



INGAA
FOUNDATION

Clearing, Grading and Restoration

Expectations

Agencies



**US Army Corps
of Engineers**



Landowners



<http://www.coastalgaslink.com/engagement/landowner-engagement/>



Clearing



- It is necessary to clear the right-of-way of any timber and brush to facilitate pipeline construction.
- Clearing is limited to the approved right-of-way and temporary extra workspace locations.
- Clearing is performed in accordance with Permit Conditions/Agency Consultations/Landowner Agreements

Clearing

Cutting and Felling

- In certain geographical locations, it is necessary to hand saw and fell trees before construction in specified periods to protect habitat. The timber is felled in place and ultimately processed during construction.
- During construction, timber can be cut by hand or specialized mechanical equipment.

Hand & Mechanical Cutting



Clearing

Processing

- Timber is de-limbed and stacked on the right-of-way for removal or placed to the side of the right-of-way to accommodate landowner agreements.
- Limbs and brush are stacked in anticipation of disposal.

Stacking



Clearing

Processing

- In uplands, stumps are either removed and stacked for disposal or ground in place. This is known as grubbing.
- In wetlands, stumps are left in place to protect the ecosystem.
- Stumps may be removed in the travel lane of the wetland to facilitate the use of construction matting with approval of environmental agencies.

Grubbing



Clearing

Disposal

- Limbs and brush are disposed of by burning or chipping/grinding.

Log Removal, Burning, and Grinding Activities



Clearing

Disposal

- Chips and Grindings may be left on the right-of-way up to the maximum pounds per acre specified in the applicable permits.
- Chips and Grindings may also be hauled offsite if required by the construction permits.
- Once disposal is complete, the right-of-way is ready for grading activities.

Grinding, Chip Removal, and Final Clearing



Clearing

Preparation of a safe working surface

- To prepare a safe, level working surface for construction activities, it is necessary to grade the work site.
- Natural drainage patterns are preserved to the extent possible.
- Care is given to place soil graded to prepare a safe working environment within the certificated right-of-way and approved extra workspace locations.
- Erosion control devices are installed to control storm water runoff during construction.

Grading and installation of erosion control devices



Clearing

Topsoil Segregation

- Topsoil is stripped, segregated, and preserved in residential and agricultural areas and other areas where requested by a land management agency or landowner.
- Generally, topsoil is removed to its actual depth, up to a maximum of 12 inches, and stockpiled separately from the subsoil that will be excavated from the pipeline trench.
- Topsoil may also be segregated from the entire right-of-way width in areas of actively cultivated, rotated croplands, pastures, hayfields, and where requested by the landowner.
- Segregation of topsoil maintains soil fertility and preserves the native seed bank. Segregation also helps to avoid mixing of topsoil and subsoil and compaction, both of which can reduce soil productivity. Segregation also facilitates timely restoration.

Topsoil segregation



Clearing

Matting

- To travel through designated wetlands, it is necessary to install timber mats
- Timber mats may also be used in areas with saturated soils to provide a safe and sturdy travel lane in the construction right-of-way.
- Mats are also used to provide a firm travel surface for access to the right-of-way and in work pad locations.

