

Chapter 14 OPF Beach Landing Facility

14.1 INTRODUCTION

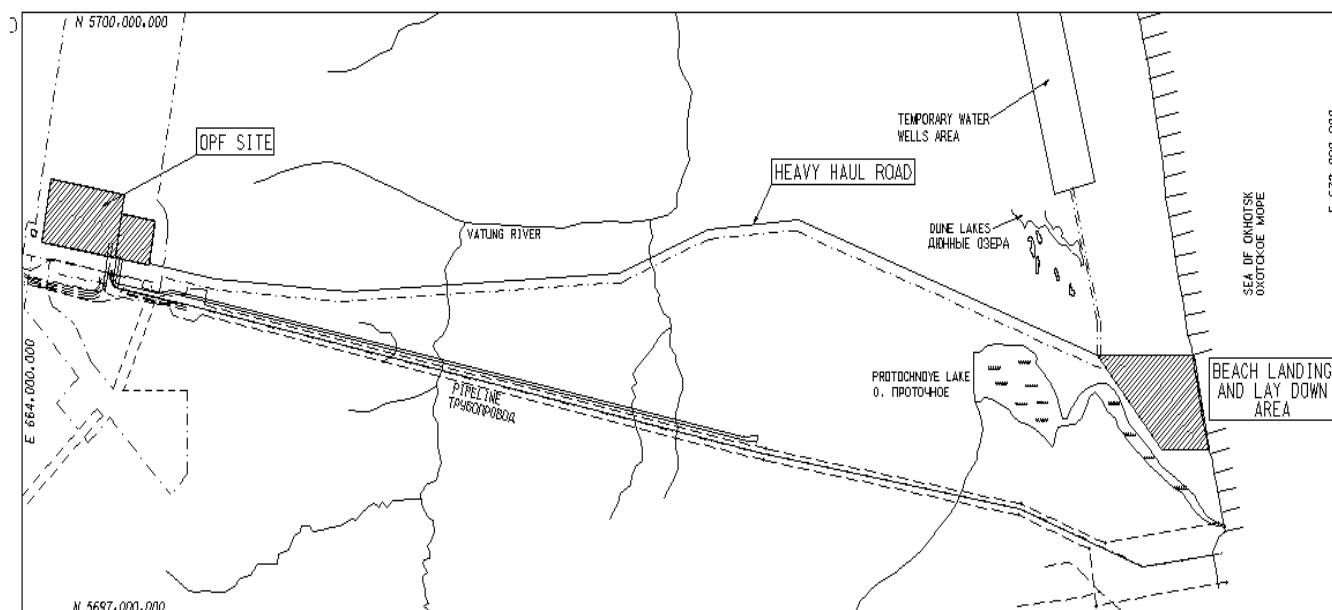
A detailed Environmental Impact Assessment (EIA) was initially carried out for the use of a pier at the beach landing area near the Onshore Processing Facility (OPF). During the detailed design phase the earlier TEO-C agreement to construct a pier was re-assessed. Environmental impacts and cost issues were the major reasons for this re-appraisal; the successful ENL beach landing exercise at Chaivo Bay was also taken into consideration. As a result, the approach was modified so that transit barges would be used instead of a pier for landing activities. Further work demonstrated a significant reduction in both the short- and long-term environmental impacts.

The main purpose of this chapter is therefore to provide an update on the beach landing of heavy pressure vessels, compressors and associated large/heavy equipment that took place at the OPF in summer 2004. The review also considers the validity of the decision to modify the landing method from a 300m-pier construction to the use of transit barges ballasted to the seabed.

This chapter also contributes to the justification for repeating the successful completion of the construction method during another beach landing of heavy modules planned for the summer of 2005 at the same location. In April 2005, OPF received MNR Approval for the 2005 landing. All project controls have been completed and the Change Panel agreed to the process and its outcome.

