

	<p>Land Management Standard</p>	<p>Rev 06</p>
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APPENDIX 6

Soil Reclamation and Site Reinstatement

Purpose

To undertake soil reclamation, erosion protection, *Site* restoration and reinstatement, taking into account natural processes, operational requirements and technical feasibility, to deliver post-construction land to the conditions appropriate for its future intended use as agreed with the relevant authorities and/or landowner.

Specific objectives of Site reclamation and restoration are to:

- Achieve long-term stabilization against erosion;
- Restore to the maximum extent possible the hydrological regime and reinstate natural drainage of the land (including provisions to maintain the water balance of the site and protect from flooding where appropriate);
- Return the land to as close to original contour as allowed for by RF law and the landowner;
- Avoid import of foreign material where possible (e.g. reserve and reuse river gravel, bank boulders);
- Reinstatement topsoil (in case it was stripped before construction activities);
- Revegetate sites with suitable native plant species;
- Discourage illegal/increased access to previously inaccessible areas through the removal of temporary construction roads and appropriate use of fencing and other measures to restrict access where possible;
- Restore impacted habitats and ecological processes to their original status where this can technically be achieved;
- Utilise an appropriate combination of engineered solutions and soft bio-engineering techniques to gain the best environmental outcome; and
- Ensure that sites are suitable for future intended uses.

Who is this for?

- *Project Managers¹, Contract Holders and Contractors with work scope including soil movement, land clearance, and/or site reinstatement;*
- *Asset Managers (onshore) in relation to maintenance activities involving soil movement, land clearance, and/or site reinstatement.*

To be clear, this specification is primarily applicable for the construction phase of projects and project expansions, however it is also applicable to maintenance activities in the operations phase (i.e. where reinstatement, erosion or drainage control works require completion and/or repair).

Requirements – General

1. Manage soil reclamation, erosion prevention, site restoration and reinstatement in accordance with the requirements of RF, Lenders and Shareholders.
2. Prepare Asset-specific **Site Reinstatement Plans** in line with the above Purpose and Objectives, including:
 - a. Soil Reclamation and Erosion Prevention Plan and other requirements of this Specification, and
 - b. relevant requirements of the Specifications Onshore Pipelines Right of Way² and River Crossings.
3. Mitigation measures put in place during decommissioning activities should focus on ensuring the long-term recovery of the environment at the site. [EIA V3: 3.13]

¹ Italicized terms in this document are included in the [Sakhalin Energy HSE Glossary](#).

² Underlined items in this document refer to Sakhalin Energy Controlled Documents.

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Requirements for Soil Reclamation and Erosion Prevention Plans

