such facilities;

12. Description of the method of securing water supply and location, design and construction materials of such facilities;

13. Location of fire and other emergency zones, including the location of fire hydrants and/or potential fire pond;

14. Location, design and construction materials of all energy distribution facilities, including electrical, gas and solar energy;

15. Location, size and design and type of construction of all proposed signs;

16. Location and proposed development of all buffer areas, including existing vegetative cover;

17. Location and design of outdoor lighting facilities;

18. Identification of the location and amount of building area proposed for retail sales or similar commercial activity;

19. General landscaping plan and planting schedule; 20. An estimated project construction

schedule;

21. Identification of any permits from other governmental bodies required for the project's execution;

22. Record of application for and status of all necessary permits from other governmental bodies;

23. For projects classified as Type 1 under the State Environmental Quality Review Act (SEQRA), a Full Environmental Assessment Form (EAF) is required. For projects classified as Unlisted under SEQRA, a Short Environmental Assessment Form (EAF) is required. After review of these documents the Planning Board may require additional information;

24. An Agriculture Data Statement (ADS) must be submitted if the proposed project occurs on property within an agricultural district containing a farm operation or on property with boundaries within 500 feet of a farm operation within an agricultural district; and

25. Other elements integral to the proposed development as may be considered necessary in the particular case by the planning board.

* It is, preferred that the size of documents be 11" X 17" or smaller.

3.040 REQUIRED FEE

An application for site plan review shall be accompanied by a fee determined by the Candor Town Board. See the Town Clerk to determine the fee and to pay.

3.050 REIMBURSABLE COSTS

Costs incurred by the Planning Board for consultation fees or other extraordinary expenses in connection with the review of a proposed site plan shall be charged to the applicant. The applicant will be provided with an estimate of such costs within 10 days after the Sketch Plan conference, which cost estimate shall be payable at the time that an application for a site plan approval is made to the Candor Town Clerk. In no event shall the fees be greater than that established by 6 NYCRR 617.17. If the estimate exceeds actual expenses, the excess will be refunded. If expenses are greater than the estimate, the difference will be billed.

ARTICLE IV

REVIEW STANDARDS

SECTION 4.010 GENERAL STANDARDS AND CONSIDERATIONS

The planning board's review of the site plan shall include, as appropriate, but is not limited to, the following general considerations:

1. Compatibility of the proposed activity with the Comprehensive Plan of the Town of Candor.

2. Location, arrangement, size, design and general site compatibility of buildings, lighting and signs.

3. Adequacy and arrangement of vehicular traffic access and circulation, including intersections, road widths, pavement surfaces, dividers and traffic controls.

4. Location, arrangement, appearance and sufficiency of off-street parking and loading.

5. Adequacy and arrangement of pedestrian traffic access and circulation, walkway structures; control of intersections with vehicular traffic and overall pedestrian convenience.

6. Adequacy of stormwater and drainage facilities.

7. Adequacy of water supply and sewage disposal facilities.

8. Adequacy, type and arrangement of trees, shrubs and other landscaping constituting a visual and/or noise buffer between the applicant's and adjoining lands, including the maximum retention of existing vegetation.

9. Adequacy of fire lanes and other emergency zones and the provision of fire hydrants and/or potential fire pond.

10. Special attention to the adequacy and impact of structures, roadways and landscaping in areas with susceptibility to ponding, flooding and/or erosion.

11. Procedures and facilities and the handling, storing and disposing of hazardous and toxic materials shall be adequate to protect surface and ground water resources.

12. Overall impact on the neighborhood including compatibility of design consideration.

13. When mining activities are contemplated, reclamation plans and procedures shall be required.

14. Telecommunication facilities will comply with the additional requirements of Appendix C.

4.020 SPECIFIC STANDARDS AND CONSIDERATIONS

The following specific standards shall apply in conjunction with the subject uses or in the designated areas.

4.021 STREAMBANK STANDARDS AND CONSIDERATIONS

1. All construction on any streambank lot shall be carried out in such manner as to minimize interference with the natural course of such waterway, to avoid erosion of the streambank, to minimize increased runoff of ground and surface water into the waterway, to remove only that

vegetation which is necessary to the accomplishment of the project, and to generally maintain the existing aesthetic and ecological character of the streambank.

2. No on-site sewage field or seepage pit shall be located within one hundred (100) feet of any streambank and no septic or other holding tank shall be located within fifty (50) feet of any streambank, as measured from the normal high water mark of the waterbody.

3. Any storage of petroleum products within one hundred (100) feet or reasonable setback as determined necessary by the planning board, of the streambank shall include adequate provisions for insuring that any leak, rupture or spill will be contained and not be introduced into or affect the adjacent waterway. In particular, a raised earthen or paved berm or dyke shall be constructed in such manner so as to afford adequate protection.

ARTICLE V

PUBLIC HEARING AND PLANNING BOARD DECISION SECTION 5.010 PUBLIC HEARING

The Planning Board may conduct a public hearing on the site plan if considered desirable by a majority of its members. Such hearing shall be held within 62 days of the receipt of application for site plan review and shall be advertised at least five (5) days before the public hearing.

5.020 TIOGA COUNTY PLANNING BOARD REVIEW
When required by General Municipal Law 239L & M the Planning Board shall submit notice of the public hearing along with a complete description of the application to the Tioga County Planning Board for review.

5.030 PLANNING BOARD DECISION
Within 62 days of receipt of the application for site plan approval or if a public hearing is held within 62 days of public hearing, the Planning Board shall render a decision. In its decision the Planning Board may approve, approve with modifications or disapprove the site plan. The time period in which the Planning Board must render its decision can be extended by mutual consent of the applicant and the Planning Board.

1. Approval **
Upon approval of the site plan, and payment by the applicant of all fees and reimbursable costs due the town, the planning board shall endorse its approval on a copy of the site plan and shall immediately file it and a written statement of approval with the town clerk. A copy of the written statement of approval shall be mailed to the applicant by certified mail, return receipt requested.

2. Approval with modifications **
The planning board may conditionally approve the final site plan. A copy of the written

statement containing the modifications required by the conditional approval will be mailed to the applicant by certified mail, return receipt requested. After adequate demonstration to the planning board that all conditions have been met, and payment by the applicant of all fees and reimbursable costs due the town, the planning board shall endorse its approval on a copy of the site plan and shall immediately file it and a written statement ofapproval with the town clerk. A copy of the written statement of approval shall be mailed to the applicant by certified mail, return receipt requested.

** The applicant can now apply for a building permit from the Town Code Enforcement Officer.

3. Disapproval
Upon disapproval of the site plan the decision of the planning board shall immediately be filed with the town clerk and a copy thereof mailed to the applicant by certified mail, return receipt requested, along with the planning board's reasons for disapproval.

ARTICLE VI

APPEAL OF PLANNING BOARD DECISION SECTION

6.010 APPEAL PROCEDURE

Any person aggrieved by any decision of the Planning Board or any officer, department, board or bureau of the town, may apply to the Town Board and then if desired to the supreme court for a review by a proceeding under Article 78 of the Civil Practice Law and Rules. Such proceedings shall be instituted within thirty (30) days after the filing of a decision in the office of the town clerk.

ARTICLE VII

MISCELLANEOUS PROVISIONS

SECTION 7.010 ENFORCEMENT OFFICER

The Town Board appoints the town code enforcement officer to carry out the duties assigned by this local law or any additional regulations adopted pursuant to section 7.020 hereof. The enforcement officer shall be responsible for the overall inspection of site improvements including coordination with the Planning Board and other officials and agencies, as appropriate.

7.020 AMENDMENTS
1. The Town Board may on its own motion, on petition, or on recommendation of the Planning Board, after public notice and hearing, amend this local law pursuant to all applicable requirements of law.

2. All proposed amendments originating by petition, or by motion of the Town Board, shall be

referred to the Planning Board for a report and recommendation thereon. The Planning Board shall submit its report within thirty (30) days, after receiving such referral. Failure of the Planning Board to report within the required tiqne shall be deemed to constitute a recommendation for approval of the proposed amendment.

7.030 INTEGRATION OF PROCEDURES
Whenever the circumstances of proposed development require compliance with this Site Plan Review Law and with any other local law, ordinance or requirement of the town, the Planning Board shall attempt to integrate, as appropriate, site plan review as required by this local law with the procedural and submission requirements for such other compliance

7.040 ENFORCEMENT
Any person, corporation, partnership, association or other legal entity who shall violate any of the provisions of this local law, or any conditions imposed by a permit pursuant hereto shall be guilty of an offense and subject to a fine of not more than seven hundred fifty dollars ($750) or by penalty of seven hundred fifty dollars ($750) to be recovered by the town in a civil action. Every such person or entity shall be deemed guilty of a separate offense for each week such violation, disobedience, omission, neglect or refusal shall continue.

7.050 SEVERABILITY
The provisions of this local law are severable. If any article, section, paragraph or provision of this local law shall be invalid, such invalidity shall apply only to the article, section, paragraph or provision(s) adjudged invalid, and the rest of this local law shall remain valid and effective.

7.060 EFFECTIVE DATE
This local law shall be effective as of the date of filing with the New York Secretary of State.

APPENDIX C

TELECOMMUNICATION FACILITIES

PURPOSE
These supplemental regulations are in addition to those listed above to provide standards for the safe provision of telecommunications consistent with applicable Federal and State regulations. These regulations are not intended to prohibit the provision of telecommunication services or to discriminate among providers. They encourage the following:

1. Minimizing the adverse visual impacts of the towers and antennas.

2. Reducing negative affects to surrounding properties.

3. Minimizing the number of these structures by encouraging joint use.

4. Removal of the telecommunication facility when it is no longer needed.

DEFINITIONS

Telecommunication facility - Towers and/or antennas and accessory structures together used in connection with the provision of cellular telephone service, personal communications services, digital and/or data communication services, paging services, radio and television broadcast services and similar broadcast services.

Telecommunication Tower - A structure on which transmitting and/or receiving antenna(e) are located.

Antenna - A system of electrical conductors that transmit or receive radio frequency signals. Such signals shall include but not be limited to radio, television, cellular, paging, digital and/or data communications, personal wireless communication services (PWS) and microwave communications.

EXEMPTIONS
The following shall be exempt:

1. The telecommunication facility may be repaired and maintained without restriction.

2. Antennas and satellite antennas used solely for residential household television and radio reception.

SITE PLAN REVIEW STANDARDS - ADDITIONAL
1. Visibility - All towers and accessory buildings shall be sited to have the least practical adverse effect on the environment. Towers shall not be artificially lighted except to assure safety as required by the Federal Aviation Administration (FAA). Towers shall be a galvanized finish or painted gray above the surrounding treeline and painted to blend with the natural surroundings below the treeline unless other standards are required by the FAA. Structures offering slender silhouettes (monopoles or guyed tower) shall be preferable except where free-standing structures would allow for future shared use. Towers should be designed and sited whenever possible to avoid FAA requirements for lighting and painting. Documentation justifying the height of the tower shall be provided along with a completed Visual Environmental Assessment Form (Visual EAF).
2. Screening - Existing vegetation shall be preserved where possible and tree and shrub plantings may be required to screen the facility from nearby properties to reduce the negative impact on nearby properties.

3. Shared use - Shared use of existing towers shall be required when available. Where there are no existing towers, the installation of antenna on other existing structures shall be considered. If a new tower is proposed, the applicant shall be required to submit a report demonstrating good faith efforts to secure shared use and documenting why a new tower is required. The applicant must submit a copy of its policy regarding collocation of other facilities on the proposed tower.

4. Setbacks - Shall be sufficient to ensure the safety and preserve privacy of adjoining property.

5. Removal of tower - The applicant shall agree in writing to remove the tower and antenna if the telecommunications facility ceases to be used for its intended purpose for 12 consecutive months. A demolition bond for the purpose of removal of the telecommunication facility and restoration of the land shall be furnished to the Candor Town Clerk. The sufficiency of the bond will be evaluated every 2 years by a Professional Engineer licensed in New York State at the applicant's expense. The bond shall be increased by the amount necessary within 10 days after the completion of the evaluation. The structural integrity evaluation will be done at the same time (See 12 below).

6. A road turnaround and one parking space shall be provided to assure adequate year-round emergency and service access. Maximum use of existing roads, public or private shall be made for access. Tower or antenna(s) accessory structures shall not be sited in public roadways or road right-of-way.

7. All towers and ground anchors, if applicable, shall be enclosed by a fence not less than eight feet in height and otherwise sufficiently protected from trespassing or vandalism.

8. The applicant must comply with all applicable state and federal regulations including but not limited to FAA and FCC regulations and from time to time may be required to provide certification of such compliance.

9. All towers and antennas shall include anti-climbing devices for a minimum of 25 feet extending above ground level.

10. Proof of ownership of the land by the applicant or the landowner's consent if the applicant will not own the property. A copy of the final lease agreement, plus any amendments thereto, must also be provided if the applicant will not own the property.

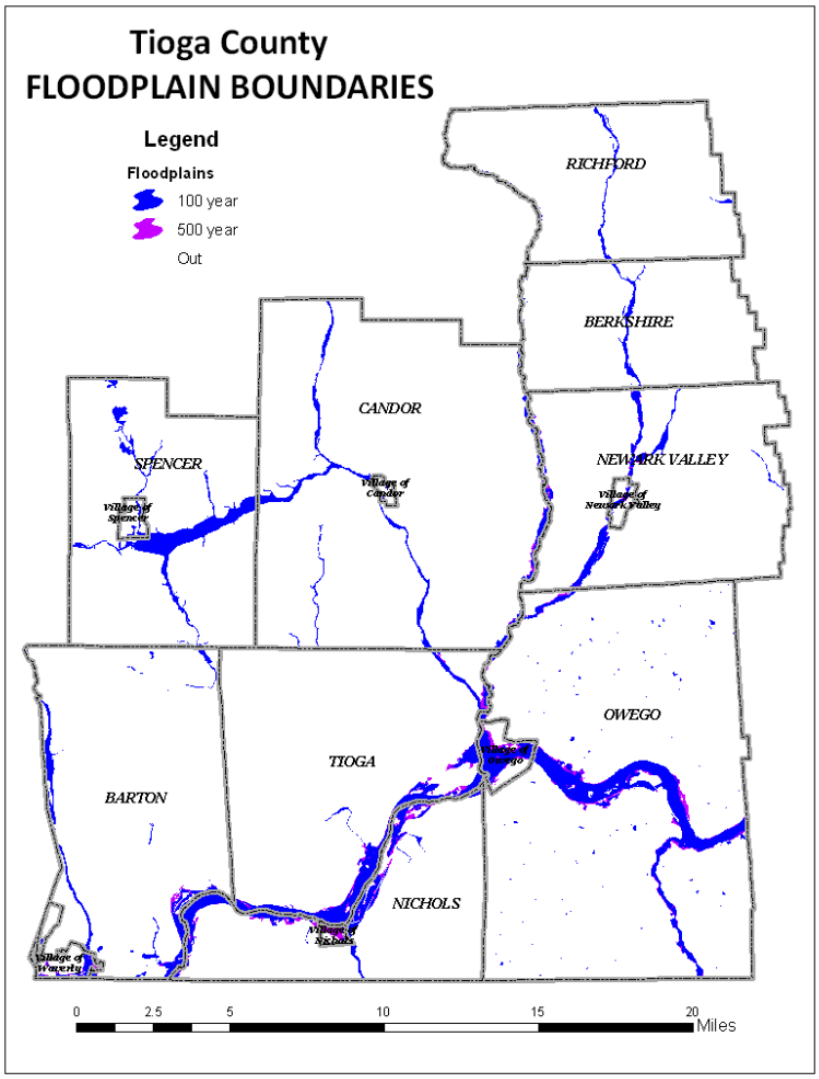
11. "Before" and "after" propagation studies prepared by a qualified radio frequency engineer (signed and sealed by a professional engineer licensed in the State of New York) demonstrating existing signal coverage resulting from the proposed telecommunications facility must be provided to the Candor Town Code Enforcement Officer.

12. Unless otherwise preempted by federal or state law, the telecommunications facility shall be inspected every two years, at the applicant's expense, for structural integrity, and a copy of the report shall be promptly delivered to the Code Enforcement Officer. A professional engineer licensed in New York State specializing in structural engineering shall perform the structural inspection. The structural inspection report shall describe the structural integrity of the facility, maintenance issues and repairs needed or made, if any. In the event that the structural inspection indicates structural deficiencies, then the deficiencies must*be remedied within the time reasonably set by the Code Enforcement Officer. Upon the applicant's failure to do so, the bonds for demolition may be exercised.

Local Floodplain Permitting

Flood plain regulations are the only local law that applies to the well drilling pads themselves. This makes it vitally important for the Municipal NGC Team Representative to notify the Local Floodplain Administrator of drilling activity within their municipality so they are aware of this development and can review and issue permits when necessary. The well pads must be constructed at or above the base flood elevation in 100-year floodplains, and in accordance with other regulations stipulated in a floodplain ordinance. In each municipality in Tioga County, Code Enforcement is the main administrator of the floodplain ordinances. A map that illustrates FEMA floodplain boundaries in Tioga County is located below.

It also important to know that since NYS DEC is requiring gas drilling projects to go through the local floodplain permitting process, this technically makes a municipality eligible to be an Involved Agency during the SEQR review for any Marcellus Shale gas drilling permit approval that lies within a 100-year floodplain boundary. Please see Chapter 5 Environment for a sample letter to NYS DEC requesting Involved Agency status under these circumstances.



Fees

Typically the municipal Planning Board or Zoning Board of Appeals will be responsible for reviewing these types of projects under site plan review or special permits. Most often these proposals will be complex with complicated information to absorb. A municipality, whether developing one of these local laws or having an existing ordinance, should be mindful of fees and other charges that might be necessary to conduct a thorough review. At minimum, there should be a clause in the ordinance about passing on costs of needed additional professional services, such as engineering or architectural, to the applicant. A municipality may also want to consider raising their application fees if they haven't been updated in a while, or some kind of sliding fee scale based on the complexity of project.

For noise ordinances, multiple municipalities might want to consider an inter-municipal agreement to jointly purchase and maintain a sound-level meter, as well as hiring a noise enforcement officer, such as a Deputy Sheriff. Again, the municipality can consider passing the personnel costs of enforcement on to the violator. But this would have to be stipulated in the ordinance.

Recommended Land Use Strategy

Given that several options for land use regulations have been presented in this Chapter, TING recommends that each municipality develop its own overall strategy for land use regulation incorporating pieces that are suitable for them. An example outline of a strategy follows:

1. Develop and Adopt Noise Ordinance
2. Develop and Adopt Light Ordinance
3. Develop and Adopt Site Plan Review Ordinance
4. Evoke Site Plan Review related to SRBC water withdrawal permits
5. Review and Enforce Floodplain Ordinance
6. Create or update a Municipal Fee Schedule

Attachment 4A – Municipal Land Use Matrix

MUNICIPAL LAND USE REGULATIONS
PERTINENT TO NATURAL GAS EXPLORATION AND DEVELOPMENT

MUNICIPALITY	SITE PLAN REVIEW Chapter 4 Land Use	NOISE CONTROL ORDINANCE Chapter 4 Land Use	LIGHT CONTROL ORDINANCE Chapter 4 Land Use	FLOODPLAIN ORDINANCE Chapter 4 Land Use	WELL HEAD PROTECTION Chapter 6 Water Qual	AQUIFER PROTECTION Chapter 6 Water Qual	DRIVEWAY PERMIT Chapter 7 Roads	WEIGHT LIMITS / ROAD POSTING Chapter 7 Roads
Town of Barton	X	X		X			X	
Village of Waverly	X			X			X	X
Town of Berskhire	X			X	N/A		X	
Town of Candor	X			X			X	
Village of Candor				X				
Town of Newark Valley	X			X			X	
Village of Newark Valley	X	X		X	X			
Town of Nichols		X		X			X	
Village of Nichols	X				X			
Town of Owego	X			X	X		X	X
Village of Owego	X	X		X				
Town of Richford	X			X	N/A		X	
Town of Spencer	X			X	N/A		X	
Village of Spencer	X			X	N/A			
Town of Tioga				X			X	
Tioga County	N/A	N/A	N/A	N/A	N/A		X	

Chapter 5: Environment

Chapter 5: Environment

Introduction

The purpose of this section is to identify the potential environmental problems of unconventional gas drilling and present methods of mitigating these problems. These methods include safeguards, procedures, and guidelines that are designed to shield the citizens of Tioga County from unnecessary nuisances associated with the increased industrial activity. It is important however when reviewing this section and dealing with environmental issues associated with gas activities that the reader keeps in mind that gas development and production is regulated by NYSDEC. The "Environmental Conservation Law provides that DEC's Oil, Gas and Solution Mining Law supersedes all local laws relating to the regulation of oil and gas development except for local government jurisdiction over local roads or the right to collect real property taxes" (Draft SGEIS). However with that said there are steps that municipalities can take locally to protect our communities and rural landscape. Included in this section is an overview of various tools and methods that municipalities can use.

Contained Within This Chapter:

- ***Environmental Issues Reviewed by TING***
- ***List of Local Foresters and Logging Companies***
- ***Sample Letter to NYSDEC requesting interested agency status for SEQR process***
- ***Description of Critical Environmental Areas (CEAs)***
- ***List of Potential Critical Environmental Areas By Municipality***
- ***Water Resources: Usage and Disposal***
- ***Local and State Resources***
- ***NYS Department of Agriculture and Markets Technical Guidance's for Well and Pipeline Restoration***

Environmental Issues Reviewed by TING:

Early in the formation of TING potential environmental issues and impacts were identified from other regions where gas activities were occurring and were given to the TING Environmental Subcommittee to review and provide comment on. The committee took the extensive list of issues and categorized them by the following topics:

- Water Quantity
- Runoff
- Soil and Surface Concerns
- Landscape Issues
- Critical Environmental Areas
- Wildlife
- Pollution

- Water Quality

From this list the committee then reviewed the issue, based on if it was addressed in the dSGEIS and if there are any local opportunities for dealing with the issue. The committee also prioritized the list of issues based on the following classification:

- High – Potential for long-term environmental impacts and possible impacts to human health.
- Medium – Regulations exist but need to refined and enforced.
- Low – Addressed by a regulatory agency but identified due to possible secondary impacts.

Based on the fact that many of the environmental issues listed are regulated by NYSDEC through the Generic Environmental Impact Statement on Oil, Gas and Solution Mining Regulatory Program of 1992 and the draft Supplemental Environmental Impact Statement it is nearly impossible for a municipality to address these issues. Therefore it is the recommendation of TING for municipalities to engage the gas companies early on in the process and develop relationships with the companies that may allow input on many of these issues and/or concerns.

Table of Potential Environmental Issues:

Category	Issue	Description	Priority	Regulatory Oversight	TING Findings & Recommendations
Water Quantity	Surface & Ground Water Withdrawals	Concerns with locations of withdrawal sites and depletion of surface and groundwater resources. (On average it takes 4-7 million gallons of water to complete hydraulic fracturing on a Marcellus Shale well in PA.)	Med	Susquehanna River Basin Commission (SRBC)	Municipalities' with Site Plan Review can provide comment to SRBC on water withdrawal permit applications. See Chapter 4 Land Use.
	Stormwater pond Creation and Water Collection Alternatives	Work with Gas Companies to identify locations for retention structures that will capture stormwater runoff and can be used for hydraulic fracturing process. Provide community benefit to flood prone areas.	Low	NYSDEC	NGC Team will engage Gas Companies early in the permit process with this possibility.
Runoff	Erosion & Sediment Control (ESC)	Concerns with runoff from well pads, access roads and pipeline right-of ways	Med	NYSDEC permits with Multi-Sector General Permit (no opportunity for local input with current dSGEIS)	Technical assistance on these issues can be provided by the Soil and Water Conservation District (SWCD). SWCD provides construction operator training on ESC.
	Dust Pollution	Concerns with dust pollution from well pads, access roads and pipeline right-of-ways construction and usage	Med	NYSDEC permits with Multi-Sector General Permit (no opportunity for local input with current dSGEIS)	Technical assistance on this issue can be provided by the Soil and Water Conservation District

	Sedimentation	Concerns with sedimentation of Streams and impact on ecosystem.	Med	NYSDEC permits with Multi-Sector General Permit (no opportunity for local input with current dSGEIS)	Technical assistance on this issue can be provided by the Soil and Water Conservation District
Soil and Surface Concerns	Use of Open Pits for flowback water and drilling muds	Concerns with use of open pits for flowback water and drilling muds. Potential for leaks, overtopping and in correct disposal of liners.	High	NYSDEC	Encourage gas companies to use closed loop systems and/or provide for proper disposal of liners.
	Right-of-way reclamation and pipelines	Concerns with siting of right-of-way and impacts on soil resources (agricultural impacts)	Med	Public Service Commission (PSC) oversees pipeline construction over 10 miles long and 125 psi or greater.	NYS Dept of Ag & Markets (NYSDAM) and SWCD can assist lands in agricultural districts. Technical references provided in this chapter.
Landscape Issues	Forest and Habitat Fragmentation	Concerns with impacts of pipeline right-of-way on forestry resource	Med	PSC	Encourage gas companies to notify local landowners of pipeline activities thru forested areas in order for landowners to contact private foresters and/or local loggers to have the area logged before the gas company begins work. See section on Forestry Resources.
	Agricultural Land Loss	Concerns with loss of productive agricultural lands due to improper mitigation of pipeline impacts.	Med	PSC	SWCD and NYSDAM can assist with siting of well pads, access roads and pipelines in order to lessen the impact to productive ag areas.
	Pipeline Infrastructure	Many gathering lines may fall below the PSC regulatory threshold.	Low		Municipalities and the NGC Team should work with the gas companies to foster sharing of pipeline right-of-way and address local siting concerns.
Critical Env. Areas	Natural Resource Inventory	Concerns with impacts to local, natural sensitive areas.	High	NYSDEC	Municipalities can identify Critical Environmental Areas and have them approved by NYSDEC for added protections. See section in this chapter on Critical Environmental Areas.
	Floodplains	Concerns with flooding of well pads during active drilling (chemical storage, and impacts to floodplain)	High	NYSDEC & Local Municipal Floodplain Ordinance	Municipalities have an opportunity to enforce local floodplain regulations. See Chapter 4 Land Use.
	Tourism and Recreational	Concerns with impacts on local tourism, hunting and	Low		NGC Team should emphasize concerns at meet and greet.

	impacts	fishing			
	Historical & Archeological Impacts	Concerns with impacts on historical and archeological sensitive areas	Low	NYSDEC (permit requires review of site for these concerns)	Re-emphasize concerns at permit application meeting with gas companies
	Classified Trout Streams	Concerns with impacts to fisheries	Low	NYSDEC & Army Corp of Engineers (ACE)	No local jurisdiction.
	Wetlands	Concerns with impacts and loss due to gas activities	Low	NYSDEC & ACE	No local jurisdiction.
Wildlife	Wildlife	Concerns with impacts to habitat and impact on all wildlife (mammals, amphibians, birds)	Low	NYSDEC	No local jurisdiction.
	Invasive Species	Concerns with introduction on invasive species from water transport and movement of equipment (already documented cases in PA)	Med	NYSDEC & SRBC	No local jurisdiction.
Pollution	Spills	Concerns with chemical spills during transport and at well sites.	High	NYSDEC	Encourage Companies to follow local wellhead protection ordinances. See Chapter 6 Water Quality. Also encourage companies to work with Tioga Co. Emergency Management Office and Sheriff. See Chapter 9 Public Safety.
	Soil Contamination	Concerns with remediation of sites where spills have occurred.	High	NYSDEC	No local jurisdiction.
	Wastewater Disposal	Concerns with proper disposal methods and oversight.	High	NYSDEC & SRBC	No local jurisdiction.
	Light Pollution	Concerns with light pollution from service businesses.	Med	Well pads regulated by NYSDEC	Municipalities can consider adopting light ordinance. See Chapter 4 Land Use
	Noise Pollution	Concerns with noise pollution from service businesses.	Med	Well pads regulated by NYSDEC	Municipalities can consider adopting noise ordinance. See Chapter 4 Land Use.
	Solid & Hazardous Waste	Concerns with Garbage and disposal of Hazardous waste	Low	NYSDEC	County Solid Waste Department may see increase use.
	Air Quality	Concerns with impacts to air quality and increased greenhouse gas emissions from drilling activity, truck traffic, etc.	Low	NYSDEC / SGEIS	No local jurisdiction
	Solid Waste and Materials Handling	Concerns with illegal dumping activities	High	NYSDEC	No local jurisdiction.

	Flowback Water Disposal Method -Underground Injection Wells	Concerns with use of underground injection wells for flowback water disposal	Med	NYSDEC & USEPA	No local jurisdiction.
Water Quality	Aquifer – Water Quality	Concerns with impacts to drinking water resource	High	NYSDEC	County Legislature can consider passing Aquifer protection ordinance. Municipalities with public water supplies should consider adopting Wellhead Protection Ordinances. See Chapter 6 Water Quality.
	Aquifer – Water Quality	Baseline testing of public and private water supplies	High	NYSDEC	Municipalities perform baseline water quality tests. See Chapter 6 Water quality.
	Surface Water Quality	Concerns with impacts to surface water bodies	High	NYSDEC & SRBC	Municipalities can investigate remote water quality monitoring stations. Refer to Water Quality Chapter.

For DEC's full listing of regulatory agencies and roles involved with high-volume hydrofracturing operations, please see Attachment 5A at the end of this chapter.

Forestry Resources:

70% of Tioga County is forested and will be impacted in some way by gas development and production activities. In order to gain the most benefit from these resources it is suggested that municipalities and private landowners consider contacting local forestry consultants and loggers in order to realize the benefit of the timber removed during natural gas development. For example it is common practice for some gas companies to remove timber from pipeline right-of-ways without reimbursing the landowner for its values, while other companies may not even remove timber from the right-of-way; instead leaving timber stacked on the edge of the right-of-way. If a landowner or municipality is interested in earning the value of this timber they should consider using local businesses that work with and know the value of our forestry resource. **Municipalities, landowners and gas companies should consider utilizing local talent and businesses during the course of natural gas exploration and development construction activities.**

List of Local Tioga County Consultant Foresters: (taken from NYSDEC List of Cooperating Foresters):

Robert Moore	**Robert Synowiez**	**James Shuler**
Forestate	Timberland Forestry	
PO Box 522	117 W Beecher Hill Rd	367 Diamond Valley Rd
Waverly NY 14892	Owego NY 13827	Barton NY 13734-1422
(607) 565-4545	(607) 687-0406	(607) 687-1585
Moore12@stny.rr.com		jfshuler@loalnet.com

List of Local Logging Companies: (taken from Tioga County Ag Resource Directory and NY Logger Training Website (www.nyloggertraining.org)

Company Name	Contact Person	Phone Number	Mailing Address	Town	Zip
Red Oakes Lumber	George Oakes	607-589-6950	1892 Halsey Valley Road	Spencer	14883
	Dick Ennis	607-589-6174	86 Hulbert Hollow Road	Spencer	14883
	Bill Corson	607-642-5490	2188 Dalton Hill Road	Newark Valley	13811
Craig Jochum Logging	Craig Jochum	607-687-1598	2668 S. Apalachin Road	Apalachin	13732
Joyce Bros. Logging	Chris / John Joyce	607-625-5179	3111 Pennsylvania Ave	Apalachin	13732
	Kevin Wagner	607-687-5268	3886 Gaskill Road	Owego	13827

State Environmental Quality Review Act (SEQRA) and Gas Drilling:

SEQRA Compliance

According to the Draft SGEIS each application to drill a well is considered an individual project; the size of the project is defined as the surface area affected by development. NYSDEC is the lead agency for purposes of SEQRA compliance. This agency has had exclusive statutory authority since 1981 to regulate oil and gas development activities.

When application documents demonstrate conformance with the 1992 GEIS and the 2010 SGEIS, SEQR is satisfied and no Determination of Significance or Negative or Positive Declaration under SEQRA is required. In that event NYS DEC files a record of consistency with the GEIS and SGEIS.

The SEQRA process can be a useful tool for municipalities to gain insight into the proposed location of a well pad. According to the 1992 GEIS the DEC found that issuance of a drilling permit for a location in a State Parkland, in an Agricultural District, or within 2000-feet of a municipal water supply well, or for a location which requires other DEC permits, may be significant and requires a site-specific SEQRA determination. The only instance where issuance of an individual permit to drill an oil or gas well is always significant and always requires a Supplemental Environmental Impact Statement (SGEIS) is when the proposed location is within 1,000 feet of a municipal supply well. In these cases the local municipality where the well pad is located can become involved in the SEQRA process as an interested party if a request is made to NYSDEC. **It is recommended that your municipality pursue this request with NYSDEC as an interested party in order to provide you an opportunity to comment on the well pad application. A sample letter requesting**

interested party status in the SEQRA process is included in this chapter. For more information on the SEQRA process please review the NYSDEC SEQRA handbook (http://www.dec.ny.gov/docs/permits_ej_operations_pdf/seqrhandbook.pdf).

Another option for municipalities to track active permit applications with NYSDEC that may be significant and require a site specific SEQRA determination would be to monitor the NYSDEC Environmental Notice Bulletin. This information is posted on a weekly basis at http://www.dec.ny.gov/enb/enb.html. This site will also be monitored at the County Level and municipalities will be notified through the County Central Point of Contact (CPOC) if an application is listed within their municipality.

Sample Letter to NYSDEC:

Municipal Letterhead Here

Date

NYS DEC Region 7

Division of Environmental Permits

615 Erie Blvd West

Syracuse NY 13204-2400

To Whom It May Concern:

This letter is written in regards to notification of natural gas drilling wells permit applications in the Marcellus Shale.