Matting for Access & on ROW in Wetland or Saturated Soil Areas

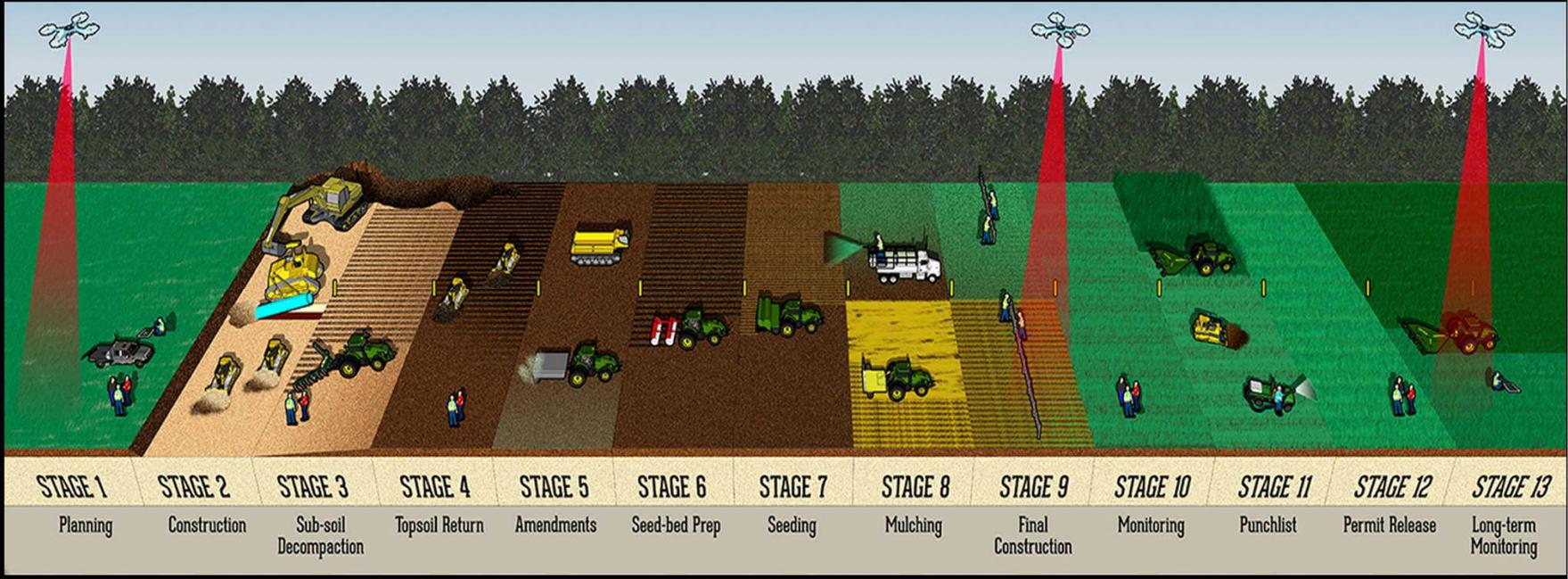


Restoration Considerations



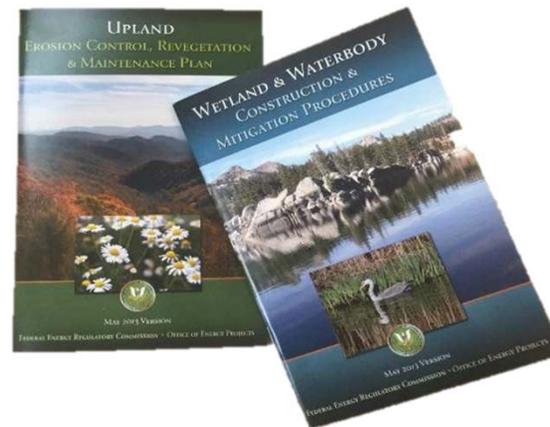
- Sensitive habitats and wetlands, archaeological sites, and topological features such as steep hills and side slopes
- Permit Conditions/Agency Consultations/Landowner Agreements
- Seasonal Construction Schedule and Changes
- Land Uses and Region of the Country
- Soil and Weather Conditions, existing, during construction, and post construction
- Soil Amendments
- Seed Mixes, Seed bed Preparation, and Availability
- Success Criteria and Expectations

Restoration Activities



Restoration Planning

- Revegetation recommendations
 - FERC defers to federal, state, and local agencies for project- and area-specific recommendations
 - Project sponsors seek input and recommendations for inclusion into project planning and construction
- FERC provides guidance (not site-specific)
 - Uplands
 - Wetlands



FERC Guidelines

FERC GUIDELINES	UPLANDS	AG LANDS	WETLANDS	STREAMS	RESIDENTIAL
Erosion controls/ BMPs	X	X	X	X	X
Topsoil segregation		X	Non-saturated		X
Decompaction		X			X
Mulch	X				X
Remove excess rock		X			X
Soil additives (amendments)	X	X			X
Trench breakers	X	X	X (Up-slope of wetlands)	X (Up-slope of streams)	X
Slope breakers (temporary/ permanent)	X / X	Depends	Installed up-slope of resource on slopes > 5% and < 50 feet from resource		Depends

FERC Guidelines

FERC GUIDELINES	UPLANDS	AG LANDS	WETLANDS	STREAMS	RESIDENTIAL
Final grade, soil replacement, install permanent erosion controls	20 days from backfill				10 days from backfill
Seeding (within days of backfill)	6 days				Immediately following backfill
Revegetation success (with desirable species)	Similar to off-ROW	Similar to off-ROW (crop yields)	80% of pre-construction or adjacent ROW	Similar to off-ROW (native species)	

Uplands

Temporary Erosion Control Measures and Stabilization

- Method primarily determined by
 - Soil type and condition
 - Slopes
- Other factors include
 - Longevity
 - Weather
 - Timing
 - Water availability and logistics
 - Access
 - Proximity to sensitive resources
 - Slip potential



Uplands

Temporary Erosion Control Measures and Stabilization

- Protection of topsoil from loss
- Protection of off ROW areas
- Stabilize soils until permanent erosion measures are put in place and restoration is achieved
 - Slope breakers, trench plugs, sediment barriers, ECDs, mulch
 - Quick germinating seasonal species and permanent vegetation seeds are utilized