4. Asset-specific **Soil Reclamation and Erosion Prevention Plans (SREPP)** shall be developed and implemented for all onshore construction activities that require soil removal or have the potential to lead to soil erosion. [EIA V1: 6.3, V3: 3.3.2, V4: 3.8.2 and tables 2.28, 2.33, 2.34, V5: 3.6.1]
- a. **These plans shall be approved** by relevant Russian Authorities.
 - b. **Achievement of SREPP Objectives.**
 - SREPP shall be implemented over a number of years following completion of construction, and therefore the time scale for judging its success needs to reflect the time anticipated for reinstatement and recovery to specific objectives. [EIA (2003) EIAA – Pipeline construction in wetlands. Section 3.7.4.]
 - Stabilisation and recultivation of impacted soil shall be managed according to the commitments presented in this specification and the SREPP, including technical and biological recultivation/ revegetation, and the use of appropriate local species. This shall be implemented along the full length of the Right of Way.
 - Replanting shall be monitored on a regular basis until pre-determined reinstatement objectives have been achieved.
 - Specific reinstatement objectives and requirements for wetlands are included in the Wetlands Specification.
 - c. **SREPP Onshore Pipelines – General requirements.**
 - Reinstatement the Right of Way to allow previous land use to continue (within operational conditions) or to conditions stipulated in any relevant approval. [EIA, Table 2.28 VOL 4]
 - Soil compaction – In any agricultural areas where soil compaction as a result of project activities is an issue then appropriate measures shall be implemented to restore the soil structure to agreed RF requirements, and consultation with a soil expert will be undertaken. [FERC comparison - Upland Erosion Control, Revegetation and Maintenance Plan VC1]
 - Return to sections and reseed them using the agreed seed mixture once prevailing climatic conditions allow. [EIA VOL 4, Section 3.6.1]
 - **SREPP Onshore Pipelines – Permanent erosion control.** Permanent erosion controls shall include appropriately designed trench breakers and slope breakers where necessary to meet Good International Industry Practice.
 - **SREPP Onshore Pipelines – Reinstatement and Clean up of the Right of Way.** Construction equipment and materials will be removed as soon as possible upon completion of construction. All temporary construction structures (including erosion control measures and access roads/bridges) will also be removed upon completion of construction activities and replaced by permanent structures where appropriate.
 - d. **SREPP general requirements – Revegetation.**
 - Sakhalin Energy and its contractors (as appropriate) shall be responsible for ensuring successful revegetation of soils disturbed by project-related activities. [FERC comparison - Upland Erosion Control, Revegetation and Maintenance Plan VD1a]
 - The reinstatement endpoint should include sufficient tree density, species diversity, and vegetative cover (taking into account any limitations from the requirements of process safety and protection zones).
 - Revegetation is to take place in accordance with the optimal time periods for the area climatic conditions.
 - Vehicle access shall be restricted to the area undergoing reinstatement.
 - Where appropriate, the planting of native species shall be undertaken, for landscaping purposes, in areas of the LNG site not required for the operation of the facility. [EIA VOL 5, Sections 3.8.1 and 3.9.1, Table 1.5 in Section 1.5.3]
 - e. **SREPP general requirements – Soil additives.**
 - Fertilize and add soil pH modifiers in accordance with written recommendations obtained from the local soil conservation authority, land management agencies, or landowner. Where topsoil has been removed and not segregated, the Contractor shall institute a soil sampling programme to



determine the soil amendments required (i.e., lime, fertilizer, bio-stimulants, etc.) that will be needed to re-establish vegetation. [FERC comparison - Upland Erosion Control, Revegetation and Maintenance Plan VD2]

f. **SREPP general requirements – Seeding requirements.** [FERC comparison - Upland Erosion Control, Revegetation and Maintenance Plan VD3]

- The plan for reinstatement shall include the sourcing of sufficient native seed or grass mixtures recommended by local scientific agricultural institutions.
- Prepare a seedbed in disturbed areas to a depth of 8 to 10cm using appropriate equipment to provide a firm seedbed. When hydroseeding, scarify the seedbed to facilitate lodging and germination of seed.
- Seed disturbed areas in accordance with written recommendations for seed mixes, rates, and dates obtained from the local soil conservation authority or as requested by the landowner or land management agency. Seeding is not required in actively cultivated croplands unless requested by the landowner.
- Where appropriate, more stringent measures for seeding and revegetation may be applied to the restoration of the pipeline ROW within protected areas (Makarovsky and Izubrovsky reserves).
- Perform seeding of permanent vegetation within the recommended seeding dates. If seeding cannot be done within those dates, use appropriate temporary erosion control measures and perform seeding of permanent vegetation at the beginning of the next recommended seeding season. Lawns may be seeded on a schedule established with the landowner.
- In the absence of written recommendations from the local soil conservation authorities, seed all disturbed soils within 6 working days of final grading, weather and soil conditions permitting.
- Base seeding rates on Pure Live Seed based on results of seed testing. Use seed within 12 months of seed testing.
- Wherever possible revegetation shall use native species and attempt to recreate the natural vegetative conditions that existed prior to disturbance. Revegetation shall be undertaken as quickly as possible after completion of disturbance.
- Inspect method statements and reinstatement plans.

Requirements for Soil Management

5. **Soil Reinstatement Plans** shall be developed and implemented for onshore Major Installations and Major Pipelines.