Since the MUNICIPAL NAME HERE has a floodplain ordinance in effect, we do have permitting power for

floodplain development, which includes wells and pads in conjunction with natural gas drilling in the Marcellus Shale. By virtue of this, we technically should be designated an Involved Agency under SEQRA on any gas drilling activities located within the 100-year flood plain. Therefore we are requesting notification and a copy of the permit application for any and all well pad locations that are proposed to be located within the 100-year floodplain in our town.

Additionally, we request to be an Interested Agency in all natural gas drilling activities located elsewhere throughout our town since this industry will have a major impact on all aspects of our community. As an Interested Agency, we request that only notification be provided to our town of each and every natural gas drilling permit application for every gas operating company.

Please respond to this request in writing.

Sincerely,

Town Supervisor

Critical Environmental Areas (CEAs)

Introduction

Critical Environmental Areas are designated to protect a region's natural resources. Identifying CEAs can aid in distinguishing the most and the least suitable locations for business and development infrastructures, as well as facilitating effective land use policies. In particular, the designated CEAs are important to consider when mitigating the fast changes that may occur with unconventional gas drilling without damaging the existing natural environments: Land uses such as pipelines, man-camps, and access roads can have harmful effects if placed in environmentally sensitive areas. This section includes a list of potential CEAs, which each municipality can modify as they see fit.

What Are Critical Environmental Areas (CEAs) and Why are they Important?

Local agencies may designate specific geographic areas within their boundaries as "Critical Environmental Areas" (CEAs). State agencies may also designate geographic areas they manage or regulate.

According to NYSDEC, "to be designated as a CEA, an area must have an exceptional or unique character with respect to one or more of the following":

- A benefit or threat to human health
- A natural setting (e.g. fish and wildlife habitat, forest and vegetation, open space and areas of important aesthetic or scenic quality);
- Agricultural, social, cultural, historic archaeological, recreational, or educational values; or
- An inherent ecological, geological, or hydrological sensitivity to change that may be adversely affected by any change.

Following the designation, the potential impact of any Type I or Unlisted Action on the environmental characteristics of the CEA is a relevant area of environmental concern and must be evaluated in the determination of significance prepared pursuant to Section 617.7 of SEQR. Although CEA designation does not offer the legal protection provided by land use controls such as zoning, they encourage thorough examination and planning for development. CEA designation serves "to alert project sponsors to the agency's concerns for the resources or dangers contained within the CEA," and to what the community wants to "protect or ensure due consideration… in land use decisions.

Disclaimer about CEAs

It is important to note that designating an area a CEA is not an avenue for development control. Even if a local or state agency goes through the CEA designation process and is successful in its effort, "it does not grant any agency permitting authority, zoning restrictions, or other jurisdictions that did not already exist before the designation of the CEA" (DEC).

Criteria for CEA's

Members of the TING Environmental Subcommittee defined the following CEA criteria in this section as follows:

- **Human Health** – a feature that is a benefit or threat to human health
- **Socio-Cultural** – an exceptional or unique social, historic, archaeological, recreational or education values
- **Natural / Hydrologic** – An inherent ecological, geological or hydrological sensitivity to change that may be adversely affected by any physical disturbance including exceptional or unique natural settings, open space areas of important aesthetic or scenic quality.

List of Environmental Sensitive Areas or Potential Critical Environmental Areas By Municipality:

The TING Environmental Committee reviewed sites within each municipality that might be considered a CEA and provided the information in the following section. The TING Environmental Committee realizes that these lists for each of the municipalities is not all inclusive but wanted to provide suggestions for those higher priority sites based on the above criteria. Municipalities may also want to consider Social Centers (i.e. churches, parks, medical centers, schools, libraries), Cemeteries and Historic sites and structures in your communities as potential CEA's. Other natural/hydrologic areas in municipalities that were not listed that are important are floodplains. It is also important as a municipality to consider areas that if developed upon may negatively impact human health such as closed or abandoned landfills and brownfield sites.

Municipality: TOWN OF BARTON

Site	Human Health	Socio-Cultural	Natural / Hydrologic
Two River State Park		X	X
Wildwood Reserve		X	X
Barton Municipal Water Well (Chemung Street) & Recharge Area	X		X

Two Rivers State Park

Located on a plateau overlooking the confluence of the Chemung and Susquehanna River in Waverly and the Town of Barton, the Two River State Park contains mixed woods with spruce, hemlock, white pine, scots pine, dogwood, and oaks. Because of its fragile habitat, the park provides limited recreational activities such as cross-country skiing, canoeing/kayaking, hiking, birding, photography, and picnicking.

Wildwood Reserve

Approximately 50-acres of pond, wetlands and upland areas that demonstrate the variable vegetation and wildlife characteristics of the Southern Tier. Short marked hiking trails off a handicap accessible parking lot.

Barton Municipal Water Well & Recharge Area

Municipal well draws from groundwater resource that if contaminated would be hard to find an economical alternative.

Municipality: VILLAGE OF WAVERLY

Site	Human Health	Socio-Cultural	Natural / Hydrologic
Two River State Park		X	X
Waverly Glen Park		X	X

Carantouan Greenway Forbidden Path		X	X
Municipal Well 1,2,3,4 and Recharge Areas	X		X

Two Rivers State Park

Located on a plateau overlooking the confluence of the Chemung and Susquehanna River in Waverly and the Town of Barton, the Two River State Park contains mixed woods with spruce, hemlock, white pine, scots pine, dogwood, and oaks. Because of its fragile habitat, the park provides limited recreational activities such as cross-country skiing, canoeing/kayaking, hiking, birding, photography, and picnicking.

Waverly Glen Park

The park provides family recreational opportunities. It contains picnic areas, basketball court, two tennis courts, children's gym equipment, covered pavilions, water taps and barbeque fireplaces. The park is also well known for its single track mountain bike trail.

Carantouan Greenway

Access directly off intersection of 220 and Route 17C onto a historical spring and Iroquois Indian Path.

Municipal Well 1,2,3,4 and Recharge Areas
Municipal wells serve 5255 people and utilize groundwater resource that if contaminated would be hard to find an economical alternative.

Municipality: TOWN OF BERKSHIRE

Site	Human Health	Socio-Cultural	Natural / Hydrologic
Jenksville State Forest		X	X

Jenksville State Forest

Encompassing 1349 acres of land in the towns of Berkshire and Newark Valley in Northeastern Tioga County, Jenskville State Forest provides recreational areas for hunting, fishing, bird watching, snowshoeing, and trapping. Moreover, the forest's trail system is designed to offer family-based recreation for hiking, mountain biking, horseback riding, and cross country skiing. http://www.dec.ny.gov/lands/8189.html

Municipality: TOWN OF CANDOR

Site	Human Health	Socio- Cultural	Natural / Hydrologic
Fairfield State Forest		X	X
Shindagin Hollow State Forest		X	X
Willseyville Marsh			X

Fairfield State Forest

Encompassing 815 acres of land, the Fairfield State Forest lies within the Central Appalachians ecological subzone. The forest contains many species of trees, including oaks, hardwoods, and hemlocks. There are also various plant types, such as tree clubmoss, painted trillium, and Christmas fern. Furthermore, it provides habitats for diverse wildlife species including mammals, reptiles, amphibians, and birds. In terms of recreational opportunities, the forest offers approximately 1 mile of formal snowmobile trails. In addition, visitors can use the informal trails and old farm lanes that are found throughout the State Forest.

http://www.dec.ny.gov/lands/37358.html

Shindagin Hollow State Forest

Shindagin Hollow State Forest (Tompkins #3) covers 5,266 acres of land in the towns of Caroline in southern Tompkins County and Candor in northern Tioga County. Its large size and good access from public roads make this a great forest to enjoy activities such as mountain biking, hunting, hiking, snowmobiling, cross-country skiing, bird watching, nature viewing, picnicking and camping.

http://www.dec.ny.gov/lands/64136.html

Willseyville Marsh

Area of hydrological importance identified by municipality.

Municipality: VILLAGE OF CANDOR

Site	Human Health	Socio-Cultural	Natural / Hydrologic
Municipal Wells and recharge areas	X		X
Moyer Park		X	X
Lane-Collyer Ball Fields		X	

Municipal Wells and Recharge Areas

Groundwater resource is used to serve 1000 people in the Village of Candor, that if contaminated would be hard to find an economical alternative.

Moyer Park

Adjacent to school property, and nestled along the Catatonk Creek near what was the lower dam, this park hosts many community benefits, barbeques and rallies.

Lane-Collyer Ball Fields

These ball fields are used by both community and school teams. They host the 4th of July carnival and picnic as well as other community events.

Municipality: TOWN OF NEWARK VALLEY

Site	Human Health	Socio-Cultural	Natural / Hydrologic
Alexander Park		X	X
Ketchumville State Forest		X	X
Oakley Corners State Forest		X	X
Scott Park		X	

Alexander Park

The park was built and donated by Don Alexander in the early 1960s. It continues to be a peaceful tract of land with a serene lake located west of the Newark Valley Middle School. Many community service groups come to utilize this park and help with the upkeep of maintenance.
http://cornellalumnimagazine.com/index.php?option=com_content&task=view&id=69&Itemid=56&ed=4

Ketchumville State Forest

Located in the Central Appalachians ecological subzone, Ketchumville State Forest provides a diverse range of habitats. Many species of plants can be found in the area, including the Orange Hawkweed and the Wild Hydrangea. The park contains no formally-marked trails, but it does provide visitors the opportunity to hunt, hike, and nature observation.

http://www.dec.ny.gov/lands/37365.html

Oakley Corners State Forest

Oakley Corners State Forest is located in the towns of Newark Valley and Owego in eastern Tioga County. The forest was established between 1933 and 1947 in an effort to reduce soil erosion problems, produce forest products, and provide future recreational opportunities.

http://www.dec.ny.gov/lands/8144.html

Scott Park

This attractive picnic area is used by local residents and county organizations. The Weltonville Fire station is adjacent.

Municipality: VILLAGE OF NEWARK VALLEY

Site	Human Health	Socio-Cultural	Natural / Hydrologic
Trout Ponds Park		X	X
Well #3 (Village Barn) and Recharge Area	X		X
Well #4 (Trout Ponds) and Recharge Areas	X		X
Village Green Park		X	

Trout Ponds Park

The park provides a space for annual community events, such as Newark Valley Days. It contains pavilions, playground, basketball court, and baseball diamonds.

http://villagenv.com/residents/parks/trout-ponds/

Village Green (Park)

The green has been subject to many beautification projects by the local townspeople. Many community organizations have used the village green for —bottle drives and Christmas tree sales, as well as vendors at events and the occasional small weddings.

http://villagenv.com/residents/parks/village-green/

Municipal Wells & Recharge Areas

Groundwater source for municipal well serves 1400 people and if contaminated would be hard to find an economical alternative.

Municipality: TOWN OF NICHOLS

Site	Human Health	Socio-Cultural	Natural / Hydrologic

Municipality: VILLAGE OF NICHOLS

Site	Human Health	Socio-Cultural	Natural / Hydrologic
Kirby Park		X	X
Municipal Wells and Recharge Area	X		X

Kirby Park

The park offers various recreational facilities, such as playgrounds, picnic pavilions, and basketball and tennis courts. The park is on the banks of the Susquehanna River and offers beautiful views of the river valley.

Municipal Wells and Recharge Areas

Groundwater source for municipal well and if contaminated would be hard to find an economical alternative.

Municipality: TOWN OF OWEGO

Site	Human Health	Socio-Cultural	Natural / Hydrologic
Hiawatha Island		X	X
Apalachin Marsh			X
Brick Pond		X	X
Hickories Park		X	X
Tracy Creek State Forest		X	X
Oakley Corners State Forest		X	X
Heron Rookery			X
Pumpelly Gorge			X
Water District #1 Route 38 Well 1&2 and Recharge Areas	X		X
Water District #2 Tioga Terrace Well 1 & 2 and Recharge Areas	X		X
Water District #3 Crest View Heights Well 2, 3, 4 and Recharge Areas	X		X

Hiawatha Island

Resting in the Susquehanna River between Owego and Apalachin, this 112 acre island contains a variety of wildlife. The site contains "hundreds of flora and fauna species, including several listed on the state endangered species listing." In 2006, the DEC declared that a family of bald eagles was living on the island. Large tree species such as sugar maple, black walnut, and white ash, can be found on the island. The property,

maintained by the Waterman Conservation Education Center, is now an education center and wildlife refuge. Source: http://www.watermancenter.org/hiawatha.htm

Apalachin Marsh

Apalachin Marsh is recognized by the NYS Department of Environmental Conservation as a protected wetland area. This scenic site is home to many species of waterfowl, shorebirds, songbirds, and mammals and is one of the best bird watching sites in NY State. Hawks, herons, egrets, wood ducks, mallards, warblers, and other wildlife species visit the marsh each year. Visitors can access a second pond area of the marsh as well as an old canal bed (located along the east bound lanes of Route 17) through the expanded trail system. The property is owned and maintained by the Water Conservation Education Center.

Brick Pond

This wetland contains "30 acres of open water surrounded by emergent plants and a wet woods." This pond, home to muskrats, waterfowl, shorebirds, and many species of songbirds, is a great site for wildlife observations. It is also known to be one of NY State's best birding sites. It is important to note this site is a NYS DEC designated wetland.

Hickories Park

Hickories Park is witness to the historic peace conference that founded the Iroquois Confederation in the 1400's. Currently, many recreational activities take place within the park, including cross-country skiing along the banks of the Susquehanna River, horseshoe pitching, boat launching, rental of covered pavilions, camping, and summer outdoor concerts.

Tracy Creek State Forest

512-acres of state forest, includes Northern Hardwoods, oak, red pine, and Norway spruce. On the Southeast boundary of the forest is a 2-acre wetland, which contains geese, ducks, beaver, herons, and other wetland wildlife species. The state forest also has extensive informal trail system, ideal for hiking, skiing, horseback riding, and mountain biking.

Oakley Corners State Forest

The forest offers 16 miles of trails for hiking, mountain biking and cross-country skiing. Containing two ponds, the state forest is also an ideal site for bird-watching, hunting, fishing and boating.

Heron Rookery

Located on the banks of the Susquehanna River this is bird nesting habitat and nursery for herons.

Pumpelly Gorge

Located at the end of Pumpelly Creek, this is a unique outcropping of bedrock and falls that is visited by locals.

Municipal Water Wells and Recharge Areas

Groundwater resource serves 5200 people and if contaminated would be hard to find an economical alternative.

Municipality: VILLAGE OF OWEGO

Site	Human Health	Socio-Cultural	Natural / Hydrologic
Brick Pond		X	X
Courthouse Square Park		X	X
Ahwaga Park (Mayor's Park)		X	X
Draper Park		X	X
Hallstead Park		X	
Dave Livingston Memorial Park		X	
Gerry Boland Memorial Park		X	
Hyde Park		X	
Marvin Park		X	
Thompson Memorial Park		X	
Woodlawn Park		X	
Water District #1 and Recharge Areas	X		X
Water District #5 and Recharge Areas	X		X

Brick Pond

This wetland contains "30 acres of open water surrounded by emergent plants and a wet woods." This pond, home to muskrats, waterfowl, shorebirds, and many species of songbirds, is a great site for wildlife observations. It is also known to be one of NY State's best birding sites. It is important to note this site is a NYS DEC designated wetland.

Municipal Water Wells and Recharge Areas

Groundwater resource serves 5600 people and if contaminated would be hard to find an economical alternative.

Municipality: TOWN OF RICHFORD

Site	Human Health	Socio-Cultural	Natural / Hydrologic
Beaver Dam State Forest		X	X
Robinson Hollow State Forest		X	X
Michigan Hill State Forest		X	X
Turkey Hill State Forest		X	X
Anderson Hill State Forest		X	X
Finger Lake Trails		X	X
Tri-County Pond		X	X

Beaver Dam State Forest

The Beaver Dam State Forest provides mountain biking opportunities, hunting, and trapping activities. It ensures a perpetual supply of timber, a diversity of wildlife habitats, and clean water.

http://www.dec.ny.gov/lands/37439.html

Robinson Hollow State Forest

Encompassing 1,402 acres of land, the Robinson Hollow State Forest extends to the towns of Richford, Caroline, and Harford. It provides recreational opportunities such as hunting and trapping, informal camping, and bird watching. Also, the forest is an excellent habitat for many different species of plants and animals, especially deer, turkey, grouse, raccoon, and fox. The Tri-County pond provides family fishing opportunities as it is stocked with rainbow trout and largemouth bass. Moreover, the forest has about 3 miles of marked snowmobile trial and about 2.5 miles of the Finger Lakes Hiking Trails.

http://www.dec.ny.gov/lands/37381.html

Michigan Hill State Forest

Encompasses 1,209 acres of land in the town of Richford. It is provides a landscape with various tree types, including oak, red pine, and spruce. Also, the forest is a critical habitat for a suite of birds, including the ruffed grouse, American woodcock, white-throated sparrow, American goldfinch, chestnut sided warbler, yellow warbler, blue-winged warbler, and so on. In addition, approximately 45 acres are maintained as grassland and pheasants are released on a yearly basis. Furthermore, mammals such as the red fox, gray fox, white tailed deer, eastern cottontail, woodland vole, and the meadow jumping mouse can all be found within the early forest habitat. There are also 42 species of reptiles and amphibians confirmed or predicted in the area.

http://www.dec.ny.gov/lands/37372.html

Turkey Hill State Forest

Encompasses 1,108 acres of land in the town of Richford and Berkshire in the northeastern tip of Tioga County. The landscape and the recreational opportunities that are provided are very similar to that of the

Michigan Hill State Forest. Yet, it also provides 1.0 mile of snowmobile trails. **Source**: http://www.dec.ny.gov/lands/37388.html

Anderson Hill State Forest

This State Forest encompasses 554 acres of completely forested land. The park provides habitats for many different species of birds, amphibians, and mammals such as the Acadian flycatcher, American woodcock, cerulean warbler, scarlet tanager, spotted salamander, grey tree frog, white tailed deer, and little brown bat. Furthermore, Andersen Hill is a hunting, trapping, fishing, hiking, and snowmobiling destination. A cooperative fishing access site developed by the DEC and the Tioga County Soil and Water Conservation District (SWCD) provides public access to the West Branch of Owego Creek; the West Branch is stocked with over 5,000 brown trout annually. The forest has a marked snowmobile trail about 0.5 miles in length.

http://www.dec.ny.gov/lands/37351.html

http://www.visittioga.com/sports-a-recreation/hiking--biking

Finger Lake Trails

A footpath for hikers which stretches 560 miles from the Pennsylvania/ New York border in Allegany State Park to the Long Path in the Catskill Forest Preserve. It is part of the North Country National Scenic Trail, which is a much larger trail system that extends half way across the continent. The trail provides access to unique natural areas and rugged gorges.

http://www.visittioga.com/sports-a-recreation/hiking--biking

http://vacation.away.com/attractions/travel-ad-cid8986-finger-lakes-national-forestattid295567-finger-lakes-trail-attraction.html

Tri-County Pond Description

This 1.7 acres pond is located at the intersection of Cortland, Tioga, and Tompkins County lines. It is a rainbow trout habitat, and provides trout and panfish fishing. It is also an ideal ice fishing location.

http://www.dec.ny.gov/outdoor/39722.html

http://www.dec.ny.gov/outdoor/23224.html

Municipality: TOWN OF SPENCER

Site	Human Health	Socio-Cultural	Natural / Hydrologic
Michigan Hollow Marsh			X

Spencer Lake		X	X
Pylkas and Pelto Dams on Dean Creek	X		X

North Spencer Swamp / Michigan Hollow Marsh

Area of hydrological importance identified by municipality. These wetlands are divided by a road and culvert.

Pylkas & Pelto Dams (Part of Dean Creek Flood Control Project)

Flood Control Structures installed in the late 1950's to alleviate flooding in the Dean Creek Watershed and the Village of Spencer. Area of hydrological importance identified by municipality.

Municipality: VILLAGE OF SPENCER

Site	Human Health	Socio-Cultural	Natural / Hydrologic
Nichols Pond		X	X

Nichols Pond

An excellent picnic area for the local residents. It hosts the annual Spencer Picnic, the summer ―Music in the Park series of concerts and many other events.

http://www.visittioga.com/sports-a-recreation/parks/37-nichols-park

Municipality: TOWN OF TIOGA

Site	Human Health	Socio-Cultural	Natural / Hydrologic
Ransom Park		X	X
Wildlife Refuge (Friends of Animals)			X

Ransom Park

A 10-acre park located in Tioga Center, used by the community.
Criteria: Human Health, Socio-Cultural, Natural/Hydrologic

Municipality: TIOGA COUNTY

Site	Human Health	Socio-Cultural	Natural / Hydrologic
Susquehanna River		X	X
Primary & Principal Aquifer System	X		X

Water Resources: Usage and Disposal

A typical Marcellus gas well uses, on average 4 to 7 million gallons of water for the hydraulic fracturing process. Because of the large volumes of water used in this process, the Susquehanna River Basin Commission (SRBC) plays an important role as it regulates water withdrawal and consumptive uses in the Susquehanna River Basin. Approval of the use of this water by SRBC is necessary before drilling is undertaken and any water is used regardless of its source. SRBC's approvals are equivalent to the term permits used by other agencies. SRBC requires all gas companies to seek approval from the Commission before withdrawing or using any amount of water to develop wells in the Marcellus or Utica shale formations in the river basin. With this new approval system adopted in October 2008, SRBC can evaluate the gas industry's individual and cumulative impacts on water resources in the basin. (See Reference for SRBC Information Sheet, Natural Gas Well Development in the Susquehanna River Basin or visit http://www.srbc.net/programs/projreviewmarcellus.htm).

The approval process includes SRBC reviewing the proposed water withdrawal application for whether the project would cause adverse impacts to the water resources of the basin. Based on activities seen in Pennsylvania, there are several potential water sources for gas companies that all need to be reviewed and approved by SRBC including:

- *Municipal Water Supply* – companies purchase water from municipalities public water supply system(s); sources include both surface and groundwater. Generally a quicker water source but often a more costly option for companies.
- *Surface Water* – including streams, rivers and ponds. This has been the primary source for water.
- *Ground Water* – will need sufficient yields for this source option to work.
- *Alternative Water Sources* – such as abandoned mine drainage, treated wastewater effluent and cooling water from electrical generation plants are currently being researched.

Water source is not the only consideration taken into account by the gas companies, there are a number of other factors considered by each company when determining the type of water source that they will be using including:

- Access to water near the drilling project area
- Proximity to drill site: Piping vs. Trucking
- Availability – seasonal or perennial
- Passby flow considerations for streams and river systems
- Water Quality

- Drilling Schedule vs. Permitting Schedule
- Permitting complexity (it takes about a year to get Susquehanna River Basin Commission (SRBC) to issue approval for a new withdrawal location)
- Budget Considerations

Regardless of the basis for the gas companies utilizing one water source over another, any usage of water requires SRBC approval. SRBC also sets conditions on all approvals requiring the gas company to meet these conditions or no approvals will be granted. All companies must demonstrate the following:

- All flow-back and produced fluids are treated and disposed of in accordance with state and federal laws.
- Any unused (surplus) water is not to be discharged back to the waters of the basin without controls or treatment to prevent the spread of nuisance aquatic species.
- All necessary permits or approvals required by local, state or federal agencies are obtained.
- All water withdrawn from surface waters is transported, stored, injected into a well or discharged so as to not spread aquatic invasive species.
- There are accurate meters to monitor daily withdrawals and consumptive use of water.

Water usage and flowback disposal are two of the primary reasons that NYSDEC is completing a Supplemental Generic Environmental Impact Statement, in order to address the required water volumes in excess of the 1992 GEIS. There are several options being explored by companies for disposal of flowback water; how this will be handled in NYS will be dependent on the final conditions set forth in the SGEIS. Potential options explored by the draft SGEIS and gas companies in Pennsylvania include:

- *Direct reuse without treatment* – this method is being undertaken by many companies that blend flowback with freshwater for reuse at another well. There is minimal costs associated with this methodology however, there is well plugging potential used with reuse. Companies such as Chesapeake and Range Resources state they recycle 100% of their flowback.
- *On-site treatment and reuse* – this method requires re-conditioning of the water by treatment on site and has a moderate costs with minimal potential for well plugging issues.
- *Off-site treatment and reuse* – this method has the same benefit of on site treatment but is more costly due to transportation costs.
- *Off-site treatment and disposal* – There is high transportation and disposal costs associated with this method. This category would include underground injection wells and other treatment facilities. There are limits to underground injection and permits will be required from both the EPA and NYSDEC for this disposal method.

The SGEIS states that direct discharge of fluids onto the ground or into surface water bodies from the well pad are prohibited. Discharges will be managed at treatment facilities or in disposal wells (Draft SGEIS, 9/30/2009, page 6-39). The draft SGEIS goes on to state that treatment facilities and disposal wells are options for disposal and such facilities must be permitted by NYSDEC.

Local and State Resources

It is important at the municipal level to understand and utilize local technical resources during all parts of the drilling process, including pre-drilling, construction and drilling, production and reclamation. It is also suggested by TING that municipalities engage natural gas companies and foster relationships with these businesses that will be in the County for the next 20-30 years. Below is a listing of local and state resources that might be useful.

Agency	Role	Contact Information
Tioga County Soil and Water Conservation District	Soil and Water Conservation Districts (SWCDs) are authorized under state law as local natural resources management agencies. The District can assist landowners and municipalities with natural resource concerns due to the impact of well pads, access roads and pipelines.	Tioga County SWCD Wendy Walsh District Manager 183 Corporate Drive Owego, NY 13827 Phone: (607) 687-3553 Fax: (607) 687-9440 Email: tcswcd@co.tioga.ny.us
NYS Department of Agriculture and Markets (NYSDAM)	For those areas of construction that take place in an agricultural district, NYS Department of Agricultural and Markets (NYSDAM) can provide assistance to landowners on such issues as drainage problems, trench settling, soil compaction, stormwater runoff, stream crossings and wetland impacts. NYSDAM working in conjunction with the SWCD have the necessary knowledge and expertise to monitor and provide technical recommendations to mitigate environmental issues in regard to natural gas exploration (including well pad development and associated pipeline activities).	NYSDAM Michael Saviola Ag Resource Specialist 158 Main Street Mount Morris, NY 14510 Phone: (585) 658-9854 Email: michael.saviola@agmkt.state.ny.us
NYS Public Service Commission (PSC)	PSC has approval authority over actions involving intrastate electric power transmission lines and high pressure natural fuel gas pipelines, and actions related to such projects. An example of an action related to a high pressure natural fuel gas pipeline is the siting and construction of an associated compressor station. PSC through Article VII regulates and permits transmission lines at least ten miles long and operated	Contact Info needed.

	at a pressure of 125 psi or greater (For more information review Chapter 5.16.8.1 dSGEIS).	
NYS Department of Environmental Conservation	NYSDEC enforces the Environmental Conservation Law through regulation. Responsible permitting authority over natural gas well pads as well as disposal, transport, and treatment of hazardous and toxic wastes; manages the program for oil and chemical spills; protects tidal and freshwater wetlands and floodplains; and promotes wise use of water resources.	NYS Department of Environmental Conservation Division of Mineral Resources Bureau of Oil & Gas Regulation 625 Broadway, 3rd Floor Albany, New York 12233-6500 Phone: 518-402-8056
Susquehanna River Basin Commission (SRBC)	Regulates and permits surface and ground water withdrawals for all natural gas activities.	SRBC 1721 N Front Street Harrisburg, PA 17102-2391 Paula Ballaron – 717-238-0423 x 219 pballaron@srbc.net Damian Zampogna – 717-238-0423 x222 dzampogna@srbc.net

NYS Department of Agriculture and Markets Technical Guidance's for Well and Pipeline Restoration

- Pipeline Right-of-Way Construction Projects – Agricultural Mitigation Through the Stages of Project Planning, Construction/Restoration and Follow-up Monitoring
- Guidelines for Construction and Restoration at Natural Gas Well Drilling Sites in Agricultural Areas.

These documents are located in Attachment **5B** of this chapter.

Recommended Environment Strategy

Given that several options to address environmental concerns have been presented in this Chapter, TING recommends that each municipality develop its own overall strategy to address the environment incorporating pieces that are suitable for them. An example outline of a strategy follows:

1. Request involvement from NYSDEC in SEQRA process as an interested agency for all drilling activity within the municipality and as an involved agency if drilling activity occurs within the 100-year floodplain
2. Identify and adopt Critical Environmental Areas (CEAs)
3. Review finalized Supplemental Generic Environmental Impact Statement (sGEIS) for High Volume Hydrofracking once released by NYSDEC

4. Become familiar with Federal, State and Local Resources that can be utilized during natural gas exploration and development (SRBC, NYSDEC, NYSDAM, NYSPSC, TCSWCD, TCDOH)

Attachment 5A

Table 8.1
Regulatory Jurisdications Associated With High-Volume Hydraulic Fracturing

Regulated Activity or Impact	DEC Divisions & Offices						NYS Agencies				Federal Agencies			Local Agencies		Other	
	DMN	DEP	DOW	DSHM	DFWMR	DAR	DOH	DOT	PSC	OPRHP	EPA	USDOT	Corps	Local Health	Local Govt.	NYC DEP	RBCs
General																	
Well siting	P	-	-	-	-	-	-	-	-	*	-	-	-	-	-	*	*
Road use	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-
Surface water withdrawals	S	*	*	-	P	-	-	-	-	-	-	-	-	-	-	-	*
Centralized freshwater surface imopundment	-	-	P	-	-	-	-	-	-	*	-	-	-	-	-	-	-
Stormwater runoff	S	-	P	-	-	-	-	-	-	-	-	-	-	-	-	*	*
Wetlands permitting	-	P	-	-	S	-	-	-	-	-	-	-	P	-	-	*	*
Floodplain permitting	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	*	*
Transportation of fracturing chemicals	-	-	-	-	-	-	-	P	-	-	-	P	-	-	-	-	-
Well drilling and construction	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*
Wellsite fluid containment	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hydraulic fracturing/ refracturing	P	-	*	-	-	-	*	-	-	-	-	-	-	-	-	-	-
Cuttings and reserve pit liner disposal	P	-	-	A	-	-	*	-	-	-	-	-	-	-	-	-	-
Site restoration	P	-	-	-	S	-	-	-	-	-	-	-	-	-	-	-	-
Production operations	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gathering lines and compressor stations	S	S	-	-	-	S	-	-	P	-	-	-	-	-	-	-	-
Air emissions from operations all site operations	S	-	-	-	-	P*/A*	*	-	-	-	-	-	-	-	-	-	-
Well plugging	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Invasive species control	S	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-
Fluid Disposal Plan 6NYCRR 554.1(c)(1)																	
Waste transport	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-
Centralized flowback water surface impoundment	P	-	A	A	A	P*/A*	*	-	-	*	-	-	-	-	-	-	*
POTW disposal	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	*	*
New in-state industrial treatment plants	-	P	S	-	-	-	-	-	-	*	-	-	-	-	-	*	*
Injection well disposal	S	P	S	-	-	-	-	-	-	-	P	-	-	-	-	-	*
Road spreading	-	-	-	P	-	-	*	-	-	-	-	-	-	-	P	-	-
Private Water Wells																	
Baseline testing and ongoing monitoring	P	-	-	-	-	-	-	-	-	-	-	-	-	P		-	-
Initial complaint response	S	-	-	-	-	-	*	-	-	-	-	-	-	P	-	-	-
Complaint follow-up	P	-	-	-	-	-	-	-	-	-	-	-	-	S	-	-	-

Key:
P = Primary role
S = Secondary role
A=Advisory role
* = Role pertains in certain circumstances

DEC Divisions
DMN= Division of Mineral Resources
DEP = Division of Environmental Permits (DRA in GEIS Table 15.1)
DOW = Division of Water (DW in GEIS Table 15.1)
DSHM=Division of Solid and Hazardous Materials (DSHW in GEIS Table 15.1)
DFWMR=Division of Fish, Wildlife and Marine Resources
DAR=Division of Air Resources

Attachment 5B – NYSDAM Technical Guidance Documents

NEW YORK STATE
DEPARTMENT OF AGRICULTURE AND MARKETS

Guidelines for Construction and Restoration
at Natural Gas Well Drilling Sites in Agricultural Areas

The following guidelines shall apply to the construction and restoration of natural gas well drilling pads and access roads constructed on agricultural land. The project sponsor should coordinate with the New York State Department of Agriculture and Markets (Ag. and Markets) to develop an appropriate schedule for inspections to assure that the goals of these guidelines are being met. The project sponsor should also hire an Agricultural Monitor to oversee the construction and restoration of well drilling sites in agricultural lands.

Siting Goals

Minimize impacts to normal farming operations by locating well pads along field edges and in nonagricultural areas where possible.

Avoid dividing larger fields into smaller fields, which are more difficult to farm, by locating access roads along the edge of agricultural fields (hedgerows and field boundaries) and in nonagricultural areas where possible.

Locate access roads, which cross agricultural fields, along ridge tops and following field contours, where possible, to eliminate the need for cut and fill and reduce the risk of creating drainage impacts.

The permanent width of access roads in agricultural fields should be no more than 16 feet to minimize the loss of agricultural land.

All existing drainage and erosion control structures such as diversions, ditches, and subsurface drain tile lines shall be avoided or appropriate measures taken to maintain the design and effectiveness of the existing structures. Any structures disturbed during well pad construction shall be repaired to as close to original condition as possible, as soon as possible, unless such structures are to be eliminated based on a new design.

Construction Requirements

The surface of access roads constructed through agricultural fields shall be level with the adjacent field surface.

Culverts and waterbars shall be installed along access roads to maintain natural drainage patterns.

