



## Considerations for Gas Leasing:

### Avoiding and Minimizing Ecological Harm from Natural Gas Development

*A guide for conservation-minded landowners*

Natural gas extraction is part of life in Western Pennsylvania. With the ability to extract natural gas from deep shale formations (e.g. Marcellus and Utica shales), the industry has grown exponentially since the mid-2000s with hydraulic fracturing (fracking) of deep lateral wells. Extraction of natural gas, much like any energy development activity, can have negative effects on the environment, water resources and wildlife habitat, many of which are serious. The Western Pennsylvania Conservancy believes that conservation should be a primary goal for landowners and specific conservation goals, such as protecting wildlife habitat, should be carefully considered when entering into a natural gas lease agreement. As a landowner, this is the best time to request (and receive) considerations for land, water, and wildlife over the course of the activity.

More specifically, in order to conserve the landscape, landowners should work with the land agent to carefully establish guidelines and develop an addendum to the lease agreement that minimizes damage to ecologically-sensitive landscapes, significant natural communities, and critical wildlife habitat while permitting recovery of gas resources.

There are many resources detailing ecological best management practices for development of shale gas resources, many of which were developed with input from the Western Pennsylvania Conservancy. This document is not meant to supplant these other sources. The objective is to present some of the fundamental environmental issues that can be addressed in a lease as well as note some of the current regulations that developers must follow.

This document provides practical suggestions for what a conservation-minded landowner may want to request to minimize ecological impacts from development. These strategies to avoid and minimize impacts can be incorporated into lease language or can be achieved through an addendum to the standard lease.

In particular, conservation features of a property that may need additional protection measures include:

- streams, springs, seeps, vernal pools, wetlands, and floodplain areas;
- steep slopes (generally those having a slope of 20% or greater)
- intact forests; wildlife habitat;
- native flora and fauna; natural plant communities; rare species
- recreational features (e.g. trails) and scenic vistas.

Each section of this guide describes negotiables (“What’s at Stake?”), specific requests that a conservation-minded landowner can make (“Conservation Considerations”), what’s required by law (“Current Regulations”), and other resources you can turn to (“Additional Info”).

No extractive activity is completely without consequence; but there are ways to make the process less impactful, especially when working with companies that strive to a higher standard.

#### **Before You Sign (or Renew) a Lease...**

##### **Know your property:**

The single most important pre-signing step is a site visit with the interested party. Walk the property together and take photos. Document current conditions with detailed notes and identify all of the important areas and features that warrant protection. The site visit should happen **before** contract negotiations begin.

##### **Know your rights:**

Natural gas is considered a subsurface right that is part of your land (if it has not been severed, or split and sold to another party). If your rights are intact, you possess them up until you sign the lease, so make sure that everything is discussed and agreed to – clearly, with no ambiguities or “to be determined” – before you sign.

##### **Timing!**

*It is important for the landowner to be aware of any potential negative impacts, as well as their rights as a landowner to control and guide any potential extractive use on their land.*

*More specifically, in order to conserve the landscape, landowners should work with the land agent **before the lease is signed** to carefully establish guidelines and develop an addendum to the lease agreement that ensures protection of ecologically sensitive landscapes that include natural communities and species habitat.*

# Natural Landscapes

Your property is part of a larger, connected landscape, which provides habitat to wildlife and other benefits. Habitat functions best when it remains intact. Shale gas development is part of a larger landscape as well. With the ability to extract natural gas from large areas from one centralized well pad connected to other well pads and infrastructure by roads and pipelines, gas companies often lease many properties in a concentrated region. Property boundaries can often influence the siting of natural gas development infrastructure, resulting in more roads, pipelines, and well pads. Leveraging negotiating power with neighbors who are also considering a lease can be a very effective way to receive concessions that will leave a lighter footprint from a developer by allowing for the most efficient layout of infrastructure.

Forest fragmentation, co-location of pipelines, and overall master site planning (to address pipelines, roads, tanks, parking areas, etc.) all affect the degree of landscape disruption. In addition to natural resources, drilling activity can impact recreational features – trails, and stream access points for example -- and alter scenic vistas. All of these issues can be addressed through a carefully-worded lease.