- Soil resources on construction campsites shall be managed such that upon site decommissioning and reinstatement, the area can be returned to its agreed pre-existing condition as determined by the SREPPs for the site. This shall be undertaken to restore as many components of the environment (soils, flora and fauna) to pre-existing conditions as possible taking into account the requirements of process safety and protection zones of the facilities.
- Topsoil and excess soil shall be stored in a designated Soil Storage Area. This soil shall be stored and then revegetated at the completion of the construction period in such a way as to prevent erosion, and in the interim, runoff shall be contained through the use of drainage channels. [EIA, VOL 3, Section 3.3.2].
- Restore the soil and vegetation properties of rejected soil by biological remediation as specified in the SREPP. [EIA VOL 4].
- Care shall be taken when landscaping not to cause damage to adjacent areas.

6. **Management of soil resources.** [EIA V4; FERC comparison - Upland Erosion Control, Revegetation and Maintenance Plan VIB, VA4]

a. In all areas maximise topsoil preservation.

- Topsoil removed during construction (or repair works) shall be reused or retained on site for later reuse.
- Topsoil, overburden and peat shall be stripped and stored in separate stockpiles for later use in reinstatement (refer storage requirements in item 6h below).



- Preserved topsoil shall be stockpiled and backfilled separately from subsoils, to avoid mixing of soil types.
- b. Topsoil shall be segregated in accordance with RF regulations, which specify applicable topsoil properties as a basis for determining the depth of soil required to be segregated and reserved for reinstatement.
- c. Maintain separation of salvaged topsoil and subsoil, in accordance with 6b, throughout all construction/repair activities. Segregated topsoil may not be used for padding the pipe.
- d. Remove excess rock from at least the top 30cm of soil in all actively cultivated or rotated cropland and pastures, hayfields and residential areas, as well as other areas at the landowner's request. The size, density, and distribution of rock on the construction work area should be similar to adjacent areas not disturbed by construction. Other provisions may be approved by the landowner or relevant regulatory body, where appropriate.
- e. Disposing of excess soil materials shall be undertaken in compliance with all relevant permits.
- f. All excavated soil for onshore pipelines shall remain on the RoW or at spoil disposal sites on additional land. All disposal areas and procedures must be approved by the geotechnical engineer for slope stability purposes (ie, to avoid existing landslides). Furthermore, the geotechnical engineer shall approve all soil disposal areas and procedures to ensure that the soil is disposed in a way that avoids mass wasting. [EIA VOL 4, Section 3.6.1]
- g. Topsoil and excess soil cleared from the site shall be stored in the Soil Storage Area. Stockpiles shall only be located within the approved land allocation or ROW, and within this area, only in locations where they will not cause environmental or access issues. This soil/peat shall be stored and re-vegetated in such a way as to prevent erosion by precipitation or floodwaters and subsequent increase in suspended sediment loads. Topsoil/peat stockpiles shall be no more than 2 m in height, drained, compacted and maintained in a manner that prevents loss and substantial degradation. [EIA VOL 5, Section 3.6.1]
- h. No soil or snow is permitted to be stockpiled within 30m of a river, stream or water body. For snow and soil clearance works required within 30m of a river, stream or water body, the soil and snow is to be moved and stockpiled at a Sakhalin Energy approved area at or beyond the 30m zone.
- i. Where topsoil has already been removed and not segregated, the Contractor shall institute a soil sampling program to determine the soil amendments required (i.e., lime, fertilizer, bio-stimulants, etc.) that will be needed to re-establish vegetation, in accordance with the SREPP.
- j. Wherever possible, site clearing activities and reinstatement activities shall be implemented progressively, i.e. areas are only to be cleared as they are required, and stripped vegetation and topsoil is to be placed directly onto an area being restored.