All topsoil must be stripped from agricultural areas used for vehicle and equipment traffic and parking. All vehicle and equipment traffic and parking shall be limited to the access road and/or designated work areas such as well pads. No vehicles or equipment will be allowed outside the work area without prior approval from the landowner and, when applicable, the Environmental Monitor. Topsoil stockpile areas shall be clearly designated in the field and on the on-site "working set" of construction drawings.

A level and stable surface is required for the drilling rig at the well site. Construction of the well pad can require significant grading of the existing surface. Topsoil should be removed from the drilling site and stockpiled separate from subsoil and other material. Topsoil and subsoil graded from the drilling site should not block natural drainage.

Subsurface drainage can be damaged during the grading of the well site. Provisions for drain tile repair should be included in the easement agreement.

During the drilling operation, water with a high salt content may be removed from the hole and pumped into a brine pit. Brine pits should be covered with several feet of subsoil to prevent salt damage to vegetation after reclamation. Original topsoil must be placed over the surface of the brine pit during reclamation.

During the drilling, a slurry of pulverized rock and clay like material is generally removed from the hole and pumped into a pit on site. The landowner should be aware of how this mud or drill cuttings will be disposed of after drilling. Drilling mud should be removed from active agricultural fields. Drilling mud or cuttings cannot be mixed with topsoil.

Farmland soils with an extended seasonal-perched high water table will sustain a chronic state of wetness throughout the mass of buried drill cuttings. The same condition may also lead to the potential leaching of residual salts within the agricultural soil profile resulting in the loss or reduction in soil fertility, and long-term crop loss. When a well pad and associated drilling operations occur on a site that has a shallow depth to the water table, alternative on-site burial techniques shall be employed. These techniques include temporary, raised earthen berm pits with plastic liner to accommodate the removal of both the drilling fluids and the wet drill cuttings from the site before restoration.

In pasture areas, work areas will be fenced to prevent livestock access, consistent with landowner agreements.

Restoration Requirements

Following construction, all agricultural areas temporarily used for the well pad must be regraded to restore the original contours to the extent possible.

After the well pad is regraded, all disturbed agricultural areas will be decompacted to a depth of 18 inches with a deep ripper (subsoiler) or heavy-duty chisel plow. In areas where the topsoil was stripped, soil decompaction shall be conducted prior to topsoil replacement. Following decompaction, all rocks 4 inches and larger in size will be removed from the surface of the subsoil prior to replacement of the topsoil.

The topsoil will be replaced to original depth and the original contours will be reestablished where possible. All rocks 4 inches and larger shall be removed from the surface of the topsoil. Subsoil decompaction and topsoil replacement should be avoided after October 1, unless approved on a site-specific basis by the landowner in consultation with Ag. and Markets. All parties involved should be cognizant that areas restored after October 1st may not obtain sufficient growth to prevent erosion over the winter months. If areas are to be restored after October 1st, necessary provision should be made to restore any eroded areas in the springtime, to establish proper growth.

Where farmland on a soil with a high water table has been inadvertently used as a disposal pit for the wet drill cuttings and potential residual salts, the site can be rehabilitated for farming by the re-excavation of the pit, removal of the materials, and subsequent backfilling with soil materials that is consistent with the native soil profile.

All access roads will be regraded to allow for farm equipment crossing and to restore original surface drainage patterns, or other drainage pattern incorporated into the design.

Lime and fertilizer shall be applied to restored agricultural areas where necessary and such areas shall be seeded with the seed mix specified by the landowner, in order to maintain consistency with the surrounding areas.

All surface or subsurface drainage structures damaged during construction shall be repaired to as close to preconstruction conditions as possible, unless said structures are to be removed as part of the project design. Any surface or subsurface drainage problems resulting from construction of the well pad will be corrected with the appropriate mitigation as determined by the Agricultural Monitor, The Department and the Landowner.

Following restoration, all construction debris will be removed from the site.

Two Year Monitoring and Remediation

The Project Sponsor will provide a monitoring and remediation period of no less than two years immediately following the completion of initial restoration. The two year period allows for the effects of climatic cycles such as frost action, precipitation and growing seasons to occur, from which various monitoring determinations can be made. The monitoring and remediation phase will be used to identify any remaining agricultural impacts associated with construction that are in need of mitigation and to implement the follow-up restoration.

General conditions to be monitored include topsoil thickness, relative content of rock and large stones, trench settling, crop production, drainage and repair of severed fences, etc. Impacts will be identified by the Environmental Monitor through on site monitoring of all agricultural areas impacted by construction and through contact with respective farmland operators and the Department of Agriculture and Markets.

Monitoring and follow-up should include any necessary mitigation of residual drainage problems with effective installation of AASHTO M252 subsurface drain line systems along the perimeter of the overall site and "horseshoed" around and slightly upslope from the burial pit.

Topsoil deficiency and settling shall be mitigated with imported topsoil that is consistent with the quality of topsoil on the affected site. Excessive amounts of rock and oversized stone material will be determined by a visual inspection of disturbed areas as compared to portions of the same field located outside the construction area. All excess rocks and large stones will be removed and disposed of by the Project Sponsor.

When the subsequent crop productivity within affected areas is less than that of the adjacent unaffected agricultural land, the Project Sponsor as well as other appropriate parties, will help to determine the appropriate rehabilitation measures to be implemented. Because conditions which require remediation may not be noticeable at or shortly after the completion of construction, the signing of a release form prior to the end of the remediation period will not obviate the Project Sponsor's responsibility to fully redress all project impacts.

Subsoil compaction shall be tested using an appropriate soil penetrometer or other soil compaction measuring device. Compaction tests will be made for each soil type identified on the affected agricultural fields. The subsoil compaction test results within the affected area will be compared with those of the adjacent unaffected portion of the farm field/soil unit. Where representative subsoil density of the affected area exceeds the representative subsoil density of the unaffected areas, additional shattering of the soil profile will be performed using the appropriate equipment. Deep shattering will be applied during periods of relatively low soil moisture to ensure the desired mitigation and to prevent additional subsoil compaction. Oversized stone/rock material which is uplifted to the surface as a result of the deep shattering will be removed.

PIPELINE RIGHT-OF-WAY CONSTRUCTION PROJECTS

AGRICULTURAL MITIGATION THROUGH THE STAGES OF PROJECT PLANNING , CONSTRUCTION/RESTORATION AND FOLLOW-UP MONITORING

By
New York State
Department of Agriculture and Markets
Albany, New York

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1.0 INTRODUCTION

The following agricultural mitigation standards are designed to apply to transmission pipelines that affect agricultural land. These standards and practices apply to the early planning stage of the project through construction, restoration, and post-construction monitoring and rehabilitation. The specific details regarding "Agricultural and Soil Conservation Specialists/Inspectors", in addition to the traditional environmental specialists, apply to projects of significant length or projects of relatively moderate length, but which affect proportionally significant or unique areas of agricultural resources.

These standards and practices for construction, cleanup and restoration of agricultural lands are for mineral soils only and, therefore, do not pertain to organic muckland soils. The New York State Department of Agriculture and Markets (Ag & Markets) recommends avoidance-routing around agricultural organic muckland soils. When this is not possible, project-specific development and implementation of agricultural mitigation techniques will be needed. The project sponsor's representatives should contact Ag & Markets during preliminary planning for such sites.

2.0 PLANNING

2.1 AGRICULTURAL AND SOIL CONSERVATION SPECIALIST/INSPECTOR

The Project Sponsor must retain a qualified Agricultural and Soil Conservation Specialist/Inspector (Agricultural Specialist) on each work spread for each phase: Environmental Management and Construction Plan (EM&CP) development, construction, initial restoration, post-construction monitoring and follow-up restoration. The Agricultural Specialist will submit site-specific agricultural information for EM&CP development to the Project Sponsor. This information will be obtained through field review as well as direct contact with affected farm operators, County Soil and Water Conservation Districts, Ag & Markets and others. The Agricultural Specialist will maintain regular contact with the Spread Environmental and Engineering Coordinators and appropriate on-site Project Inspectors throughout the construction phase. The Agricultural Specialist also maintains regular contact with the affected farmers and County Soil and Water Conservation Districts concerning farm resources and management matters pertinent to the agricultural operations and the site-specific implementation of the EM&CP. The Poject Sponsor will consult with Ag & Markets at the same time they submit a request for an EM&CP modification concerning agriculture.

2.2 EM&CP MAPS

The Project Sponsor will provide on the general EM&CP plan maps the information described below concerning agricultural areas/uses.

2.2.1 Type of Agricultural Land and Facilities

A. Pasture/Grazing
   1. Unimproved grazing areas (brushy or wooded land used by livestock)
   2. Permanent open pasture (land devoted only to pasture use, notsuited to tillage rotation)
   3. Improved pasture (including tillable rotation pasture/hayland)
   4. Livestock fencelines

B. Cropland
   1. Hayland
   2. Rotation cropland
   3. Long-term cropland (also includes agricultural lands enrolled ineither the annual set-aside or the Conservation Reserve Program of the U.S.D.A. Consolidated Farm

Service Agency). Such lands will be identified through consultation with the offices of the Consolidated Farm Service Agency and the County Soil and Water Conservation District.

C. Unique Agricultural Lands (Avoidance routing strongly recommended)
1. Specialty cropland (vegetables, berries, etc.)
2. Orchard
3. Vineyard
4. Maple Sugarbush
5. Organic Muckland
6. Permanent Irrigation systems

2.2.2 Vulnerable Agricultural Soils

Vulnerable agricultural soils are defined as areas of cropland, hayland, or pasture which are somewhat more highly sensitive than other agricultural soils to construction disturbance due to slope, relative soil wetness, and/or shallowness to bedrock. Wetness conditions are the result of factors such as landscape position, soil texture, seasonal water table and/or slowly permeable subsoil horizons (e.g., areas of laterally draining subsoils). All vulnerable agricultural soils including, but not limited to, those identified in the county soil survey as fragipans, lacustrines, dense basal tills, soils with a seasonally high water table, or soils with less than 5 feet of depth to bedrock are to be located and identified on the project map using the following codes:

A. "VE" (designate the general area of vulnerability of erosion due to R-O-Wfactor(s) of slope and/or the texture of exposed soil).

B. "V/W" (designate the general area of vulnerability to soil horizon wetnessas described above).

C. "V/B" (designate the general area of vulnerability due to shallow depth to bedrock).

D. "V/OR" (designate the location of unavoidable organic mucklands).

2.2.3 Other Features

In addition, the Project Sponsor will provide the following information on the general EM&CPmaps:

A. Land and Water Management Features
1. Subsurface drainage area (indicate each field)
2. Open Ditch
3. Diversion Terrace
4. Buried water lines (farmstead consumptive use)
5. Water source (developed springs, etc.)
6. Unnamed water flow

B. Depth of cover if it varies from the agricultural standard (refer to 2.7).

C. Any off right-of-way access roads, work or storage areas. Map all such areas identified at the time of the EM&CP submission indicating their proposed locations and the location and size of all culverts to the extent required. Any other areas that may be identified during construction will be considered and filed as a change in the EM&CP.

D. The proposed location of any compressor stations, valve stations, metering and regulating stations and any other proposed facilities. Agricultural areas should be avoided when siting any above ground facilities.

E. General locations for trench breakers, including a notation of the distance between breakers based on percent of slope, or an appended generic chart of trench breaker spacing by degree or percent of slope.

F. General locations for subsurface intercept drains to control soil saturation and/or aid trench breakers in minimizing water piping, based on the vulnerable agricultural soils data (see Section 2.2.2) and site monitoring. Such locations will generally coincide with "V/W" vulnerable agricultural soils and breaks in slopes.

2.3 DOCUMENTATION OF IMPLEMENTATION PROCEDURES

The Project Sponsor will explain in the EM&CP narrative how the respective features of agricultural-related mitigation will be included in the contractual specifications or otherwise be carried out. The narrative will describe the method by which the Project Sponsor's staff and the contractor's field supervisors will be trained on the agricultural mitigation plan, which includes management criteria and designed standards and practices.

2.4 CHERRY TREE VEGETATION

The Project Sponsor will identify Black Cherry trees located on the right-of-way near active livestock use areas during EM&CP development. Black Cherry tree vegetation is toxic to livestock when cut and wilted and shall not be stockpiled in areas accessible to livestock. During the clearing phase, such vegetation will be disposed of in a manner which eliminates contact with livestock.

2.5 TRENCH CROSSINGS

The open trench will be fenced and temporary livestock and farm equipment crossings (or trench plugs) will be provided where requested and/or needed, by the farm owner/operator.

2.6 UNDERLAYMENT FOR ROCK/GRAVEL FILL

Where access ramps are required from the highway to the pipeline construction area in agricultural fields, an underlayment of durable, geotextile matting will be placed over the exposed subsoil surface prior to the use of temporary gravel access fill material. All such material will be removed upon completion of the project. The use of durable, geotextile matting as an underlayment helps prevent rock and stone from becoming embedded in the subsoil material. Complete removal of the ramp upon completion of the project and restoration of the impacted site is required prior to topsoil replacement.

2.7 DEPTH OF COVER

2.7.1 Cropland, Hayland and Improved Pasture

In cropland, hayland and improved pasture a minimum depth of forty-eight inches of cover will be required; except where the new pipeline is located parallel and adjacent to an older existing pipeline that was buried with less than forty inches of cover. If such a situation occurs, a minimum depth of forty inches of cover will be required.

2.7.2 Unimproved Pasture

In unimproved grazing areas and land permanently devoted to pasture, a minimum depth of thirty-six inches of cover will be required.

2.7.3 Areas of Shallow Soil

In areas where the depth of soil over bedrock ranges from zero to forty-eight inches, the pipe shall be buried entirely below the top of the bedrock or at the depth specified for the particular land use (see 2.7.1 and 2.7.2), whichever is less. At no time will the depth of cover be less than twenty-four inches below the soil surface. All variances from this will be clearly stated in contract documents, construction drawings, or detailed drawings for special areas or crossings.

2.8 DRAIN LINE ALLOWANCE OF DEPTH

In existing agricultural fields where future surface and subsurface drainage plans have been identified by the owner/occupant or are on file with the Soil and Water Conservation District prior to EM&CP development, the Project Sponsor will provide adequate cover over the pipe to allow the future installation of major header drains and main drains across the right-of-way without obstruction due to the burial depth of the pipeline. It will be the responsibility of the Ag Specialist to determine the required elevations of the pipeline for clearance between the bottom of

future drain systems and the top of the pipeline. Deviations to the standard depth of cover as detailed in section 2.7 will be specified in the EM&CP.

2.9 SUBSURFACE DRAIN REPAIR

During preparation of the EM&CP, a detailed drainage line repair procedure will be developed for the repair of crushed/severed clay tile and plastic drain lines. The procedure will be developed by the Ag Specialist in consultation with the local Soil and Water Conservation District. Specific drawings showing the generic technique to be implemented for drain line repairs will be provided by the Project Sponsor. The plan for the replacement of functional stone drainage systems severed during pipeline construction shall be prepared during the restoration phase by the Agricultural Specialist, in consultation with Ag & Markets and/or the Soil and Water Conservation District.

2.10 ALTERNATIVE GRAZING PLANS

The Ag Specialist(s) will work with the farm operators during the planning phase to develop a plan to delay the pasturing of the right-of-way, following construction, until pasture areas are adequately revegatated. The Project Sponsor will be responsible for maintaining the temporary fences on the right-of-way until the Ag Specialist determines that the vegatation on the right-of-way is established and able to accommodate grazing. At such time, the Project Sponsor will be responsible for the removal of the fences.

3.0 CONSTRUCTION/RESTORATION

3.1 CONTROL OF TRENCH WASHOUTS, WATER PIPING AND BLOWOUTS

Trench breakers are installed for the dual purpose of preventing trench washouts during construction and abating water piping and blowouts subsequent to trench backfill. The distance between permanent trench breakers may range from the relatively close-spaced formula of the toe of the upper trench breaker being level with the head of the lower trench breaker to the relatively greater spacing as detailed on the sample drawing “TRENCH BREAKER SPACING” or on the sample chart “PERMANENT SLOPE BREAKER SPACING”. The Project Sponsor will record each installed trench breaker location, by map referenced station-number.

3.2 TOPSOIL PROTECTION

In all agricultural portions of the right-of-way, topsoil will be removed from the subsoil stockpile area, trench, construction assembly and traffic zones. The depth of topsoil removal will include all of the “A” horizon down to the beginning of the subsoil "B" horizon, generally not to exceed a maximum of 12 inches. Topsoil removal up to a depth of 16 inches will be required in specially designated soils encountered along the pipeline route and identified in the EM&CP. All topsoil will be stockpiled and separated from other excavated materials. The Agricultural Specialist will determine depth of topsoil stripping per affected farm during EM&CP development by means of the County Soil Survey and on-site soil augering, if necessary. All topsoil material will be stripped, stockpiled, and uniformly returned to restore the original soil profile. During the clearing/construction phase, site specific depths of topsoil stripping will be monitored by the Agricultural Specialist. Where right-of-way construction requires cut-and-fill of the soil profile across grades, to the extent practicable, topsoil stockpiling will be located on the upslope edge of the right-of-way. Where topsoil cannot be seperately stored on the upslope side, suitable right-of-way space will be provided on the downslope side to ensure the complete segregation of the topsoil from all cut-and-fill material.

Right-of-way width for agricultural lands will generally be the maximum necessary to allow adequate space for traffic, the trench and construction area, and the separate stockpiles of both topsoil and spoil

material. Except in special conditions, such as road and stream crossings that may require a greater working area, the temporary right-of-way construction width should range from a minimum of 80 feet for a 12 inch diameter pipeline1, to a maximum of 125 feet for a 36 inch diameter line. In projects using the relatively wide trenching method to meet construction worker safety requirements, a proportionally wider right-of-way will be temporarily acquired.

1 The term "minimum" refers to the absolute minimum width of the temporary construction right-of-way, under the very best of working conditions: that is, a level farmscape on deep, well drained soil. An 80 feet width, however, is not adequate as the initial, "available width" through farmlands with mild, rolling or moderately steep slopes, nor on soils that are less than well drained or shallow to bedrock. In those situations, the minimum available width of temporary construction right-of-way should be 90 feet. This allows for the inherent cut-and-fill grading; the drift of wet subsoil muds/spoil materials; and the special concerns of shallow bedrock soils, without jeopardizing the protection of
the stockpiled topsoil materials. Certain site-specific conditions may accommodate the farmland protection in a slightly narrower space, leaving
some of the temporary right-of-way unused. Nevertheless, the availability of the 90 feet for the construction of a 12 inch pipeline should be provided for the temporary periods of construction and restoration.

3.3 SUBSOIL PROTECTION (SHALLOW SOILS)

Construction through farm soils dominated by a shallow depth to bedrock can result in a significant loss of, or permanent damage to, the subsoil or "B" horizon and corresponding damage to the soil profile, regardless of the measures employed to protect the topsoil ("A"horizon) material. The structure and thickness of the thin layer of remaining subsoil over bedrock can be adversely impacted as a result of grading, construction traffic and trench excavation as well as backfilling that involves bedrock material. The actual need for subsoil protection, as well as the method to be employed, must be based on project-specific factors including the diameter of the pipeline to be constructed, the site-specific depth to bedrock and the thickness of the subsoil. Among the construction phase measures that may help to minimize damages are:

- Stripping and seperately stockpiling the "B" horizon of the right-of-way for a depth of 12 inches or to the top of the bedrock, whichever is shallower; or, stripping and separately stockpiling the "B" horizon from the full top width of the trench and spoil pile zone.
- Removing excavated bedrock materials from the site at the time of excavation.
- Backfilling the work trench with imported subsoil material.

3.4 BLASTING REQUIREMENTS

In agricultural areas of till over bedrock which requires blasting, the Project Sponsor will use matting or controlled blasting to limit the dispersion of blast rock fragments. Farm owners/operators will be given timely notice prior to blasting on farm property.

3.5 SUPPLEMENTAL BACKFILL MATERIALS

In agricultural areas where the materials excavated during trenching are insufficient in quantity to meet backfill requirements, the soil of any agricultural land adjacent to the trench and construction zone will not be used as either backfill or surface cover material. Under no circumstances will any topsoil material be used for pipe padding material or trench backfill. In situations where imported soil materials are employed for backfill on agricultural lands, such material shall be of similar texture to the existing soils on site.

In order to satisfy agricultural restoration requirements, a portion of a farm's non-cropland may, in some specific instances, be considered as an alternative source of imported soils.

3.6 BACKFILL PROFILE AND TRENCH CROWNING

In areas of cropland, including rotation hayland, permanent hayland and improved pastureland, ripped or blasted bedrock or concentrated volumes of excavated stone or rock material may be used for backfill, but no closer than twenty four (24) inches in mesic soils nor thirty (30) inches in frigid soils from the exposed working construction surface of the right-of-way. (To determine the temperature regime of the soil, consult the U.S.D.A. Natural Resources Conservation Service, formerly S.C.S.). All excess rock not utilized as trench backfill will be hauled away. The remaining backfill materials will

consist of suitable subsoil over the rock fill material. Trench crowning will occur during the backfill operation of the construction phase, using subsoil materials over the trench to allow for trench settling. The stockpiled topsoil will be spread over the entire affected right-of-way, after the initial ripping of the exposed subsoil and the rock cleanup has been completed. In areas where trench settling occurs after topsoil spreading, imported topsoil will be used to fill each depression. Topsoil from the right-of-way or from adjacent agricultural land will not be used to backfill depressions.

3.7 SUBSOIL RIPPING, STONE REMOVAL, TOPSOIL COVER AND SUBSOIL SHATTERING

In all agricultural sections of the right-of-way where topsoil is stripped, the Project Sponsor shall break up the exposed construction surface subsoil with deep tillage by such devices as a deepripper or heavy duty chisel plow. Following the deep ripping and chiseling, all stone and rock material four inches and larger in size which has been lifted to the surface shall be collected and taken off site for disposal. Upon approval of the subsoil decompaction and the stone removal by the Agricultural Specialist, the topsoil that has been temporarily removed for the period of construction shall then be replaced. Finally, deep subsoil shattering shall be performed with a subsoiler tool having angled legs. Stone removal shall be completed, as necessary, to eliminate any additional rocks and stones brought to the surface as a result of the final subsoil shattering process. Due to the generally unsuitable weather for continuing agricultural land restoration in late autumn, subsoil decompaction and topsoil replacement activities shall not be performed after October 1, unless approved on a site-specific basis by the certifying agency and Ag and Markets in consultation with the Agricultural Specialist.

4.0 TWO YEAR MONITORING AND REMEDIATION

The Project Sponsor will provide a monitoring and remediation period of no less than two years immediately following the full-length activation of the pipeline or the completion of initial right-of-way restoration, whichever occurs last. The two year period allows for the effects of climatic cycles such as frost action, precipitation and growing seasons to occur, from which various monitoring determinations can be made. The Project Sponsor will maintain a project work spread Agricultural Specialist on at least a part-time basis through this period. The monitoring and remediation phase will be used to identify any remaining agricultural impacts associated with right-of-way construction that are in need of mitigation and to implement the follow-up restoration.

4.1 GENERAL MONITORING AND REMEDIATION

General right-of-way conditions to be monitored include topsoil thickness, relative content of rock and large stones, trench settling, crop production, drainage and repair of severed fences, etc. Impacts will be identified through on site monitoring of all agricultural areas along the right-of-way and through contact with respective farmland operators and County Soil and Water Conservation Districts.

Topsoil deficiency and trench settling shall be mitigated with imported topsoil that is consistent with the quality of topsoil on the affected site. Excessive amounts of rock and oversized stone material will be determined by a visual inspection of the right-of-way and periodic probes of the trench area. Results will be compared to portions of the same field located outside of the right-of- way. Included in the determination of relative rock and large stone content is the right-of-way's condition subsequent to farm plowing/tillage and the relative concentration of such materials within the right-of-way as compared to off the right-of-way. All excess rocks and large stones will be removed and disposed of by the Project Sponsor.

On site monitoring shall be conducted at least three times during the growing season and shall include a comparison of growth and yield for crops on and off the right-of-way. When the subsequent crop productivity within the affected right-of-way is less than that of the adjacent unaffected agricultural

land, the Agricultural Specialist, in conjunction with the Project Sponsor as well as other appropriate organizations, will help to determine the appropriate rehabilitation measures for the Project Sponsor to implement. During the various stages of the project, all affected farm operators will be periodically apprised of the duration of remediation by their respective work spread Agricultural Specialist. Because conditions which require remediation may not be noticeable at or shortly after the completion of construction, the signing of a release form prior to the end of the remediation period will not obviate the Project Sponsor's responsibility to fully redress all project impacts. After completion of the specific remediation period, the Project Sponsor will continue to respond to the reasonable requests of the farmland owner/operators to correct project related affects on the impacted agricultural resources.

4.2 SPECIFIC MONITORING AND REMEDIATION

4.2.1 Compaction Testing and Remedial Action

After the moisture of the soil profile on the affected right-of-way has returned to equilibrium with the adjacent off right-of-way land, subsoil compaction will be tested using an appropriate soil penetrometer or other soil compaction measuring device. Compaction tests will be made for each soil type identified on the affected agricultural fields. The subsoil compaction test results within the right-of-way will be compared with those of the adjacent off right-of-way portion of the affected farm field/soil unit. Where representative subsoil density on the right-of-way exceeds the representative subsoil density outside the right-of-way, additional shattering of the soil profile will be performed using a deep, angled-leg subsoiler tool. Deep shattering will be applied during periods of relatively low soil moisture to ensure the desired mitigation and to prevent additional subsoil compaction. Oversized stone/rock material which is uplifted to the surface as a result of the deep shattering will be removed. In the event that subsequent construction or clean-up activities result in new compaction, additional deep tillage will be performed to alleviate such compaction.

4.2.2 Control of Soil Saturations and Seeps

For lands disturbed within or adjoined to agricultural areas where the construction alters the natural stratification of soil horizons and natural soil drainage patterns, the Project Sponsor will rectify the effects with measures such as subsurface intercept drain lines. Selection of the type of intercept drain lines to install to prevent surface seeps and the seasonally prolonged saturation of the backfilled trench zone and adjacent areas will be performed by a qualified Agricultural Specialist. Drawings of such drain locations will be provided by the Project Sponsor during monitoring and follow-up remediation. All drain lines will be installed according to Natural Resource Conservation Service (formerly SCS) standards and specifications.

4.3 COMMUNICATION ACCESS

The Project Sponsor will provide all farm owners/operators with a telephone number to facillitate direct contact with the Project Sponsor and the project's Agricultural Specialist(s) through all of the stages of the project, including operation and maintenance.

Chapter 6: Water Quality

Chapter 6: Water Quality

Introduction

The purpose of this chapter is to provide an overview of gas development-related water quality issues within New York State and to provide information and resources specific to water quality planning for municipalities in Tioga County. For information on water quantity issues please refer to Chapter 5 Environment, Water Resources: Usage and Disposal. Gas drilling brings with it a number of new concerns about water quality. The processes that local governments undergo in preparation for gas drilling will be relevant to other types of industrial development and the general health and safety of the community. Municipalities can better address water quality and safety concerns by understanding the state and federal water resource regulations and by establishing proactive plans for water protection.

This chapter contains a general description of the fracturing fluid, including a list of chemical additives. Current legislation makes it impossible to know what specific chemicals are used at a given site; however, this chapter includes potential hydro-fracturing additives and also suggested water quality parameters for baseline water quality tests. It is critical that municipalities with public water supplies perform baseline tests of their wells to have documentation of water quality prior to drilling commencing. The same suggested list of water quality parameters should be performed by private residents using certified laboratories and the proper procedures. To date, the Pennsylvania Department of Environmental Protection as reported the greatest distance that they have seen wells affected by gas drilling has been 3000 feet, with the vast majority of cases falling within 1000 feet from drilling activity (Source: Penn State Extension, Webinar 9/15/2010 "How to Interpret Pre & Post Gas Drilling Water Test Reports).

Included In this Chapter:

- ***Chemicals used in hydro-fracturing***
- ***Water Testing Parameters***
- ***List of Certified Local Laboratories***
- ***Surface Water Quality Monitoring Efforts***
- ***Aquifer and Water Sources***
- ***Wellhead Protection Ordinance***
- ***Aquifer Protection***
- ***Agencies and their Roles***

Chemicals Used in Hydro-fracturing

Description of Hydro-fracturing Fluid

According to the 2009 dSGEIS, "Hydraulic fracturing is a well stimulation technique which consists of pumping a fluid and a propping agent such as sand down the well bore under high pressure to create fractures in the hydrocarbon-bearing rock", through which gas can flow. The types of chemical additives used during the fracturing process are dependent on the specific geology of a particular region and the depth of the Marcellus Shale from the surface.

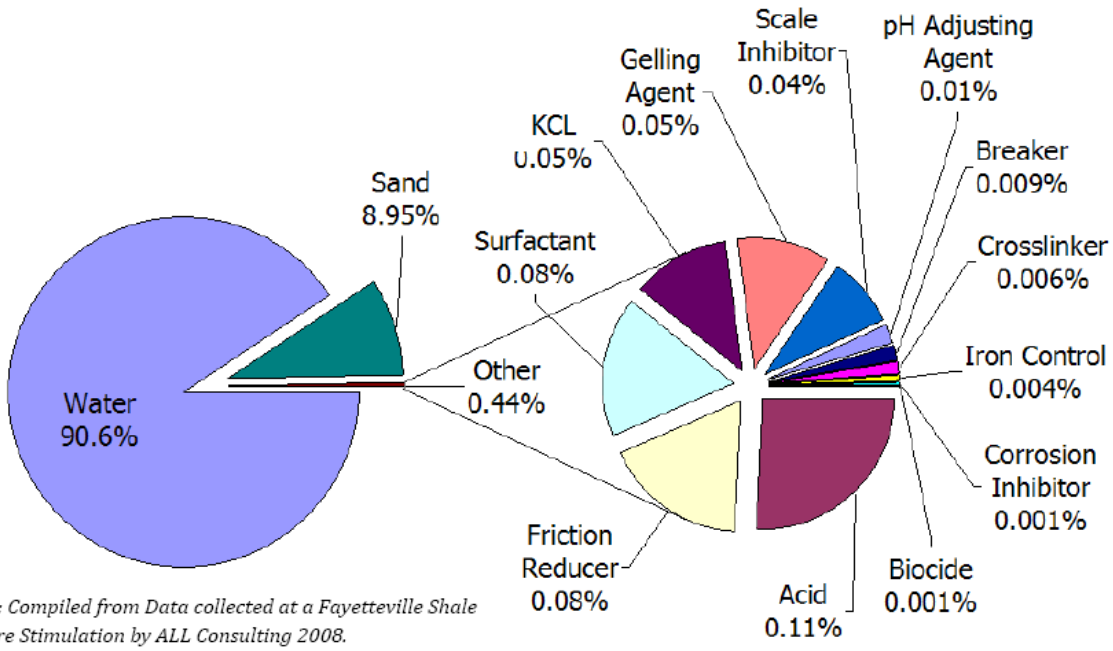
Classes of Additives Used in Fracturing Fluid

The fluid used for fracturing is typically comprised of more than 98% fresh water and sand, with chemical additives comprising 2% or less of the fluid. Figure 5.1 shows potential hyrdo-fracturing fluid additives (dSGEIS, 2009 pg 5-42). Drilling companies are required to release information to NYSDEC on the chemical makeup of their fracturing fluid but this information is not available to the public based on the fact they are considered confidential business information and disclosing them would diminish competitiveness (dSGEIS, 2009 pg 5-35). The table on the following page is included to serve as an indicator of the classes of additives and types of chemicals that are used to compose fracturing fluid.

Classes of Additives in hydro-fracturing fluid (dSGEIS, 2009).

Additive Type	**Description of Purpose**	**Examples of Chemicals**
Proppant	"Props" open fractures and allows gas/fluids to flow more freely to the well bore.	Sand
Acid	Cleans up perforation intervals of cement and drilling mud prior to fracturing fluid injection, and provides accessible path to formation.	Hydrochloric Acid (HCL 3%-28%)
Breaker	Reduces the viscosity of the fluid in order to release proppant into fractures and enhance the recovery of the fracturing fluid	Peroxydisulfates
Bactericide/Biocide	Inhibits growth of organisms that could produce gases (particularly hydrogen sulfide) that could contaminate methane gas.	Gluteraldehyde: 2-Bromo-2-nitro-1, 2-propanediol
Clay Stabilizer/Control	Prevents swelling and migration of formation clays which could block pore spaces thereby reducing permeability	Salts (KCL)
Corrosion Inhibitor	Reduces rust formation on steel tubing, well casings, tools and tanks (used only when fracturing fluid contains acid)	Methanol
Crosslinker	The fluid viscosity is increased using phosphate esters combined with metals. The metals are referred to as crosslinking agents. The increased fracturing fluid viscosity allows the fluid to carry more proppant into the fractures	Potassium Hydroxide
Friction Reducer	Allows fracturing fluids to be injected at optimum rates and pressures by minimizing friction.	(PAM)
Gelling Agent	Increases fracturing fluid viscosity, allowing the fluid to carry more proppant into the fractures	Guar Gum
Iron Control	Prevents the precipitation of metal oxides which can plug the formation	Citric acid
Scale Inhibitor	Prevents the precipitation of carbonates and sulfates which could plug off the formation.	Ammonium Chloride
Surfactant	Reduces fracturing fluid surface tension thereby aiding fluid recovery	Methanol; isopropanol

Figure 5.2 Composition of Proppant Laden Fracturing Fluid



Source: Compiled from Data collected at a Fayetteville Shale Fracture Stimulation by ALL Consulting 2008.