Uplands

Permanent Erosion Control Measures and Restoration

- Fully stabilized soils
- Properly installed slope breakers and trench breakers
- Density and cover are similar on ROW to off ROW
 - Agency comments or permit conditions may impact
- Identify key areas for long-term monitoring
 - Steep slopes
 - Poor in situ soils
 - Areas upslope to meandering streams
 - Invasive/noxious weed species



Seed Mixes

- Use restoration, soils, and vegetation specialists to support early agency/landowner consultations
- Amend soil, de-compact as required, and proper seed bed preparation impacts overall vegetative success
- Where the seed comes from and how fresh the seed is will determine viability
- Verify project magnitude with availability of seeds/plantings at least one year prior to construction



Revegetation

Native Species/Pollinators



<https://www.usda.gov/media/blog/2013/06/20/nrcs-helps-provide-pollinator-habitat-along-sd-highway>

Stabilization Species



Sodding Residential Areas



Uplands

Transition from Short-Term Stabilization to Permanent Restoration



Agricultural Lands

Agricultural Concerns

- Soils compaction
- Mixing soil layers
 - Utilize topsoiling (double ditching)
- Drian tiles, laser leveling, irrigation
- Soil fertility changes
- Invasive weeds
- Poor yields
- Stabilize soils (surface roughing)



Agricultural Lands

Permanent Restoration

- Repair drain tiles
- Typically, no permanent slope breakers
- De-compact soils
- Return top soils
- Landowner plants crops
- Control of Nuisance species



<https://www.transcanada.com/en/commitment/landowners/>

Steep Slopes

Temporary Stabilization

- Control of surface and subsurface water with trench and slope breakers
- Proper compaction
- Revegetate and establish rooting to reduce erosion
- Spoil pile placement and weighting, snow, and brush management
- Soil drying and amendments
- Monitoring and early identification of issues



Steep Slopes

Permanent Restoration

- Early and continuous monitoring to ensure small issues do not grow
- Surface and subsurface water management converted to permanent
- Ensure revegetation; re-seed and re-amend soils as needed



Wetlands Restoration

Permanent Restoration

- Remove mats
- Restore contours to original wetland hydrology
- Install trench breakers in adjacent uplands to prevent wetland drainage
- Follow project-specific wetland restoration plan
- Until a project-specific plan is developed/ implemented, temporarily revegetate with annual ryegrass



<https://www.aboutpipelines.com/en/blog/saving-canadas-wetlands-a-conservation-group-thats-working-with-pipeline-companies/>



Stream Bank Stabilization

Stream Concerns

- Construction windows for stream (minor, intermediate, major)
- Minimize impacts to woody vegetation on streambanks (leave stumps, matt over existing vegetation)
- Minimize use of riprap to areas where flow conditions limit effective re-vegetation
- Species safe erosion control fabrics to prevent entrapment of wildlife
- Flow maintenance of the stream during construction



Monitoring and Vegetation Maintenance

FERC GUIDELINES	UPLANDS	AG LANDS	WETLANDS	STREAMS	RESIDENTIAL
Inspections/ Monitoring	At least after 1st and 2nd growing seasons	At least after 1st and 2nd growing seasons	Annually until success criteria is met		At least after 1st and 2nd growing seasons
Mowing 10-foot width over Centerline	Annual	Annual	Annual	Annual (riparian buffer)	Annual
Full-Width ROW Mowing	3 years (not more than)	3 years (not more than)	Not Allowed	Not allowed; Maintain 25-foot riparian strip	3 years (not more than)

Vegetation maintenance not to be conducted during certain species windows that could impact migratory patterns or breeding, rearing and nest departure

Monitoring and Vegetation Maintenance

FERC GUIDELINES	UPLANDS	AG LANDS	WETLANDS	STREAMS	RESIDENTIAL
Tree Removal within 15 feet of Centerline	Depends	Depends	Annual	Annual	Depends
HDDs	Depends	Depends	Not allowed	Not allowed	Depends
Time of Year Restriction (migratory birds nesting season)	Apr 15 - Aug 1				
Control unauthorized off-road vehicle use, and maintain signs, gates, and permanent access roads	Life of project (as needed)				

External Factors

- Invasive species control is a condition of the Certificate
- Cattle, deer, geese, and other species
- Third-party use (ATVs, hunters)
- Weather
 - Water - too little or too much
 - Heat or cold



Transition to Maintenance and Monitoring

- Temporary erosion control devices are replaced with permanent ECDs
- Monitor permanent erosion controls until revegetation success criteria have been met
- Remove bridges, consider long-term bridges/access for problematic areas
- Install fences/gates
- Permit releases and Close-outs



Post Construction Agency Reporting

- FERC 7c - Quarterly Reporting, Third Party Program
- FERC Blanket Projects - Annual Reporting
- On-going monitoring of restoration using aerial and ground line patrols

