



RECOMMENDED PRACTICES: Site Planning, Development and Restoration

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Section 1

1.1 Purpose

These recommended practices address relevant considerations and guidelines for Site Planning, Restoration, and Development. These recommended practices support our guiding principles.

Section 2 - General

2.1 Why Site Development and Restoration Recommended Practices are Important

In order to extract clean burning natural gas and deliver it to end-users, surface facilities and disturbances are necessary, including disturbances for the construction of well pads, access roads, water and gas pipelines, and gas compression and processing facilities. This infrastructure is vital to obtain the economic and energy security benefits from this abundant natural resource. However it is also desirable to producers and the public at large to minimize impacts from these activities; therefore, our members have developed recommended practices for site development and restoration, which are intended to reestablish pre-disturbance conditions or, in some cases, improve sites for desired end-uses.

Coalition members recognize that responsible development should acknowledge the needs and concerns of all relevant stakeholders. We encourage parties engaged in such development to utilize procedures and technologies that will protect and preserve environmental resources for generations to come.

2.2 What These Site Development and Restoration Practices Cover

These Recommended Practices address the full range of site development and restoration activities, from initial determination of needs for new facilities and associated land disturbances through site planning, surface owner discussions, permitting, clearing, site and facility construction, interim restoration, and final restoration. These recommended practices do not address the industrial activities that occur within the confines of the construction site itself; those are addressed in other documents.

When possible, upfront planning and coordination with the affected landowner(s) are desirable and beneficial to all parties. A clear understanding of the need for oil and gas facilities over the long term (given that several viable unconventional resources overlay one another in many areas) is one aspect of the planning. Future land use options should also be considered prior to development. This will lead to beneficial and optimal restoration options when the oil and gas activity has ceased. Regulatory agencies have emphasized site restoration practices that quickly and effectively stabilize sites against erosion and resulting sediment transport. However, dense vegetation established for this single purpose may inhibit native plant growth and, thus, natural succession from occurring. When available and appropriate, the blending of native vegetation seed along with quick growth vegetation should be utilized. The planning stage is when long-term land use desires should be identified and incorporated. Once permits and plans are approved, the ability to change how a site is developed and restored is reduced. Likewise, once earthmoving has begun, additional post-disturbance restoration options are limited because site features of potential value for the long-term land use may have already been impacted.

Table 2-1 shows the major steps involved in Recommended Practices for site planning, development and restoration. These steps form a repeatable process that MSC companies can follow in site planning and development. In this document, "restoration" means both interim restoration (following site construction and reflecting site conditions that will exist through

the operational life of the well pad, pipeline, or other facilities) and final restoration (at the end of the operational life, following site closure and removal of facilities).

The Appendix provides website links to organizations that can provide valuable information and guidance for operators seeking to explore options for creative and resource friendly site management and restoration opportunities.

Table 2-1. Site Planning, Development and Restoration Process Recommended Practices

Each step in the following table may be implemented as appropriate.

