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 conditions as similar as possible to those prior to construction or as agreed with the relevant authorities and/or landowner.

Specific objectives of Site reclamation and restoration are to:

- Achieve long-term stabilisation against erosion;
- Restore 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 its original contours, or as a minimum make the reinstated land visually compatible with the surrounding landscape;
- Avoid import of foreign material where possible (e.g. reserve and reuse river gravel, bank boulders);
- Replace topsoil;
- 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 to the pipeline Right of Way;
- 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-engineered techniques to gain the best environmental outcome; and
- Ensure that sites are suitable for future uses.

Who is this for?

- Project Managers, 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 Way 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]

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 SREP Objectives.
   - SREP 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)EIA – 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 SREP, 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. SREP Onshore Pipelines – General requirements.
   - Reinstate 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. [HSESAP Annex A. 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]

d. SREP Onshore Pipelines – Permanent erosion control.
   - Trench breakers shall be installed to slow the flow of subsurface water along the trench. Trench breakers may be constructed of materials such as sand bags or polyurethane foam. Do not use topsoil in trench breakers. An engineer or similarly qualified professional shall determine the need for and spacing of trench breakers. Otherwise, trench breakers shall be installed at the same spacing as and upslope of permanent slope breakers. In agricultural fields and residential areas where slope breakers are not typically required, install trench breakers at the same spacing as if permanent slope breakers were required. At a minimum, install a trench breaker at the base of slopes greater than 5 percent where the base of the slope is less than 15 meters (50 feet) from a waterbody or wetland and where needed to avoid draining a waterbody or wetland. [HSESAP Annex A. FERC comparison - Upland Erosion Control, Revegetation and Maintenance Plan VB1]
   - Permanent slope breakers shall be installed to reduce runoff velocity, divert water off the construction right-of-way, and prevent sediment deposition into sensitive resources. Permanent slope breakers may be constructed of materials such as soil, sand bags, or some functional equivalent. Construct and maintain permanent slope breakers in all areas, except cultivated areas and lawns, using spacing recommendations obtained from the local soil conservation authority or land managing agency. In the absence of written recommendations, use the following spacing unless closer spacing is necessary to avoid excessive erosion on the construction right-of-way: Slope (% Spacing (meters(feet)) 5–15% 90m (300ft), >15–30% 60m (200ft), >30% 30m (100ft). Construct slope breakers to divert surface flow to a stable area without causing water to pool or erode behind the breaker. In the absence of a stable area, construct appropriate energy dissipating devices at the end of the breaker. [HSESAP Annex A. FERC comparison - Upland Erosion Control, Revegetation and Maintenance Plan VB2]

e. SREP Onshore Pipelines – Reinstatement and Clean up of Right of Way [HSESAP Annex A. FERC comparison - Upland Erosion Control, Revegetation and Maintenance Plan VA]
   - Commence cleanup operations immediately following backfill operations. Complete final grading, topsoil replacement, and installation of permanent erosion control structures within 20 days after backfilling the trench (10 days in residential areas). If seasonal or other weather conditions prevent compliance with these time frames, maintain temporary erosion controls (temporary slope breakers and sediment barriers) until conditions allow completion of cleanup. A winterization plan shall be developed if construction will continue into the winter season when conditions could delay successful de-compaction, topsoil replacement, or seeding until the following spring.
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- A travel lane may be left open temporarily to allow access by construction traffic if the temporary erosion control structures are installed and inspected and maintained. When access is no longer required, the travel lane must be removed and the right-of-way restored.
- Rock excavated from the trench may be used to backfill the trench only to the top of the existing bedrock profile. Do not allow rock to be placed in close proximity to pipe in trench bottom. Rock that is not returned to the trench should be considered construction debris, unless approved as mulch for some other use on the construction work areas by the landowner or land managing agency.
- Grade the construction right-of-way to restore pre-construction contours and leave the soil in the proper condition for planting.
- Remove construction debris from all construction work areas unless the landowner or land managing agency approves otherwise.
- Remove temporary sediment barriers when replaced by permanent erosion control measures or when revegetation is successful.