Water Testing Parameters

Initial Testing for Baseline Water Quality

Having baseline water quality characteristics established for a number of water sources will allow localities to accurately quantify any change in water quality as a result of drilling or other industrial development. There are a few ways to collect data for establishment of baseline water quality information. The following section describes suggested parameters by NYSDEC and the Tioga County Department of Health for use in both municipal and private wells. Another option described is the installation of surface water quality monitoring sondes, a device that continually monitors numerous surface water quality parameters.

Suggested Water Testing Parameters for Municipal and Private Water Wells

Total Coliform	Total Dissolved Solids
pH	Chlorides
Lead	Carbonates
Nitrate	Bicarbonates
Nitrite	Sulfate

Iron	Barium
Manganese	Strontium
Iron plus Manganese	Arsenic
Sodium	Surfactants (Detergents)
Total Hardness (includes Calcium & Magnesium)	Methane
Alkalinity	Hydrogen Sulfide
Turbidity	EPA 524.2 Volatile Organic Compounds (Benzene)
Total Suspended Solids	Gross Alpha/Gross Beta

It is strongly recommended that these parameters be tested prior to high-volume hydraulic fracturing, in order to establish a baseline and to ensure pre-existing conditions are adequately characterized. Parameters are based on NYS Department of Health (NYSDOH) recommendations for new residential water wells and from review of fracturing additives and flow back water composition.

Testing Timing and Frequency

It is recommended that sampling be completed before and after the drilling process in order to monitor drinking water quality effectively. The sample results will change over time naturally and seasonally so if drilling is postponed after the initial sample was taken it may need to be tested again. Baseline sampling should be acceptable for some time unless there is a change in water quality, quantity or the environment.

For assistance with the review of your baseline water quality test results please contact the Department of Environmental Health (687-8565).

List of Certified Local Laboratories

The following labs are available for testing in the region and have been certified as testing locations by the Environmental Laboratory Approval Program (ELAP) through the NYSDOH. The categories for which they have been approved for testing are listed below each laboratory name.

Mircobac New York, (607) 565-2893, located in Waverly, NY
509 Cayuta Ave, Waverly, NY 14892

Approved for the following categories: Non potable water, potable water, solid and hazardous waste.

Community Science Institute, Inc, 607-257-6606), located in Ithaca, NY
95 Brown Road, Ithaca, NY 14850

Approved for the following categories: Non potable water, potable water

Environmental Associates LTC, (607-272-8902), located in Ithaca, NY
24 Oak Brooke Drive, Ithaca, NY 14850

Approved for the following categories: Non potable water, potable water

Benchmark Analytics, Inc., (570-888-0169), located in Sayre, PA
2566 Pennsylvania Avenue, Sayre, PA 18840

Approved for the following categories: Non potable water, potable water, solid and hazardous waste

Yaws Environmental Laboratory, (607-277-7128) located in Ithaca, NY
951 East Shore Drive, Ithaca, NY 14850

Approved for the following categories: Non potable water, potable water

Testing Costs

Costs of water well testing to provide baseline data vary between testing locations. Estimates vary from $400 to $800 depending on the parameters you test for. Please contact labs directly for specific testing costs.

NYS DEC Private Well Testing Requirements

It is important to note that the dSGEIS states that "Supplementary permit conditions for high-volume fracturing will require sampling and testing of residential water wells within 1000-feet of the well pad, subject to the property owner's permission, or within 2000-feet of the well pad if no wells are available for sampling within 1000-feet either because there are none of record or because the property owner denies permission. All testing must be by an ELAP-certified laboratory, and the results of each

must be provided to the property owner and the county health department prior to commencing drilling operations".

Even with the requirements of the dSGEIS the County Department of Health recommends that all municipal and private water well sources located within a production unit be tested prior to drilling activities by a certified laboratory. It is also recommended that you contact the lab first for proper protocols and procedures that are specific to each lab. If an individual or municipality wants the baseline test results as well as other testing during the life of a well to be valid, you must have an outside certified 3-party individual take the samples from your well in order to protect the chain of custody. It is recommended when contacting a laboratory that you are specific as to your testing needs and they will know the proper protocols.

Surface Water Monitoring Efforts: Susquehanna River Basin Remote Water Quality Monitoring Network (RWQMN) in NY

The Susquehanna River Basin Commission (SRBC) has initiated a network designed to remotely monitor water quality conditions to maintain and protect surface waters in select portions of the Susquehanna Basin. The SRBC has proposed 10 remote water quality monitoring stations in NY in order to monitor the increasing demands on surface water sources throughout the basin due to natural gas activity. Members of the TING WQ committee have actively pursued this opportunity and have determined that there are seven watersheds within Tioga County that meet the monitoring network criteria. As a result, members of the committee have provided SRBC with criteria to help them prioritize these seven watersheds in Tioga County. In September of 2010, SRBC released a preliminary list of priority watersheds within the NY portion of the Susquehanna Basin which included two watersheds in Tioga County: Apalachin Creek and the Upper Catatonk Creek Watershed.

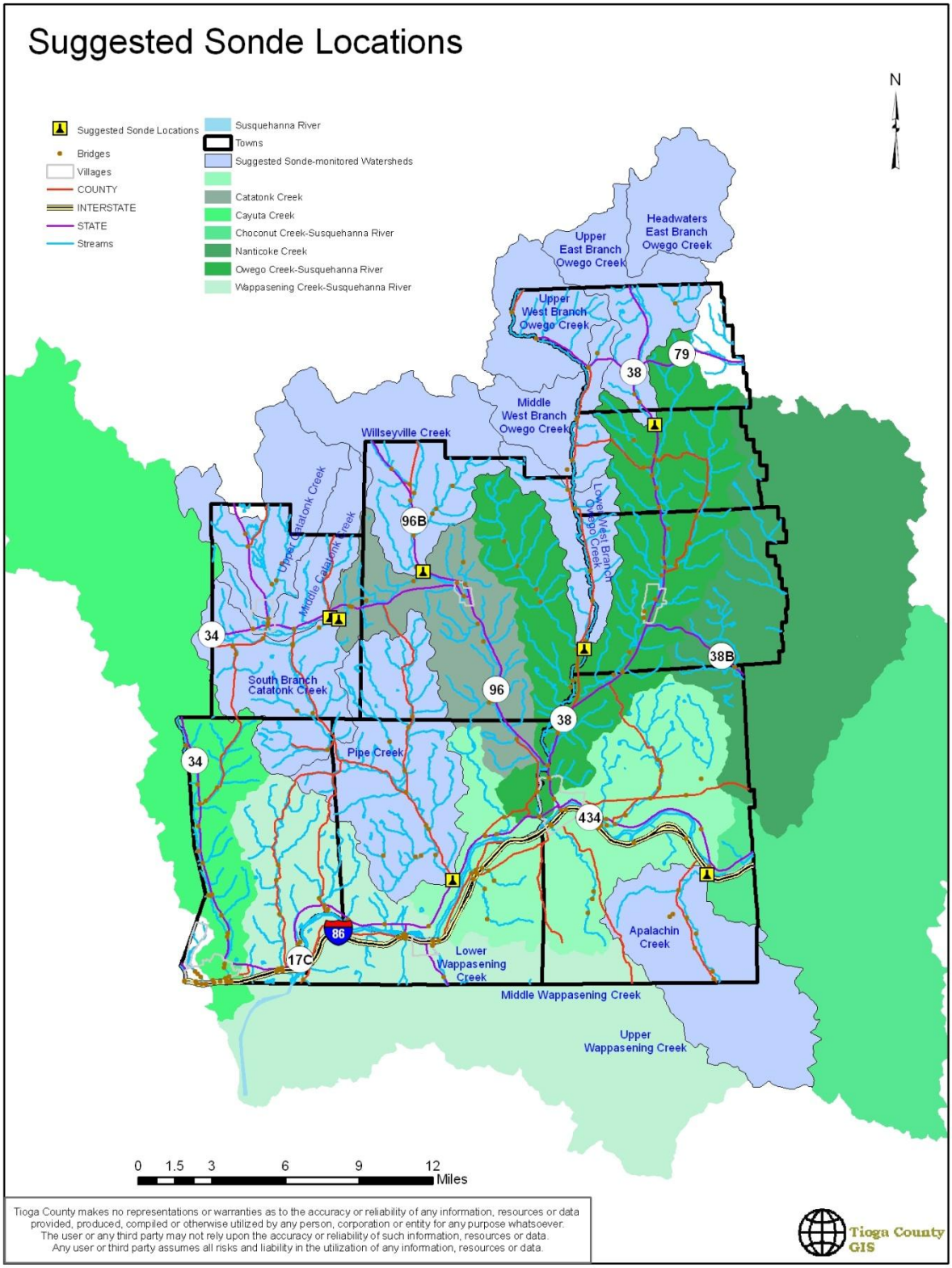
Included in this section is the map showing the seven proposed watersheds in Tioga County for municipal reference in case there are future funding opportunities to monitor these watersheds.

Each monitoring station includes a datasonde and platform, powered by a solar panel or other power source and observation can be made as frequently as every five minutes. The data is posted on the SRBC website making it user friendly. The data collected from these sondes include:

- Temperature
- pH
- conductance
- dissolved oxygen
- turbidity
- water depths

The data collected will enable water resource agencies, water users, and the public to make informed decisions regarding management and use of the resource. (SRBC publication 7/2010). For more information on the Remote Water Quality Monitoring Network go to the SRBC website: http://www.srbc.net/programs/remotenetwork.htm

The Tioga County Soil and Water Conservation District plans to monitor this website and data from the remote water quality monitoring stations located in Tioga County. If a discrepancy is found in the data it will be shared with the appropriate county and municipal officials.


Suggested Sonde Locations
N
Suggested Sonde Locations
Bridges
Villages
COUNTY
INTERSTATE
STATE
Streams
Susquehanna River
Towns
Suggested Sonde-monitored Watersheds
Catatonk Creek
Cayuta Creek
Choconut Creek-Susquehanna River
Nanticoke Creek
Owego Creek-Susquehanna River
Wappasening Creek-Susquehanna River
Upper East Branch Owego Creek
Headwaters East Branch Owego Creek
Upper West Branch Owego Creek
Middle West Branch Owego Creek
Willseyville Creek
Upper Catatonk Creek
Middle Catatonk Creek
Lower West Branch Owego Creek
South Branch Catatonk Creek
Pipe Creek
Lower Wappasening Creek
Middle Wappasening Creek
Upper Wappasening Creek
Apalachin Creek
79
38
96B
34
38B
96
38
34
434
86
17C
0 1.5 3 6 9 12
Miles
Tioga County makes no representations or warranties as to the accuracy or reliability of any information, resources or data provided, produced, compiled or otherwise utilized by any person, corporation or entity for any purpose whatsoever. The user or any third party may not rely upon the accuracy or reliability of such information, resources or data. Any user or third party assumes all risks and liability in the utilization of any information, resources or data.
Tioga County GIS

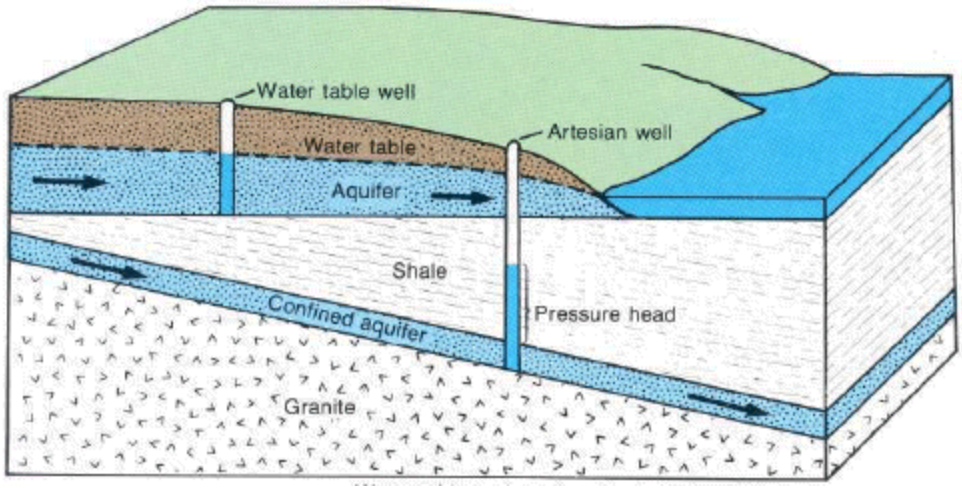
Aquifer and Water Sources

Aquifer Attributes

Two types of aquifers are found in Tioga County – unconsolidated and consolidated (bedrock) aquifers.

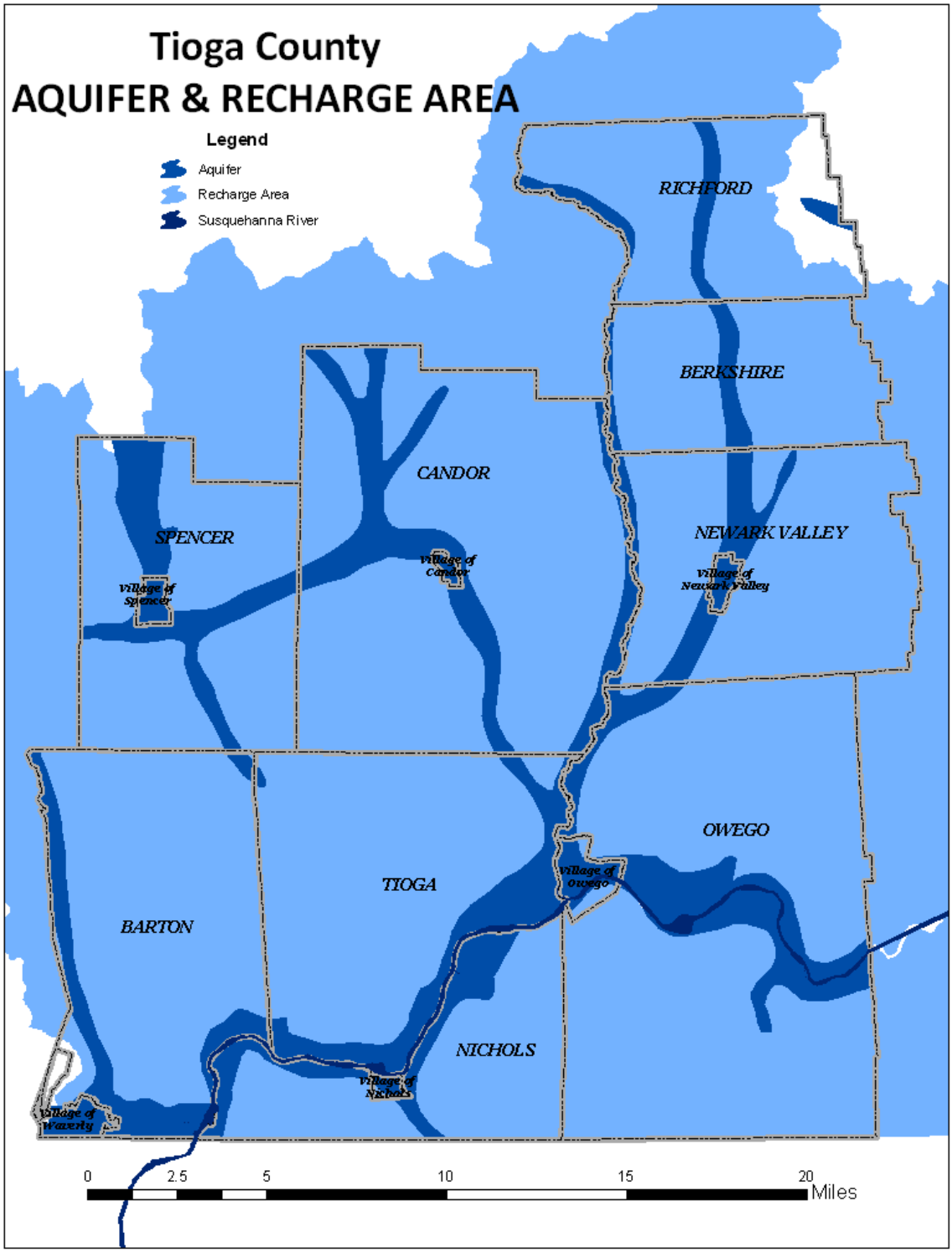
Unconsolidated aquifers are deposits of sand and gravel that occupy major river and stream valleys or lake plains and terraces. Since these aquifers generally form flat areas that are beneficial for development, are highly permeable, and are found at relatively shallow depth, they are particularly susceptible to contamination from urban and agricultural runoff, as well as point sources such as landfills (USGS, 2010). Unconsolidated aquifers are also referred to as unconfined aquifers, and are in direct contact with the atmosphere through porous spaces in the overlying sediment.

Consolidated aquifers are geologic bedrock units that are usually found further under the ground than unconsolidated aquifers. Consolidated aquifers are also referred to as confined aquifers, and are overlaid by relatively impermeable rock or clay that limits groundwater movement in or out of the consolidated aquifer (Minnesota DNR, 2010).



There is significant variability in the depth to water in wells by location and type of aquifer (unconsolidated versus bedrock) (W. Kappel, personal communication, February 17, 2010). A good quality well in a consolidated aquifer may have a neighboring well with very different water quality, because of differences in (1) how the well was drilled, (2) how deep the well was drilled, and/or (3) what geologic layer the well reached during drilling.

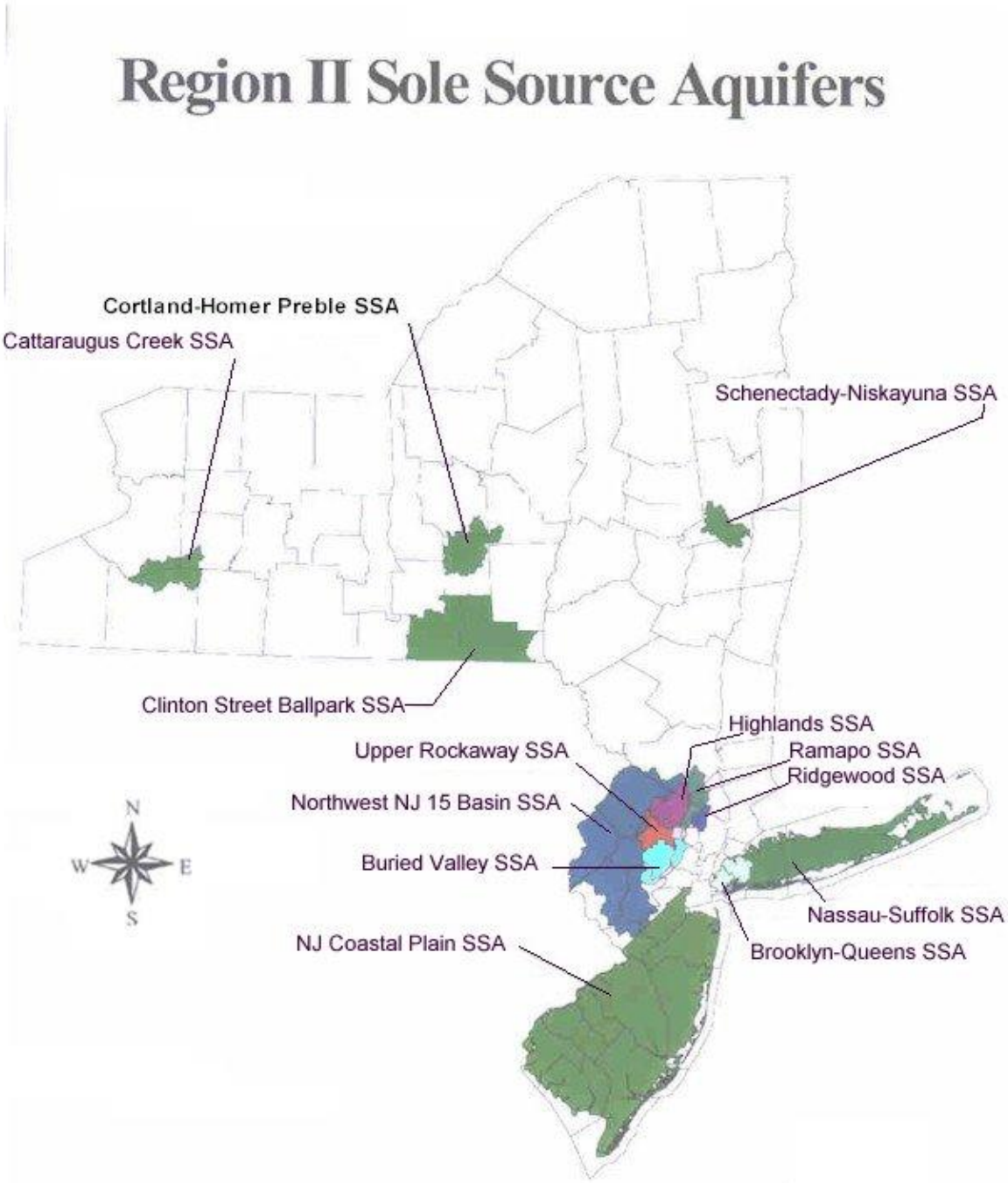
Aquifer Map of Tioga County



The major aquifer system in Tioga County is unconsolidated/unconfined aquifer system which by its definition is vulnerable to contamination. Therefore the need for protection is great; for both current uses and future growth. Tioga County has been designated as a sole source aquifer by the Environmental Protection Agency because of its susceptibility to pollution. The aquifer is an unconfined/unconsolidated system that is vital to the County and its residents. All residents in the County rely on groundwater for their drinking water source, be it through a municipal system or private well. A sole source aquifer designation protects drinking water supplies in areas with few or no alternative sources to the ground water resource, and where if contamination occurred, using an alternative source would be extremely expensive.

The Sole Source Aquifer designation is a tool to assist communities in protecting their drinking water resource. The EPA sole source designation protects the groundwater resource by requiring the EPA to review all proposed projects within the designated area that will receive federal assistance. All projects that are federally funded must prove that they do not endanger the groundwater resource. Also the NYSDEC closely reviews projects that are located in a sole source aquifer area and may impact the resource. TING recommends that municipalities review and discuss this concept with gas companies during permit application meetings in order for them to understand the importance of protection our aquifer resource.

Another important consideration is that streams in Tioga County are a major recharge source of the aquifer (please refer to aquifer map). Monitoring of certain streams may determine if pollutants are endangering the aquifer from this recharge. Thus signifying the importance of the remote water quality surface monitoring program SRBC is spearheading in the basin. This is a countywide issue as most of the streams in Tioga County act a recharge area to our unconfined aquifer system.


Region II Sole Source Aquifers
Cortland-Homer Preble SSA
Cattaraugus Creek SSA
Schenectady-Niskayuna SSA
Clinton Street Ballpark SSA
Highlands SSA
Upper Rockaway SSA
Ramapo SSA
Ridgewood SSA
Northwest NJ 15 Basin SSA
Buried Valley SSA
Nassau-Suffolk SSA
NJ Coastal Plain SSA
Brooklyn-Queens SSA
N
W
E
S

Wellhead Protection Ordinance

It is recommended that municipalities with public water supply systems consider adopting a wellhead protection ordinance; in order to pro-actively protect your community's water supply. The following communities in Tioga County have public water supplies and should consider adopting a local ordinance to protect this resource of one is not in place already:

- Village of Owego
- Town of Owego
- Village of Nichols
- Town of Barton
- Village of Waverly
- Village of Candor
- Village of Newark Valley

Recommended examples in Tioga County of Wellhead Protection Ordinances include the Town of Owego and the Village of Newark Valley. A sample ordinance from the Village of Newark Valley has been included for your use. If a municipality wants to proceed with a wellhead protection ordinance the following resources are available:

New York Rural Water Association (NYRWA) Steven Winkley Source Water Protection Specialist PO Box 487 Claverack, NY 12513 Phone: (518) 828-3155 extension 17 Fax: (518) 828-0582 Email: winkley@nyruralwater.org Website: www.nyruralwater.org	Tioga County Department of Environmental Health Erica Gifford Public Health Engineer 1062 State Route 38 PO Box 120 Owego, NY 13827 Phone: 687-8565 Fax: 687-6041 Email: gifforde@co.tioga.ny.us

It is important to note that the NYSDEC dSGEIS does not require drilling companies to follow local wellhead protection ordinances, however it is still recommended for municipalities to adopt a local wellhead protection ordinance in order to protect your municipal water supply from incidental uses and service businesses to the drilling companies such as pipe staging areas, chemical storage facilities, compressor stations, etc. Also TING believes that as relationships are developed between the gas drilling companies, municipal and county contacts that these companies may be willing to abide by our local wellhead protection laws. It is important to keep in mind that the only protection that NYSDEC provides for municipal water supplies is that they require a Supplemental Environmental Impact Statement (SGEIS) be completed by the drilling company when the proposed well location is within 1000-feet of the municipal supply well.

Local Law Number __ of 2010

Village of Newark Valley
Municipal Potable Water Distribution System
Wellhead Protection Law

A LOCAL LAW ENACTING Chapter of the Village Code of the Village of Newark Valley in Tioga County, New York and adding a new Chapter to be entitled Wellhead Protection, which Chapter provides for the same.

Be it enacted by the Code of the Village of Newark Valley as follows:

1. The Code of the Village of Newark Valley is hereby amended by adding thereto a new Chapter, to be Chapter164, Wellhead Protection, to be read as follows:

Chapter 164
Municipal Potable Water Distribution System
Wellhead Protection Law
Article I
General Provisions

164-1 Purpose

The intent of this Village law is to protect the quality and safety of current and future wellheads and their penetrations to the sole source underground aquifer supplying the municipal potable water distribution system of the Village of Newark Valley from possible contamination that could arise from human or natural activities, causes or sources.

164-2 Title

This Local Law shall be known and shall be cited as the "Village of Newark Valley Wellhead Protection Law."

164-3 Application

The Wellhead Protection Law herein set forth, duly made and enacted in accordance with the provisions of 1100 through 1107 of the Public Health Law, shall apply to the wells which comprise the source of the public water supply of the Village of Newark Valley and the land within a two-thousand-five-hundred foot radius of the wells. These wells are located on land owned or otherwise controlled by the Village of Newark Valley. These wells and surrounding protected areas are situated the Village of Newark Valley.

164-4 Definitions

Abandoned Tanks – In the event that any storage tank is not used for a period of three months, wherein there is no continuous business operation for at least four continuous weeks in said three-month period, as measured from the first day of nonuse, then the facility"s storage tanks shall be considered abandoned.

Aboveground – When referring to storage tanks, means 100% of the tank is exposed above the final ground elevation or a portion of the tank is resting on an impervious material and the rest of the storage tank is above final ground elevation.

Aquifer – An underground water bearing area of permeable rock, sand or gravel.

Biocide – Any substance used to destroy or inhibit the growth of living organisms such as, but not limited to fungi, bacteria, etc.

Chloride Salt – The solid compounds or solutions of potassium chloride (commonly used as fertilizer), calcium chloride (commonly used for winter road maintenance) or sodium chloride (commonly used for water softener regeneration).

Containment System – A structure having an impervious surface (concrete, asphalt, membrane,

etc.) surrounded by curbs, gutters, dikes, etc. The purpose is to prevent any flow from leaving a defined area.
Discharge – To release by any means to the surface waters, ground waters, surface of the ground, below ground, the air and living resources. Discharge includes, but is not limited to, any spilling, spraying, leading, pumping, pouring, emitting emptying or dumping, except those activities duly permitted by any state or federal agency.
Drilling Backflow – The fluids, chemicals and dissolved solids that are transported to the surface from any well during and after the drilling, hydro-fracturing and production phases of a well lifetime.
Existing Storage facility – A storage facility as defined herein that was in operation on the date that this Part 1 became effective.
Groundwater – Water within an aquifer.
Heavy Metals – Although the term "heavy metal" has no single consistent definition recognized by any authoritative or peer reviewed body, as used in popular lexicon and by certain industries, it will be taken, for the purpose of this Village law, to be a class of metals such as lead, arsenic, mercury, beryllium, cadmium and chromium that in sufficient concentrations can be hazardous to human health.
Herbicide – Any substance used to destroy or inhibit plant growth.
Human Excreta – Human feces and urine.
Hydro-fracturing (Hydraulic Fracturing) – The process of injecting large volumes of water and chemical additives under extremely high pressure to fracture the underground rock formations.
Hydro-fracturing (Hydraulic Fracturing) Fluid – The fluid and any additives, chemicals, substances, compounds used in the hydro-fracturing process.
Impervious – A layer of natural and/or man-made material of sufficient thickness, density and composition as to prevent the discharge of toxic or hazardous materials for a period of at least as long as the maximum anticipated time during which the toxic or hazardous substance will be in contact with the material.
Injection Activity – The introduction of any fluids into a well either by gravity feed or under pressure. The term „injection activity" is to include any activities performed during the drilling, hydro-fracturing, production life and closeout phases of any well. Injection activity will also be taken to include the injection of fluids into a well for storage or disposal.
Junkyard – Land or a building used for the collecting, storage or sale of wastepaper, rags, scrap metal or discarded material or for the collecting, wrecking, dismantling, storage, salvaging or sale of vehicle or machinery parts.
Lifetime (of a Well) – The lifetime of a well shall be taken as the time at which installation of such well commences and include all drilling, hydro-fracturing, production and post-production closing phases of said well.
Linear Distance – The shortest distance from the nearest point of the structure or object to the extension of the centerline of the wells.
Modification – Any change in a storage facility that would result in a ten-percent or more increase in the maximum stored volume specified on the operational permit application; or any change in containment system(s), storage tank(s) and related piping other than routine maintenance.
Owner, Occupant, Operator – The person(s) who hold title to the property or premises in question and all of the buildings and contents thereon/in. This also extends to all lessee(s) and their subcontractors occupying, operating or otherwise utilizing said property and/or premises. Furthermore, this definition is to include any person(s), business, corporation and all levels of their subcontractors involved in the installation and operation of a natural gas well on said

property/premises over the lifetime of that gas well.
Person – Any individual, firm, company, association, society, corporation or group.
Pesticide – Any substance used to destroy or inhibit pests such as rodents and insects.
Pollutant – Dredge, spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, chemical waste, biological materials, radioactive materials, heat, wrecked, discarded equipment, rock, sand, cellar dirt and industrial, municipal or agricultural waste.
Product-Tight – Impervious to the material which is or could be contained therein so as to prevent the seepage of the product through the container. To be product-tight, the container shall be made of a material that is not subject to physical or chemical deterioration by the product being contained.
Public Water Supply – A water supply as defined in Part 5 of Chapter 1 of Title 10 (Health) of the Official Compilation of Codes, Rules and Regulations of the State of New York.
Radioactive Material – Any naturally occurring or manmade radionuclide that spontaneously emits high energy particles (alpha, beta or neutron) or high energy electromagnetic radiation (gamma or x-ray) that in sufficient concentration and dose levels could be harmful to human health.
Refuse – All putrescible or nonputrescible solid wastes including garbage, sludge, manure, rubbish, ashes, incinerator residue, street cleaning, dead animals, offal or solid commercial industrial wastes.
Refuse Disposal Area – Land used for the depositing of refuse.
Septage – The content of a septic tank, cesspool or other individual sewage treatment facility the receives domestic sewage wastes.
Sewage – A combination of water-carried wastes from residences, business buildings, institutions and industrial establishments, together wit such ground, surface and storm waters as may be present.
Sewage Disposal System – Any system used for the disposing of sewage and/or wastewater.
Sewage Sludge – The accumulated semisolids or solids resulting from treatment of wastewater from publicly or privately owned or operated sewage treatment plants.
Storage – The holding of toxic or hazardous materials for a temporary period of time.
Storage Facility – All contiguous land and structures and other appurtenances and improvements on the land used for the storage of toxic or hazardous materials. A storage facility may consist of several different storage operational units.
Storage Tank – Any device, permanent, temporary, stationary or mobile used or designed to be used to contain a substance, solid, liquid or gas, or which provides structural support for such containment.
Toxic or Hazardous Material – Any substance, solution or mixture as stated in Part 116 of Title 40 of the Code of Federal Regulations and subsequent amendments thereof, which, because of its quality, concentration or physical, chemical, radiological or infectious characteristics, may present a potential hazard to human health, drinking water or food supply quality of discharge to the land, air or water.
Underground – When referring to storage tank(s), means any storage tank which is not above ground.
Underground Injection Well – Any Class V injection well as defined and classified under 40 CFR 144.3, which allows for the injection of fluids into the ground.
Water Supply – The public water supply of the Village of Newark Valley.
Wellhead Protection Area – The surface and subsurface area surrounding a water well or well field, supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or well field. This area is defined by the Zone 3 boundary for

each well within this Village law.
Wellhead Protection Permit – A permit issued by the Village Board, pursuant to this Village law.
Wells – Wells now used as a source of this water supply, or to any additional wells which may be constructed as a source for this water supply.
Zones 1, 2 and 3 – The zones which delineate the boundaries of the wellhead protection areas. Zone boundaries are established from the following:
Zone 1: One-hundred-foot radius from wellhead
Zone 2: Three-hundred-foot radius from wellhead
Zone 3: Two-thousand-five-hundred-foot radius from wellhead

Article II
General and Specific Prohibitions
164-5 General Prohibitions

No person, including state agencies or political subdivisions having jurisdiction, shall perform any act or grant any permit or approval which may result in the contravention of the standards for raw water quality as contained in Part 170 of Title 10 (Health) of the Official Compilation of Codes, Rules and Regulations of the State of New York (10 NYCRR Part 170).

164-6 Specific Prohibitions

The following shall be prohibited or restricted within Zone 1, 2 and/or 3:
A. Cemeteries – No interment of a human body shall be made within Zone 3.

B. Chloride Salt – No chloride salt shall be stored within Zone 3 in excess of 50 pounds, except in a weatherproof building with an impervious floor of as aboveground, watertight vessel with a one-hundred-percent product-tight containment system, and by permit only. Household use is exempt.

