

Reclamation of Oil & Gas Wells sites



Reclamation

- Restore back to original or similar to original.
- Replace as closely as practicable to original condition (NDIC admin. Rules)
- *Reclamation* means returning disturbed land as near to its predisturbed condition as is reasonably practical (Onshore Order #1)

NDIC Rules Guiding Reclamation

- **43-02-03-34.1. RECLAMATION OF SURFACE. NDCC**
- 1. Within a reasonable time, but not more than one year, after a well is plugged, or if a permit expires, has been cancelled or revoked, the well site, access road, and other associated facilities constructed for the well shall be reclaimed as closely as practicable to original condition. Prior to site reclamation, the operator or the operator's agent shall file a sundry notice (form 4) with the director and obtain approval of a reclamation plan. The operator or operator's agent shall provide a copy of the proposed reclamation plan to the surface owner at least ten days prior to commencing the work unless waived by the surface owner. Verbal approval to reclaim the site may be given. The notice shall include, but not be limited to:
 - a. The name and address of the reclamation contractor;
 - b. The name and address of the surface owner and the date when a copy of the proposed reclamation plan was provided to the surface owner;

- c. A description of the proposed work, including topsoil redistribution and reclamation plans for the access road and other associated facilities; and
- d. Reseeding plans, if applicable.
- The commission will mail a copy of the approved notice to the surface owner. All equipment, waste and debris shall be removed from the site. Flow lines shall be purged in a manner approved by the director. Flow lines shall be removed if buried less than three feet [91.44 centimeters] below final contour.
- 2. Gravel or other surfacing material shall be removed, stabilized soil shall be remediated, and the well site, access road, and other associated facilities constructed for the well shall be reshaped as near as is practicable to original contour.
- 3. The stockpiled topsoil shall be evenly distributed over the disturbed area, and where applicable the area re-vegetated with native species or according to the reasonable specifications of the appropriate government land manager or surface owner

NDIC rules continued

- 4. Within thirty days after completing any reclamation, the operator shall file a sundry notice with the director reporting the work performed.
- 5. The director, with the consent of the appropriate government land manager or surface owner, may waive the requirement of reclamation of the site and access road after a well is plugged.
- *History: Effective _____ General Authority Law Implemented*
- *NDCC 38-08-04*

ND State School Trust Lands

- Weather permitting, within 180 days of abandonment of the well, dispose of all surface contaminated soil, remove equipment and debris, remove the above ground power source(s) and pipeline(s), recontour the access road, well site and any associated facilities to conform with the original terrain, bury all rocks and evenly respread the reserved soil and reseed with a mixture of native grasses as specified in Exhibit “D”. After seeding, the entire disturbed area shall be fenced to exclude livestock. Reclamation shall not be deemed complete until erosion is controlled, the surface revegetated with a mixture of native grasses, and written approval is received from the State Land Department:
- *#14 ND State Land surface damage agreements: including exhibits “B” & “D”*

Federal lease reclamation

- Point 10: Surface Use Plan of Operations

The operator must submit a plan for the surface reclamation or stabilization of all disturbed areas. This plan must address interim (during production) reclamation for the area of the well pad not needed for production, as well as final abandonment of the well location. Such plans must include, as appropriate:

- Configuration of the reshaped topography:

Federal lease reclamation

- Drainage systems ;
- Segregation of spoil materials (stockpiles);
- Surface disturbances;
- Backfill requirements;
- Proposals for pit/ sump closures;
- Redistribution of topsoil;
- Soil treatments;

Federal lease reclamation

- Seeding or other steps to reestablish vegetation;
- Weed control; and
- Practices necessary to reclaim all disturbed areas, including any access roads and pipelines.

Operators may amend this plan at the time of abandonment.

XII “Abandonment”; Onshore Order #1

Plans must be designed to return disturbed area to productive use and meet LRMP objectives. Work must be completed within 6 months of completion or plugging. Pads, pits and roads must be reclaimed to a satisfactorily revegetated, safe, and stable condition.