14.2 SCOPE

Heavy equipment for the OPF site was brought onshore at a beach landing facility (BLF), as shown in Figure 14.1, and transported via a newly constructed access road to the site. A lay-down area was levelled in the foredune immediately inland of the beach landing strip.



OPF SITE AND BEACH LANDING

Figure 14.1 OPF Site and Beach Landing

14.3 BASELINE ENVIRONMENT

The coastal areas in the general vicinity of the OPF site, which include the Lunskey Bay Natural Monument, Nabilskey Bay and coastal lagoons/wetlands, are of high environmental importance and are being recommended for international designation under the Ramsar Convention. These habitats support several breeding and migrating bird species, including a number of rare species of shorebirds (e.g. Steller's Sea-eagle, Aleutian Tern).

Intensive bird surveys have been carried out and a comprehensive Steller's Sea Eagle monitoring programme is in place (see Chapter 5 of the EIA-Addendum). There are no nests in the proximity of the OPF; however, there is one reproductive nest along beach access road that runs between the OPF and BLF. This lies to the south-west but is outside the recommended buffer zone protection area. An observation programme was implemented during the beach landing operations to observe Steller's Sea Eagle nesting birds and other eagles that feed in the beach area.

The OPF and BLF sites were surveyed by a botanical team in 2002 by the Far East State University (FESU 2002). There are no Red data Book plant species recorded in this area. The plant communities affected by the beach landing activity are characteristic of the habitat: the semi-stable foredune supports a *Leymus* and *Glehnia littoralis* community backed by a *Pinus pumila* and *Empetrum sibiricum* community with abundant *Cladonia*. Their presence was confirmed at this precise location by a qualified botanist on the OPF team with a view to appropriate reinstatement.

A bathymetric survey was carried out prior to any activity as part of the baseline survey. In addition, a programme of sediment sampling and subsequent analysis was undertaken by SakhNIRO, before and after beach landing operations in order to assess environmental baseline conditions and to assess the level of environmental impact, if any, post operations.

Pre-installation sediment sampling was undertaken after the bathymetry survey and prior to the first (transit) beach barge arrival in late June 2004. Post-operational sampling was to be completed after the transit barge had departed the BLF site.

Sediments were to be collected at a total of five sample locations. Three sample locations were along axis of barge at 50m, 100m and 150m from the mean high water level. Two sample locations at distances of 100m from shore and 100m north and south of the barge centreline were used.

The results, described in detail in a Close out Report (Crowley Nov. 2004) and the SakNIRO report, reveal a natural pattern of erosion and sediment accumulation across the inshore zone, which has not been affected by the beach landing activities.

The same sampling programme will be repeated in 2005.

14.4 DESCRIPTION OF ACTIVITIES

Construction of the OPF requires the importation, by sea, of heavy modules (total tonnage approximately 4,500 tonnes) to the site in the summers of 2004 and 2005. The points of origin of the heavy cargos included Russia, Italy, Korea and Japan.

The original concept for the BLF, as described in the TEO-C and in the international-style EIA, was for the construction of a 300m long and 20m wide pier/jetty. Construction required sheet piling, the importation of granular fill and dredging.

Through the EIA process, the key potential impacts of the BLF and the construction of the temporary pier were identified as:

- The direct footprint of the pier on littoral and seabed areas and loss of benthic habitat;
- The alteration of local hydrodynamics due to the pier and the influence any changes could have on sediment transport, erosion and accretion;
- Western gray whales, for example, feed in the coastal waters off to the north-east coast of Sakhalin Island. In particular, sheet piling and rock-filling have the potential to generate high levels of noise;
- Dredging for berths and the approach channel to the pier (and the disposal of dredged sediment) would result in benthic habitat change

and would temporarily increase suspended sediment concentration in the water column;

- Navigational impacts related to shipping activities (e.g. incidents or accidents).