C. Herbicides, Pesticides and Biocides – No pesticides, herbicides, or biocides, including such chemicals that may be used in well hydro-fracturing fluids, shall be stored underground or aboveground within Zone 3 except for aboveground, product-tight containers for household use and retail sales, provided that they are stored in a weatherproof building. No pesticides, herbicides or biocides, including such chemicals that may be used in well hydro-fracturing fluids, shall be discharged within Zone 3 except for household aerial discharge.

D. Human Excreta and Sewage – No privy, privy vault, pit or other receptacle of any kind for either the temporary storage or permanent deposit of human excreta or sewage shall be constructed, located, placed or maintained within Zone 2 (300 foot of wellhead). No sewage or polluted liquid of any kind shall be discharged or allowed to flow on or beneath the surface of the ground within Zone 2 except in watertight pipes connected to a sewage treatment plant for which a permit has been granted by the appropriate state agency having jurisdiction over such facility. No such watertight pipe shall be located within a twenty-five foot linear distance of the wells. Exception to the above shall be made for existing residential septic systems and municipal temporary storage vaults serving recreational facility toilets where no sanitary sewers are available, provided that these facilities are not within Zone 1 (100 feet of wellhead). Properties within Zone 2 that do not have a sanitary sewer available and are operating with a septic system shall be given priority for construction of sanitary sewers when declared a health hazard by the Tioga County Health Department.

E. Radioactive Material – No radioactive material including those that may be brought to the surface as a result of well drilling and hydro-fracturing processes shall be disposed

of by burial in soil or held within surface retention ponds, troughs, ditches, or any such open containment/storage system, lined or unlined, within Zone 3.

F. Heavy Metals – No materials containing heavy metals, including those that may be brought to the surface as a result of well drilling and hydro-fracturing processes, shall be disposed of by burial in soil or held within surface retention ponds, troughs, ditches, or any such open containment/storage system, lined or unlined, within Zone 3.

G. Well Hydrofracturing and Drilling Backflow Material – No backflow material including those that may be brought to the surface as a result of well drilling and hydro-fracturing processes shall be disposed of by burial in soil or held within surface retention ponds, pits, troughs, ditches, or any such open containment/storage system, lined or unlined, within Zone 3.

H. Sewage Sludge or Septage – No sewage sludge or septage shall be disposed of in any manner, including landspreading of treated sludge or septage within Zone 3.

I. Solid Waste – No Junkyard refuse, refuse disposal area or recycling site shall be located within Zone 3.

J. Toxic Chemicals –

(1) No new containers used for the storage of gasoline, kerosene, fuel oil, diesel oil or toxic chemicals, including those used in the drilling, hydro-fracturing and production lifetimes of any wells, nor these materials themselves, shall be buried beneath the surface of the ground within Zone 2 effective immediately.

(2) No new containers used for the storage of gasoline, kerosene, fuel oil, diesel oil or toxic chemicals, including those used in the drilling, hydro-fracturing and production lifetimes of any wells, nor these materials themselves, shall be buried beneath the surface of the ground within Zone 3 immediately, except:

(a) Fuel oil tanks 550 gallons or less which are used for heating purposes only.

(b) New containers which are being installed to replace preexisting underground storage containers in order to comply with New York State Department of Environmental Conservation (NYSDEC) and United States Environmental Protection Agency (USEPA) regulations.

(3) No person shall store above the ground more than 550 gallons of gasoline, kerosene, fuel oil, diesel oil or toxic chemicals, including those used in the drilling, hydro-fracturing and production lifetimes of any wells, within Zone 3 effective immediately. The use of surface retention ponds, pits, troughs, ditches, or any such open containment/storage system, lined or unlined, is strictly prohibited.

(4) All preexisting and new underground storage tanks within Zone 3 shall meet and comply with all current New York State Department of Environmental Conservation (NYSDEC) and United States Environmental Protection Agency (USEPA) regulations.

(5) Any leak(s) found in storage tank(s) used for the storage of gasoline, kerosene, fuel oil, diesel oil or toxic chemicals, including those used in the drilling, hydro-fracturing and production lifetimes of any wells, within Zone 3 will constitute a violation of this Part I. Upon notification by the Village of Newark Valley, the owner and/or operator of the storage tank(s) will have 48 hours to remove the storage tank(s) and to excavate the contaminated ground. If this is not accomplished within this timeframe, the Village of Newark Valley may proceed against the owner as set forth in 164-7 and 164-8 of this Village law.

(6) In the event that tanks are abandoned in accordance with the definition of "abandoned tanks" herein, the owner and/or lessee of such tanks will immediately remove the tanks and gasoline pumps, if any, from the site of the same. In lieu of removing the tanks, said owner and/or lessee shall remove the contents therefrom and fill all tanks with water or solid materials. Any tank(s) used in the drilling and hydro-fracturing of any wells in addition to any tanks used during the lifetime of a well, including but not limited to condensate and separator tanks, shall be removed when no longer in use.

(7) To assure performance of the foregoing provisions, every applicant hereafter applying to the Village Board for a permit for a gasoline, service station or any underground injection wells within Zone 3 shall be required, before constructing, building or operating such gasoline, service station or any underground injection wells, to present the bond of a reputable insurance company, in an amount to be fixed by the Village Board, assuring the performance of the foregoing provisions.

K. Trespassing – No trespassing shall occur within the boundaries of any property posted against trespassing which is owned or occupied by the Village of Newark Valley or by any agency or special improvement district, organized under law, within the Village of Newark Valley.

L. Underground Injection Wells – 40 CFR 144.12(a) states that no owner or operator shall conduct any injection activity in a manner that allows the movement of any contaminant into underground sources of drinking water, if the presence of that contaminant may cause a violation of any primary drinking water regulation under 40 CFR Part 142 or may otherwise adversely affect the health of persons. All existing underground injection wells within Zone 3 shall be closed under a USEPA and Village of Newark Valley approved closure plan, or obtain a federal underground injection control (UIC) permit within 180 days of the adoption of this Part I. No new

underground injection wells shall be allowed within Zone 3 without a federal UIC permit and by approved permit (per Article II below) issued by the Village of Newark Valley.

(1) No new wells shall be drilled expressly for the purpose of storing or disposing of waste drilling and hydro-fracturing fluids within Zone 3.

(2) All wells, when being removed from service at the end of their lifetime, shall not be used for the purpose of storing or disposing of waste drilling and hydro-fracturing fluids within Zone 3.

(3) As per the above, all wells being removed from service at the end of their lifetimes shall be closed under a USEPA and Village of Newark Valley approved closure plan within Zone 3.

Article III
Permit Requirements
164-7 Application Required
Any person seeking a special use permit or site plan approval from the Village of Newark Valley Planning Board, Zoning Board of Appeals or Village Board for sites in Zone 3 which are also in general business, industrial or highway interchange districts must obtain a wellhead protection permit from the Town Board as a prerequisite for applying for site plan approval or a special use permit.
164-8 Village Board Review
A. The wellhead protection permit application shall be reviewed by the Village Board of the Village of Newark Valley, who shall determine compliance with the provisions of this Part I.

B. In the event that the Village Board denies a wellhead protection permit, it shall state the specific reasons for denial on the record.

C. The Town Board may grant a wellhead protection permit with or without conditions. Such conditions may include requirements for special construction, professional construction and inspection and/or certification, ongoing inspection, monitoring, reporting requirements, bond posting and such other or further conditions as the Village Board deems reasonable or appropriate to assure compliance with this Village law. Permits for underground injection wells, including hydro-fractured wells will require a specific contamination mitigation and remediation plan to be included up front during any permitting process in addition to financial bonding to ensure such measures would be covered. This plan shall include both surface and underground contamination in

addition to the sole source underground aquifer supplying the Village Public Water system.

D. To assist the Village Board in its review, the Village Board may require the preparation of a hydro-geological study or any other scientific or engineering study, the expense of which shall be borne by the applicant. In the case were the permit application is for an underground injection well, including hydro-fractured wells, the Village Board shall require the full disclosure (including but not limited to MSDS - Material Safety Data Sheets) of any and all chemicals and compounds used in the drilling and hydro-fracturing of each well for which a permit is being sought.

164-9 Appeals
Any person or persons, jointly or severally aggrieved by any decision of the Village Board, may apply to the Supreme Court for review by a proceeding under Article 78 of the Civil Practice Law and Rules. Such proceeding shall be instituted within 30 days after the filing of a decision in the office of the Village Clerk.
Article IV
Enforcement
164-10 Inspection; Copies of violated provisions; Annual report
A. All authorized employees of the United States Environmental Agency, the New York State Department of Environmental Conservation, the New York State Department of Health, the Tioga County Health Department and duly authorized employees and Officers of the Village of Newark

Valley bearing proper credentials and identification shall be permitted to enter all properties for the purpose of inspection, observation, measurement, sampling and testing. The Village of Newark Valley shall take water samples for the required parameters at frequencies determined by Part 5 of the New York State Department of Health Code.

B. It shall be the duty of the Village of Newark Valley Department of Public Works Supervisor or Code Enforcement Officer to cause copies of any provisions of this Village law violated to be served upon the persons violating the same, together with notices of such violations. If such persons served do not immediately comply with this Village law, it shall be the further duty of the aforesaid Village of Newark Valley Department of Public Works Supervisor or Code Enforcement Officer to promptly notify the State Commissioner of Health or duly authorized representative of such violations.

C. The aforesaid Village of Newark Valley Public Works Supervisor or Code Enforcement Officer shall report to the State Commissioner of Health and the Tioga County Health

Department in writing annually, prior to the 30th day of January, the results of the regular inspections made during the preceding year. The report shall state the number of violations abated and the general condition of the area surrounding the wells at the time of the last inspection.

164-11 Notice of violation; Correction

A. The Village Code Enforcement Office shall give written notice by personal service or by registered or certified mail on the owner, occupant and/or operator of the violating property. Such notice shall direct the owner, occupant and/or operator to correct the stated problem within 48 hours of notification. Required correction of stated problem(s) could include restoration, repair and/or remediation of the Village water source should contamination occur due to some mishap related to the drilling, hydro-fracturing and production life of any well. The owner, occupant and/or operator shall allow a representative of the Village of Newark Valley to inspect the property and its contents.

B. If the owner, occupant and/or operator fails to correct the stated problem within 48 hours of notification, the Village of Newark Valley or its authorized agent may enter upon the premises and correct the stated problem at the expense of the owner, occupant and/or operator. If the owner, occupant and/or operator fails to reimburse the Village of Newark Valley for the expense of correction within 60 days of billing, the total expense may be assessed by the Village Board on the real property from which the problem occurred and the expense so assessed shall constitute a lien and charge on the real property on which it is levied until paid or otherwise satisfied or discharged and shall be collected in the same manner and at the same time as other Village charges.

164-12 Penalties for offenses

A. Any person who fails to comply with the provisions of this Village law shall be subject to a fine not exceeding $250 or imprisonment for not more than 15 days, or both for each violation. The continued violation of any provision of any section of these regulations shall constitute a separate offense for each and every day such violation of any provision hereof shall continue.

B. Failure to comply with a wellhead protection permit or with the provisions of this Village law

shall be cause for revocation of the wellhead protection permit by the Village Board. The Village Board may adopt rules and regulations regarding notice and procedure to be used in the event of a revocation hearing under this Village law.

C. In addition, or as an alternative to the above, the Village Board may also, at its option, maintain an action or proceeding in the name of the Village in a court of competent jurisdiction to compel compliance with or to restrain by injunction the violation of this Village law.

Article V
Miscellaneous
164-13 Severability.
A. The invalidity of any clause, sentence, paragraph or provision of this Local Law shall not invalidate any other clause, sentence, paragraph or part thereof.

164-14 Effective Date.

A. This Local Law shall take effect immediately upon filing in the office of the New York State Secretary of State in accordance with the provisions of section 27 of the Municipal Home Rule Law of the State of New York.

Note: A municipality may want to consider changing the radius of Zone 3 to 3000-feet based on evidence from Pennsylvania that wells have been impacted as far as 3000-feet from the drilling activity.

Aquifer Protection

In order to protect our drinking water resource within the County, we need to not only consider the adoption of wellhead protection ordinances for municipal water supplies but must also consider adopting an Aquifer Protection Ordinance that would protect all of our groundwater drinking resources both for community water supplies as well as private water supply systems. As was noted previously the County is a Sole Source Aquifer based on the potential for contamination to this resource and the costs associated with developing another drinking water supply. As such another recommendation of TING and members of the Water Quality Committee would be for the County Legislature to consider adopting an aquifer protection ordinance that would help to protect all of the County's drinking water supplies. It is suggested that this be considered at the County level based on the fact that the aquifer system and its recharge areas include all towns and villages within the County. Currently the Department of Health is working on an aquifer protection ordinance to bring forward to the County Legislature for consideration.

Agencies Involved in Water Quality

Agency	Role	Contact Information
NYS Department of Environmental Conservation	NYSDEC enforces the Environmental Conservation Law thru regulation. Responsible permitting authority over natural gas well pads as well as disposal, transport, and treatment of hazardous and toxic wastes; manages the program for oil and chemical spills; protects tidal and freshwater wetlands and floodplains; and promotes wise use of water resources.	NYS Department of Environmental Conservation Division of Mineral Resources Bureau of Oil & Gas Regulation 625 Broadway, 3rd Floor Albany, New York 12233-6500 Phone: 518-402-8056
NYS Department of Health	NYSDOH regulates public drinking water supplies and will have a role in reviewing new proposed hydraulic fracturing additives and issues with Naturally Occurring Radioactive Materials (NORMs).	NYS Department of Health Division of Environmental Health Protection Bureau of Water Supply Protection Phone: 518-402-7650
Tioga County Department of Health	TC DOH will be repository for private well testing data completed by the gas companies and will be responsible for conducting water well investigations and fielding complaints.	Tioga County Department of Environmental Health Erica Gifford Public Health Engineer 1062 State Route 38 PO Box 120 Owego, NY 13827 Phone: 687-8565 Fax: 687-6041 Email: gifforde@co.tioga.ny.us
Tioga County Soil and Water Conservation District	District is authorized under state law as local natural resources management agency and has been designated as the local, management and implementing agency to protect water resources from non-point water pollution in the areas of agriculture, construction activity, silviculture, stream banks, and road banks. This is accomplished by providing technical assistance relative to natural resource conservation and water quality to individual landowners, groups and units of	Tioga County SWCD Wendy Walsh District Manager 183 Corporate Drive Owego, NY 13827 Phone: (607) 687-3553 Fax: (607) 687-9440 Email: tcswcd@co.tioga.ny.us

	government in the County, protecting and improving water quality with programs for nonpoint source pollution sources and problems.	

Recommended Water Quality Strategy

Given that several options to protect water quality have been presented in this Chapter, TING recommends that each municipality develop its own overall strategy to for protection of water quality incorporating pieces that are suitable for them. An example outline of a strategy follows:

1. Compare current parameters of municipal water supply testing with recommended parameters
2. Encourage private water testing and post information for residents
3. Encourage volunteer groups to conduct surface water monitoring
4. Adopt Municipal Wellhead Protection Ordinance
5. Support county efforts to develop and adopt Sole Source Aquifer Protection Ordinance applicable countywide

Chapter 7: Roads

Chapter 7: Roads

Introduction

The purpose of this chapter is to provide an overview of road impacts caused by increases in traffic and vehicle weight and offer recommendations and examples of preventative and remedial actions. This chapter is intended to be a resource primarily for Town Boards and Highway Superintendents. Included in this chapter are options for completing a road assessment, identifying/prioritizing deteriorating infrastructure, adopting a road use agreement, adopting a road protection ordinance, posting and bonding roads, and adopting an industrial driveway permitting system. All of these tools can help municipalities be proactive against heavy road usage, as occurs in natural gas drilling development that can lead to infrastructure deterioration.

Included in this chapter:

- ***Impacts of Natural Gas Development on Roads***
- ***Road Inventory and Assessment Options***
- ***Road Use Agreements***
- ***Road Preservation Ordinances***
- ***Model Driveway Permit/Ordinance***
- ***Road Preservation Strategy***
- ***Further Points of Consideration***

Impacts of Natural Gas Development on Roads

Road stress and damage begins during the pre drilling phase of natural gas development, significantly increases during the drilling phase, drops during the production phase, and increases slightly during the final reclamation of the well pad. Exact traffic counts are directly related to the number of natural gas wells drilled and are therefore very difficult to predict without solid estimates on expected permit activity. The Draft Supplemental Generic Environmental Impact Statement (dSGEIS) estimates truck trips in the range of 890-1,350 per well (dSGEIS, 2009), with another 549 tanker truck trips when wells are re-fractured to stimulate production. The dSGEIS offers the following table breaking down trucking activity associated with drilling:

Drilling Rig Mobilization, Site Preparation and Demolition	
Drill Pad and Road Construction Equipment	10 – 45 Truckloads
Drilling Rig	30 Truckloads

Drilling Fluid and Materials	25 – 50 Truckloads
Drilling Equipment (casing, drill pipe, etc.)	25 – 50 Truckloads
Completion Rig Mobilization and Demobilization	
Completion Rig	15 Truckloads
Well Completion	
Completion Fluid Materials	10 – 20 Truckloads
Completion Equipment (pipe, wellhead)	5 Truckloads
Hydraulic Facture Equipment (pump trucks, tanks)	150 – 200 Truckloads
Hydraulic Fracture Water	400 – 600 Tanker Trucks
Hydraulic Fracture Sand	20 – 25 Trucks
Flow Back Water Removal	200 – 300 Truckloads
Well Production	
Production Equipment	5 – 10 Truckloads

Truckloads of equipment required for well pad activities (dSGEIS, 2009, p. 6-113).

Town roads vary in strength, but a study showed that on average town roads are able to handle 92,000 Equivalent Single Axle Load over the life of the road (Orr, 2010). Equivalent Single Axle Load is a standardized measure that represents the impact of an axle loaded with 9 tons. David Orr, Senior Extension Associate of the Cornell Local Roads Program, reported that town roads are depleted by 2% for every 1,000 trucks passing over a road (Orr, 2010). Despite the rigor that went into these calculations these numbers should be seen as rough estimates. Road strength will vary with the conditions of each road. Natural gas drilling activity will reduce road life expectancy and therefore necessitate increased spending on road maintenance, infrastructure repair and replacement, and road assessments.

Road Inventory and Assessment Options

TING recommends that each municipality conduct a thorough road inventory and assessment, including bridges and culverts. Initially, a road assessment will provide a baseline that can allow municipalities to track changes in road wear over time. These assessments are also necessary components of any road use agreement or road protection ordinance because they determine liability for road maintenance costs.

There are two types of assessments: structural and visual. Structural assessments are labor, resource, and technology intensive. They can be done by private engineering consultants at a cost, and provide a legally defensible baseline against which future assessments can be measured. A countywide assessment may be cheaper than town-by-town assessments. For example, Delta Engineers of Endicott, NY provides assessments in addition to ordinance and road use agreement drafting services. Other engineering firms provide core sampling services.

Visual assessments are quick and much less expensive than structural assessments, though their legal defensibility is uncertain. The Cornell Local Roads Program can provide technical information and visual assessment training for highway municipal officials (http://www.clrp.cornell.edu/). The Cornell Local Roads Program will not perform municipal road assessments itself (David Orr, interview). For more information contact Lynne Irwin, P.E. by email at lhi1@cornell.edu; or by phone at (607) 255-8033.

Additionally, the Southern Tier East Regional Planning Board (STERPDB) currently has a program funded by the Appalachian Regional Commission where they will inventory a town's roads and culverts, take digital pictures, create a database of various road attributes based on NYS DOT standards, and map the town roads classified by any attribute recorded such as pavement material, road condition, traffic density estimates, weight restrictions, distress percentage, and drainage type among many other data items recorded. This activity is critical to identifying and prioritizing deteriorating infrastructure. While this service comes at no cost to towns, town officials are expected to take over the inventory and keep the information up to date after the initial assessment. Although this methodology is likely not legally defensible in court, it provides a valuable basis for towns to inventory and rate their highway infrastructure and is a good basis for establishing truck haul routes. For more information contact Tom Evans at STERPDB by e-mail at tevans@steny.org or by phone at 607-724-1327 x205.

All assessments should be accompanied by a schedule of costs associated with road use maintenance and construction (Messmer, 2010), using FEMA standards, for example.

Model Road Use Agreements (RUAs)

Voluntary Road Use Agreements are beneficial to communities where ordinance adoption is controversial or difficult to achieve. Voluntary agreements can also allow for more flexibility than ordinances in that they are entered into specifically with the contracted industry and do not apply to all vehicles operating on the roadways. Detailing technical rights and responsibilities of each party saves time and money and decreases the chance of litigation.

A typical road use agreement should have several components. First, the agreement should apply to the contractor and all their subcontractors. It should contain an established truck haul route including a means of inventorying and assessing the highway infrastructure on those roads pre and post drilling, a means of covering costs of road repair (escrow, bonding, letter of credit, etc.), how to value the costs of road damages, 911 address requirement, insurance requirements and hours of the day trucks are allowed on the

roads. Lastly, the timeframe of the agreement should be established. Any other considerations the town deems appropriate should also be included.

The following template or model road use agreement has been developed collaboratively between the county's municipal attorney consortium and the Tioga County Highway Superintendent's Association from October 2010. It is important to note that this document is still a work in progress amongst the stated entities, and future versions will be distributed upon their release.

DRAFT

ROAD USE AGREEMENT

This Road Use Agreement is entered into this _____day of _____ , 20___ by and between _____ , having offices at _____, hereinafter referred to as "Company", and the Town of _____ , a municipal corporation having offices at _____ New York, hereinafter referred to as "Town".

RECITALS

WHEREAS Company is a private corporation, limited liability or other business entity engaged in natural gas development and production, including but not limited to, the drilling and completion of wells, and pipeline construction; and

WHEREAS Company intends to engage in natural exploration, development and production in the Marcellus Shale Formation at [location of well site}, located in the Town; and

WHEREAS Company has [applied for/been issued} (a) permit(s) by New York State Department of Environmental Conservation, numbered _____ which will allow Company to engage in certain activities which may include but not necessarily be limited to, the drilling, construction and completion of natural gas well(s) and operations site(s) pursuant to said permit(s), to drill, deepen, plug back or convert a well (hereinafter "natural gas well"), and/or to construct fuel gas transmission lines pursuant to orders of the New York State Public Service Commission granting certificate of environmental capability and public need or, if below the jurisdictional threshold of Public Service Commission, pursuant to other permits and authorizations (hereinafter "natural gas lines"), and/or ancillary activities (collectively, along with road use activities and construction activities set forth below, "natural gas activities"); and

WHEREAS Company will necessarily need to conduct certain construction activities and locate natural gas wells, natural gas lines, and/or related appurtenances within the Town, some of which may involve construction activities within roads (hereinafter "construction activities"); and

WHEREAS Company will necessarily need to traverse Town highways, roads, bridges, culverts and related fee owned land, rights-of-way or easements owned or maintained by the Town (hereinafter collectively referred to as "road" or "roads") with heavy machinery, including but not limited to, trucks, construction machinery and equipment and other related items (hereinafter "road use activities"); and

WHEREAS Company acknowledges that the nature of road use activities during natural gas activities, post production well stimulation ("fracking") and reworking activities will exceed the normal and anticipated use of public roadways within the Town's limits, causing distress to the roads which may either by structural or functional and which in turn increase overall maintenance, oversight, repair, and replacement costs to the Town in connection with the natural gas activities and which distress may be immediate or may be gradual and delayed, and also will exceed the design criteria for said roadways, thus causing greater than ordinary wear and tear and damaging of the roadways; and
WHEREAS the Town seeks guarantees and assurances from Company that Company will pay and/or otherwise indemnify the Town for any distress or damage to the roads caused by natural gas activities and/or construction activities;

NOW, THEREFORE, in consideration of these promises and other good and valuable consideration, the receipt and sufficiency which are hereby acknowledged, Company and the Town, each intending to be legally bound, agree as follows:

1. Company Responsibilities.
a. Company shall be responsible for obtaining any approvals, permits, and/or orders, including renewals thereof which are or may be required by governing law.

b. To the extent that construction activities involving installation of permanent facilities below roads, Company shall be responsible for obtaining any consents, easements or rights-of-way from the Town and appropriate property owners to authorize the installation of such facility.

c. Company agrees that it shall be responsible for insuring that all debris, garbage, and waste upon roads related to natural gas activities are disposed of in accordance with governing law.

d. The term "Company" shall include its employees, officers, directors, members, managers, partners and/or other principals along with the Company's agents, licensees, vendors, contractors, subcontractors, haulers and the like. Company shall require that each and every person or entity, including all employees, officers, directors, members, managers, partners and/or other principals along with the Company's agents, licensees, vendors, contractors, subcontractors, haulers and the like will comply with the terms and conditions of this agreement. A failure of any of the Company's employees, officers, directors, members, managers, partners and/or other principals along with the Company's agents, licensees, vendors, contractors, subcontractors, haulers and the like to comply with the terms and conditions of this agreement shall constitute a default by the Company regardless of any intent or knowledge on behalf of the Company and regardless of any defense Company may have at law, in contract or in equity against any such person or entity.

2. Road Surveys and Routes.
a. Prior to the commencement of any road use activity, Company will provide the Town with a proposed truck route containing a list of the roads that it intends to traverse as part of the natural gas activities.

b. As soon as practicable thereafter, but prior to the commencement of any natural gas activities, the Company and the Town shall agree upon a designated truck route to be used for all vehicles engaged in natural gas activities. Factors to be used in considering such route shall include the condition of each proposed road, the condition of any and all bridges, the population affected by the proposed traffic and the impact of the proposed traffic on the surrounding environment. In the event they are unable to agree, final decision shall be that of the Highway Superintendent of the Town. A description of the truck route will be deemed a supplemental exhibit to this agreement, incorporated herein as Addendum A and made a part

hereof , and shall serve as a basis for the required bonding set forth in Section 6.

c. Prior to the commencement of road use activities, Company will prepare a suitable video survey of the roads and bridges identified in the road route and shall provide a copy thereof to the Town.
d. If, in the opinion of Highway Superintendent of the Town, a proposed road route includes a road which cannot, do to its condition, withstand the structural and functional distress anticipated by heavy vehicular traffic resulting from the road use activities, the Town may make or cause to be made such improvements as may be necessary to accommodate the heavy vehicular traffic. Within 15 days of receipt of a written invoice detailing the costs, expenses and fees incurred by the Town to improve the road, the Company shall pay the invoice unless Company reasonably disputes the invoice amount. If the Company and the Town are unable to negotiate a settlement of the amount due and owing the Town, then in that event, the Company and the Town shall engage in the dispute resolution procedure set forth in paragraph 4 (entitled "Dispute Resolution") below.

e. If during the pendency of this agreement the Tioga County Commissioner of Public Works or Town Highway Superintendent determines in its sole discretion that a certain bridge cannot, due to its condition, withstand or continue to withstand the structural and functional distress anticipated by further heavy vehicular traffic, the Company shall immediately cease use of the road encompassing the bridge and shall utilize a traffic route specified by the Highway Superintendent until such time as a determination is made regarding the structural integrity of the bridge and the appropriateness of continued use. Such determination shall be made as soon as practical and any costs associated with the employment of a structural engineer[s] shall be borne by the Company.

f. Immediately following the completion of road use activities , Company shall prepare a suitable post-construction video bridge/road survey of the roads identified in the road route and notify the Town that construction activities have been completed.

g. Immediately following the completion of the post-construction video road/bridge survey, Company will provide to the Town all pre and post construction road/bridge surveys of the roads/bridges identified in the road route exhibit.

h. In the event Company deviates from the road route designated in Addendum A, the Town may request and the Company shall upon such request cease and desist such deviation. The Company shall be liable for any and all damages to the Town for repair of said roads in accordance with the procedure set forth in paragraph 3, below.

3. Road and/or Bridge Damage.
a. If any damage occurs to any bridge and/or road during road use activities and such damage is, in the sole opinion of the Town Highway Superintendent, a danger to the public using the road, then the Town shall undertake immediate repairs to the bridge and/or road. In the event Company becomes aware of any such damage, it shall notify the Town within 24 hours of such damage. The Town shall submit a written invoice to Company detailing the costs, fees, expenses and any other bills incurred by the Town to repair said damage. Company shall pay the invoice within 15 days, unless Company reasonably disputes the invoice. In the event of a reasonable dispute, then both parties shall abide by the procedure set forth herein for dispute resolution.

b. Within 14 days following the completion of natural gas activities and/or construction activities and notification to the Town by Company, the Town must notify Company in writing if the Town finds that damage(s) to the road(s) listed in the road route exhibit arose from or are related to natural gas activities or road use activities. Damage may include but not necessarily be limited to accelerated deterioration,

cracking, imprinting, pitting, tracking, buckling or asphalt and road base, damage to culverts, bridges an/or drainage facilities (hereinafter "damage").

c. Within 7 days of a receipt of an allegation of damage from the Town, Company shall notify the Town in writing of its agreement or disagreement with the allegations. The Town shall then submit a written invoice (hereinafter "invoice") to Company detailing the costs, fees, and/or expenses incurred or to be incurred by the Town to repair the damage which occurred.

d. Company shall pay the invoice and any other billings within 30 days following receipt unless Company reasonably disputes the invoice. If the Company disputes any invoice, it shall pay the Town for all undisputed items and shall provide a detailed written statement as to its basis for contesting the disputed amount(s) within the foregoing 30 day period. In the event of a dispute, then both parties shall abide by the procedure set forth herein for dispute resolution in paragraph 4 below.
e. The manner of repair of any road damage described in this agreement shall be at the sole discretion of the Town Highway Superintendent. The Town Highway Superintendent, in exercising his discretion, shall apply Town road standards that are otherwise applicable throughout the Town for the type of road involved.

4. Dispute Resolution.
a. In the event a dispute arises between Company and the Town with regard to either the causation of damage alleged by the Town to the bridges and/or roads and whether such damage occurred as a result of the road activities, natural gas activities and/or construction activities described in this agreement, or in the event Company disputes and invoice as described in this agreement, then either party may notify the other in writing that a dispute exists (hereinafter "dispute").

b. In the event of a dispute, Company and the Town agree to submit for 30 days to non-binding mediation with a neutral mediator approved by all parties to the dispute, during which each party will have their authorized representatives attempt in good faith to negotiate a resolution of the dispute.

c. Any action arising under the terms and conditions of the Agreement shall lie in
Tioga County, New York.

5. Indemnification and Insurance. The Company, at its own cost and expense, agrees to the insurance, indemnification and general terms and conditions set forth in Addendum B attached hereto entitled " General Contract and Insurance Specifications", which are to be incorporated herein by reference as if fully set forth.

6. Bonding Provision.
a. Prior to the commencement of each and every drilling or construction activity, including any re-fracking activities of a single well site, and in order to ensure performance of its obligations under this agreement, the Company shall obtain and deliver to the Town a Bond in the amount of $_____, which amount is calculated based upon the truck route calculated by the mileages and types of road and types of bridges as set forth in Addendum A. Such Bond shall be executed by a reliable bonding or insurance institution authorized to do business in the State of New York and acceptable to the Town, and shall be attached to this agreement as Addendum C.
b. The bond shall be effective prior to any road use activities and shall remain in full force and effect for at least a period of 6 months following the termination of road use activities.
c. The Company shall be listed as principal with the instrument running to the Town, as obligee, and shall be conditioned that the Company will comply with the terms and conditions of this agreement. The original bond shall be delivered to the Town Highway Superintendent.

d. The Town shall be authorized to demand payment from and against any bond to recover any amounts due from the Company for repairs to the roads and/or bridges. Upon receipt of the monies, the Town will proceed with completing the required reparations. If the Issuer of the bond refuses to honor any draft by the Town, then the Company shall cease all operations until such time as it has complied or abated the default. Nothing in this subparagraph will prevent the Town from proceeding by way of a civil action to obtain compliance and abate the default.
e. In the event the Bond contains a stated termination date, then Company shall renew or obtain a new Bond in the agreed upon amount no later than 30 days prior to the stated termination date. It is the intention of the parties that the Bond for the stated amount remain in effect throughout the term of this agreement. In addition, should Company convey any or all of its interest in this agreement, then the new owner will obtain a Bond to comply with this agreement.
f. The Bond is to guarantee reimbursement to the Town for all labor, material and equipment expenses the Town may incur in repairing any road or bridge damage arising from or related to natural gas activities and/or road construction activities if Company fails to comply with its duties and responsibilities set forth in this agreement.
g. The cancellation of any bond will not release the Company from its obligation to meet all the requirements of this agreement.
h. In the event the cost of any such reparation is less than $15,000, such amount may be deposited by the Company in an escrow account for the Town to draw upon to complete repairs.

7. 911 Address.
Company shall obtain and maintain throughout the term of this agreement a 911 address for each and every gas well or other and related appurtenances.

8. Captions and Headings.
Captions and headings throughout this agreement are for convenience and reference only and the words contained therein shall in no way be held or deemed to define, limit, describe, explain, modify, amplify or add to the interpretation, construction or meaning of any provision or of the scope or intent of this agreement nor in any way affect this agreement.

9. Modifications.
This agreement cannot be changed orally, but only by agreement in writing signed by the party against whom enforcement of the change, modification or discharge is sought or by its duly authorized agent.

10. Severability.
If any provision of this agreement, or any portion of any provision of this agreement, is declared null and void, such provision or such portion of a provision shall be considered separate and apart from the remainder of this agreement, which shall remain in full force and effect.

11. Governing Law.
This agreement shall be governed and construed in accordance with the laws of the State of New York.

12. Binding Effect.
This agreement shall be binding upon, and inure to the benefit of, the parties hereto and their respective successors and assigns.