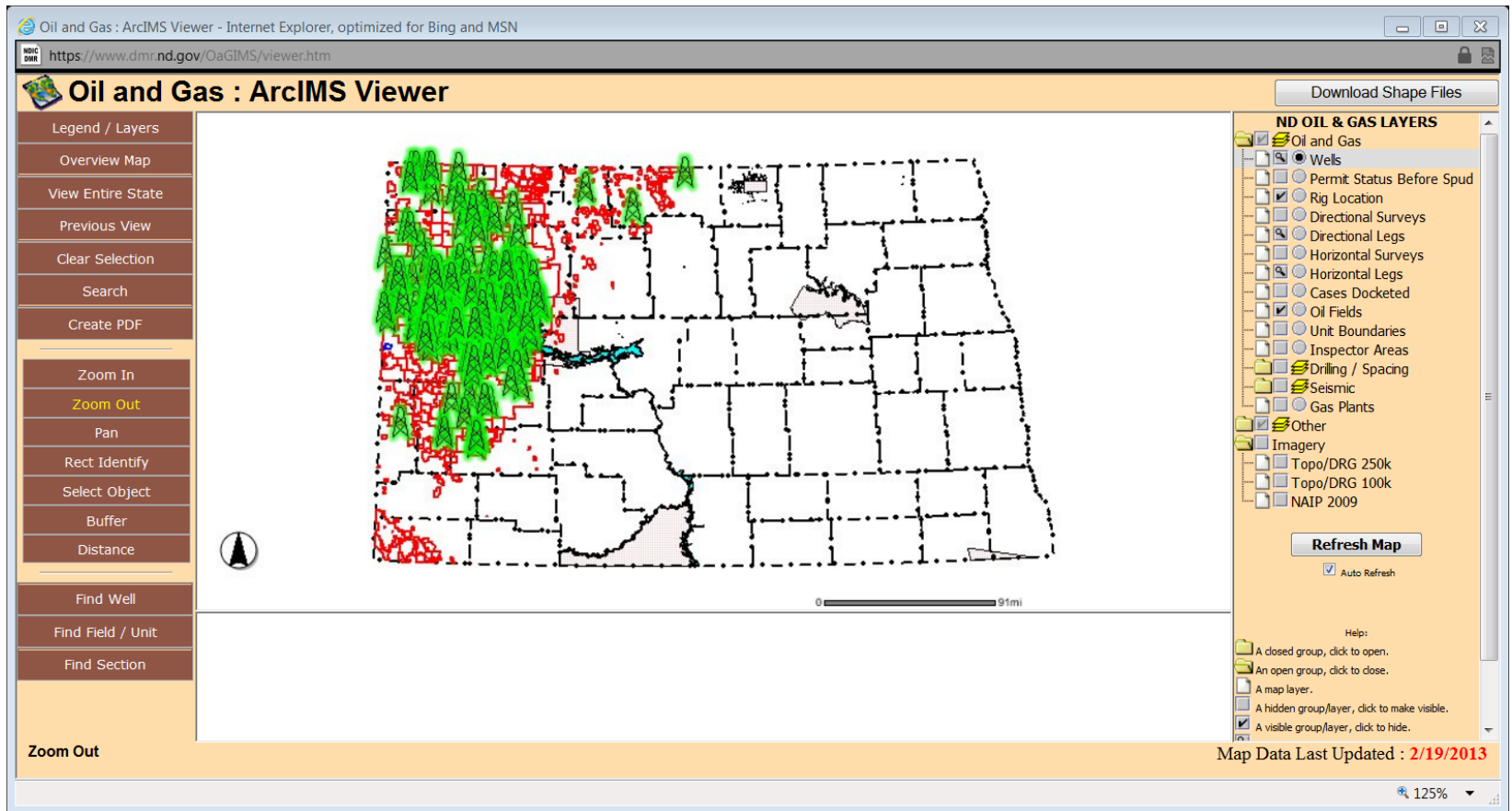
Other Entities

- Tribal Lands
- BIA
- Army Corps of Engineers
- USFW Easements
- Counties and local governments