## **What's at Stake?**

- Specific “no drilling” or “avoidance” areas
- Maximum number of wells drilled per site
- Precise location of wells, pipelines, pits, roads, storage and staging areas, and other infrastructure associated with development
- Total number of disturbed acres

## **Conservation Considerations**

**Master Site Plan** -- Ask for a master site plan from the developer that addresses the overall strategy for developing the property and guides the placement of all drilling and supporting infrastructure.

**Well Placement** – To reduce fragmentation and invasive plant pathways, the developer should locate wells closer to previously disturbed or developed areas (such as existing openings, roads, pits, pipelines and older wells). Wells should be camouflaged or screened with native plants to improve aesthetics. It is best to limit the number of wells and number of disturbed acres. Clearing on steep slopes (those greater than 20%) should also be restricted to reduce erosion.

**Pipelines** – Where possible, pipelines should be laid within the boundaries of existing roads or rights of way, such as existing pipelines and transmission lines. The developer should submit a route map for each pipeline to the landowner for review and approval as to location prior to the laying of any line. The developer should keep the pipeline and right-of-way in good repair and appearance.

**Roads** – All road locations and grades must be identified in the master site plan. The landowner should limit the size of all new roads (e.g., determine an appropriate road width to be 20 feet). The location of drilling operations should be close to existing roads to prevent further fragmentation of the property. The developer should construct access roads to drilling sites along existing pipeline rights-of-way, provided that a ten percent (10%) grade can be maintained, as described in the erosion and sedimentation control plan. Road drainage structures should conform to the Environmentally Sensitive Maintenance Principles of Penn State’s Center for Dirt and Gravel Roads program.

**Storage and Staging Areas** – Storage areas can greatly increase the size of a well pad, road, or right of way and while often necessary for site development, their location, size, and purpose can be negotiated as part of the lease.

## **Current Regulations**

Developers have limitations on siting wells, storage and staging areas near waterways and wetlands and certain public resources. Road construction and maintenance are regulated in detail by DEP.

## **Additional Info**

WPC’s conservation GIS map. <http://arcgis/2cRAAzn>

## **What goes into a Master Site Plan?**

- *A map indicating the location of each:*
  - *well drilled or proposed for drilling;*
  - *existing potable & non-potable water well;*
  - *planned or existing pipeline;*
  - *planned or existing road;*
  - *bridge, drain pipe or culvert pipe to be constructed;*
  - *stream, creek, brook, or wetland together with the location of each proposed drilling site and proposed clearing site near each such feature;*
- *a plat, diagram and/or schematics indicating the location, design, construction of each slush pit to be constructed together with a corresponding maintenance plan for each such pit;*
- *a map or plat that contains information regarding locations of plant and animal species of special concern, as well as locations of natural communities.*
- *all land cleared for parking, loading/unloading, and the temporary storage of equipment, materials, or water, collectively referred to as storage and staging areas, must be agreed upon and their location and size identified*

# Water Quality

As a landowner, most of the water resources on your property belong to you: water wells, ponds, and small streams are important natural resources, and when negotiating a lease, you control how best to protect them. Protecting small seeps, springs, and headwater wetlands is important to our downstream creeks and rivers, and the recreational and wildlife resources in them.

Shale gas extraction requires large volumes of water throughout the process. The water withdrawals, storage and disposal can all have serious impacts on water quantity and quality, and chemical composition if not handled properly. Often the most preventable threats to water quality occur at the well head: spills, leaks, and contamination are real risks.

## **What's at Stake?**

- Location of water withdrawal and storage
- Baseline water quality assessment and continuous monitoring of natural features such as springs, seeps, streams, and water wells
- Use of a DEP-certified lab for water quality testing

## **Conservation Considerations**

**Testing** – You should require the developer to use a DEP-certified lab, and to share the results of water quality tests with you. Both initial (a “baseline”) and frequent follow-ups.