13. Entire Agreement.
The entire agreement of the parties is contained in this agreement. No promises, inducements or considerations have been offered or accepted except as herein set forth. This agreement supersedes any prior oral or written agreement, understandings, discussion, negotiations, offers of judgment or statements

concerning the subject matter thereof.

14. Counterparts. This agreement may be entered in counterparts, each of which will be considered an original, and all of said counterparts shall together constitute one and the same instrument which may be sufficiently evidenced by one counterpart.

15. Authority of Parties.
The individuals who have executed this agreement on behalf of the respective parties expressly represent and warrant that they are authorized to sign on behalf of such entities for the purpose of duly binding such entities to this agreement.

16. Notice.
a. Any notice or other communication required or permitted under this agreement shall be in writing and shall be deemed to have been duly given (1) upon hand delivery, or (2) upon the third day following delivery via the U.S. Postal Service, or (3) on the first day following delivery via a nationally registered United States overnight courier service, or (4) on the day when telecopies or sent by facsimile transmission if additional notice is also given under (1), (2), or (3) above within three (3) business days thereafter.

b. For purposes of this agreement only, any notices to the parties shall be directed to the party as set forth below:

For Company:

For Town:

IN WITNESS WHEREOF, Company and the Town have caused their respective, duly authorized officers to execute this agreement under seal as of the day and year first above written.

[Company Name] Town of [ ]

By:_____ By:_____
Supervisor
Title:_____ _____

Road Preservation Ordinances

Though municipalities have no legal power to directly regulate the natural gas industry, Title 8 of NYS Vehicle and Traffic Laws (Sections 1640-1664) provides a means for municipalities to protect themselves from the increased costs of road repairs. Options on local laws/ordinances follow.

Weight Restrictions

First, Article 41, §1660 of the NYS Vehicle and Traffic Law authorizes municipalities to enact a local law that enables a Town Highway Superintendent to temporarily exclude from any portion of a town highway any vehicle having a gross weight over 4 tons or more, when in his opinion, the highway will be materially injured by operation of such a vehicle on it. Exclusions can take effect upon erection of posting signs on the highway and newspaper publication of a notice and remain in effect until signs are removed as directed by the Town Board. Vehicle operators can apply to the Town Board for permits providing appropriate exemption to the temporary exclusion if it is deemed to be performing essential local pick up or delivery service and that a failure to grant such permit would create a hardship.

Since this type of regulation is temporary in nature, it should be used in conjunction with either a road use agreement or a road preservation local law whereby the municipality temporarily closes a road to the gas industry company and all subcontractors until they either enter into a voluntary road use agreement or secure a permit for road usage, whichever the town requires. A sample Weight Restriction Local Law follows.

TOWN OF _____ WEIGHT RESTRICTION LOCAL LAW

Temporarily Exclude Trucks and Other Similar Vehicles With Certain Designated Gross Weight Limits from Town Roads When Those Roads Would Be Materially Damaged By Operation of Those Vehicles on Those Roads

1. Section 1. Pursuant to the authority granted by Vehicle and Traffic Law §1660, the Town of Owego hereby enacts the following local law by adding a new section in Chapter 110 of the Town Code entitled "Vehicles and Traffic", to temporarily exclude trucks and other similar vehicles exceeding a certain designated gross weight from highways when such highways would be materially injured by the operation of any such vehicle thereon:

A. The Town Superintendent of Highways is hereby delegated the power of this Town Board as granted to it by Vehicle and Traffic Law §1660, subdivision 11, to temporarily exclude from highways designated by him all trucks, commercial vehicles, tractors and tractor-trailer combinations in excess of gross weight, as defined in Vehicle and Traffic Law §117, of over four or more tons or any vehicle with a gross weight in excess of 20,000 pounds on any wheel, axle, any number of axles, or per inch width of tire.

B. The highways applicable to such temporary exclusions shall be as designated by the Superintendent of Highways on any Schedule that he files with the Town Clerk.

C. Such exclusions shall take effect upon the erection of signs on the section of highway from which such vehicles are excluded, and a notice that such vehicles are excluded shall be published in a newspaper in the county where all the highways are situated. The exclusions shall remain in effect until the removal of the signs as directed by the Town Board.

D. Upon written application by any operator of a vehicle subject to the restrictions of this section, the Town Superintendent of Highways may issue a permit providing an appropriate exemption to such vehicle from any exclusions he establishes as authorized above, if he determines that said vehicle is performing

essential local pickup or delivery service, or services related to the maintenance, repair or installation of public improvements, and that a failure to grant such permit would create hardship. Every such permit may designate the route to be traversed and contain other reasonable restrictions or conditions deemed necessary. Every such permit shall be carried on the vehicle to which it refers and shall be open to inspection of any peace officer, police officer or Town highway department officer or employee. Such permits shall be limited to the time periods of the restrictions imposed under this section by the Superintendent.

E. Pursuant to Vehicle and Traffic Law §1603(e), this Town Board hereby delegates to the Town Superintendent of Highways its authority to designate such highways under Vehicle and Traffic Law §1660, subdivision 11.

2. Section 2. SEVERABILITY. If any clause, sentence, paragraph, section, article or part of this local law shall be adjudged by any court of competent jurisdiction to be invalid, such judgment shall not affect, impair, or invalidate the remainder thereof, but shall be confined in its operation to the clause, sentence, paragraph, section, article or part thereof directly involved in the controversy in which such judgment shall have been rendered.

3. Section 3. EFFECTIVE DATE. This local law shall take effect immediately upon filing with the Secretary of State of the State of New York.

SUMMARY OF LOCAL LAW 2 of 2010
(Chapter XX of the Town Code - Vehicles and Traffic)

The purpose of this law is to enable the Town to temporarily exclude trucks and other similar vehicles with certain designated gross weights from Town roads when those roads would be materially damaged by the operation of those vehicles on those roads. This law enables the Town Board to delegate the Town Superintendent of Highways to temporarily close roads designated by him from all trucks and other commercial vehicles that are in excess of the proposed gross weight in excess of 20,000 lbs. on any wheel axle or number of axles or per inch width of tire.

This local law also provides that the Town Superintendent of Highways can issue permits providing exemptions to those designated vehicles from any temporary exclusion in order to still allow local pickup and delivery service, services related to maintenance, repair, or installation of public improvements or a determination that failing to grant a permit would create undue hardship. This local law is further intended to be used for enforcement purposes when the Town Highway Superintendent determines such action to be reasonable, particularly, but not exclusively, in light of the impending oil and gas drilling activity that may occur in the Town of Owego. The Town wishes to exercise jurisdiction over its local roads and it is the intent of this local law to protect the Town roads from damage.

Road Usage / Preservation Local Laws

Municipalities also can enact local laws pursuant to §383(15) of the NYS Vehicle and Traffic Law to establish a permit system for vehicles that exceed 8 tons (or 55,000 lbs) to operate or move a vehicle or combination of vehicles on town highway systems. This type of regulation must be applied uniformly to

all vehicles that exceed the weight limit, including emergency, local delivery and existing truck traffic as well as school buses. No particular industry's vehicles can be targeted. A municipality permits road usage for these vehicles which in turn is supported by bonds, escrow accounts or letters of credit which are used to demonstrate both the fiscal capacity of the Permittee, as well as to cover any expenses involved in restoring the road to its previously documented condition.

Further, designating haul routes (pursuant to New York State Vehicle and Traffic Law, Title 8, Article 39, Section 1640.10) for the user is a common practice that can help localize road damage impacts as well as noise and safety concerns. This may be of particular importance around sensitive areas (e.g. schools). This should be a component of a road preservation law, as well as in a road use agreement.

Schoharie County adopted the following road preservation law for use by its municipalities in March 2010:

Be it hereby enacted by the Town Board of the Town of _____, Schoharie County, New York, as follows:

Section I – Title

This Local Law may be cited as the Town of _____ Road Preservation Law.

Section II – Purpose

The purpose of this local law is to maintain the safety and general welfare of the Town residents by regulating high impact commercial activities that have the potential to adversely impact roads and property. Well maintained roads are important to the economic wellbeing of the Town. Construction, maintenance, and operation of high impact commercial endeavors (e.g. timber harvesting, mining, natural gas drilling, wind energy facilities and telecommunications facilities) can be economically beneficial. This Law is not intended to regulate such endeavors, but the intent is to protect the Town roads and property from damage from such endeavors that typically require use of heavy equipment with heavy loads.

Section III – Authority

The Town Board of the Town of _____ enacts this local law under the authority granted under section 10 of the New York State Municipal Home Rule Law and the New York State Town Law.

Section IV – Applicability

The _____ Town Board hereby delegates to the Town Highway Superintendent (herein called "Highway Superintendent") the oversight of assuring commercial activities do not have an adverse impact on public roads and property.

Section V - Definitions

1. Bond ; A commercial bond to ensure that the condition of the Town roads and/or property impacted by high frequency, high impact truck traffic is left in good or better condition at the completion of the project as they were at the start of the project.
2. Escrow: Money put into the custody of a third party for delivery to a grantee only after the fulfillment of the conditions specified.
3. Final Bond Release: Final release of the Bond by the Town Board
4. High Frequency Truck Traffic: Traffic to and from a project site that generates more than ten truck trips per day for more than three consecutive days, involving trucks that exceed thirty (30) tons (truck and load combined) that could impact Town roads and/or property. (Not including the operation of year round permanent facilities such as commercial quarries).
5. High Impact Truck Traffic: Other truck traffic of considerable weight (e.g. total weight exceeding 30 tons) and/or size (e.g. trucks requiring escort vehicles) as determined by the Highway Superintendent that could impact Town roads, and/or property. Any seismic testing by vibroseis trucks (aka "thumper trucks") is considered high impact truck traffic.
6. Permitee: Shall mean and include the holder of a "Road Preservation Vehicle Permit", its contractors, subcontractors, employees and agents, issued pursuant to this Local Law.
7. Preliminary Bond Release: A bond release given by the Highway Superintendent based upon satisfactory road conditions at project completion.
8 Project Site: An area where construction work is performed on a short term basis (i.e. not including year round permanent business such as commercial quarries), Construction work includes any of the following:
(a) excavation, including the removal of soil or gravel for off-site use or excavation or filling of trenches, ditches, shafts, wells, tunnels and pier holes, and the use of caissons and cofferdams.
(b) building, including the construction (including the manufacturing of prefabricated elements of a building at the place of work concerned), alteration, renovation, repair, maintenance and demolition of all types of buildings.

(c) civil engineering, including the construction, structural alteration , repair, maintenance and demolition of, for example, airports, dams, river and landslide defense works, roads and highways, railways, bridges and tunnels, viaducts, and works related to the provision of services such as communications, drainage, sewerage, water, and energy supplies.
9 Property: Shall mean and include any real property (including any improvements therein, thereon or thereunder) or personal property owned by, or leased to, in the Town of _____.
10. Road: Shall mean and include any highway, road, street, avenue, boulevard, parkway, shoulder, guard rail, concourse, driveway, easement, right-of-way, bridge, culvert, sluice pipe, ditch, dock, tunnel, sidewalk or any utilities or improvements therein, thereon, or there under.
11. Road Preservation Local Law Worksheet: Worksheet to be completed by a potential Permitee, summarizing the project, project location, start and completion dates, expected maximum gross vehicle weight used for the project, proposed truck routes, and any other items that the Highway Superintendent deems necessary.

Section VI – Permit Issuing Authority

1. The Highway Superintendent is hereby designated as the authority to receive and approve applications for a Road Preservation Vehicle Permit to use, park, operate, transport, or move High Frequency Truck Traffic and/or High Impact Truck Traffic, as defined above, on, over or across a designated Town Road or other Town property. The Highway Superintendent must submit a copy of the Road Preservation Vehicle Permit to the Town Code Enforcement Officer (herein called "Code Enforcement Officer").
2. The Highway Superintendent is hereby authorized to consult with others (i.e. County Department of Public Works) and/or hire, in compliance with Town Local Laws and procurement policies, any engineer, consultant and/or expert which the Highway Superintendent deems necessary to assist in reviewing and evaluating any application hereunder for a Road Protection Vehicle Permit

Section VII – Application and Road Preservation Vehicle Permit Requirements

1. The Highway Superintendent is hereby authorized to promulgate:
(i) an application form requesting the issuance of a Road Preservation Vehicle Permit, said application shall require the person requesting the permit to provide at time of initial application and continuing thereafter a proposed road map that the High Frequency Truck Traffic and/or High Impact Truck Traffic will travel on, a video or photographic documentation demonstrating the condition of the proposed road and/or property described in the permit, and any other documents, maps, sketches, and plans which the Highway Superintendent may require;
(ii) money in escrow, a highway permit bond, maintenance bond, or comparable blanket bond and the amount shall be determined by the Town Board and will be listed on the fee schedule on file with the Town Clerk. The amount of the bond or money in escrow may be changed by the Town Board by Resolution;
(iii) a completed Road Preservation Local Law (RPLL) Worksheet, available from the Town Clerk or Highway Superintendent.
All materials must be submitted to the Highway Superintendent.
2. The Highway Superintendent will decide if the scope of work is such that a Bond or money in escrow is required. If no Bond or money in escrow is needed, the RPLL worksheet is approved by the Highway Superintendent and becomes the Work Permit.
3. Upon issuance of the Work Permit and prior to commencement of the work, the Permitee will arrange for a video or photographic documentation of the roads, shoulders, and all structures (culverts, bridges, etc.) that will be traversed by the permitted traffic. The video or photographic documentation will also occur monthly and within two weeks of the conclusion of the permitted work. All video or photographic documentation will be submitted to the Highway Superintendent within one week of recording. Failure to submit the
required video or photographic documentation will result in immediate revocation of the Work Permit.

Section VIII – Highway Permit Bond/Maintenance Bond/ Escrow Account

1. If the Highway Superintendent determines that a Bond is required, the Bond must be paid to the Town and remitted to the Town Supervisor. At such time, if ever, that said highway permit bond, maintenance bond, comparable blanket bond is expended, the Permitee shall replace the same within 5 days of the receipt of written notice from the Town, failing which the Road Preservation Vehicle Permit shall be subject to revocation. The Worksheet will then be approved by the Highway Superintendent and becomes the Work Permit.
2. If the Highway Superintendent determines that a source of funds is needed to promptly reimburse the Town for any reasonable costs and expenses incurred by the Town in processing an application for a Road Preservation Vehicle Permit, and/or seeking reimbursement for damages, injuries, discharges or spills involving Town Roads or other Town Property, the applicant for a Road Preservation Vehicle Permit may be required by the Highway Superintendent to file with the Town Clerk of the Town of _____ an initial deposit in the sum of _____ dollars ($ _____)
3. As used in this section, the term "cost and expenses" shall be determined to include the reasonable fees charged by engineers consultants and/or experts hired in accordance with provisions of §VI of this Law: reasonable administrative costs and expenses incurred by the Town in connection with the permitting process and the repair, restoration, and preservation of Town Roads and Other Town Property; and reasonable legal fees, accountants fees, engineers fees, costs , expenses, disbursements, expert

witness fees and other sums expended by the Town in pursuing any rights, remedies, or claims to which the Town may be entitled under this Local Law, or under applicable provisions of Law, as against any Permitee, any person who has violated this Local Law, any insurance company, any bonding company, any issuer of a letter of credit and/or any United States or State of New York agency, board, department, bureau, commission, or official.
4. These funds may be required to accompany the filing of the application and the Town shall maintain a separate escrow account for all such funds.
5. The Town is hereby authorized to withdraw funds from said escrow account (without prior notice or consent from the Permitee) in order to promptly reimburse the Town for any costs and expenses (as defined herein).
6. Immediately following any such withdrawals, the Town shall give written notice to the Permitee detailing such withdrawals and the reasons therefore.
7. If at any time during the period when a Road Preservation Vehicle Permit is in effect , this escrow account has a balance less than _____ dollars , the Permitee shall immediately upon notification from the Town, replenish said escrow account so that it has a balance of at least _____ dollars.
8. In the event that there is any balance remaining in the escrow account as of the date that the Highway Superintendent determines the Road Preservation Vehicle Permit has expired and further determines that no damage or injuries have been caused to any Town road or other Town property for which the Town has not been fully reimbursed, the Town shall pay to the Permitee the balance remaining in the escrow account.
9. Upon completion of the project, the Permitee will apply to the Highway Superintendent for a preliminary Bond Release. Upon inspection of the work site, as necessary, the Highway Superintendent may approve the release of the Bond. If the release is not approved, the Superintendent will specifically document the tasks that must be accomplished in order for the bond to be released. In this case the Permitee will remedy the specified problem(s) items and then reapply for a Bond Release. Final Bond Release must be approved by the Town Board for repayment of Bond funds.

Section IX – Stop Work Orders

The Highway Superintendent and the Code Enforcement Officer shall each have the right and authority to issue stop work orders to those operating violations of the terms of the Road Preservation Vehicle Permit, in violation of this Local Law, in violation of applicable provisions of law, or violation of any conditions or requirements set forth in any permit issued by the New York State Department of Environmental Conservation, or contrary to the conditioned upon which the Road Preservation Vehicle Permit was issued.

Section X – Revocation of Road Preservation Vehicle Permit

Upon violation of any provisions of the Road Preservation Vehicle Permit, or violation of any provision of this Local Law, the Highway Superintendent may suspend any such permit until there is a remedy of the violation in the allocated time period set by the Highway Superintendent. A public hearing may be scheduled by the Town Clerk at which the Permitee shall have the right to appear and be heard. The Highway Superintendent may permanently revoke any Road Preservation Vehicle Permit on written notice to the Permitee.

Section XI – Other Special Conditions

1. In no event shall vehicles or equipment be parked or located outside the roadway boundaries or block access to neighboring landowners.
2. Traffic will be maintained in accordance with the Uniform Traffic Control Manual
3.The Permitee shall supply proof of insurance co-naming the Town _____ within a minimum of $3 million liability insurance coverage. The Town shall be notified 30 days prior by the insurance company of termination of coverage.
4. The Permitee shall be responsible for any and all repairs of damages cause by their operation to any Town property.
5. This Law applies to the entire duration of any project that induces High Frequency Truck Traffic and/or High Impact Truck Traffic, as defined above.
6 The Road Preservation Vehicle Permit shall not be assigned, conveyed, pledged, or transferred without prior written consent of the Highway Superintendent.
7. The Highway Superintendent shall be given one week's written notice in advance by said Permitee of the date when the Permitee intends to begin the activity authorized by the Road Preservation Vehicle Permit, and shall be given prompt written notice of its completion.
8. The Road Preservation Permit shall not authorize the holder thereof to exceed the maximum gross weight limit authorized for crossing any bridge. The Highway Superintendent shall have the authority to reasonably alter the proposed roads and other property set forth in the application before a permit is issued or after the permit is issued.
9. The Town of _____ makes no warranties or representations as to the conditions or fitness of any Road or other property; or their fitness for any intended use; or to the Town's rights, titles, or interests therein or thereto.
10. If any of these conditions are not met, the permit is automatically voided and all work shall cease.

Section XII – Fee

A non-refundable processing fee as depicted in the Town of _____ Fee Schedule, payable to the Town of _____ must accompany each worksheet submitted to the Highway Superintendent.

Section XIII – Request for Waiver

Request for a waiver from the standards set forth in this Local Law shall be made to the _____ Town Board in writing and shall contain the grounds on which the appellant relies for requesting the waiver, including all allegations on any facts on which the appellant will rely. Where the _____Town Board finds that due to special circumstances of a particular case a waiver of certain requirements as stated in Section IV is justified, then a waiver may be granted. No waiver shall be granted, however, unless the Town Board finds and records in its minutes that: (a) granting the waiver would be keeping the intent and spirit of this Local Law and is in the best interests of the community, (b) there are special circumstances involved in the particular case; (c) denying the waiver would result in undue hardship to the applicant, provided that such hardship has not been self-imposed; (d) the waiver is the minimum necessary to accomplish the purpose.

Section XIV – Invalid Segment

If any part or provision of this Local Law or the application thereof to any person or circumstances be adjudged invalid by any court of competent jurisdiction, such judgment shall be confined in its operation to the part or provision or application directly involved in the controversy in which such judgment shall have been rendered an shall not affect or impair the validity of the remainder of this Local Law or the application thereof to other persons or circumstances, and the Town of _____ hereby declares that it would have passed this Local Law or the remainder thereof had such application or invalid provision [not been included].

Section XV – Effective Date

This Local Law shall take effect immediately upon filing in the office of the New York State Secretary of State in accordance with the provisions of Section 27 of the Municipal Home Rule Law of the State if New York.

This local law was extracted from a technical paper generated by the Southern Tier East Regional Planning Board (STERPDB) entitled *CONSIDERATIONS FOR PROTECTION OF TOWN HIGHWAYS Including Regulation of Oversized and Overweight Vehicles* (Nov. 2010). It a good source of various explanations and examples of all types of road regulations options available to utilize in NYS. For more information, please contact STERPDB directly at 607-724-1327 x 201.

Model Driveway Permit/Ordinance

Driveways are an integral part of road systems, particularly ones that will be used by the gas industry, logging operations, or wind energy industry. Well-built driveways can protect waterways, control erosion, protect existing public roads, and provide safe access to and from adjacent roads. The following model for driveway permits can be used as-is, to amend current ordinances, or for comparison with similar ordinances.

TOWN OF _____DRIVEWAY PERMIT APPLICATION

DRIVEWAY APPLICATION AND PERMIT APPROVAL/DENIAL

***Please type or print in ink** ***Attach extra sheets if space on form is insufficient**

APPLICANT/OWNER INFORMATION:		
1. Applicant/Owner Name(s)	2. Applicant/Owner(s) Mailing Address- Street, P.O. Box, City, State, Zip	
3. Applicant/Owner(s) Daytime and Evening Phone Numbers Day ( ) Eve: ( ) _____ Day ( ) Eve: ( ) _____	2a. Name/Address/Phone of Contractor Installing or Modifying the Driveway:	
DRIVEWAY LOCATION INFORMATION:	4. Name of Road to which Driveway Will Connect:	5. Planned Completion Date:
6. Legal Description of Property: Tax Parcel ID: Section _____Lot :_____Block:__ _____ Fire District: _____	7. Type of Driveway Activity (check one) ☐ CLASS I DRIVEWAY (Residential) ☐ CLASS II DRIVEWAY (Commercial land and/or building(s) utilized for diversified business types including non-retail commercial) ☐ CLASS III DRIVEWAY (Industrial Business Use) ☐ CLASS IV DRIVEWAY (Temporary Industrial Use); Duration of Activity: From: _____ To: _____	

DEPOSIT AND FEES:

8. Deposits: Check if Deposit is Included with Application (Deposits must be submitted in the form of a certified check or money order).
___ CLASS I DRIVEWAY: **Applicant for a single family unit is not required to submit a deposit.** An applicant with a proposed residential subdivision of 3 lots or more is required to submit a deposit in the amount of $500.00. Upon the Town's approval of roadway restoration, the deposit shall be returned.
___ CLASS II DRIVEWAY: Applicant must submit a deposit in the amount of $500.00. Upon the Town's approval of roadway restoration, deposit shall be returned.
___ CLASS III DRIVEWAY: Applicant must submit a deposit in the amount of $1000.00. Upon the Town's approval of roadway restoration, the deposit shall be returned.
___ CLASS IV DRIVEWAY: Applicant must submit a deposit in the amount of $1000.00 for a six (6) month period. Upon the Town's approval of roadway restoration, the deposit shall be returned to the applicant.

9. Fees:
___ CLASS I DRIVEWAY: $100 for 3-10 unit subdivision; $50 for each additional unit
___ CLASS II DRIVEWAY: $100 for business up to 10,000 square feet in commercial space; $ 50 for each additional 1,000 square feet
___ CLASS III DRIVEWAY: $100 for business up to 10,000 square feet in commercial space; $ 50 for each additional 1,000 square feet
___ CLASS IV DRIVEWAY:

SITE PLAN SUBMITTAL:
The applicant shall submit a completed copy of this application along with a site plan drawing that includes all information described in Attachment 1 of this packet. Examples of drawings are included for the applicant to use as a guide in preparing a completed application. All driveway street connections shall be constructed in accordance with regulations and standards issued by the Town of _____.

I HEREBY CERTIFY THAT THE INFORMATION CONTAINED IN THIS APPLICATION IS TRUE AND CORRECT. I understand that the construction and maintenance of the driveway shall be my responsibility. It is further understood and agreed that approval is subject to my full compliance with the pertinent statutes, as well as any codes, rules, regulations, ordinances and permit requirements of other jurisdictions. I agree to comply with all permit provisions, superimposed notes and detail drawings which may be required by the Town of _____. Any alteration of this form is prohibited. I understand that I have the right to appeal any decision to deny a driveway permit as allowed by the Town of _____ Driveway Ordinance. I further agree to notify the Town Clerk and Building Inspector 48 hours prior to starting the work on this driveway.
Applicant Signature _____ Date:_____ _____

For official use only	**PERMIT APPROVAL/DENIAL**	**For official use only**

☐ PERMIT IS APPROVED. THIS PERMIT IS REVOCABLE and NOT TRANSFERABLE.
☐ PERMIT NUMBER: _____
☐ PERMIT IS DENIED. See attachment for explanation.
☐ Permit fee has been paid
☐ Special conditions apply. See attachment for explanation.

Dated this _____ day of _____, 20_____. TOWN OF _____TOWN BOARD
By: _____
(Name and Title)

ATTACHMENT

DRIVEWAY PERMIT APPLICATION SITE PLAN REQUIREMENTS CHECK LIST

APPLICANT: The following is a site plan requirements checklist. It will be reviewed by staff to determine that right-of-way (ROW) DRIVEWAY access to the site is in accordance with local laws. This information will also be used to assign a 911 Address. Application will not be processed without the following information:

1. The site Plan must be accurately drawn to scale (no smaller than 1 inch = 50 feet). Indicate direction with North arrow. The Site Plan must indicate the location of the proposed driveway access and other items and measurement to include:
   - A. Shape of the lot or parcel of land. Note: this may require a separate drawing showing overall plot plan with location of driveway/ROW access.
   - B. Driveway Information (Refer to example drawing on the following pages):
     - i. Distance from centerline of road of right-of-way (D)
     - ii. Width of driveway pavement (W)
     - iii. Length of driveway from edge of road to residence, commercial/agricultural/or industrial building, or industrial or utility installation (cell phone tower or natural gas well pad, e.g.)
     - iv. Radius of driveway turnout (R)
     - v. Utilities in Right-of-Way within 50 feet of driveway (water, sewer, gas, electricity, cable, etc.)

2. Cross Section and Details must be included; they are not required to be drawn to scale but must clearly indicate the information requested, as follows:
   - A. Culvert Information (Refer to example drawings on following pages):
     - i. Length, opening size, and type of material of drain pipe (min. length = 20 ft; min. diameter = 12 in.)
     - ii. Material and dimensions of endwalls (stone or precast concrete required)
     - iii. Arrow showing direction of water flow in drainage ditch.
     - iv. Pipe size and material of nearest upstream and downstream culverts.
     - v. Indicate "No Culvert Necessary" with reason.
   - B. Surface and Base Materials:
     - a. Material and thickness (in inches) of surface layer.
     - b. Material and thickness (in inches) of base layer(s):
       1. Compacted or stabilized existing soils.
       2. Other type of base material with depth.
3. Clearances and Site Line Distances:
   - A. Minimum distance from property line = 25 ft.
   - B. (Consider referencing Highland/DOT standards on site distances)

Further Points of Consideration

- Gas and wind energy companies generally welcome consistent ordinances and agreements among towns. If this is important to a municipality/region it may be worth the added effort to coordinate with neighboring towns.
- Increased road traffic by heavy trucks will bring with it significant noise and visual impacts along haul routes (dSGEIS, 2009, p. 6-139). The noise ordinance offered in Chapter 4 offers good foundation for preventative action. Additionally, it may be worth designating haul routes and times (pursuant to NYS Vehicle and Traffic Law, Title 8, Article 39, §1641; Article 40, §1650; and Article 41, §1660). This may be of particular importance around sensitive areas (e.g. schools).
- Increased traffic (particularly of tractor trailers) will also deteriorate air quality. Smog-producing particulate matter, ozone, carbon dioxide, and volatile organic compounds from diesel engine exhaust all pose health hazards which can increase in intensity as truck traffic increases (Armendariz and Alvarez, 2009). The rate at which air pollution increases is influenced by the region's climate, terrain, and duration of natural gas development (Armendariz and Alvarez, 2009).
- Well pad access roads will increase accessibility, and potentially human activity, in remote areas (dSGEIS, 2009, p. 6-140). For more information on designating culturally or ecologically sensitive areas, see "Description of Critical Environmental Areas" in Chapter 5.
- Vehicle accident and pedestrian safety issues increase with the number of vehicles on the road. This is of particular concern where and when natural-gas-associated traffic flows are at their highest. This becomes especially important near school zones, farming operations, and areas with poor signage and lack of enforcement.

Though this is not an exhaustive list of concerns regarding road impacts, road deterioration, air quality deterioration, and traffic safety will be among the most serious concerns municipalities will face.

Recommended Road Preservation Strategy

Given that several options for road preservations have been presented in this Chapter, TING recommends that each municipality develop its own overall strategy for road preservation incorporating pieces that are suitable for them. An example outline of a strategy follows:

1. Inventory and assess roads, culverts and other vital highway infrastructure
2. Identify infrastructure in poor, vulnerable condition
3. Develop Weight Restrictions Local Law
4. Develop Road Use Agreement
5. Develop Road Preservation Local Law incorporating weight restrictions and road use agreements
6. Develop a driveway permit ordinance with classes

Chapter 8: Workforce

Chapter 8: Workforce

Introduction

The purpose of this chapter is to briefly describe the expected workforce impacts of the natural gas industry in Tioga County and the Southern Tier Region of New York and to provide insight into the education and training needs required for this workforce with special focus on the local labor force. Much of this information is based on the 2009 "Marcellus Shale Workforce Needs Assessment" study report which can be downloaded from the **Marcellus Shale Education and Training Center** (MSETC) website (http://www.msetc.org/) – See reference in Chapter 12. A link to the MSETC website can also be found at http://naturalgas.cce.cornell.edu/, which is the **Cornell Cooperative Extension Natural Gas Resource Center.** Both sites post updated information as it becomes available.

Workforce can be broken down into three labor forces: direct, indirect, and induced. In the natural gas industry:

Direct labor refers to the energy companies and contractors that are directly involved in the drilling phase and the production phase. The occupations in this force can range from surveying, permitting, engineering, site clearing, drilling, finishing, trucking, cementing, fracturing, as well as construction of pipelines and compressor stations.

Indirect labor refers to supply-chain industries, such as quarries or machine manufacturers.

Induced labor is the furthest removed from natural gas development, and refers to the housing, food and drink, and higher education services required for gas development. This chapter focuses mostly on direct labor workforces.

When communities are planning for natural gas impacts to their workforce it is wise to have three working scenarios that describe workforce impacts: low, likely, and high. These scenarios give municipalities some flexibility in preparing their agencies and training their workforces as gas development progresses. This approach is especially important to take because it acknowledges the high unpredictability that surrounds this industry, particularly in regards to workforce needs. These estimates will also help estimate the exact education and training levels needed for the industry.

Contained within this chapter:

Workforce Anticipation
Comparison between Southern Tier NY and Northern Tier PA
Education and Training
Finding natural gas job opportunities

Workforce Anticipation

Political and environmental concerns have temporarily halted gas development in the Marcellus Shale in New York State. These concerns are likely to only be temporary holdups as new standards and procedures are established for the industry. Energy companies already working in the Marcellus Shale have expressed interest in the Southern Tier Region, including Tioga County. The anticipated presence of the natural gas industry in this region will have significant effects for many years as gas exploration and development increase.

The unpredictability mentioned earlier complicates forecasts of the location of workforce impacts. When locations are forecasted, the geographic areas from which prospective employees would be expected to commute from (commuter sheds) should be considered. Currently there are three major industry offices and supply-chain centers located near Tioga County: Williamsport, PA; Horseheads, NY; and Towanda, PA. These areas will be the source of major activity, transportation, and job creation for the natural gas industry. Tioga County, being less than an hour from Horseheads, NY and Towanda, PA , fall within the commuter sheds of these activity centers.

Development Phase Workforce

The workforce needs of the natural gas industry vary during the development phase (pre-drilling and drilling) and the production phase. The drilling phase is the most intensive and requires the most workers. The pre-drilling portion of the development phase relates to the exploration, leasing, surveying, engineering, permitting, etc. of wells, which can take several years to complete. Once approval is granted, the drilling portion begins. The work involves well-pad and access road construction, local collection pipeline construction, drilling of the well, fracturing of the well, trucking of water and/or fracking fluids, and some reclamation of land disturbance. Drilling of one well can be completed in just a few weeks. The MSETC study estimated direct workforce requirements on a per well drilled basis in the Marcellus Shale region. Drilling one well requires "410 individuals working within nearly 150 different occupations." To put these numbers into perspective and increase their usability, the study breaks down the array of individuals involved into full-time jobs per year. **Each well creates 11.53 full-time direct jobs per year.** This is only a rough estimate because the gas industry is so mutable. Further complicating this estimate is the fact that the industry definition of full-time is based on working 260 days (or 2,080 hours per year) even though a very large majority of jobs involved in the drilling phase are not worked regular hours and employees normally work in multiple locations over the span of a year. The study also mentions that "98% of these jobs are required only while wells are being drilled." Drilling phase estimates for the Marcellus play vary greatly from as few as 10 years to as many as 70 years. The size of the workforce and how quickly the development phase will be completed will depend on the number of wells drilled each year.