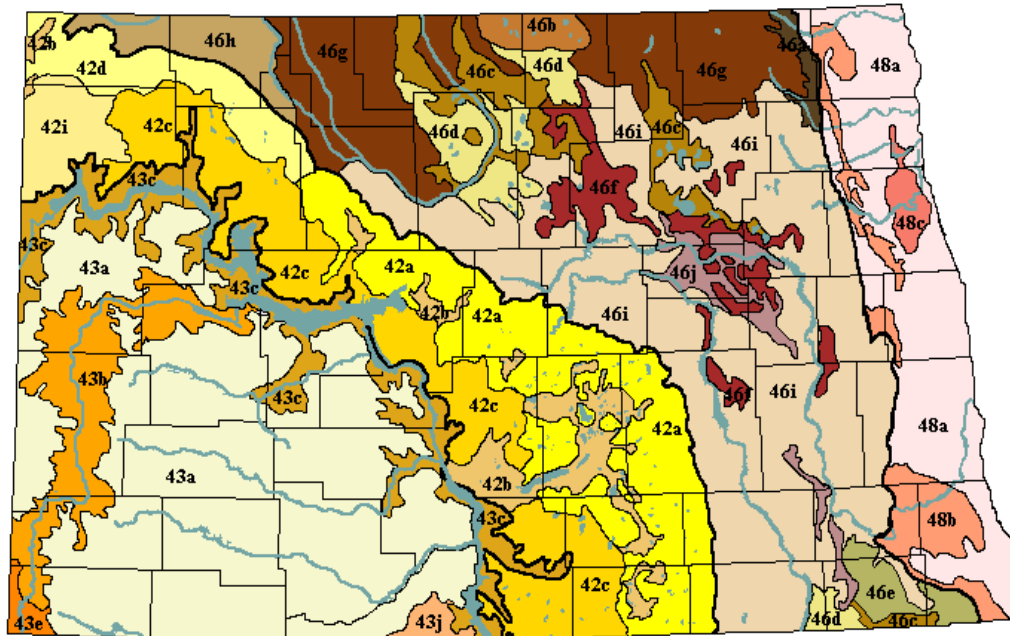
Reclamation considerations

- Reclamation starts at the initial well staking.
- Once soil is moved your committed to reclamation.
- Site selection- include pictures
- Amount of topsoil available.
- Slopes.
- Drainages.