14.5 ALTERNATIVE SOLUTIONS

During the detailed design, transportation and logistics-planning phase for the OPF, further studies were commissioned to evaluate a series of alternative solutions for the BLF. Options other than a jetty included using a heavy lift aircraft, dismantling the heavy modules and reassembling at site and road transport. Once a beach landing had been assessed as the only viable option, variations on this theme were discussed, included the potential use of hovercrafts, landing craft, ramps and transit barges. These studies were undertaken by Global Maritime (on behalf of SEIC in 2003) to consider the requirements and options.

The studies evaluated the options in terms of their technical feasibility, practicality, robustness, repeatability, environmental impacts, safety and cost-effectiveness. The option, which subsequently emerged from these studies as the preferred solution, comprised the use of an anchor barge (see Figure 14.2), which received the three transport barges, and a marshalling yard located on the shore.



Figure 14.2 Arrival of barge (left) at anchor barge (right)

Site preparation works for the option included:

- The construction of a temporary lay-down area for off-loaded equipment from the transport barges;
- The installation of four shoreside anchors for use during the temporary mooring of the transport and transit barges. The anchors to be placed in four metres deep excavations in the dunes adjacent to the BLF;

- Temporary road and access routes from the transit barge landing site to the lay down area. A Dura-base™ road to be used to minimise beach compaction;
- Removal and storage of vegetated sand for use during reinstatement.



Figure 14.3 Side view of barges at BLF



Figure 14.4 Transfer of gas/liquid receivers over dock barge and ramp using Self-propelled Motorised Transport

In comparison with the original pier concept, the use of transportation and transit barges for the beach landing operation had significantly less environmental impacts, over a far shorter time period. There was no difference in marine traffic between using a pier and transit barges but this option did not require any dredging or piling (see Figure 14.3). Impacts to the marine environment in the way of sediment displacement and scour associated with vessel operations were temporary and ephemeral in nature. Once the vessels have withdrawn, tidal movement of water quickly reinstated

the natural inshore profile. The use of operational controls and emergency preparedness plans also ensured that potential impacts were minimised. Experienced Marine Mammal Observers (MMO) were present on board all transport tugs during the journey from Korsakov to Lunskeye. If whales were sighted, during the voyage, in close proximity then the vessel would be instructed to take avoidance actions and/or slow down or stop. Several seals, but no whale sightings, were recorded during the transit or operations. Table 14.1 shows more detail about the logistics; the survey time periods were organised to capture as much of daylight hours as was possible.

Table 14.1. Details of MMO Surveys at BLF

Ref.	Survey Type	Location or Vessel Name	No. of MMOs on Survey	Dates of Observation in 2004	Time Period of Survey; Duration of above (Average) in hrs per day; Total Hours
i.	OPF (onshore observation)	Lunskeye coast	3	17 July to 17 August	<ul style="list-style-type: none"> • 07.00 – 19.00hrs; • Average 10hrs per day • 317 hrs.
ii.	OPF (Onshore observation)	Lunskeye coast	2	12 to 26 June	<ul style="list-style-type: none"> • 08.00 – 20.00hrs; • Average 12hrs per day; • 180hrs.
iii.	HLO (Onshore observation)	Aniva Bay (Onsh “Prigorodnoye”)	2	6 to 19 September	<ul style="list-style-type: none"> • 08.00 – 18.00hrs; • Average 8hrs; • Total 112hrs.
iv.	OPF	“Guardian”	2	14 July to 5 August	<ul style="list-style-type: none"> • 06.00 – 22/00hrs; • Average 15hrs • 344hrs.
v.	OPF	“Guardian”	2	19 August to 12 September	<ul style="list-style-type: none"> • 06.00 – 21.00hrs; • Average 13hrs; • 326hrs.
vi.	OPF	“Sea Viking”	2	16 July to 23 August	<ul style="list-style-type: none"> • 05.15 – 22.00hrs; • Average 15hrs 20mins; • 599hrs 25mins.