Direct Workforce at Production Phase

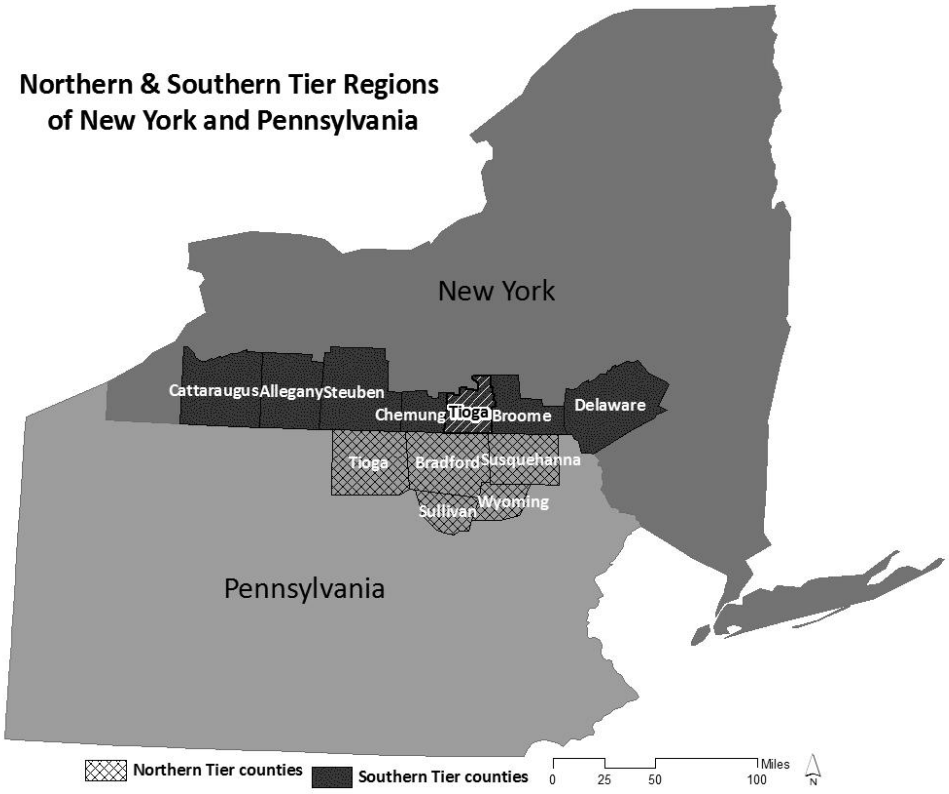
The production phase involves a significantly smaller full-time workforce that is less prone to sudden changes. The work includes trucking water and condensate from the well site, monitoring production,

and occasional well work-overs (partially re-drill/re-frac). The needs assessment study estimates that 0.17 long-term, full-time "permanent" jobs are required per-well in the production phase. The location of these workers is easier to predict, as production phase workers are generally located at company offices near well locations.

Comparison Between Southern Tier NY and Northern Tier PA

Predicting different ranges of workforce requirements is difficult, but becomes much easier once the industry begins to develop in a region. Because Marcellus Shale gas development has not begun in New York, Pennsylvania's Northern Tier is used to estimate potential impacts for Tioga County. Though Pennsylvania has different jurisdictional regulations and procedures, the Northern Tier is geographically similar to New York's Southern Tier, the regions have similar demographics, and are both underlain with the Marcellus Shale as shown in the figure on the following page.

The table on the following page summarizes the MSETC's estimates for direct workforce requirements in Pennsylvania's Northern Tier Region. In order for New York's Southern Tier Region to perform a similar direct workforce study the number of expected wells to be drilled would have to be known. Direct workforce estimates can be used to estimate indirect and induced jobs throughout the economy. In Pennsylvania, an economic league created a multiplier to calculate indirect and induced jobs through the economy. Creating a multiplier requires very specific information about a community or region to input different variables to make the multiplier more accurate. New York would have to do a similar economic study to determine its multiplier.



Map of Twin Tiers of New York and Pennsylvania. Created by Meghan Jacquet (CUGIR Data).

Northern Tier Direct Workforce Requirements (est. number of jobs)	
2009	1,292 – 2,153
2011	2,107 – 3,511
2013	3,281 – 5,468

Projected Northern Tier direct workforce requirements during drilling and production phases (MSETC, 2009).

Education and Training

Unlike many industries, natural gas industry requires little formal post-secondary education and trade certifications. Seventy-five percent of the direct workforce involved in the industry has little formal education (e.g. college, trades or technical school, or university) and depends instead on experience-driven skills and knowledge unique to the industry. The MSETC study found "company respondents indicated that finding workers with the unique skill sets, knowledge, and work ethic gains from experience in the gas industry remains a significant barrier to finding adequate local workforces." When the gas industry moves into a region non-local workers will fill most industry jobs. This situation usually changes over time as local workers are hired in greater numbers. The study found the percentages of employees that the industry will need in the following job areas: general office (24%), general laborer (20%), heavy equipment operator (17%), CDL drivers (10%), landmen / realty (8%), semi-skilled technicians (6%), supervisors (5%), lawyers (4%), geologists (3%), engineers (3%), inspectors (1%), welders (1%), welders helpers (1%), timber logging (1%), paralegals (1%), GIS (1%), x-ray tech (less than 1%).

Understanding the workforce an industry wants will help communities plan for appropriate education and training programs. Drilling phase employment is typically short term, whereas the production phase employment is more long-term and permanent. However, because of the current estimate of the size and scale of the Marcellus play as well as the potential development of the Utica Shale, the drilling phase could last well over 20 years. A community should focus its energy on understanding how to prepare its workforce accordingly. Developing and establishing education and training centers takes time, money, and energy.

Training opportunities are currently offered at established centers like the Marcellus Shale Education and Training Center at the Pennsylvania College of Technology and Natural Gas Industry programs at Lackawanna College. Closer to home, Corning Community College is offering an introductory industry short course and is in the process of developing new programs related to energy studies. As demand for skilled workers increases, it is expected that we will see more course and program offerings from BCC and TC3 as well. The BOCES districts that serve Tioga County (GST, Broome-Tioga, and Tompkins) each offer a variety of courses (CDL, heavy operation, downhand welding, forklift certification, secretarial) that are directly or indirectly related to the gas industry and they work closely with the Tioga Employment Center to offer trainings to meet the current needs of employers.

Finding Natural Gas Job Opportunities

Most jobs that typically don't require advanced degrees or training that are associated with the gas industry are being offered through subcontractors, not the drilling companies directly. Employment agencies are the main subcontractors for the drilling companies. Employment agencies will hire, put

employees through training, and after a period of time, the employee may be hired permanently by the drilling company. Many companies will also direct hire after the employment agency does the recruitment and initial screening. Hiring for jobs that require advanced degrees will often be handled by the companies directly.

Employment agencies currently recruiting with the Tioga Employment Center include Express Pros (based in Scranton), Manpower, and SOS Staffing Services. In 2010, these companies have listed the following jobs (which are consistent with the job expectations discussed above): floor hands, mechanics, supervisors, field technicians, administrative assistants, title search and scanning assistants, CDL drivers, land technicians, equipment operators, welders, pipe fitters, installers, machine operators, general labors, and dispatchers.

General requirements for working in the natural gas industry include:

High School Diploma or GED

Able to pass random and frequent drug screenings

Background and reference checks

No felony convictions within 7-10 years

No alcohol related convictions within 3-7 years

Physically fit

Anyone interested in applying for a job in the natural gas industry is advised to prepare an up-to date resume and to have on hand all pertinent personal and work history information in order to complete a job application. Make sure that all dates and spellings are accurate. Go to job fairs and/or interviews prepared with the generic application and copies of the resume, as well paper, a pen, and two forms of identification. In addition, if you are applying for a job that will require driving, you may need copies of your motor vehicle report, your license, endorsements, and a DOT medical card. It is best to apply only for jobs for which you are qualified and/or within your capabilities.

There are three primary ways to find natural gas industry job opportunities in the Tioga County area:

Contact the Tioga Employment Center which is located 1062 Route 38, Owego, NY. The phone number is 607-687-8500. You can visit them on the web at www.broometiogaworks.com .

Several gas companies work through local or regional employment agencies including S.O.S Staffing (www.sosstaffing.com) and Manpower (www.manpower.com).

Contact the Natural Gas Companies directly. See the list of natural gas companies below. (Please note that this list is not intended to be a complete listing of all companies nor an endorsement for them.). Please visit www.developtioga.com for a recent company listing.

Natural Gas Industry Directory

Name of Gas and Oil Company	Website Address
Abarta Oil & Gas Co.	www.abartaoilandgas.com
Alta Resources, LLC	www.alta-resources.com
Anadarko Petroleum Corporation	www.anadarko.com
Anchor Drilling Fluids USA, Inc.	www.anchorusa.com
Atlas Energy Resources, LLC	www.atlasenergyresources.com
Burnett Oil Co., Inc.	www.burnettoil.com
Cabot Oil & Gas Corporation	www.cabotog.com
Carrizo Oil & Gas, Inc.	www.crzo.net
Chesapeake Energy Corporation	www.chk.com
Chief Oil and Gas	www.chiefog.com
CNX Gas Corporation	www.cnxgas.com
Cohort Energy Company	www.jwoperating.com
Covalent Energy Inc.	www.covalentenergy.com
Devon Energy	www.devonenergy.com
Diamond Y Enterprises	www.chk.com
DLH Energy Services	www.dlhenergyservice.com
Dominion Exploration and Production	www.dom.com
Earth Energy Consultants, LLC	www.earthenergy.consultants.com
East Resources Inc.	www.eastresourceinc.com
El Paso Corporation	www.elpaso.com
Elexco Land Services	www.elexco.com
EOG Resources, Inc.	www.eogresources.com
EQT Corporation	www.eqt.com
Excell Services, Inc.	www.jwoperating.com
EXCO Resources, Inc.	www.excoresources.com
Fortuna Energy, Inc.(Talisman Energy, Inc.)	www.fortunaenergy.com
Gene D. Yousts & Sons, Inc.	www.chk.com
Great Plains Oilfield Rental LLC	www.gpor.com
Hawg Hauling, LLC	www.chk.com
Homeland Energy Ventures, Inc.	www.homelandenergyventures.com
Huntley & Huntley, Inc.	www.huntleyinc.com
J-W Gathering Company	www.jwoperating.com
J-W Manufacturing Company	www.jwoperating.com
J-W Measurement Company	www.jwoperating.com
J-W Operating Company	www.jwoperating.com
J-W Power Company	www.jwoperating.com
J-W Wireline Company	www.jwoperating.com

Lenape Resources, Inc.	www.lenaperesources.com
Linn Energy LLC	www.linnenergy.com
Marathon Oil Corporaiton	www.marathon.com
Mark West Energy	www.markwest.com
MegaEnergy and Disposal, Inc.	www.megaenergy.com
National Fuel Gas Distribution Corp.	www.natfuel.com
NOMAC Drilling, LLC	www.chk.com
Nornew, Inc.	www.nornew.com
Norse Pipeline, LLC	www.norsepipeline.com
North Coast Energy, Inc.	www.excoresources.com
North Coast Energy, Inc.	www.northcoastenergy.com
North Penn Pipe & Supply, Inc.	www.northpennpipe.com
Penn Virginia Corporation	www.pennvirginia.com
Pennsylvania General Energy	www.penngeneralenergy.com
PetroEdge Energy	www.petroedgeresouces.com
Range Resources	www.rangeresources.com
Schlumberger Technology Corp.	www.slb.com
Seneca Resources Corp.	www.natfuel.com/seneca
Southwestern Energy	www.swn.com
Southwestern Energy Co.	www.swn.com
Stone Energy Corporation	www.stoneenergy.com
Superior Well Services Ltd.	www.superiorwells.com
Texas Keystone Inc.	www.texaskeystone.com
TXOK Energy Resources Co.	www.excoresources.com
Universal Well Services	www.univwell.com
XTO Energy	www.xtoenergy.com

Recommended Workforce Strategy

While workforce issues typically are not handled at the municipal level, the following are suggestions on how to handle industry-related job inquiries from your residents:

1. Direct job opportunity inquiries to:
    a. Tioga Employment Center -
    Contact: Sheri McCall @ 607-687-8504
    b. Natural Gas industry company listing on Develop Tioga website -
    http://www.developtioga.com/Natural-Gas/Economic-Development/Natural-Gas/
    c. Shale Zone Jobs website -
    http://shalezonejobs.jobamatic.com/a/jobs/find-jobs

Chapter 9: Public Safety

Chapter 9: Public Safety

Introduction

The development of natural gas in Tioga County will present new challenges to public safety agencies due to the industry's use of significant amounts of water, chemicals, and heavy machinery, the transportation of same, the significant increase in vehicle traffic, and the increase in the overall population in the community. This chapter provides information on the potential issues associated with the exploration and development of natural gas and recommended steps that can be taken by public safety departments to prepare for these incidents.

Contained within this chapter:

- ***Potential Issues***
- ***How to Prepare***
- ***Hotlines***

Potential Issues

The following is a list of issues that public safety agencies should be aware of and prepare for:

A. Explosions / Fire
B. Personal injury (on-site)
   Injuries to oil and gas field service employees occur at about twice the rate as for general industry employees and, of this group, oil and gas drilling workers are exposed to even greater dangers due to the nature of this type of work (U.S. Dept. of Health and Human Services, 1983).
C. Increased traffic; violations and accidents
D. Crime
E. Spills

While items A through D require no explanation, emergency responders will need an understanding of the fluids and chemicals used in, or produced by the drilling process in order to be prepared for a possible spill event. The following is a description of these fluids and a list of where they can be found.

Types of Fluids and Chemicals

Reference: GEIS Chapter 9 (http://www.dec.ny.gov/energy/45912.html)
Draft sGEIS Chapter 5 (http://www.dec.ny.gov/energy/58440.html)

- Drilling Mud: When drilling a well, compressed air and/or freshwater mud is used. This mud may be water-based, potassium chloride/polymer-based with a mineral oil lubricant, or synthetic oil-based. Synthetic oil-based muds are described as 'food-grade" or "environmentally friendly".

- Cuttings: Very fine-grained rock fragments are removed by the drilling process and brought to the surface in the drilling fluid. Black shale, such as the Marcellus, typically contains trace levels of naturally occurring radioactive materials (NORMs) such as uranium. Therefore, NORMs may be found in the cuttings. The Draft sGEIS states that this will not generally pose a threat to workers or the general public

- Fracturing (Frac) Fluid: Hydraulic fracturing is a well stimulation technique which consists of pumping a fluid and a propping agent ("proppant") such as sand down the wellbore under high pressure to create fractures in the hydrocarbon-bearing rock.

- Foam fracturing uses a water-based gel and foam, hydrochloric acid and additives including surfactants, bactericides, clay and iron inhibitors and nitrogen.

- Slickwater fracturing uses a fluid typically comprised of more than 98% fresh water and sand, with chemical additives comprising 2% or less of the fluid. Although the chemical additives are identified in the MSDS, more complete compositional information on these chemicals is provided in the Draft sGEIS 5.4 and other sections and tables referenced therein.

- Flowback – after the hydraulic fracturing procedure is completed, frac fluid flows back up through the wellbore to the surface. Between 9 and 35% of the frac fluid originally pumped in during fracking is returned. The composition of flowback includes not only frac water but other components such as dissolved solids, metals, suspended solids, minerals, acid gases to name a few (Ref: Draft sGEIS 5.11 and Chapter 7 for mitigation measures regarding flowback water handling)

- Brine – after the initial flowback operation, some volume of brine is expected to be produced

- Liquid Hydrocarbons - Gas Composition – the Marcellus and Utica Shales are dry gas shales, therefore, the gas composition is not expected to produce liquid hydrocarbons such as oil or condensate.

For information on mitigation measures, refer to the sGEIS, Chapter 7.

Location of Fluids and Chemicals

Some or all of the materials mentioned above are:

a. Transported into Tioga County
b. Stored in bulk at locations in the county (See map list in Chapter 11)
c. Transported to a drill-site
d. Stored, mixed, used at a drill-site

e. Transported from one drill-site to another for reuse
f. Transported away from the drill-site for disposal

Note: the term "transported' could mean either trucked or piped

For regulatory information, refer to the sGEIS:

- Transport of hydraulic fracturing additives is regulated by the USDOT. See Draft sGEIS section 5.5
- Bulk storage of hazardous chemicals is regulated by the DEC. See Draft sGEIS section 5.6

How to Prepare

A summarized list of the following recommendations can be found in the Master Checklist.

Before drilling starts in Tioga County

1. Become familiar with the drilling process
   a. Review the NYS DEC GEIS and sGEIS for a description of the process, and to become familiar with drilling regulations:

      GEIS (http://www.dec.ny.gov/energy/45912.html)
      Draft sGEIS (http://www.dec.ny.gov/energy/58440.html)

   b. Tour drill-sites in nearby PA counties. Contact the Tioga County CPOC (Central Point of Contact) to arrange tours. See item #8d below for details of drill-site training.

2. Become familiar with the fluids used in and produced by the drilling process; especially the chemical components of frac fluid, in order to protect emergency personnel and provide or assist in treatment of injuries.
   Reference: Draft sGEIS (http://www.dec.ny.gov/energy/58440.html)

3. Ensure emergency personnel have adequate hazardous materials training

4. Become familiar with the types of industry-related incidents that could occur.
   Although Tioga County's public safety agencies are prepared to respond to most incidents, the possible increase in frequency and/or severity of incidents could tax the agencies' ability to respond. Therefore, the following steps are recommended:
   a. Establish a baseline of Tioga County's current capabilities:
      - Current facilities & equipment
      - Current staffing
      - Historical statistics on the number/type of emergency calls

A survey of this baseline data was conducted in the Spring of 2010 and is included as Attachment **9A**.

b. Stay informed of gas-related emergency calls and incidents in neighboring PA counties where gas development is underway. This can be done by monitoring news reports and remaining in contact with Pa counterparts. This information should highlight to public safety officials where there might be gaps in Tioga County's ability to respond to gas-related emergencies.

5. The County Sheriff might want to meet with Towns/Villages to update local ordinances, giving the Sheriff's office enforcement authority (e.g. road/bridge weight limits)

6. Ensure evacuation plans are up to date (schools, and other buildings with large populations)

7. Encourage county residents to register with NY Alert

8. Meet with Gas Companies
It is reasonable to assume that the gas companies that hold leases on properties in the county will eventually start drilling in the county. The County CPOC will arrange "Meet and Greet" meetings between these companies and the various municipal stakeholders in the county, including public safety. Public safety officials will want to use this opportunity to discuss the following topics. These topics have also been summarized for easy reference in the Master Checklist.
    a. Obtain names and contact information of company safety/emergency services personnel (Attachment **9B**, Section 1)
    b. Obtain company's development plans in Tioga County (Attachment **9B**, Section 3)
    c. Subcontractor information
        - Request a list of company's subcontractors, and their contact information (Attachment **9B**, Section 2)
        - Discuss company's policy regarding subcontractors; e.g. are subcontractors expected to abide by company's rules?
    d. Chemical transportation routes and bulk storage locations
        - What route(s) does the company plan to use to transport chemicals into and out of the county?
        - What are the in-county locations that will be used for bulk storage?
    e. Provide County emergency contact information (Attachment **3A**)
    f. Law enforcement topics
        - Explain County Sheriff vs. Village Police
        - Review ground rules (Attachment **9C**)
    g. Provide maps of county Fire Districts and EMS Districts (Attachment **9D** & **9E**)
    h. Emergency procedures, plans, forms
        - Provide and discuss regulations regarding, and procedures for responding to incidents (Attachment **9B**, Sections 4 and 5)

- Regarding spill, refer company to the DEC's Technical Field Guidance on Spill Reporting and Initial Notification Requirements (http://www.dec.ny.gov/docs/remediation_hudson_pdf/1x1.pdf)
- Do emergency operations follow NIMS protocol?
- Inform company of the need for documented Plans (e.g. Incident Action Plan) and Forms (e.g. MSDS) for each site (Attachment **9B**, Section 6)
- Ensure everyone understands which agencies/departments are responsible for what.

i. EMS & Fire equipment needs
- What equipment is needed?
- What equipment will the company have on-site, have access to?
- What equipment should we have in the county?
- Will the company provide or fund new equipment through a Community Benefits package?

j. EMS & Fire training needs
- Request that the company provide well-specific training to familiarize EMS teams with site clearing, well pad preparation, drill rigs, drilling, fracturing, blowout preventers, gas flaring, well production, pipelines, and compressor stations.
- What are the expected hazards of drilling? (crush/suspension injuries, burns, confined space rescues, elevated space rescues, gas leaks, gas explosions, spills)
- What additional training should the county EMS teams have, and will the gas company provide?
- Are there special mechanisms of injury for EMS calls scene?

k. Hunting seasons
Many well sites and other gas industry locations will be near hunting areas. By providing gas companies with information on local hunting seasons (Attachment **9F**), hunting-related accidents can be prevented.

9. After Meet with Greet meetings with Gas Companies
- As a result of what was discussed/learned at these meetings, it is likely that various documents (attachments, checklist, maps, etc) will need to be updated and/or created.
- In addition, much of the information learned at these meetings needs to be passed along to other emergency services departments and teams.
- It may be necessary to pursue funding for , and purchase of EMS equipment
- EMS training may need to be scheduled and conducted

When drilling is underway

1. Know the location of all active drill sites
The CPOC will send notices, including mapped location, to all stakeholders, including public safety officials, of all drilling activity (permit application, permit approval, drill start date). This information should be passed along to the appropriate local departments/teams.

2. Meet with drilling operator (gas company) at the "Permit Application Meeting"
   The CPOC will arrange a "Permit Application meeting" whenever a permit is granted. This meeting provides the opportunity for all stakeholders, including public safety, to discuss details concerning that drill-site with the operator. The public safety topics to discuss are listed below. This list is almost identical to the topics discussed at the Meet and Greet meeting with the parent company. However the discussion with the operator needs to be at a more detailed level. A summarized list of can also be found on the Master Checklist for quick reference.
   a. Obtain site specific information including site contact information (both operating company and subcontractor personnel) and required Plans and Forms (IAP, MSDS, etc) on-site for Fire and EMS personnel. Discuss where they will be located, and who will have access. See Attachment **9B**, Section 6.
   b. Provide County emergency contact information (Attachment **3A**)
   c. Chemical transportation routes and bulk storage locations
   d. EMS equipment: What equipment will there be on-site?
   e. Fire equipment: What equipment will there be on-site?
   f. Hunting seasons – give operator schedule of hunting seasons (Attachment **9F**)
   g. Law enforcement topics – review ground rules (Attachment **9C**)
   h. Emergency procedures
      - Discuss emergency procedures and regulations
      - Refer company to DEC's Technical Field Guidance on Spill Reporting and Initial Notification Requirements at (http://www.dec.ny.gov/docs/remediation_hudson_pdf/1x1.pdf).
      - Provide maps of county Fire Districts and EMS Districts (Attachment **9D** & **9E**)

3. After the Permit Application meeting
   a. Update or create documents (attachments, checklists, maps, etc) as required
   b. Pass along information to local departments and teams as
   c. Provide copies of the required Plans and Forms (IAP, MSDS, etc) for that drill-site to the appropriate departments/teams.

4. Incidents
   a. As appropriate, notify county residents of emergencies via Reverse 911 and/or NY Alert
   b. During an incident, local responders should utilize the gas company's expertise and assets
   c. In the event of a spill, notify 911 Dispatch and the County Public Health Department, and take the appropriate actions as defined in DEC's Technical Field Guidance on Spill Reporting and Initial Notification Requirements at (http://www.dec.ny.gov/docs/remediation_hudson_pdf/1x1.pdf).

Hotlines

Federal Environmental Protection Agency

EPA "Eyes on Drilling" is designed for citizens to report non-emergency suspicious activity related to oil and natural gas development. The toll free tip line number is (877) 919-4372. Citizens may also send reports by email to eyesondrilling@epa.gov, or send written notes to EPA Region 3, 1650 Arch Street (3CEOO), Philadelphia, PA 19103-2029. Tips may be provided anonymously.

National Response Center is designed for reports of spills or releases of hazardous material, including oil, that present an emergency. The toll free number is (800) 424-8802.

New York State Department of Environmental Conservation

New York State Spill Hotline's toll free number is (800) 457-7362.
This hotline connects to the office of the NYSDEC.

For further in-depth information brochures visit these websites:
http://www.dec.ny.gov/chemical/8428.html
Spill FAQ http://www.dec.ny.gov/chemical/8692.html

For further general information contact:
NYS DEC
Division of Remediation
Bureau of Technical Support
625 Broadway – 11th Floor
Albany NY 12233-7020
(518) 402-9543

Recommended Public Safety Strategy

Here is a summary of activities TING is recommending that municipalities undertake to address public safety:

1. Adopt local ordinances recommended in other Chapters of this Resource Binder that can then be enforced by law enforcement in your jurisdiction
2. Post Hotline Numbers on your websites and in your municipal halls to educate residents

PUBLIC SAFETY ATTACHMENTS

Attachment 9A – Public Safety Capabilities Baseline Survey

What is your name? **John Scott**

What is your email and telephone number (in case of follow up questions only, NO SPAM)?

scottj@co.tioga.ny.us **607-687-8467**

What is your local department agency/ department name? **Tioga Bureau of Fire**

In the chart below, please list the different facilities

EMS WORKFORCE	Workforce			
	Number	**Voln.**	**Full-time**	**Part-time**
Overaching				
Deputy Fire Coordinator	6			6
Advanced Cardiac Life Support (ACLS) (people hired for daytime coverage in Berkshire, Candor, Owego, and Spencer)	55	34	21	
Emergency Medical Technician (EMT)	187	128	59	
Certified First Responders (CFR)	24	24		
Drivers (req. certifed CFR)	223	223		
Emergency Medical Services (EMS) units (fire based or tax supported):				
Apalachin	19	19		
workforce breakdown				
Campville	18	14	4	
Salsey Valley	5	5		
Lockwood	6	6		
Nichols	7	7		
Owego	35	33	2	
South Side	7	7		
Tigoa Center	10	10		
Welton	7	7		
Emergency Medical Services (EMS) units (independent non-profit or not tax supported):				
Berkshire (also Neward Valley and Richford)	25	24	1	
Candor	23	22	1	
Spancer	17	16	1	
Waverly/ Greater Valley	80	0	80	

In the chart below, please list the different employee positions available in your agency, and note the number of persons employed in that position to date:

EMS WORKFORCE	Workforce		
	Number	**Voln.**	**Full-time**
Overaching			
Deputy Fire Coordinator	6		
Advanced Cardiac Life Support (ACLS) (people hired for daytime coverage in Berkshire, Candor, Owego, and Spencer)			
Emergency Medical Technician (EMT)			
Certified First Responders (CFR)			
Drivers (req. certifed CFR)			
Emergency Medical Services (EMS) units (fire based or tax supported):			
Apalachin	19	19	
workforce breakdown			
Campville	19	15	4
Salsey Valley	5	5	
Lockwood	6	6	
Nichols	7	7	
Owego	35	33	2
South Side	7	7	
Tigoa Center	10	10	
Welton	7	7	
Emergency Medical Services (EMS) units (independent non-profit or not tax supported):			
Berkshire (also Neward Valley and Richford)	16	15	1
Candor	26	25	1
Spancer	12	11	1
Waverly/ Greater Valley	80	0	80

(**Please be as complete as possible, e.g. drivers, coordinators, office staff, technicians, etc)*

Have you recently added new positions or increased the number of employees to your agency or do you plan to do so in the future? If so, please describe below:

In the chart below please fill the total number of emergency calls for your agency before and after natural gas development began, as well as estimate the percentage of gas-related calls?

EMS WORKFORCE			Workforce	
	Number	**Voln.**	**Full-time**	**Part-time**
Overaching				
Deputy Fire Coordinator				
Advanced Cardiac Life Support (ACLS) (people hired for daytime coverage in Berkshire, Candor, Owego, and Spencer)				
Emergency Medical Technician (EMT)				
Certified First Responders (CFR)				
Drivers (req. certifed CFR)				
Emergency Medical Services (EMS) units (fire based or tax supported):				
Apalachin	*	*		
workforce breakdown	*	*		
Campville	*	*		
Salsey Valley	*	*		
Lockwood	*	*		
Nichols	*	*		
Owego	*	*		
South Side	*	*		
Tigoa Center	*	*		
Welton	*	*		
Emergency Medical Services (EMS) units (independent non-profit or not tax supported):				
Berkshire (also Neward Valley and Richford)	604	604		
Candor	503	503		
Spancer	248	248		
Waverly/ Greater Valley	1457	1457		

In the chart below please fill the total number of emergency calls/ responses/ violations for your agency before and after natural gas development began, as well as estimate the percentage of gas-related calls?

Fire Department	Workforce	
	Voln.	**Paid**
Fire Districts (13):		
Apalachin Fire District	677	
Berkshire Fire District	151	
Candor Fire District (includes Candor and Weltonville Fire)	208	
Halsey Valley Fire District	48	
Lockwood Fire District	50	
Lounsberry Fire District	0	
Newark Valley Fire District	127	
Nichols Fire District	295	
Richford Fire District	48	
Spencer Fire District	266	
Tioga Center Fire District	448	
Town of Owego Fire District (includes Campville and Southside Fire Departments)	2582	
Waverly Barton Join Fire District	174	

Do you anticipate any new demands on your workforce due to the Marcellus Shale natural gas drilling? If so, please describe below:

Yes, a slight increase in industrial type fire and EMS calls.

An increase in motor vehicle accidents involving trucks.

An increase in Haz-Mat incidents both at well sites and at motor vehicle accidents.

What is your name?

Sheriff Gary W. Howard

What is your email and telephone number (in case of follow up questions only, NO SPAM)?

Howardg@co.tioga.ny.us **607-687-1010**

What is your local department agency/ department name?

Tioga County Sheriff's Office

In the chart below, please list the different facilities operated by your agency and their locations:

Pre-Natural Gas Drilling (today)	
Facility	**Location (address if possible)**

Tioga County Sheriff's Office **103 Corporate Drive Owego, NY 13827**

In the chart below, please list the different employee positions available in your agency, and note the number of persons employed in that position to date:

Pre-Natural Gas Drilling (today)			
Position	Number of Employees		
	Volunteer	Full-time	Part-time
Road Patrol Deputies	0	30	2
911-Dispathers	0	13	0
Criminal Investigators	0	6	0
Correction Officers	0	44	13
Records	0	2	0
Civil Office	0	2	0

(**Please be as complete as possible, e.g. drivers, coordinators, office staff, technicians, etc)*

Have you recently added new positions or increased the number of employees to your agency or do you plan to do so in the future? If so, please describe below:

No addition positions, in 2010 four deputy positions went unfunded.

In the chart below please fill the total number of emergency calls for your agency before and after natural gas development began, as well as estimate the percentage of gas-related calls?

EMS	Today	Quarterly or Annually
Law Enforcement calls:		44,998
Estimated number of gas-related calls:		
Fire/ EMS calls:	7,955	
911 calls:	14,706	

In the chart below please fill the total number of emergency calls/ responses/ violations for your agency before and after natural gas development began, as well as estimate the percentage of gas-related calls?

Public Safety	Today	Quarterly or Annually
Number calls/ responses/ violations:		
Estimated number of gas-related calls/ violations:		

Do you anticipate any new demands on your workforce due to the Marcellus Shale natural gas drilling? If so, please describe below:

Increased traffic which will increase Motor Vehicle accidents, traffic tickets etc.