Major Steps in the Process	Elements for Reducing Impacts, and for Improving Restoration and Final Reclamation Outcomes
Identify Local Need for Site	Determine the operational needs and ideal location(s) for well pad(s), access road(s), pipelines, gas compression and processing facilities, water pipelines and impoundments, and other necessary facilities.
Generate Unconstrained Conceptual Site Plan	Prepare an unconstrained conceptual site plan free of potential landowner, regulatory or environmental constraints based on what would be ideal from an operational perspective.
Conduct a Constraints Analysis	Conduct fact-finding to identify constraints including regulatory/zoning/siting constraints, landowner and local community desires/preferences, environmental and public resource constraints, highway access constraints and the presence of other sensitive locations.
Refine Concept	Adjust the conceptual site plan to account for known constraints. Consideration should be given to minimizing surface disturbance. Impacts may be reduced by using brownfield or industrial areas and previously cleared land, if practical. It may be possible to use existing logging roads and trails when planning access roads or pipeline right of ways. Another option is to plan for pipelines adjacent to existing roads. In addition, there may be opportunities for coordination of infrastructure with other companies, for example: use of shared right of ways for pipeline corridors, pooling of mineral rights to optimize the number of well pads, etc.
Discuss Plans with Surface Owner(s); Alter Site Concept as Needed	Welcome input from the surface owner(s) and consider changes to the overall design. This may include a discussion of the refined concept plan and how this concept would fit within their existing and planned future uses of the site, making adjustments as appropriate.
Identify Site Features to Retain or Protect	Identify features to be retained – including timber, stumps, slashing, mulch, topsoil, ponds or stock watering devices, access roads, etc. – and account for retention of these items in site planning.
Prepare Final Site Plan from Previous Concepts; Highlight Retained Features	Prepare context-sensitive site plan while accounting for potential future oil and gas extraction from other formations.
Implement E&S and Other Environmental Controls	Build the site. Ensure that planned erosion and sedimentation (E&S), stormwater and other environmental controls are installed and maintained. Consider using permanent controls such as sedimentation basins, with potential future use, over temporary measures that can be damaged and may require multiple replacements over time.
Implement Partial Restoration During Operational Life	Reclaim portions of the site that will not be needed during the post drilling, production phase so as to minimize the impact of the project. Try to avoid additional disturbance of stable soils while minimizing soil compaction and new disturbances required to access other formations. Note that the original development phase of well pads, as well as of pipelines, gas compression and processing facilities, often requires a larger footprint than operational phases.
Implement Final Restoration Conducive to Surface Owner's Plans and Objectives	Conduct final restoration upon completion of the project. Well pads will be in use for decades, whereas surface disturbances for buried gathering or transmission pipelines can be fully reclaimed soon after installation. In re-contouring a site, control erosion and storm water runoff, minimize site compaction, apply lime and fertilizer as necessary, seed with use-adapted mix, mulch appropriately, and plant trees and shrubs as appropriate.
Conduct Site Monitoring, Maintenance and Repair	Conduct site monitoring, maintenance and repair throughout the life of the project. Although listed last in this process, site monitoring, maintenance and repair begins with initial site development and continues until the site is fully restored and the site is permanently closed. Critical elements include repair of access controls and gates, security fencing, ruts or washouts (often caused by uncontrolled all-terrain vehicle access), and revegetation of areas where initial efforts did not yield desired results.

This document provides general guidance on recommended practices for the subject(s) addressed. It is offered as a reference aid and is designed to assist industry professionals in improving their effectiveness. It is not intended to establish or impose binding requirements. Nothing herein constitutes, is intended to constitute, or shall be deemed to constitute the setting or determination of legal standards of care in the performance of the subject activities. The foregoing disclaimers apply to this document notwithstanding any expressions or terms in the text that may conflict or appear to conflict with the foregoing.

Appendix References for: Habitat, Species, Sportsmen and Agricultural Organizations

The following conservation organizations and state agencies can provide valuable information and guidance for operators seeking to explore options for creative and resource friendly site management and restoration opportunities.

Conservation Organizations

American Chestnut Foundation
<http://www.acf.org/>

Appalachian Regional Reforestation Initiative
<http://arri.osmre.gov/Default.shtm>

Ducks Unlimited - Pennsylvania
National: <http://www.ducks.org/>
Pennsylvania: <http://www.ducks.org/Pennsylvania>

Keystone Elk Country Alliance
<http://www.experienceelkcountry.com/>

National Audubon Society
<http://www.audubon.org/>

National Wild Turkey Federation
<http://www.nwtf.org/>

Penn State Cooperative Extension Service, Marcellus Shale Electronic Field Guide
<http://marcellusfieldguide.org/index.php>

Pennsylvania Farm Bureau
<http://www.pfb.com/>

Pennsylvania Federation of Sportsmen's Clubs
<http://www.pfsc.org/>

Pheasants Forever
<http://www.pheasantsforever.org/>

Ruffed Grouse Society
<http://www.ruffedgrousesociety.org/>

The Nature Conservancy - Pennsylvania
<http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/pennsylvania/index.htm>

The Western Pennsylvania Conservancy
<http://www.paconserve.org/>

Trout Unlimited
<http://www.tu.org/>

Wildlife for Everyone Foundation
<http://www.wildlifeforeveryone.org/>

State Agencies

Pennsylvania Department of Conservation and Natural Resources
<http://www.dcnr.state.pa.us/forestry/NaturalGas/index.htm>
http://www.dcnr.state.pa.us/cs/groups/public/documents/document/dcnr_004055.pdf

Pennsylvania Fish and Boat Commission (Habitat Improvement)
<http://fishandboat.com/habitat.htm>

Pennsylvania Game Commission (Private Landowner Assistance Program)
<http://www.portal.state.pa.us/portal/server.pt?open=514&objID=620396&mode=2>



24 Summit Park Drive • 2nd Fl. • Pittsburgh PA 15275
412.706.5160 • www.MarcellusCoalition.org

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