Minor refuelling of heavy equipment took place in a designated area near the lay down area. All other standard refuelling takes place at the main OPF refuelling area. The OPF environmental control plan describes the use of controls to prevent pollution (e.g. secondary containment in vehicles parking areas, drip pans). Spill control barrels are placed at strategic locations around the facility.

14.6 PROJECT EXECUTION

In December 2003, a contract was awarded to a joint venture project team, lead by Crowley Maritime (CM) for the execution of the heavy lift, transport and beach landing operation. The SEIC team worked closely with Crowley during the planning stages of this operation to ensure that the environmental aspects of the operation were addressed, that mitigation control measures were in place prior to the commencement of the works and regulatory requirements were met.

Under the terms of the contract with SEIC, Crowley was required to prepare a series of management and control plans which described in detail how the environmental requirements would be managed during project execution. The following documents were approved prior to works commencing:

- Crowley Project Execution Plan;
- Environmental Control Plan;
- Marine Mammal Avoidance Plan;
- Emergency Response Plan.

14.7 MITIGATION AND MONITORING

Environmental monitoring, as summarised in Table 14.2, was undertaken and reported in an Environmental Monitoring Close Out Report.

Baseline surveys of the beach landing location were incorporated into the SEIC general flora and fauna-monitoring programme. Special consideration was given to the area of land take and potential disturbance to bird activity and nesting sites. Bird populations within the project area will be monitored throughout the operation and to date, no adverse effects relating to the operations were reported (see also EIA-Addendum Chapter 5 on Baseline Steller's Sea-eagle and Chapter 15 of Red Data Book and Migratory Birds).

Marine mammals were monitored as part of the wider SEIC monitoring scheme throughout the beach landing operation. The MMOs were provided by the Sakhalin State University and their roles and responsibilities clearly defined (SEIC Marine Mammal Observers Qualification and Scope of Work, 1000-S-90-04-T-7050-00). This document summarised SEIC's position towards the use of MMOs on vessels during offshore operations, identified the required qualifications of the MMOs and outlined their tasks and responsibilities. The MMO guidance was based on international guidelines, such as those of the International Whaling Commission (IWC) and the Joint Nature Conservation Committee, UK (JNCC), as well as international industry best practices applied elsewhere. No adverse effects on marine mammals were recorded during the works and monitoring period.

Sand was replaced to its original position. In this matrix, which has no organic topsoil layer, it was not possible to hold the vegetation together. Restoration will rely on natural regeneration from the seed bank held in the sand and replanting using cuttings from adjacent grasses.

Table 14.2. Summary of Environmental Monitoring Results

Activity and Type of Impact	Mitigation / Monitoring Activity	Site of Measurement or Observation Point	Parameter/ Indices	Frequency and documentation	Results
Marine operations to and from the BLF site. Potential for disturbance to marine mammals.	Avoidance and minimisation of nuisance strategy (e.g. slowing down/stopping vessel). Team of marine mammal specialists (MMOs) observing throughout operations with authority to influence barge manoeuvres.	From land and vessel observation points.	Number and type of marine mammal recorded. In the event, follow avoidance plan.	As observed. Noted in Marine Mammal Log.	No whales observed, some seals. No disturbance effects noted.
Placement of the transition barge, ramps and flexi floats. This activity has the potential to create scouring and disrupt benthic organisms.	Avoidance; bathymetric survey used to select deepest water for landing site location which would cause least potential harm to benthic organisms.	Subtidal area and beach landing.	Bathymetric survey to be performed by divers and vessels.	Survey performed immediately after departure of ice.	Confirmed location of deeper water for landing site. No observable impact.
Placement of the shore-side anchoring system. Potential for habitat degradation due to anchor excavation.	Work carried out to minimise land take. Ecological surveys taken as baseline from which to monitor biorestitution.	Beach/dune at BLF site.	Topographic, photographic and flora and fauna surveys.	Baseline; once prior to arrival of transit barge estimated at 20 June.	Foredune supports a coarse grass/umbellifer community which is robust and colonises easily.
Potential for long-term habitat degradation due to vegetation destruction and sand compaction. Erosion potential created.	Land take minimised and Dura-Base™ mats laid down to minimise compaction and ground disturbance. Ecological surveys taken as baseline from which to monitor biorestitution.	Beach/dune at BLF site.	Flora and fauna survey.	Baseline. Once, prior to placement of Dura-Base™ mats.	Foredune supports a coarse grass/umbellifer community, which is robust and colonises easily. Approximately 10m inland there is a sharp transition to Pine and Empetrum, which characterises the stable, low-lying backdunes.
Placement of ramps and flexi floats. Potential for water contamination from petroleum, oils and lubricants (POL).	Avoidance and risk minimisation; appropriate clean-up material on site. Observation checks carried out during operations	On line haul and transit barges.	Inspections for residual POL.	As required – for each piece of cargo and equipment using transit barge.	No contamination of sediments or water.
Operation of barges at the BLF site; potentially leading to change and/or	Minimisation of risk; best practice techniques for dealing	Nine sample locations -	Sediment and benthos	Twice – prior to barge arrival and post-	No residual change to composition of sediments