	Tioga 2002	Tioga 2009	Bradford 2002	Bradford 2009	Lycoming 2002	Lycoming 2009
Total County Population - Agencies Represents Arrests	**52278**		**63037**		**120573**	
Rapes	3		7		9	
Robberies	0		4		44	
Aggravated Assaults	20		34		73	
Burglaries	49		63		110	
Larcenies	136		143		546	
Motor Vehicle Thefts	17		34		54	
Arsons	1		4		11	
Other Assaults	135		363		444	
Forgery and Counterfeiting	17		12		46	
Fraud	69		22		584	
Number of Agencies in county report arrests	**8**		**11**		**13**	
Embezzlement	0		0		0	
Have stolen property	15		16		12	
Vandalism	70		81		130	
Weapons Violations	10		16		17	
Prostitution and Commerce Vice	0		0		6	
Sex Offenses	31		16		42	
Total Drug Abuse Violations	**138**		**95**		**320**	
Drug Abuse-Sale/ Manufacture	7		32		56	
Opium/ Cocaine-Sale/ Manufacture	1		7		41	
Marijuana Sale/ Manufacture	5		19		10	
Multi-County Jurisdiction Flag	0		0		0	
Synthetic Drug-Sale/ Manufacture	0		5		0	
Other: Dangerous Non-narcotics	1		1		5	
Subtotal Drug Possession	**131**		**63**		**264**	
Opium/ Cocaine-Possession	3		1		97	
Marijuana-Possession	113		50		143	
Synthetic Narcotics-Possession	6		6		5	
Other Drug-possession	9		6		19	
Total Gambling	**0**		0		0	
Bookmaking, horse and sport	0		0		0	
Numbers and lottery	0		0		0	
Coverage Indicator	100		96		93	
Gambling - all other	0		0		0	
Offenses against family and child	29		7		8	
Driving under influence	169		209		581	
Liquor law violation	108		120		339	
Drunkenness	0		37		269	
Disorderly conduct	69		235		675	
Vagrancy	0		1		3	
All other off except traffic	353		227		993	
Suspicion	0		0		0	
Curfew, loitering Violation: Juvenile	0		1		23	
Grand total	**1439**		**1771**		**5490**	
Runaways: Juveniles	0		21		149	
Part 1 - total	226		289		850	
Part 1 - violent crimes	23		44		129	
Part 1 - Property crimes	203		244		721	
Murders	0		0		3	

Attachment 9B – Emergency Response Plan

Section 1: Gas Company Contact Information

a. Corporate HQ:
   1) Address
   2) Key contacts: Name, Position/Title, Phone numbers (business, cell, home), type of problem person should be notified of
b. Local Office:
   3) Address
   4) Key contacts: Name, Position/Title, Phone numbers, type of problem person should be notified of

Section 2: Subcontractor Information

a. List of subcontractors
b. Type of Service provided
c. Local address
d. Key contact(s): Name, Position/Title, Phone numbers (business, cell, home), type of problem person should be notified of

Section 3: Company Development Plan

Provide map(s) showing current and proposed:

a. Well Sites
b. Other project sites (e.g. compressor stations, pipe yards, etc)
c. Gathering systems

Section 4: Emergency Check List

For each type of emergency listed below, gas company to provide:

a. Instruction Check List
b. On-Scene command
c. Company Contact
d. Additional information as noted

Types of emergencies:

a. Injury / Fatality
b. Bomb Threat: also provide Guidelines / Bomb Threat Checklist
c. Spill Response :
   - Containment Procedures
   - General Guidance
   - Spill Reporting
   - Spill Assessment Form
d. Fire / Explosion

e. Security Breach
f. Well Control
g. Pipeline Leak
h. H2S Release (High H2S Incident Only)
i. Ignition
   - Procedure Protocols
   - Ignition Decision Flowchart
   - Ignition Procedure Flowchart

Section 5: General Emergency Information

a. General Information:
   - General statement about company's emergency planning policy
   - Scope of the emergency response plan
   - Basis of the emergency response plan
b. ERP Administration
   - ERP Distribution
   - ERP Audits and Updates
c. Emergency Preparedness, Planning, and Response
   - Risk Assessment
   - Incident Command During an Emergency
   - Define Emergency Levels
   - Plan Activation and Situation Assessment
   - Immediate Action for Each Level
   - Records of Past Incidents that Required Activation of this Plan
   - Company Incident Accident Report Form
   - Emergency Operations Center
   - External Resources Notification / Governmental Involvement
   - Hazard-specific Procedure
   - Communications System
   - Training

Section 6: Site Specific Information

Each Site IAP should contain the following:

a. Location Information:
   1) Site name
   2) Site latitude/longitude
   3) Town
   4) 911 address
   5) Site map
   6) Driving directions from nearest community or main highway
b. Company contact Information for well site:
   1) Drill Site person in charge: Name, Position/Title, Phone numbers: hard line, cell, radio frequency, Type of problem person should be notified of
   2) "Position Tree" for the site, with Names, Positions/Titles, Phone numbers: hard line, cell, radio frequency, Type of problem person should be notified of

3) Emergency instructions for Operator

c. Subcontractor contact information for well site.

Provide list of subcontractors, and the following information for each:

1) Type of Service provided
2) Local address
3) Key contact information:
    a) Name
    b) Position/Title
    c) Phone numbers: hard line, cell, radio frequency
    d) Type of problem person should be notified of
    e) Emergency instructions for Subcontractor

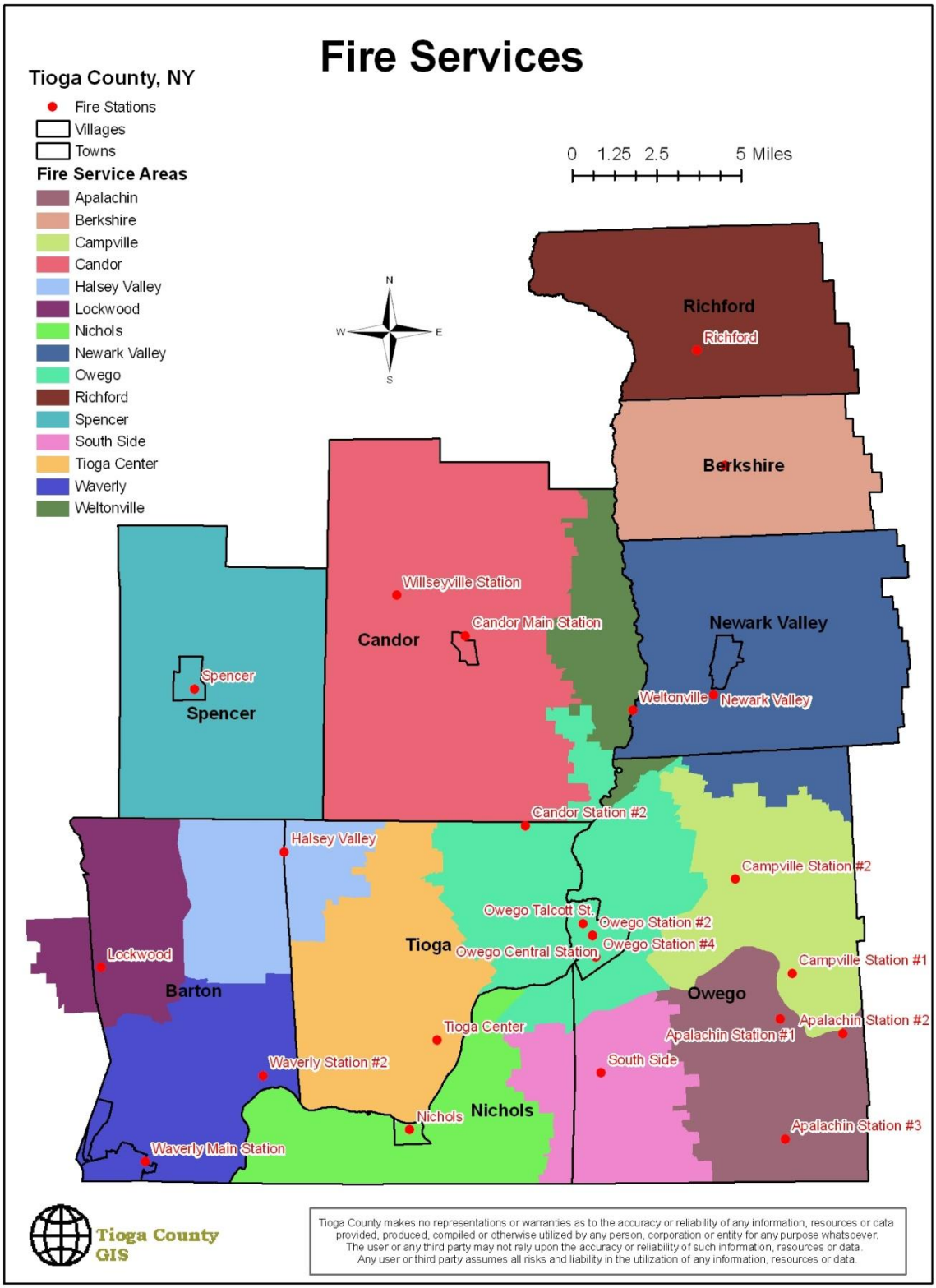
d. Materials Safety Data Sheet (MSDS)

- to be kept on site
- copy to be provided to County EMO

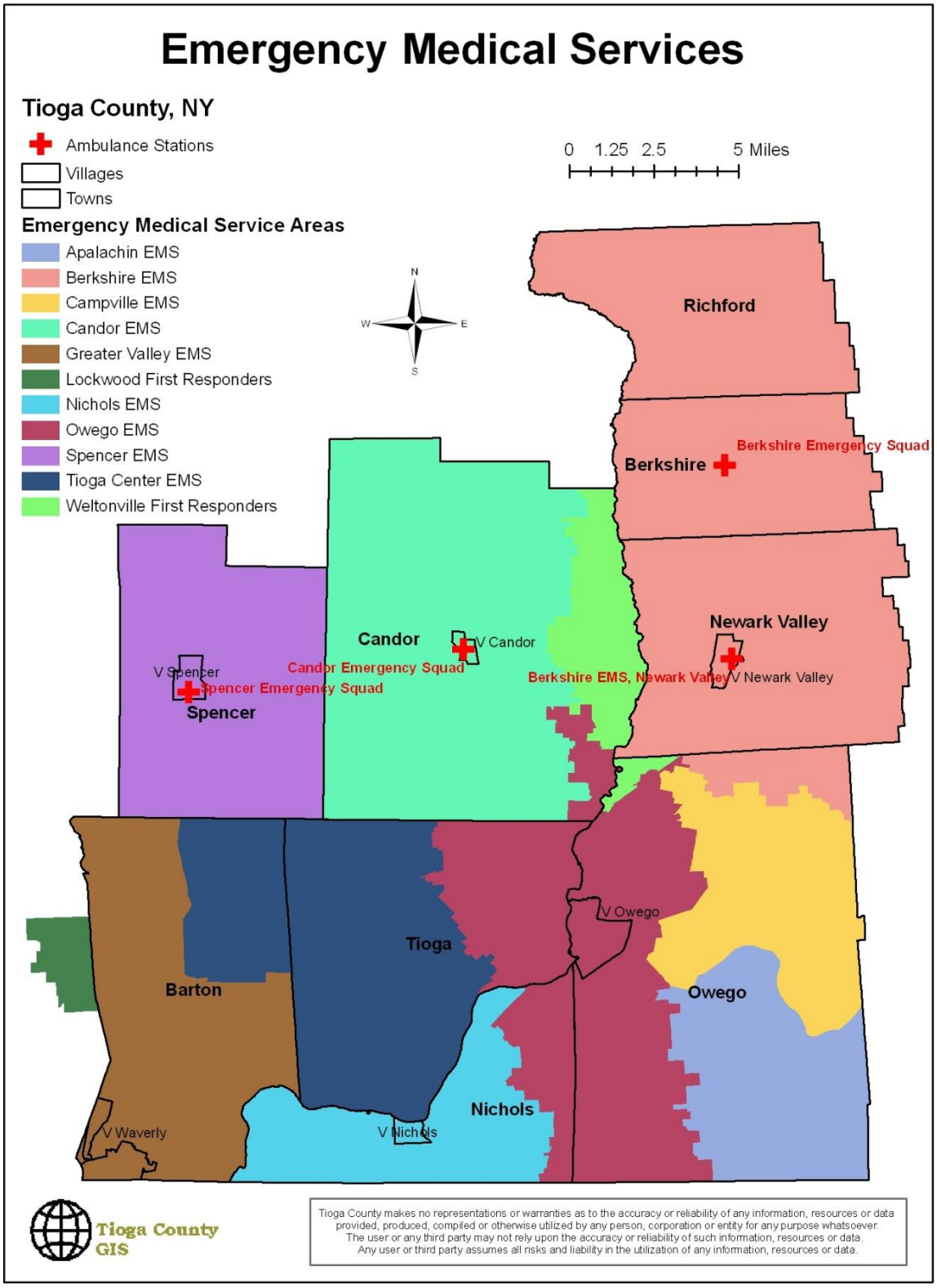
Attachment 9C – Law Enforcement Ground Rules

1. On-going mandatory drug testing of all employees
2. Drivers fired upon 3rd traffic violation
3. No alcoholic beverages on drill site
4. No weapons on drill site

Attachment 9D – Map of Tioga County Fire Districts



Attachment 9E – Map of Tioga County EMS Districts



Attachment 9F – Schedule of Hunting Seasons

The dates for hunting seasons change year to year. To get the most recent dates, go to the DEC website (http://www.dec.ny.gov/), click on Outdoor Activities, and scroll down to the section on Hunting Season dates.

Date Last Update: 8/13/10

		Start Date	End Date
Deer & Bear	Regular	Nov 20	Dec 12
	Bowhunting	Oct 16	Nov 19
	Bowhunting	Dec 13	Dec 21
	Muzzleloading Deer	Dec 13	Dec 21
Turkey	Fall	Oct 1	Nov 19
	Spring	May 1	May 31
	Spring Youth	Apr 23	Apr 24
Small Game			
	Cottontail Rabbit	Oct 1	Feb 28
	Reptile & Amphibian	Jun 15	Sep 30
	Snapping Turtles	Jul 15	Sep 30
	Pheasant	Oct 16	Feb 28
	Pheasant Youth	Oct 9	Oct 10
	Ruffed Grouse	Oct 1	Feb 28
	Squirrel	Sep 1	Feb 28
	Varying Hare	Dec 13	Feb 28
Waterfowl & Migratory Game Birds		Oct	Apr

Chapter 10: Additional Public Sector Impacts

Chapter 10: Additional Public Sector Impacts

This binder is not comprehensive in its coverage. More aspects of gas drilling in the Marcellus Shale need to be researched. Because of rapidly changing technology, geologic differences across the region, and changes in energy policy and regulation, natural gas drilling will require constant monitoring by local governments. There are aspects that may never be understood in their entirety. This chapter identifies the areas which still need to be examined in order to grasp the potential impact of gas drilling for communities.

Economic Impacts

The economic impacts associated with drilling in the Marcellus Shale still require analysis. Communities in economically disadvantaged areas frequently expect drilling to be a great economic boom; however, the economics of the effects of natural gas exploration on communities is very complex. An economic analysis must include not only the impact of gas-related investments, but the costs and benefits associated with the impacts on schools, public health, transportation systems, agriculture, and tourism. As the development of gas drilling in the Marcellus Shale region continues to grow, it will be pivotal to take into account, not only the environmental impacts, but also the economic impacts associated with gas drilling, a summation of both positive and negative factors.

Land Value

The effect of gas drilling on houses and land values in the communities needs to be examined. The complexities and nuances of lease agreements regarding land use, mineral rights, royalties, and property owner rights can greatly impact land values. Large scale gas development can raise or lower land values; a likely outcome is that gas development could both raise and lower land values on a case by case basis. Securing favorable lease agreements and staying informed about local gas development is important to protecting and maximizing the value of homes and land in an uncertain future.

Housing

As the gas industry and its workers come into municipalities, housing will become an issue. Most immediately, the question of where the temporary employees would reside needs to be answered. Rent may increase as gas workers compete for the limited existing rental units. This may eventually displace long-term renters (residents) of Tioga. The permitting and construction of accessory dwelling units (in attics or above garages) may create the necessary temporary housing Tioga will need and create some income for existing residents. In addition, the location and regulation of man camps (temporary/semi-permanent worker housing) will need to be considered.

Taxation

In the early 1980's, laws were enacted to promote the development of oil and gas resources in New York and to regulate the activities of the industry. Specifically, the new laws added provisions to

govern the assessment of oil and gas producing properties. The separate assessment of oil and gas economic units for producing wells in New York State was mandated. In the early 1990's the Real Property Tax Law (RPTL) was amended to authorize the Office of Real Property Services (ORPS) to impose an annual charge on oil and gas producers to pay costs incurred in the administration of the oil and gas program.

The following is a summary of how oil and gas producing properties are assessed to arrive at property taxes charged to oil and gas producers:

- Each each oil and gas producer is required to report to each appropriate assessor, and to the DEC, the total amount of oil and gas produced from each well.
- The DEC is required to provide each County Director of Real Property a copy of each production report received by the DEC relating to production in that county, as well a list identifying all oil and gas drilling well permits
- The County Real Property Director is required to provide each assessor, production data relating to oil and gas economic units within that assessor's assessing unit, as well as apportionment information
- ORPS requests from owners or operators of producing oil and gas wells, a statement of income and expense related to production for the purpose of determining the discounted net cash flow, which is used to establish unit of production values. The value of oil and gas rights shall be established as of December 31 of the year preceding the year in which the rights will be described and assessed on the assessment roll.
- Upon receipt of the unit of production values certified by the state board, each assessor shall compute and determine the assessed value of oil and gas economic units located in that assessing unit

In summary, gas companies are required to pay property taxes on gas wells. The amount of tax is calculated based on the well's production. Since wells are taxed as real property, the county, town, and school district in which a well is located receive these tax revenues.

It is important to note that other states have imposed a severance tax on oil and gas wells. New York State is also considering imposing a severance tax. Although the specifics of the severance tax may vary from state to state, and it's uncertain what the specifics might be for a future proposed severance tax in New York, more than likely it would eliminate the local revenue (county, town, and school districts) and route the revenue to the state.

Public Sector Capacity

The demands placed upon the public sector by gas drilling will likely exceed the current capacity of local governments in terms of both staffing and funding. Tioga County and municipalities may need to seek an increase in budgets. They can apply for outside grant funding or request assistance from drilling companies. Communities may not be prepared to deal with the pace of development. They will

likely need more staff to improve communications between departments, listen to citizens' concerns, provide information for the industry, fulfill state requests, respond to emergencies, and develop plans.

Fees Charged by Municipality

This Binder contains a number of ordinances and suggested fees. Fee amounts need to be reviewed and revised by each municipality when ordinance adoption is considered. To determine more appropriate fees, municipalities should do further research for proposed and existing ordinances. Additionally, existing fees for services currently provided should be examined. Gas industry researchers may stress municipalities with requests for copies and GIS data. The County and municipalities should examine what fees are currently charged and determine – before drilling begins – whether they cover the costs of the effort associated with photocopying, assembling the data, etc. Usually, municipalities don't "revisit" fees on a regular basis, even though salaries, printing costs, postage, etc., rise on an annual basis.

TING therefore recommends that municipalities create one fee schedule with all fees on it that are contained in individual local laws, or if one does exist, update it with current rates. The Town of Candor, for example, in 2010 assigned to their Planning Board the task of extracting fees from all local laws on record, compiling one fee schedule and updating the fee amounts for 2011.

Seismic Testing

Energy companies perform seismic testing in an effort to determine the presence of oil and gas and to gain related scientific data. This section is not intended to describe the various types of testing, but rather to caution municipalities about seismic testing that is conducted through the use of "thumper trucks".

A Thumper, or weight-drop truck, is a vehicle which may be used to provide the signal in seismic exploration. Its purpose is to drop heavy weights onto the road surface, thereby generating seismic signals which travel through surrounding properties.

If the owners of the surrounding properties have not entered into leases permitting such seismic exploration, any seismic testing company's entry onto those owners properties, **including portions extending to the center line of the road** upon which the trucks travels, constitutes a trespass. See Jane Welsh, Esq., MEMORANDUM CONCERNING SEISMIC TESTING IN HIGHWAY RIGHTS OF WAY 1 (2008), available at http://www.ccfbny.org/issues/oil_lease/MEMORANDUM_regarding_Seismic_Testing.pdf.

Further, as per this memorandum, New York law does not empower a municipal official to "issue a permit to any person for the purpose of conducting seismic testing for a private purpose unrelated to the construction, repair, maintenance or improvement of a county road in order to determine whether the property of adjacent landowners would make a good drilling site".

In light of the above, it is recommended that any applications received by a municipality for permits allowing seismic exploration conducted over municipal roads must be denied, and that any companies that perform such exploration without permission of the surrounding property owners must be ordered to cease and desist such activity.

Using Brine for Road De-icing

This topic will be revisited after NYS DEC releases the final SGEIS.

Chapter 11: Maps

CHAPTER 11: MAPS

Sub-Committee	Index No.	Map	Availability	NGC Team
General		Well sites	Available	Yes
		Pipelines	Available	Yes
		Chemical storage locations	Available	Yes
		Drilling permits	Available	Yes
		Spacing Unit	Available	Yes
Environmental		Local water withdrawal locations	Available	Yes
		Local impoundment sites	Available	Yes
		Critical environmental areas	Available	
		Nature Preserves	Available	
		At Risk Species	Printed	
		Archaeologically Sensitive Areas	Printed	
Land Use		Agricultural Districts	Printed	
		Cemeteries	Printed	
		Flood Zones	Printed	Yes
		Gravel Mines	Printed	
		National Register Historic Sites	Printed	
		Parks and State Forests	Printed	
		Land cover	Printed	
Public Safety		Fire Districts	Printed	Yes
		EMS Districts	Printed	Yes
Roads		Road classifications	Available	Yes
		Truck Routes to well sites	Available	Yes
		Access roads	Available	Yes
		Bridges	Available	
Water Quality		Aquifers	Printed	
		Public Water Wells and Parcels with Private Water Wells	Printed	
		DEC Classified Streams	Printed	Yes
		Waterbodies	Printed	Yes
		Watersheds	Printed	
		National wetlands inventory	Available	
		NYS DEC wetlands	Printed	

***Any of the above listed map layers can be combined into one map**

Chapter 12: Resources and References

Chapter 12: Resources and References

This chapter highlights useful resources on the Marcellus Shale and cites works referred to in the Resource Binder. The first half of this chapter describes websites that can be useful to municipalities and landowners. These websites contain general and specific information related to gas drilling. Resources that are mentioned throughout the text, such as the dSGEIS, are also included here.

The second half of the chapter lists works referred to in the Binder. These references are drawn from a variety of sources including websites, reports, interviews, etc. References are organized by Binder chapters. Some internal citations refer to interviews.

Useful resources on the Marcellus Shale and gas drilling

A. New York State Department of Environmental Conservation

1. http://www.dec.ny.gov/energy/205.html
   - Information about oil and gas drilling in NY
   - Oil and gas production data
   - Well owner information center
   - Environmental protection during drilling
   - Geographic information on NYS wells and mines

2. http://www.dec.ny.gov/energy/46288.html
   - Map of Marcellus Shale Formation
   - General information on Marcellus Shale and gas development
   - Updates on Federal Safe Drinking Water Act, Emergency Planning, and Community Right-to-Know Act
   - **Draft Supplemental Generic Environmental Impact Statement (dSGEIS) for horizontal drilling and hydraulic fracturing**

B. Pennsylvania State Department of Environmental Protection

1. http://www.dep.state.pa.us/dep/deputate/minres/oilgas/new_forms/marcellus/marcellus.htm
   - Information on the Marcellus Shale for landowners and oil & gas industry

C. Cornell Cooperative Extension Natural Gas Development Resource Center

1. http://cce.cornell.edu/EnergyClimateChange/NaturalGasDev/Pages/default.aspx
   - Information on the Marcellus Shale from a variety of sources, including academic research, industry analysis, local government officials and citizens
     - About the Marcellus Shale

- Community task forces
- Landowner information
- Business and industry resources
- The Marcellus Shale and the environment
- The Marcellus Shale and the economy
- Cornell Marcellus Shale team

D. Penn State Cooperative Extension- Natural Gas and Marcellus Shale

1. http://naturalgas.extension.psu.edu/
   - Natural gas impacts
   - Penn State Cooperative Extension's educational and research materials about Marcellus Shale, natural gas, and how it may affect the Commonwealth

E. Pennsylvania College of Technology- Marcellus Education and Training Center

1. http://www.pct.edu/msetc/
   - Central resource for workforce development and community education needs related to Marcellus Shale gas
   - Needs assessment on Marcellus Shale

F. New York State Energy Plan

1. http://www.nysenergyplan.com/stateenergyplan.html
   - Objectives, strategies, assessments, briefs, and supporting documents on NYS energy plan

G. Tioga Investigate Natural Gas (TING)

1. http://tiogacountyny.com/ting/
   - Resource Binder and Action Checklists
   - TING press releases
   - Other useful information

H. Local Landowners Groups

1. http://www.tiogagaslease.org/
   - Tioga County Landowners Group is a landowner's coalition for residents of Tioga County. Emphasis on lease strengthening and protection of private resources while drilling for natural gas in the Marcellus Shale

2. www.apalachinlandowners.blogspot.com/
   - Apalachin Landowners Group is a coalition of landowners in Apalachin, South Owego, Nichols, Campville, Vestal, working together to achieve the common goal of

creating and negotiating a landowner-friendly lease, with provisions that protect us and our properties, and with the best financial terms possible

3. www.jlcny.com
4. www.jlcny.org
5. www.jlcny.net
   - The Joint Landowners Coalition (JLC) is a not-for-profit organization made up of 37 Landowner Coalitions in New York State, working on behalf of the members of these coalitions to foster, promote, advance and protect the common interest of the people as it pertains to natural gas development through education and best environmental practices.

I. Oil and Gas Journal

1. http://www.ogj.com/index.html
   - Contains industry specific, data intensive publication on oil and gas related subjects

J. GasMain.org

Lists various groups in opposition to hydrofracturing in the Marcellus and other shales.

1. http://www.shaleshock.org/
   - Shaleshock Action Alliance is a movement that works toward protecting local communities and their environment from exploitative gas drilling in the Marcellus Shale region. Shaleshock is an alliance of working groups that include people who have signed leases, not signed leases, who have been compulsorily integrated, and people who don't own land.

2. http://nyrad.org/
   - NY Residents Against Drilling (NYRAD) is a grassroots network of local residents who are opposed to unconventional gas development in New York State

K. Geology.com

1. http://geology.com/articles/marcellus-leases-royalties.shtml
   - Provides dozens of links to relevant sites such as gas leasing forums, job opportunities, drilling company web sites, and video presentations.

L. Marcellus Shale Coalition

1. http://www.pamarcellus.com/
   - Describes Marcellus Shale in development through 4 stages
     - Process - Discusses the production process, leasing, exploration, drilling, casting a well, fracture stimulations, and information on well pad restoration.
     - Protection - Overviews on common environmental concerns.

- Opportunity - Describes the economic development and opportunities that follows the industry.
- Community - Overviews the Marcellus Shale Coalition and its commitment to community, land owners, and targeting local needs.

M. Employment Opportunities

1. http://regionalhelpwanted.com/twin-tiers-jobs/
   - Twin Tiers Help Wanted provides employment opportunities in the Twin Tiers area of New York and Pennsylvania.

2. http://www.broometiogaworks.com/
   - Broome Tioga Works is the employment agency for Broome and Tioga Counties in NYS.

3. http://shalezonejobs.jobamatic.com/a/jobs/find-jobs
   - Shale Zone Jobs is a natural gas industry sponsored website featuring job postings fro the web.

References

Communications

1. Department of Environmental Conservation. (2009). DEC Proposes New Safety Measures, Mitigation Strategies to Govern Potential Marcellus Shale Drilling. Retrieved on April 15, 2010 from http://www.dec.ny.gov/press/58472.html
2. Department of Environmental Conservation. (2010). Effect of Federal Safe Drinking Water Act, Clean Water Act and Emergency Planning and Community Right-to-Know Act. Retrieved on April 14, 2010 from http://www.dec.ny.gov/energy/46445.html
3. Howell, K. (2010). EPA begins study of fracturing's effects on water supplies. New York Times. Retrieved on April 15, 2010 from http://www.nytimes.com/gwire/2010/03/18/18greenwire-epa-begins-study-of-fracturings-effects-on-wat-76992.html?scp=3&sq=hydraulic%20fracturing&st=csell

Land Use

1. Weaver, J. (April 8, 2009). *Planning Commision*. Retrieved January 25, 2010, from Tioga County, Pennsylvania: http://www.seda-cog.org/tioga/cwp/view.asp?A=903&Q=431441

   – Contains the goals of zoning in Tioga County in PA. Lists important factors that are considered when implementing county-wide zoning and ordinances, which is part of the

Tioga County Comprehensive Plan. Tioga County Planning Commission plans to introduce zoning to towns and villages that do not currently have zoning. Discusses the pre-emption clause in the Oil & Gas Act of 1984 that prevents the county from implementing ordinances that specifically address the natural gas industry.

2. City of Fort Worth, Texas

   - Zoning guidelines for industrial districts- City of Fort Worth, Texas. (n.d.). *Fort Worth Zoning Ordinance*. Retrieved February 10, 2010, from Fort Worth: http://www.fortworthgov.org/zoning/section_243016655453.html

   - Regulation on distribution line and natural gas compressor stations in Fort Worth, Texas- City of Fort Worth, Texas. (n.d.). *Development Regulations*. Retrieved March 1, 2010, from Fort Worth: http://www.fortworthgov.org/planninganddevelopment/misc.aspx?id=57932

   - Contains Fort Worth's ordinances on noise, tree preservation, and zoning- City of Fort Worth, Texas. (n.d.). *Ordinances*. Retrieved February 20, 2010, from Fort Worth: http://www.fortworthgov.org/zoning/section_243017041859.html

3. Chalk, J. A. (2009). *Light, Noise, Vibration- Nuisance?* Retrieved February 20, 2010, from Basin Oil & Gas: http://www.fwbog.com/index.php?page=article&article=15

   - Describes how a Texas court defined drilling as a nuisance. In Texas complaints of interference or invasion must be found by an appropriate court to be (1) negligent, or (2) intentional or unreasonable, or (3) abnormal and out of place in its surroundings. It takes one of these three kinds of conduct - negligent or intentional or abnormal - for a nuisance to be found. This kind of interference or invasion must also substantially interfere with the complainant's private use and enjoyment of the property in question and must cause injury to the complainant.

4. General Code. (2009). *E-Codes - Municipal Codes on the Internet*. Retrieved February 20, 2010, from General Code: http://www.generalcode.com/Webcode2.html

   - An online database of municipal codes. Ordinances can be searched by county or municipality.

5. Tompkins County Council of Governments. (n.d.). *Gas Drilling Information*. Retrieved February 20, 2010, from Tompkins County Council of Governments: http://www.tompkins-co.org/legislature/TCCOG/

   - Tompkins County Council of Governments' minutes from meetings. Links to resources and presentations on gas drilling.

6. US Government. (n.d.). *US Law*. Retrieved February 20, 2010, from Justia.com: http://law.justia.com/index.html

   - Site on New York State codes.

7. New England Light Pollution Advisory Group. (n.d.). *The New England Light Pollution Advisory Group*. Retrieved February 20, 2010, from NELPAG: http://www.cfa.harvard.edu/nelpag/nelpag.html

   – This is the new website of NELPAG

8. **Memtech:** http://www.memtechacoustical.com/facts.asp

9. **Unger Technologies Inc.:** http://www.enoisecontrol.com/default.asp

10. **Noise Pollution Clearinghouse**: http://www.nonoise.org/

    – - A national non-profit organization with extensive online noise related resources
    Noise Ordinances: http://www.nonoise.org/lawlib/cities/cities.htm

11. **DEC Report:** http://www.dec.ny.gov/docs/permits_ej_operations_pdf/noise2000.pdf

12. **EPA Definition of Noise Pollution:** http://www.epa.gov/air/noise.html

13. **The Right to Quiet Society**: http://www.quiet.org/index.htm

Environment

1. New York State Department of Environmental Conservation. (2010). *Critical Environmental Areas.* Retrieved February 2010, from New York State Department of Environmental Conservation: http://www.dec.ny.gov/permits/45500.html

   – Defines Critical Environmental Areas (CEAs) and the 4 criteria for CEA designations. Provides background information regarding animals, plants, aquatic life and environmental policies in New York State.

2. Penn State Cooperative Extension Marcellus Shale Educational Webinar Series. (October 2010) - *Water Use and Water Resuse/Recycling in Marcellus Shale Gas Exploration and Production.* Dave Yoxtheimer, P.G. – Penn State University, Marcellus Center for Outreach and Resource and Tony Gaudlip, Water Operations Manager, Range Resources
   http://extension.psu.edu/naturalgas

3. Susquehanna River Basin Commission (January 2010). Natural Gas Well Development in the Susquehanna River Basin. Retrieved October 2010 from Susquehanna River Basin Commission: http://www.srbc.net/programs/projreviewmarcellus.htm

Water Quality

1. Environmental Protection Agency. (2010). Clinton Street Ballpark Aquifer System. Retrieved April 10, 2010 from http://www.epa.gov/region02/water/aquifer/clinton/fr_clint.htm

2. William Kappel, personal communication, February 17, 2010

3. USEPA. (August 28, 2009). Retrieved April 28, 2010 from Region 2 Water: Sole Source Aquifers: http://www.epa.gov/region02/water/aquifer/

   – Explains the purpose of sole source aquifers.

Roads

1. Armendariz, A., & Alvarez, R. (2009). *Emissions from a natural gas production in the Barnett Shale Area and opportunities for cost effective improvements.* Austin, Texas: Environmental Defense Fund.

   – The objectives of this study were to: (1) estimate emissions of volatile organic compounds, nitrogen oxides, hazardous air pollutants, methane, carbon dioxide, and nitrous oxide [from drilling activities in the Barnett Shale region; (2) evaluate the current state of regulatory controls and engineering techniques used to control emissions from the oil and gas sector in the Barnett Shale; (3) identify new approaches that can be taken to reduce emissions from Barnett Shale activities; and (4) estimate the emissions reductions and cost effectiveness of implementation of new emission reduction methods

– This is a model road preservation ordinance drafted by Scoharie County Senior Planner Lillian Bruno.

2. Messmer, P. (March 26, 2010) Engineer with Delta Engineers. *Marcellus Shale Drilling and Protecting Your Roads*.

3. Orr, D. (March 3, 2010). Senior Engineer of Cornell Local Roads Program. (M. Roberts, Interviewer)

   – Interview about the services provided by the Cornell Local Roads Program.

4. Orr, D. (January 20, 2010). *Municipal Officials' Information: Preserving Municipal Roads: What are Your Options?* Retrieved February 19, 2010, from Cornell Cooperative Extension: Community and Economic Vitality: http://cce.cornell.edu/Community/NaturalGasDev/Pages/MunicipalOfficials'Information.aspx

   – This is a PDF version of a power point presentation that David Orr gave at New York State's County Highway Superintendents Association winter meeting

5. Bruno, L. (March 18, 2010). *Schoharie County Planning and Development.* Retrieved April 3, 2010, from Scoharie County Web Site: http://www.schohariecounty-ny.gov/CountyWebSite/Planning/ModelRoadPreservationLaw.pdf

6. A Technical Paper, *Considerations for Protection of Highways*, Southern Tier East Regional Planning Development Board, 2010.

Workforce

1. Marcellus Shale Education & Training Center (MSETC). (2009). *Marcellus Shale Workforce Needs Assessment*. Williamsport: Pennsylvania College of Technology at http://www.msetc.org/.