**Leak & Spill prevention** – The developer should exercise extreme care to not contaminate or pollute springs, brooks, streams, wetlands, vernal pools or other waters on the property. You should request a copy of the developer’s spill response plan.

**Well-water** – Water well usage should not be used for fracking, stimulation or completion processes.

**Dams** – The developer or its contractors and subcontractors should not construct earthen dams across any stream to obtain a water supply for its operations.

**Disposal** – The developer should remove all water used in drilling and fracking processes from the property including water discharged from the well. In addition, the developer must supply the landowner with a plan to address water source pollution in the event of a leak.

**Buffer zone** – Request a buffer area of at least 100 and up to 300 feet be included for all water sources (rivers, creeks, streams, wetlands, etc.) to prohibit drilling in certain areas.

## **Current Regulations**

Developers are required to use best management practices (BMPs) to control erosion and sedimentation, and document these in an erosion and sediment control plan.

## **Additional Info**

- The Nature Conservancy and Carnegie Mellon University’s *Advancing the Next Generation of Environmental Practices for Shale Development: Workshop Deliberations and Recommendations*
- Your local county conservation district. <http://pacd.org/>  
Alliance for Aquatic Resource Monitoring (ALLARM) for water quality monitoring information

### **What goes into an erosion and sediment control plan?**

- existing topographic features of the site;
- contours, ditches and other excavations;
- water bars or diversion channels for surface runoff to prevent siltation;
- settling basins;
- spreading of gravel or shale on intercepting dips;
- installation of silt fences;
- stabilization of cut slopes;
- stabilization of highwalls; and
- a restoration and re-vegetation plan

# Wildlife & Habitat

Large-scale industrial activities like Marcellus extraction can have a detrimental effect on the wildlife on your property and the habitats they depend on – not just during the process, but long afterwards.

A conservation-minded landowner will need to make a careful determination of the most valuable natural resources on his or her property and how to avoid them. Special or unique habitats such as caves, bogs, fens, old-growth forest deserve close attention and the highest protections that can be incorporated into the lease. Impacts that can't be avoided can be mitigated.

## **What's at Stake?**

- Using comprehensive best management practices (for overall operations)
- Better buffers
- Co-location of infrastructure
- Timing of activities
- Mitigation

## **Conservation Considerations**

**Best management practices** – Requiring the developer to adopt and strictly adhere to drilling BMPs (not just for erosion) can minimize the risk of damage to wildlife habitat. Also, you can request that they detail for you the BMPs that they plan to use to guide their overall drilling activity.

**Borrow Pits** – The developer should install and maintain fences to prevent wildlife access to borrow pits (for construction debris) or excavations.

**Buffers** – All drilling activity should operate with a buffer around special habitats like riparian areas, vernal pools, wetlands, springs, seeps and rock outcrops. The buffer distance should be flexible and offer the maximum amount of protection based on the feature and the threat.

**Co-location** – When possible, the developer should locate infrastructure such as gathering lines, clearings and roads, along existing infrastructure to reduce the need for newly disturbed areas.

**Timing and lighting** – The developer should schedule the most disruptive activities during times when wildlife will be least disturbed. This may mean scaling back or adjusting practices during breeding, hibernation or migration windows.

## **Current Regulations**

Developers are required to conduct a search for threatened and endangered species in their proposed drilling site area as part of the permit review and issuance. Pits for waste and drilling fluids are not allowed to be on-site.

## **Additional Info**

WPC's energy impacts report (2013). <http://waterlandlife.org/374/energy-impact-research>

# Management & Restoration

The landowner and developer have another opportunity to significantly improve or restore degraded natural resources after the wells are drilled and the site is ready for restoration. Many aspects of restoration are regulated and required by law, but there are still areas where the developer can and should go “above and beyond” what’s required. Also, how the developer and operator conduct day-to-day activities on site can influence the ecological integrity of the surrounding landscape, even after the site has been developed and well is in the operation phase.