Activity and Type of Impact	Mitigation / Monitoring Activity	Site of Measurement or Observation Point	Parameter/ Indices	Frequency and documentation	Results
contamination of sediments and associated benthos.	with fuel etc on board. Sampling survey carried out as baseline for post-ops monitoring. (See also Contractors' spill response plans).	see detailed report.	sampling and analysis.	departure of transit barge.	or hydrocarbon contamination.
Preparation of the road to the lay down yard. Potential for permanent habitat destruction due to compaction.	Correct construction procedure to reduce risk of long-term impacts. Implement biore restoration strategy. Comprehensive surveys taken as baseline from which to monitor biore restoration.	Dune at BLF site.	Topographic, photographic and flora and fauna surveys.	Baseline. Once, prior to arrival of transit barge estimated at 20 June.	The road to the lay down area runs through the foredune and stable dune vegetation (vegetation as above). Area to be de-compacted prior to re-vegetation.
Sedimentation around BLF Site – degradation of natural habitat.	Works only temporary. Observation of sub- and intertidal topography to establish no lasting impact.	Beach at BLF site.	Inspections of sedimentation around transit barge and flexi floats.	Daily, with documented photographic inspection after extreme weather.	Natural profile of sub-tidal and inter-tidal zones restored due to dynamic conditions of environment.
Equipment leaks of POL causing ground and/or surface water contamination.	Equipment checks and maintenance to minimise risk of risks/accidents. Observation checks carried out during operations and appropriate clean-up material on site.	On transit barge of BLF site.	Mechanical soundness leaks and drips of hazardous materials.	Daily.	No contamination of sediments or water. No residual change to composition of sediments or hydrocarbon contamination.
Ballasting operations. Potential for marine contamination.	Ballast water taken and discharged from same location. Visual inspection of ballast water prior to discharge and foreign material removed.	On transit or line haul barge.	Inspection of ballast water prior to discharge for sheen, discoloration, foreign particulate matter.	Prior to each discharge and logged.	Minimal impact as ballast water taken on, and discharged from same location. Waste – scale, slag, rust etc., was removed prior to discharge. No corrective actions required.
Storage of waste. Potential for contamination and degradation of natural habitat and surface water quality.	Strict waste management procedure ensuring waste containment and ultimate transfer for disposal.	Waste storage areas.	Inspection for leaks, storm water accumulation, housekeeping.	Logged daily on form kept at storage area.	All waste appropriately stored in labelled containers, removed from site to barge for disposal in USA. No Corrective action required.
Storage of POL. Potential for contamination and degradation of	Equipment checks and maintenance. Observation	POL storage areas.	Inspection for leaks, storm water	Logged daily on form kept at storage area.	Corrective action was required in the event of a

Activity and Type of Impact	Mitigation / Monitoring Activity	Site of Measurement or Observation Point	Parameter/ Indices	Frequency and documentation	Results
natural habitat and surface water quality.	checks carried out during operations and appropriate clean-up material on site.		accumulation, housekeeping.		leaking stand-by generator. Drip trays used and contamination removed. No corrective action required for storage method. No residual effect.