Current well activity



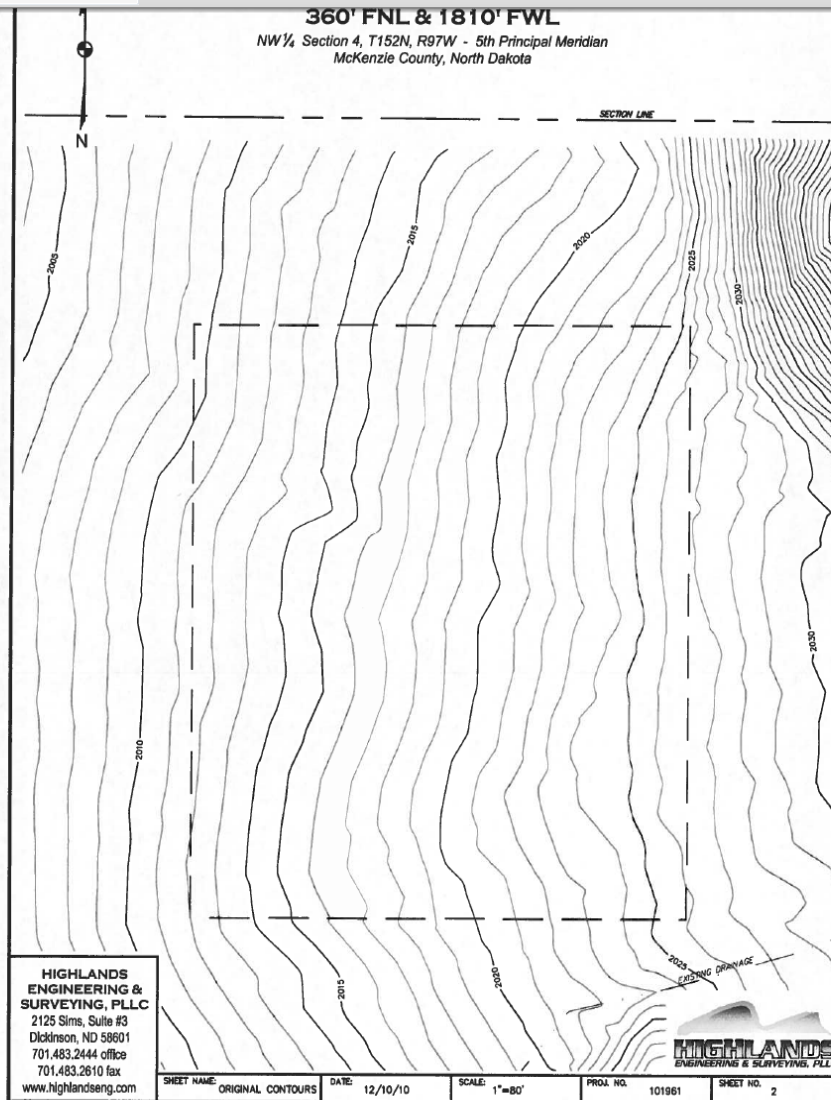
Eco-regions of ND

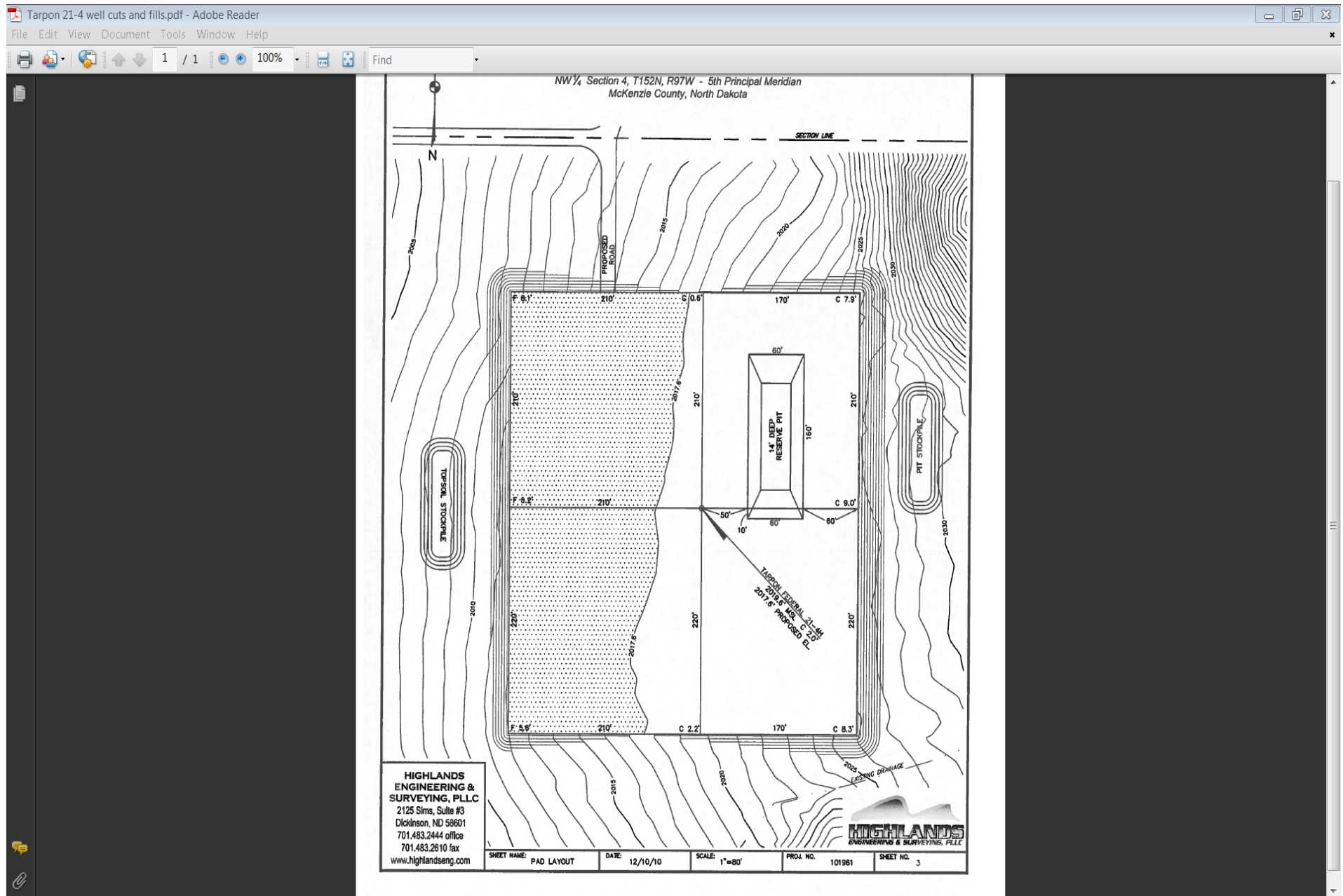


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|------------------------------------|----------------------------------|
| 17 Middle Rockies | 44 Nebraska Sand Hills |
| 17a Black Hills Foothills | 44a Nebraska Sand Hills |
| 17b Black Hills Plateau | 46 Northern Glaciated Plains |
| 17c Black Hills Core Highlands | 46a Pembina Escarpment |
| 25 Western High Plains | 46b Turtle Mountains |
| 25a Pine Ridge Escarpment | 46c Glacial Lake Basins |
| 42 Northwestern Glaciated Plains | 46d Glacial Lake Deltas |
| 42a Missouri Coteau | 46e Tewaukon Dead Ice Moraine |
| 42b Collapsed Glacial Outwash | 46f End Moraine Complex |
| 42c Missouri Coteau Slope | 46g Northern Black Prairie |
| 42d Northern Missouri Coteau | 46h Northern Dark Brown Prairie |
| 42e Southern Missouri Coteau | 46i Drift Plains |
| 42f Southern Missouri Coteau Slope | 46j Glacial Outwash |
| 42g Ponca Plains | 46k Prairie Coteau |
| 42h Southern River Breaks | 46l Prairie Coteau Escarpment |
| 42i Glaciated Dark Brown Prairie | 46m Big Sioux Basin |
| 43 Northwestern Great Plains | 46n James River Lowland |
| 43a Missouri Plateau | 46o Minnesota River Prairie |
| 43b Little Missouri Badlands | 47 Western Corn Belt Plains |
| 43c River Breaks | 47a Loess Prairies |
| 43d Forested Buttes | 47d Missouri Alluvial Plain |
| 43e Sagebrush Steppe | 48 Lake Agassiz Plain |
| 43f Subhumid Pierre Shale Plains | 48a Glacial Lake Agassiz Basin |
| 43g Semiarid Pierre Shale Plains | 48b Sand Deltas and Beach Ridges |
| 43h White River Badlands | 48c Saline Area |
| 43i Keya Paha Tablelands | |
| 43j Moreau Prairie | |
| 43k Dense Clay Prairie | |

Site selection







Pictures pre-build



Topsoil removal & storage



Topsoil removal completed.



Steps of Reclamation



Other considerations

- These may alter your reclamation plans