## **What’s at Stake?**

- Best practices for site restoration
- Minimizing non-native species invasion
- Well-plugging
- Production threshold
- Violations disclosure
- Waste disposal
- Ongoing site management

## **Conservation Considerations**

**Restoration Plan** -- Require submission of a restoration and re-vegetation plan to be completed by developer and approved by the landowner, which identifies specific steps taken to minimize site disturbance and addresses any alterations in the land associated with the extraction or transmission activities.

**Invasives** -- An invasive species management plan should detail the ways that the developer will avoid introducing non-native or harmful plant and animal species, as well as remedies for controlling or eliminating invasive species that have been introduced or encouraged by drilling activities.

**Species choice** – Select plants and seed mixes that contain native species found locally (e.g. in the watershed or county). Freely include those species that provide forage for wildlife, especially pollinators such as bees and birds. Avoid species that have (pending) disease issues such as eastern hemlock (hemlock wooly adelgid) and ash species (emerald ash borer).

**Ongoing Site Management** – Drilling may not be fully completed for many years; wastewater (produced water) must be collected and disposed of properly. Developers and operators should use strategies to limit the impact of prolonged and recurring disturbances at the well site, which may include employing noise-abatement measures, limiting vehicle traffic, and monitoring run-off and erosion along access roads, well pads, and pipelines. Gates and barricades may be needed to limit non-permitted access by off road vehicles.

**Production** – The landowner and developer should agree on a level of production required to allow the well to continue to operate. If production falls below this level, the developer will cease operations and plug the well.

**Violations** – The developer should inform the landowner about any violations or fines they receive for their operations in the area.

**Waste Disposal** – All waste, especially cuttings, should be hauled off-site and disposed of properly by the developer.

**Well-plugging** – A copy of the certificate of well-plugging should be supplied to the landowner. This DEP-required document shows the procedures used for plugging a well and provides evidence that the proper procedures have been followed, once the well has permanently ceased production.

## **Current Regulations**

After production ceases, developers are required to plug the well and restore the site within nine months. The site must be re-graded to a natural contour.

## **Additional info**

Pennsylvania DCNR’s Invasive Species Management Plan

[http://www.invasivespeciestouncil.com/Documents/FINAL%20Plan\\_low\\_res.pdf](http://www.invasivespeciestouncil.com/Documents/FINAL%20Plan_low_res.pdf)

## Resources

- Cornell Cooperative Extension, [Gas Rights and Right-of-Way Leasing Pointers for Forest Owners](#) (Dec. 12, 2008).
- Environmental Defense Fund, [Emissions from Natural Gas Production in the Barnett Shale Area and Opportunities for Cost-Effective Improvements](#) (January 26, 2009).
- The Nature Conservancy [Reducing Ecological Impacts of Shale Development: Recommended Practices for the Appalachians](#)
- Penn State College of Agricultural Sciences Cooperative Extension:
  - [Natural Gas Publications](#)
  - [Forest Landowners and Natural Gas Development](#) (2009)
  - [Forest Landowners and Natural Gas Development: Timber Resources](#) (2009)
  - [Water Facts #28: Gas Well Drilling and Your Private Water Supply](#) (Rev. March 2, 2010)
  - [An Illustrated Guide to Shale Gas Drilling Equipment & Practices in Pennsylvania](#)
- Pennsylvania Department of Conservation and Natural Resources, Bureau of Oil and Gas Management, , [Oil and Gas Resources](#)
- Pennsylvania Department of Conservation and Natural Resources, [Guidelines for Administering Oil and Gas Activity on State Forest Lands](#) (Revised 2013).
- Pennsylvania Department of Conservation and Natural Resources, [Invasive Species Management Plan](#)
- Pennsylvania Department of Environmental Protection, Bureau of Oil and Gas Management, [Oil and Gas Operators Manual](#) (Oct. 30, 2001)
- Pennsylvania Environmental Council [Marcellus Shale Lease Guide](#)
- Pinchot Institute for Conservation, [The Marcellus Shale: Resources for Stakeholders in the Upper Delaware Watershed Region](#) (Dec. 15, 2010).
- U.S. Bureau of Land Management and U.S. Forest Service, [Oil and Gas Exploration and Development: The Gold Book](#) (Rev. 2007).