

## **DLCD Rulemaking – Energy Facilities on Agricultural Land Meeting #2 10-20-08**

### **Soil Compaction/Protection Measures from Selected EFSC Documents**

#### Reference Documents:

Northwest Natural Gas South Mist Pipeline Extension, Proposed Order  
September 19, 2002

South Mist Pipeline Extension Project, Attachment D to Final Order –  
Agricultural Impact Mitigation Plan, Approved March 2003

Shepherds Flat Wind Farm, Final Order  
July 25, 2008

Shepherds Flat Wind Farm, Attachment B: Revegetation Plan  
July 25, 2008

#### ***Summary:***

Soil protection, disturbance, compaction, and remediation has been addressed through Oregon energy facility siting process and has been documented in the Oregon Energy Facility Siting Council's (EFSC) proposed and final orders and related documents.

The two projects selected here (South Mist Pipeline Extension, in Washington, Marion and Clackamas counties, and Shepherds Flat Wind Farm, in Gilliam and Morrow counties) were recommended by Oregon Department of Energy's facility siting staff, and chosen for their comprehensive discussion of soil protection, disturbance and mitigation measures.

These documents discuss the ways in which these energy projects can affect soils, including through compaction, which is one of the topics that was raised during the first DLCD Wind Energy Advisory Committee meeting in September.

Specifically, during the first Committee meeting, the comment was made that soil compaction from the enormous and heavy transportation equipment has or can cause ongoing reduction of agricultural benefit from the affected land area.

The EFSC siting documents identify soil compaction risks, impacts, and mitigation procedures. Avoidance of compaction is naturally recommended whenever possible. To mitigate soil compaction, these plans generally call for use of an agricultural subsoiler to relieve compaction of soils before replacement of topsoil and also deep tillage to break up compacted soils.

Further, these documents include discussion of mixing of soils during construction, removal of excess rock before replacement of soils, wet soils, noxious weeds and soil-borne disease, revegetation, and erosion control.

***The following relevant sections are excerpted from these documents:***

- With regard to topsoil (SM-AIMP):
  - a) Where topsoil is stripped in agricultural lands, NWN will relieve compaction of the exposed subsoil prior to topsoil replacement. Subsoil **compaction** will be relieved utilizing an agricultural subsoiler or other appropriate implement. After decompaction and prior to topsoil replacement, a disc or harrow will be utilized, as necessary, to smooth the subsoil surface.
  - b) Following final grading and topsoil replacement in agricultural lands, NWN will conduct deep tillage to relieve soil **compaction** in construction areas or will test soils for compaction at regular intervals. Where soil compaction is tested, construction areas will be compared to adjacent areas not disturbed by construction utilizing U.S. Army Corps of Engineers-style cone penetrometers or other appropriate devices or methods. **Compacted** agricultural lands will be treated utilizing a non-inversion, deep-tillage agricultural subsoiler specifically designed for soil decompaction and designed to minimize surface disturbance to minimize significant mixing of subsoil with topsoil.
  - c) Weather and soil conditions permitting, NWN will conduct soil decompaction when soil moisture levels allow for effective soil shattering. Decompaction equipment will not be operated on soils that are too wet, such that a greater level of soil **compaction** might result.
  - d) NWN will utilize agricultural subsoiling equipment with shank operating depth and shank spacing that is adequate to effectively relieve soil **compaction**.
  - e) NWN will make multiple passes of decompaction equipment where necessary to effectively relieve soil **compaction**.
  - f) NWN will restore rutted areas and leave the soil in the proper surface condition for planting.
  - g) On agricultural land, NWN will make reasonable efforts to complete the soil restoration work and leave the construction area on each parcel in a condition ready for planting within 30 days of backfilling the trench on that parcel, weather and soil conditions permitting. SM-AIMP
- To ensure monitoring and mitigation follow-up for soils (SM-AIMP):

NWN will actively monitor soil restoration, crop production, drainage and irrigation systems for two years following the completion of initial construction area restoration. During the monitoring period, NWN will identify remaining soil and

agricultural impacts associated with construction that require mitigation and will implement follow-up restoration or appropriate mitigation measures. Follow-up repairs and restoration of damages that are the result of the pipeline construction will not be limited to the two-year monitoring period.

And...