Requirements for erosion and drainage control

7. Sakhalin Energy is committed to implement the following **sediment source control** measures:
- a. Minimise the width of the RoW where practicable and only use the middle section of the RoW for construction traffic;
 - b. Ensure that the right equipment and sufficient erosion control materials are available on site in preparation for the river crossing. Farming equipment will be available in each section and used where appropriate;
 - c. "Track-walk" slopes where feasible and appropriate on slopes with a high erosion potential;
 - d. Construct slope breakers in line with Good International Industry Practice where required. Silt fences shall not be used in place of slope breakers;
 - e. Regularly inspect silt fences (and other sediment controls), particularly after rainstorms and clean them out when they are 1/3 full, repaired or replaced. Sandbag materials shall also be inspected regularly and replaced prior to any degradation;



- f. Implement a topsoil preservation policy for areas that have not been cleared yet; and
 - g. Protect existing windrowed stockpiles of soil to prevent erosion and subsequent suspended sediment loads to streams. Stockpiles shall be protected where necessary by silt fencing, mulch, grass seeding, or geojute to prevent sediment laden runoff.
8. Where the design of a facility includes construction of permanent erosion and sedimentation structures, these are to be constructed as soon as practicable after disturbance of the area.
 9. Where chipped deforestation debris is available, re-use cut vegetation during restoration to promote soil stability and reduce the erosion potential of the bare ground. [EIA VOL 4, Table 2.28]
 10. **Temporary erosion control.** [FERC comparison - Upland Erosion Control, Revegetation and Maintenance Plan IVF]
 - a. Install temporary erosion controls immediately after initial disturbance of the soil. Temporary erosion controls must be routinely inspected by suitably qualified personnel, particularly after rainstorms, and properly maintained throughout construction (on a regular basis) and reinstalled as necessary (such as after backfilling of the trench) until replaced by permanent erosion controls or restoration is complete.
 - b. Prior to the onset of winter, temporary surface stabilization measures shall be applied to areas of bare soil on slopes and water protection zones (WPZs) along the RoW. Such measures shall include temporary seeding, track-walking, mulching and drainage controls (slope breakers) – see below for installation requirements.
 - c. RoW conditions shall be re-examined as to the applicability of temporary and permanent drainage control, sediment control, erosion control, and re-vegetation practices.
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 - d. Installation of drainage control, sediment control, erosion control, and re-vegetation practices shall be documented separately for each construction site:
 - A progress report shall be established that indicates the status of these soil protection practices with respect to the current construction activities;
 - Materials usage (e.g., seed, fertilizer, erosion Control Products, etc.) shall be monitored such that additional quantities of supplies may be ordered in a timely manner.
 - e. **Drainage control.** [FERC comparison - Upland Erosion Control, Revegetation and Maintenance Plan IVF1]
 - During site preparation, pre-construction drainage shall be established to serve the site until post-construction (as per design) drainage is available.
 - Pre-construction drainage shall be designed to minimise the volume of stormwater flowing through exposed areas and to surface water features. Water flow through the site shall be controlled to reduce potential for erosion.
 - Temporary slope breakers shall be used to reduce runoff velocity and divert water off the construction right-of-way. Earthen slope breakers will be constructed to an appropriate size and must be drivable. .
 - Install temporary slope breakers in line with Good International Industry Practice on all disturbed areas, as necessary, to avoid excessive erosion.
 - Slope breakers must afford drainage protection across the whole width of the RoW.
 - Direct the outfall of each temporary slope breaker to a stable, well vegetated area or construct an energy-dissipating device (e.g. properly sized riprap) at the end of the slope breaker and off the construction right-of-way. Position the outfall of each temporary slope breaker to prevent sediment discharge into wetlands, waterbodies, or other sensitive resources. Requirement is contained in SREPP and construction design plans.
 - Tie-in pits are to be filled in as soon as feasible following connections.
 - Well point dewatering of the groundwater table shall be used where needed to control water logging of a site. Verify that well point dewatering activities do not result in the deposition of silt, sediment or other contaminants near the point of discharge into a wetland or waterbody. If such deposition is occurring, the dewatering activity shall be stopped and the design of the discharge shall be changed to prevent reoccurrence.



f. **Surface stabilization.**

- Temporary stabilization and erosion prevention measures shall be implemented for steep slopes adjacent to rivers that remain undisturbed for more than 14 days during non-snow conditions.
- Temporary stabilization and erosion prevention measures shall be implemented for any construction area that remains undisturbed for more than 21 days during non-snow conditions

11. **Hydrostatic Testing.** Implement erosion control measures as specified in the Hydrostatic Testing Specification.