 - Access road going through a location that will not be reclaimed.
 - Operating Tank batteries
 - Active pipelines. Especially in fill areas of well pad or access roads.

Define boundary



Remove topsoil begin to re-contour



Finish contouring



Main shaping completed

- Replace topsoil uniformly
- Allow surface to firm up to seed
- Seed with grass seeding drill
- Install erosion control
- Fence disturbed area

Topsoil

- Spread topsoil evenly
- Mainly spread with scrapers and blades.
- Smooth surface may not be a plus, some texture and surface roughing may help in seeding success and moisture retention.
- Bond between subsurface and surface tends to be where the runoff concerns are

Seeding

- Most agencies have a seed mixture prepared.
- Pvt lands can have the companies prepare a mix or specify what they want seeded.
- Let ground firm up prior to seeding
- Use Grass drills vs. grain drills.
 - Accuracy and depth control of grain drills usually not suited for grass seeding.
- Seed with the contours
 - helps with moisture retention and erosion control
- Seed depths and seed rates (% of PLS) and rate/acre
- Use of cover crops?
- Surface texturing is helpful.

Erosion control

- Many types of erosion control.
 - Waddles, fiber blankets, silt fences, crimped mulches.
 - Require maintenance
- Installed properly.
- Quick vegetation establishment one of the better ways to contain runoff.

Roads

- Reclaim unless landowner wants it to remain in writing.
- Reshape and remove structures such as culverts.
- Should have stockpiled topsoil as well.
- Re-establish drainages

Remove template



Re-contour drainages



Prior to dirt work



Rough contouring



Monitoring and Maintenance



Success?

When is reclamation completed



Challenges

- Well sites built today will probably be around for 30+ more years.
 - Current reclamations are mostly from 70's and 80's.
 - Many new wells today are multiple well pads.
- What will the process be then. What new developments will help.
- Soil amendments?