NWN will retain qualified Agricultural Specialists on each work phase of the project including construction planning, pipeline construction, restoration, post-construction monitoring and follow-up restoration. During construction and initial restoration, NWN will designate a Project Inspector to serve as an Agricultural Inspector. An important role of the Agricultural Inspector will be to provide technical assistance to Construction Managers, other Project Inspectors and NWN Land Representatives to facilitate the effective implementation of agricultural mitigation measures.

- For a description of soils more inclined to compact (SM-AIMP):

Compaction is a function of moisture content, soil texture, and the amount of traffic on the soil. Soils prone to excessive compaction are identified as soils with a surface texture of silty clay loam, clay loam, or sandy clay loam or finer and a drainage designation of somewhat poorly drained to very poorly drained;

- Soil compaction impact identification and mitigation plan (SM-AIMP):

1. Impact

Soil compaction could result from the movement of heavy construction equipment over construction areas. The potential for soil compaction depends primarily on soil moisture and soil texture. The potential for soil compaction would be the greatest where heavy equipment operates on wet soils with high clay content. Soil compaction results in a loss of soil structure and pore space, thereby restricting water penetration, root development, and the rate of oxygen diffusion in soils. Soil compaction can reduce the yield of most agricultural crops. Most soils in the analysis area are subject to some degree of compaction under wet soil conditions. Approximately 11 percent of the acreage in the Preferred Corridor is occupied by soils considered to be prone to excessive soil compaction (ASC, Tables I-2 and I-4).

2. Mitigation

Where topsoil is stripped in agricultural lands, NWN will relieve compaction of the exposed subsoil before topsoil replacement. Subsoil compaction will be relieved utilizing an agricultural subsoiler. After decompaction and topsoil replacement, a disc or harrow will be utilized, as necessary, to smooth the subsoil surface.

Following final grading and topsoil replacement in agricultural lands, NWN will conduct deep tillage to relieve soil compaction in construction areas or will test soils for compaction at regular intervals. Where soil compaction is tested, construction areas will be compared to adjacent areas not disturbed by construction utilizing U.S. Army Corps of Engineers-style cone penetrometers or other appropriate devices or methods.

Compacted agricultural lands will be treated utilizing a non-inversion, deep-tillage agricultural subsoiler specifically designed for soil decompaction and designed to minimize surface disturbance to minimize significant mixing of subsoil with topsoil. Weather and soil conditions permitting, NWN will conduct soil decompaction when soil moisture levels allow for effective soil shattering. Decompaction equipment will not be operated on soils that are too wet, such that a greater level of soil compaction might result. NWN will make multiple passes of decompaction equipment as necessary. NWN will restore rutted areas and leave the soil in the proper surface condition for planting.

- Correction for Compaction (SFWF – Revegetation Plan)

In the northern section, soils are generally too shallow to become compacted by construction activities. Deeper soils in the southern section may become compacted. The certificate holder shall examine disturbed areas as soon as construction is finished in the area. Areas that appear to be affected by compaction will be treated by deep tillage or ripping (scarification) using the method preferred by the landowner. In some areas, compaction might not become evident until vegetation indicates the condition through poor seed sprouting, stunting or plant death. Where that occurs, the area will be tilled or ripped and then re-seeded.

### ***Orphaned Land***

Another issue we discussed during the WEAC meeting in September was the “orphaned land” or “shadow fields” resulting from energy device placement in tilled fields in a way that interfered with the ability to maneuver farm equipment into some areas of the field.

The Shepherds Flat final order addresses this issue (SFWF-FO):

Construction and operation of the SFWF could cause changes in routes of access to fields and changes in the pattern of cultivation, seeding, fertilizing and harvesting near the SFWF turbines and access roads. In the southern project area, CSF, in consultation with the landowners, would lay out the facility components to minimize obstacles to farming in cultivated fields (facility components around which the farmer would have to plow, plant and harvest).<sup>1</sup> Condition 36 would require the certificate holder to consult with area landowners during construction and operation of the facility to determine further measures to reduce or avoid any adverse impacts to farm practices on surrounding lands and to avoid any increase in farming costs.

Condition 36: The certificate holder shall consult with area landowners and lessees during construction and operation of the facility and shall implement measures to reduce or avoid any adverse impacts to farm practices on surrounding lands and to avoid any increase in farming costs.

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