SakhNIRO undertook a programme of sediment sampling and analysis before and after beach landing operation in order to document environmental conditions and to ascertain the level of any residual environmental impacts. Pre-installation sediment sampling was undertaken after the bathymetry survey and prior to the first (transit) beach barge arrival in late June 2004.

Post-operational sampling took place after the transit barge had departed the BLF site. The SakhNIRO report concludes that the beach landing operations did not cause any significant changes in the grain composition of sediments or their petroleum hydrocarbon content.

14.8 SITE RESTORATION

Crowley and the lead contractor consulted with the Regional Institute for Land Management (SakhZemProject) with respect to the scope of work necessary for sand dune restoration following the works and to ensure compliance with the approved Soil Remediation and Erosion Protection Plan (SREPP) for the OPF.

Site restoration was carried out after the removal of equipment and construction waste from site. Observations indicate that the shoreline is retreating, therefore care has to be taken to ensure that beach landing activities do not enhance erosion at this particular location.

Restoration work entailed re-profiling the upper beach and dune area to their original contours, filling the anchor excavations, ripping compacted areas and erecting a series of sand trapping fences on the fore dune. Restoration of the sub-tidal areas was considered unnecessary as it is a mobile environment and sediments quickly return to their pre-works equilibrium as a result of natural dynamic processes. MNR approved these procedures.

Revegetation of the disturbed areas was not carried out. This final stage of restoration will be carried out in 2005 after the next planned beach landing operation. This decision was taken as vegetation would not be given time to establish between construction periods. The dune area is not subject to excessive wind erosion so leaving the surface unvegetated was not seen as a risk with respect to promoting localised erosion

The details of a seeding and/or planting regime will be finalised during 2005 as part of the overall site Restoration Plan. This will be undertaken in line with RosNipiZemProject's SREPP and in discussion with the Sakhalin Ministry of Natural Resources. Planting will be appropriate to the habitat and use seeds of local provenance. Planted/seeded areas will be monitored over a contractually agreed time period (typically three years or until the appropriate vegetation has colonised) to ensure satisfactory establishment of vegetation cover and the need for any additional restoration and/or maintenance.

Key Performance Indicators and the parameters used to measure successful reinstatement are being developed.

14.9 CONCLUSION AND RECOMMENDATIONS

The appraisal process applied to the BLF has resulted in the selection of a method that has had significantly less environmental impact than the original one proposed and evaluated in the TEO-C documentation. Any residual impacts have been satisfactorily addressed through careful planning and close attention to detail. The need for high standards of environmental protection was a critical contractual requirement.

The high level of co-operation between Crowley (responsible for the execution of the beach landing operations), BETS (the main contractor) and SEIC contributed significantly to a successful operation. The intention is to repeat this exercise, including the full suite of monitoring activities, in the summer of 2005 and then to carry out permanent reinstatement, including revegetation, to the upper beach and dune. The 2005 activities will take place in the identical location as those in 2004 to minimise the footprint. MNR approval for the 2005 exercise was received in April 2005.

14.10 REFERENCES AND BIBLIOGRAPHY

Crowley (November 2004) *Sakhalin II Phase 2 Development Project: HLO Cargo Marine Transportation and Delivery – Environmental Monitoring Closeout Report*. Report for SEIC.

Far Eastern State University – FESU (2002). *Environmental survey for Sakhalin 2 Project: Flora and Vegetation Survey in Construction Sites along the Pipeline Route*. Report to SEIC.

Sakhalin Energy Investment Company – SEIC. SEIC Marine Mammal Observers Qualification and Scope of Work (Document ref.: 1000-S-90-04-T-7050-00). SEIC Yuzhno-Sakhalinsk.