f. 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. [HSESAP Annex A. FERC comparison - Upland Erosion Control, Revegetation and Maintenance Plan VD1a]
- Restore all turf, ornamental shrubs, and specialized landscaping in accordance with the landowner's request, or compensate the landowner. Restoration work must be performed by personnel familiar with local horticultural and turf establishment practices. [HSESAP Annex A. FERC comparison - Upland Erosion Control, Revegetation and Maintenance Plan VD1b]
- The reinstatement endpoint should include sufficient tree density, species diversity, and vegetative cover.
- Revegetation is to take place during the optimal season for establishment of vegetation.
- 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]

g. 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. Incorporate recommended soil pH modifier and fertilizer into the top 2 inches of soil as soon as possible after application. 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. [HSESAP Annex A. FERC comparison - Upland Erosion Control, Revegetation and Maintenance Plan VD2]

h. SREPP general requirements – Seeding requirements. [HSESAP Annex A. FERC comparison - Upland Erosion Control, Revegetation and Maintenance Plan VD3]
- The plan for reinstatement shall include the sourcing of sufficient native seed to complete reinstatement of areas to be disturbed.
- 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 Izubrov 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

- 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.

- Topsoil and excess soil shall be stored in a designated Soil Storage Area. This soil shall be stored and then revegetated at the conclusion 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

- In all areas maximise topsoil preservation.
  - Any soil 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.

- 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.

- 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.

- 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.

- Disposing of excess soil materials shall be undertaken in compliance with all relevant permits.

- 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]

- 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 necessary 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. Utilise on-site resources such as willow (Salix, sp.) branches for riverbank stabilisation, where appropriate;

c. 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;

d. “Track-walk” slopes where feasible;

e. Construct slope breakers at intervals, with the gradient of the slope breaker no greater than 1:100. Outlets for slope breakers should be provided with suitable energy dissipation material (e.g. riprap) and directed towards vegetated areas to the side of the RoW and not directed into areas of stockpiled soil or unstable slopes. Silt fences shall not be used in place of slope breakers;

f. 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;

g. Implement a topsoil preservation policy for areas that have not been cleared yet; and

h. 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 otherwise 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. For example:

- Water Protection Zones (WPZ) will require the following practices: Erosion control products (ECPs) for bank, slope and/or bridge abutment protection; Silt fence for sediment control at toe of slopes; Tillage and seeding for temporary or permanent re-vegetation on slopes leading to streams; Biotechnology (e.g., willow wattling) for protection of streambanks.
- Steep slopes where pipeline construction is incomplete will be stabilised using an appropriate combination of the following: Track-walking by bulldozers up and down slopes; Temporary seeding; Temporary mulching (as part of hydrosedencing). In addition the following drainage and sediment controls will be applied: Construction of slope breakers; Stabilization of outlets from slope breakers and down drains; Installation of silt fence at toes of slopes.
- Newly-disturbed areas within the RoW will be stabilised using an appropriate combination of the following: Timely removal of vegetative cover (e.g., only in advance of immediate pipeline trenching and placement); Track-walking of slopes; Temporary mulching of disturbed areas and pipeline cover (as part of hydrosedencing on steep slopes). In addition silt fence will be placed at toes of slopes.

d. Installation of drainage control, sediment control, erosion control, and re-vegetation practices shall be documented separately for each Section:

- A progress report shall be established that indicates the status of these soil protection practices with respect to the current pipeline 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 driveable. Synthetic materials (such as EnkaMat and Rubulon Green) materials may be used. Bio-options such as jute and straw will be utilized in future where possible.
- Install temporary slope breakers on all disturbed areas, as necessary, to avoid excessive erosion. Temporary slope breakers must be installed on slopes greater than 5 percent where the base of the slope is less than 50 feet from waterbody, wetland, and road crossings at the following spacing (closer spacing should be used if necessary): Slope (%) Spacing (feet) 5 - 15 300 >15 - 30 200 >30 100. It is recommended that the gradient of the slope breakers should be no greater than 100H:1V.
- 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 contained in SREPP and contained in 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 stabilisation.

- Steep slopes adjacent to rivers that remain undisturbed for more than 14 days (this period of days may not be appropriate during winter conditions when there is snow on the ground) must be track walked.
• If any construction area remains undisturbed for more than 21 days (this period of days may not be appropriate during winter conditions when there is snow on the ground), it shall be track-walked (up and down) or disked/tilled on the contour (slopes less than 3:1), temporarily seeded and/or mulched. Evidence of use of bulldozer and adherence to time periods to usage, where appropriate.

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